



Estimating the Causal Effect of Fertility on Women's Employment in Africa Using Twins

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Summary. — Women's employment is considered essential for gender equality and female empowerment, as well as for the living standard, dependency burden, and saving patterns of households in poor countries. To develop effective policies, it is important to know whether mothers with young children who are not gainfully employed prefer to be at home and care for their children, or are involuntarily out of the labor force, because they could not prevent getting those children. In this study having twins is used as the external shock due to which some women have obtained more children than they wanted. These women are compared with those who are similar in many respects (married and have at least one child) but did not experience this shock.

We use a newly constructed database that contains information on almost 250,000 women living in Sub-Saharan Africa of whom 4,863 women, or about 2%, reported a twin birth of which both children survived. To our knowledge, the present study has the highest number of twins of any Instrumental Variables study that uses twins for estimating causal effects, so that the estimates are very precise.

We find that the number of children below age six has a significantly negative effect on the woman's ability to work in the non-farm sector; it reduces the odds of employment of African mothers by 6%. The effects of the number of young children on women's non-farm work are more problematic for older women and for women with more years of education. These findings imply that investments in family planning are likely to enhance the opportunities for women to work for pay and that policies aimed at facilitating the combination of child rearing and paid labor are particularly important for educated and older women.

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1. INTRODUCTION

Promotion of family planning and ensuring access to preferred contraceptive methods is essential to increase the well-being and autonomy of women and to support the health and development of communities. Family planning benefits are related to health issues such as the prevention of pregnancy-related health risks for women, the reduction of infant mortality, and the prevention of HIV/AIDS. Additional advantages are that family planning might enhance women's empowerment, children's education, and reduce adolescent pregnancies and population growth (Cleland *et al.*, 2006; Longwe & Smits, 2012; Singh & Darroch, 2012).

A major channel through which family planning might contribute to women's empowerment is by providing opportunities for women to participate in paid employment (Besamusca, Tjens, Keune, & Steinmetz, 2015; Canning & Schultz, 2012; Engelhardt & Prskawetz, 2004). Women's labor force participation is considered to be of critical importance for gender equality, as well as for the living standard, dependency burden, and saving patterns of households (Anderson & Eswaran, 2009; Buvinic, Das Gupta, & Casabonne, 2009; Fallon & Lucas, 2002; Kritz & Makinwa-Adebusoye, 1999; Yount & Li, 2009). Ever since the pioneering work of Mincer (1962), women's labor force participation has been studied extensively in both developed and developing countries (Besamusca *et al.*, 2015; Bloom, Canning, Fink, & Finlay, 2009; Mammen & Paxson, 2000; Steiber & Haas, 2012). According to these studies, women in developing countries are mostly involved in non-market activities, at home, in the family business, or in other informal sector work, although a pronounced increase in the contribution of women to modern sector employment activities has also been noticed (Besamusca *et al.*, 2015; Gundüz-Hosgör & Smits, 2008).

The latter is partly due to the advances made in females' educational attainment and the expansion of the market economy (Tandrayen-Ragoobur, Ummersingh, & Bundhoo, 2011).

The presence of young children in the household is seen as one of the most important factors explaining variation in women's labor market participation (Besamusca *et al.*, 2015; Browning, 1992; Contreras & Plaza, 2010; Spierings, Smits, & Verloo, 2010). In most cultures, women are considered the prime suppliers of household care needs, which increase with the presence of children (Maume, 2006; Moghadam, 2004). Empirical studies in developed countries generally find a negative relationship between fertility and women's labor force participation (Ahn & Mira, 2002; Angrist & Evans, 1998; Boushey, 2008; Michaud & Tatsiramos, 2011; Mishra, Nielsen, & Smyth, 2010; Smits, Ultee, & Lammers, 1996). In developing countries, there is less consistent evidence of a negative effect of the number of children on women's labor force participation (Agüero & Marks, 2008; Benefo & Pillai, 2003; Cruces & Galiani, 2007; Orbeta, 2005). Although many studies find a negative relationship, Agüero and Marks (2008) report an insignificant effect and Nanfosso and Zamo-Akono (2010) even a positive effect of fertility on women's employment.

An important question in the literature is whether unemployed mothers with young children at home would have entered the labor market if they had less or no children (e.g., Agüero & Marks, 2008; Besamusca *et al.*, 2015; Rosenzweig & Wolpin, 1980a; Steiber & Haas, 2012). Any existing associ-

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ation could as well be the result of a reverse causal effect, with women with a job having a lower propensity to have children. Alternatively, a selection effect could be present; women who want to have more children, or have planned to have their children within a short period, might differ from women with less children in that they have a lower preference for paid work at the moment the survey is conducted.

The ideal way to determine the causal effect of fertility on female employment would be to organize an experiment in which women are randomly assigned to conditions with different numbers of (young) children. Differences in employment levels between the groups, with women with more children having lower employment levels, would then provide sound evidence for the existence of a negative causal effect of the number of young children on women's employment. Such an experiment is obviously impossible, but there exists a useful alternative; the natural experiment. If as a result of a random shock some women would get more children than they expected to have, a comparison of these women with those who did not experience this shock would be similar to the comparison suggested in the experiment described earlier.

In this paper, the causal effect of fertility on women's employment is studied using such a natural experiment. We follow the pioneering work of [Rosenzweig and Wolpin \(1980a, 1980b\)](#) and [Angrist and Evans \(1998\)](#) in using twins as instrument. In the literature on fertility and female labor force participation (FLFP) other instruments have also been used, in particular same sex siblings ([Angrist & Evans, 1998](#)). The assumption is then that parents want to have at least one child of the other sex and thus the probability of a third child increases if the first two are of the same sex. This phenomenon is probably more relevant in developed countries than in developing countries, where fertility is still relatively high.

Studies correcting for the possibility of endogeneity between the number of children and FLFP often report a negative effect of young children on FLFP. A negative relation between the number of young children and FLFP is found for the United States ([Rosenzweig & Wolpin, 1980b; Vere, 2007](#)), the United Kingdom ([Sprague, 1988](#)), Norway ([Black, Devereux, & Salvanes, 2005](#)), and various other West-European countries ([Del Boca, Pasqua, & Pronzato, 2009; Michaud & Tatsiramos, 2011](#)). It is also found for some countries from other continents, such as Argentina and Mexico ([Cruces & Galiani, 2007](#)), and the Philippines ([Orbeta, 2005](#)). However, for other non-Western countries the negative relationship is not confirmed. For Peru, Guatemala, Colombia, Bolivia, Nicaragua, and the Dominican Republic the negative relation found under Ordinary Least Squares (OLS) becomes insignificant when self-reported infertility is used as the instrumental variable ([Aguero & Marks, 2008](#)). For urban Cameroon even a positive effect is reported ([Nanfosso & Zamo-Akono, 2010](#)). These results raise the question whether the negative relationship between fertility and FLFP is also found in Sub-Saharan Africa, when twins are used as instrument.

Sub-Saharan Africa is a very interesting region in this respect, because it has much within region variation in women's fertility and their labor force participation. Women's fertility shows a declining trend but the differences between the countries are large. In the latest wave of the Demographic and Health Survey (DHS) the lowest number of children per woman is 3.3 (Lesotho), whereas the highest are with 6.3 (Chad) and 6.1 (Mali) almost twice as large. Moreover, it is well known that the factors determining women's fertility can differ a lot, even between two adjacent countries ([Benefo & Schultz, 1996](#)). Female labor force participation in Sub-Saharan countries

increased from an average of 58% in the years around 2000 to almost 70% in the period 2009–13.¹ Despite this general upward trend, the differences within the continent remain large. Around 2010, the FLFP ranged from less than 40% in Senegal to more than 80% in Tanzania and Mozambique.

The central aim of our paper is to investigate whether, despite great diversity in Africa, a causal relation between fertility rates and female labor force participation can be observed, as was found for other parts of the world (see the references above). To make this possible we will control for the diversity between Sub-Saharan regions in the strongest possible way by using fixed effects at the level of 217 sub-national areas.

We address the reverse causality problem by means of an Instrumental Variable estimation in which twins are used as an instrument. In many studies the number of twins is low, both in relative and absolute sense. [Rosenzweig and Wolpin \(1980a\)](#), for example, have 44 twins out of 2939 households, which is 1.5%, and [Schultz \(2008, p. 3272\)](#) reports that in many studies twins form less than 1% of the number of pregnancies. We are in the fortunate position that in our dataset both the number (4,863) and percentage (about 2%) of twins are high, which enhances the precision of the Instrumental Variable (IV) estimate. In Sub-Saharan Africa the natural twinning rate is higher than in any other part of the world ([Smits & Monden, 2011](#)) and twin births resulting from artificial reproductive techniques are rare. We use a newly constructed database including information on more than 220,000 women living in 217 sub-national areas (provinces, departments, districts) of 24 Sub-Saharan African countries. To our knowledge, the present study has the highest number of twins of any study that uses twins for estimating causal effects.

Besides by using twin births as an instrument, several other characteristics of the present study will be helpful in determining a causal relationship. First, we control for major confounders at the household level and include fixed effects dummies at the level of the sub-national areas. Second, as women with twins have been pregnant at least once, for reason of comparability and in order to increase the likelihood of a causal effect, we restrict our analysis to women who are similar in this respect (i.e., who have at least one living child). Third, given that women may differ with respect to their demand for family planning depending on their marital status, we include only women who are married or living together with a partner. Fourth, children are not always a burden for their parents. Older children can help their parents by doing household chores or working in the family business ([Webbink, Smits, & de Jong, 2012](#)). We therefore focus our analysis on children under age six.

The rest of the paper is outlined as follows. In the next section, we present the theoretical framework to be used in our analysis and motivate the included factors. After that, we discuss the data and methods used. The result section starts with the first stage regression, followed by the second stage model and the interaction analysis. Finally, we draw conclusions and discuss policy implications.

2. THEORETICAL FRAMEWORK

[Figure 1](#) shows the different groups of factors that are included in our analytical model and their expected direction of influence. The explanatory factors belong to one of three groups: family planning factors, household and context factors and interactions with the context.

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