Education and family formation: Lessons from an expansion of upper secondary schooling

A salient feature of the last half century is women's increased participation in higher education. In some countries today women's educational attainment even surpasses that of men (Goldin 1999). Not only do women stay longer in school but they also take considerably more theoretical courses and elect college majors more like those of men (Goldin, Katz and Kuziemko 2006). Parallel to these trends there has been a widespread decline in fertility and marriage rates accompanied by sharp rises in divorces, leading policy commentators and researchers to speculate that increased education, partly produced by historical reforms of the schooling system, may have played an important role in the demographic transition (cf. Stevenson and Wolfers 2007). The interest in understanding the underlying reasons behind the changing family formation patterns is also motivated by a documented adverse association between teenage childbearing and early marriages and women's long-term socioeconomic outcomes.[1]

Despite these empirical regularities the question of whether the observed relationship between education and family formation really reflects causation largely remains unanswered. An individual's choice of schooling is not random and it is easy to imagine factors which potentially affect both variables and therefore could give rise to a spurious correlation. For instance, individuals with high career aspirations or patience may be more likely to advance to higher education and at the same time less inclined to get children. Because of this problem the estimates typically found in the previous literature are likely to be biased.

The aim of this paper is to investigate the consequences of education for family formation. We study a major educational reform in Sweden occurring in the late 1980s in which vocational tracks in upper secondary school were prolonged from two to three years and the academic content of the curricula was increased substantially.[2] The changes made students graduating from vocational tracks eligible to apply to university. Our identification strategy takes advantage of cross-regional and cross-time variation in the implementation of a pilot scheme preceding the reform where several municipalities evaluated the new policy. The institutional set-up creates a source of plausibly exogenous variation in access to the policy which we use to account for non-random selection into education.

[1] See e.g. Bronars and Groggers (1994), Geronimus and Korenman (1992), Holmlund (2005), Kearney and Levine (2007), and Dahl (2005).
[2] Hall (2009) studies how the reform affected individuals' educational and labor market outcomes.

Our empirical analysis draws on data from administrative registers covering the universe of the Swedish working-age population observed annually from 1985 through 2007. The dataset includes a large set of standard individual characteristics (age, marital status, incomes, place of residence etc.) as well as detailed information of an individual's entire educational history, ranging from compulsory school through university. It also contains an exact link between children and their biological parents.

There are several reasons for why education can affect fertility. The first channel operates through income. It is well known that education is a strong predictor of an individual's labor market incomes (e.g. Card 1999). The tendency of highly educated women marrying highly educated men may also give rise to an indirect increase of household income via positive assortative mating (Lefgren and McIntyre 2006).[3] Since higher income raises the opportunity cost of time-consuming child rearing, individuals may opt towards having fewer kids (cf. Becker 1960). Of course, higher income also entails an income effect which encourages childbearing in cases when kids are perceived as normal goods. Although it is not obvious which effect dominates, Becker hypothesizes that income effects are likely to be small. Moreover, individuals enrolled in education may strictly mechanically have less time available to engage in risky behaviour and therefore be less likely to experience teenage pregnancies (Black, Devereux and Salvanes 2008). Education potentially also provides specific knowledge, for instance via sex education. It may also strengthen the proficiency to process and value information, such as the risks and benefits of different contraceptive technologies (cf. Cutler and Lleras-Muney 2008).

When it comes to marriage, economic theory generally assumes that marriages form when the expected gains of marriage is greater than the value of being single (Becker 1991). It is therefore possible that men and women with higher earnings potential become more appealing in the marriage market. Education may either directly raise the earnings potential by augmenting an individual's stock of human capital or by acting as a signal of high productivity (e.g. Spence 1977; Gemus 2009).[4] In the latter case it is of course possible that, over time, an individual's true earnings potential is revealed to the spouse which may affect marital stability. In addition, standard search models suggest that individuals with a higher utility of being single set a higher reservation level for spousal quality and therefore spend more time searching for a partner (Weiss 1997). Since education may increase the value of

[3] Weiss (1997) summarizes formal models of assortative mating. Empirical analyses include e.g. Behrman and Rosenzweig (2002).
[4] Goldin (1992) argues that the main purpose of continuing to higher education for women in the mid-twentieth century was to attract a highly educated husband.

being single it is conceivable that individuals with more education postpone marriage. Alternatively, if education makes people more efficient at searching for a potential partner we might expect to see education positively correlated to marriage rates as well as generating more stable marriages. Education may also create more stable marriages by reducing the risk of shot-gun marriages.

To date, several studies have documented a strong negative association between acquired levels of schooling and family formation (e.g. Becker 1991; Easterlin 1987; Rosenzweig and Schultz 1985; Isen and Stevenson 2008). Only a few papers however have explicitly tried to account for non-random selection into education. Black, Devereux and Salvanes (2008) and Monstad, Propper and Salvanes (2008) investigate the consequences of changes in compulsory schooling laws in the US and Norway. The results show that women who obtained more education as a consequence of the law changes had fewer teenage births. The results are remarkably similar across both countries. León (2004) also takes advantage of US compulsory schooling reforms and finds a significant negative effect of educational attainment on total fertility. McCrary and Royer (2008) exploit US school entry policies and find no significant effect of maternal education on fertility. Lefgren and McIntyre (2006) instrument for educational attainment with quarter-at-birth. They find no significant effect of years of schooling on the probability of marriage for US women.[5]

Our paper contributes to the literature in several ways. First, the still very few quasi-experimental studies on the topic have exclusively focused on reforms targeting primary school, most of which took place during the 1950s through 1970s. Since the reform of interest in this paper both occurred recently and also affected a higher part of the educational distribution we believe that our paper adds value to the contemporary debate over education policy and family formation.[6] Second, although our estimates are of reduced form the data used allows us to shed some light on the separate importance of some of the abovementioned mechanisms. Third, our paper appears to be the first to study both women's and men's family formation behavior. This is important, not at least since education could affect the division of the gains from marriage by changing spousal roles (Chiappori, Iyigun and Weiss 2008). Last, since we have access to measures of individual ability and parental socioeconomic

[5] Breierova and Duflo (2002) examine the consequences of a school construction program in Indonesia in the 1970s. The results show that female education is a stronger determinant of age at marriage and early childbearing than male education. This is the only study on a developing country which tries to account for endogenous schooling decisions.

[6] Many of the key institutional features have since the 1950s undergone dramatically changes; e.g. women's increased participation in the labor market, innovations in contraceptive and household technologies, family policy etc.

background we are able to directly investigate differential effects with respect to the opportunity costs of childrearing.

In the analysis we relate measures of fertility and marriages to an individual's education and instrument for the choice of upper secondary schooling track using the share of the available vocational tracks which constituted the new 3-year tracks. The results show that women who enrolled in the new program are significantly less likely to give birth early in life. We find that this effect is driven by women with highly educated parents and women with high ability. Women to highly educated parents also have fewer children and are more likely to be childless at age 32 if enrolled in the longer track. We interpret these findings as being consistent with the idea that individuals with higher earnings potential faces higher opportunity costs of childbearing and therefore get fewer kids. There is however no significant effect on men's fertility. The differential gender effects may be a result of increased bargaining power for women within the family. Turning to marital outcomes we find that the reform made more able women to delay their marriages; although there is no effect on men's timing of marriages. We find no evidence that the reform affected neither females nor males incidence of marriage or divorce at age 31.