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ABSTRACT

The Effect of Fertility on Female Labor Supply in a Labor Market with Extensive Informality

This paper presents new evidence on the causal relationship between fertility and female labor supply. We particularly focus on how informal employment affects post-fertility labor supply behavior of mothers. We employ an instrumental variable strategy based on an unused data source for twin births in Turkey—a large developing economy with extensive labor informality. We find that fertility causally affects female labor supply. After the first twin birth, female labor supply declines significantly and the ones who drop out of the labor force are mostly the informally employed women. Following further increases in family size introduced by multiple second and third births (i.e., unanticipated increase from 1 kid to 3 kids, and from 2 kids to 4 kids), formally employed females start dropping out of the labor force and hours of work decline. Wages and job search intensity also decline for females as fertility increases. We also investigate the impact of fertility on labor supply of fathers. Unlike females, males increase their labor supply, which mostly comes from the increase in informal employment—possibly due to a decline in reservation wages. Accordingly, wages decline, hours of work increase, and job search activity shifts from formal to informal search methods for males. Overall, these results suggest that informally employed women tend to quickly drop out of the labor force after giving birth. Fathers, on the other hand, become more likely to accept inferior, low-pay, and informal job offers as fertility goes up. The results are robust to using alternative IV specifications based on sex composition of children.

JEL Classification: J21, J22, J13, J31

Keywords: fertility, labor supply, twin births, informal employment, job search, instrumental variables

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1 Introduction

The effect of fertility on female labor supply is among the oldest and most interesting issues in labor economics. Micro and macro models linking fertility and labor supply decisions of women generally predict a negative association between the number of children and female labor force participation (Gronau, 1973; Rosenzweig and Wolpin, 1980b; Schultz, 1980). By affecting women's choice between labor market time and family time and by increasing women's reservation wages, increased fertility decreases female labor force participation both at extensive and intensive margins in a theoretical setting. Consistent with these theoretical predictions, time-series and cross-country evidence also suggest a clear negative correlation between the number of children and female labor supply.

However, it is empirically challenging to examine the causal relationship between labor supply behavior and fertility as they are endogenously determined. Women's age, education, wage, and partner's wage might affect both desired fertility and employment decisions simultaneously (Schultz, 1981; Goldin, 1980). Low-educated women might be both more likely to not work and less likely to practice family planning. Moreover, women with lower wages might prefer to have more children since their opportunity cost is lower. Selection of women with weaker labor market attachment into larger families leads OLS to overestimate the effect of fertility on labor supply behavior (Killingsworth and Heckman, 1986; Blundell and MaCurdy, 1999). Alternatively, parents with higher wages might prefer to have more children, since they have more resources to devote to each child, which would lead OLS to underestimate the true causal effect. Thus, it is not always possible to predict the direction of the bias beforehand. In addition to these issues, unobservable characteristics related to tastes for working and children may lead to omitted variable bias and, therefore, generate imprecise OLS estimates.

Economists have used various tools to address this endogeneity problem such as the simultaneous equation models, control function methods, panel data methods, and instrumental variable (IV) methods based on twin births and sex composition of children. Improvements in micro data availability and increased interest in quasi-experimental methods have made the latter—and its

versions/variations—the standard approach to estimate the causal impact of fertility on female labor supply. The twin-birth instruments generate "fertility shocks" that resemble exogenous variation in family size so that the classical endogeneity problem associated with fertility decision is addressed. Several papers in the literature use twin births in appropriately formulated IV designs to estimate the causal impact of fertility on various outcomes including, but not limited to, labor force participation, earnings, education, and child mortality—see, e.g., Rosenzweig and Wolpin (1980a,b), Bronars and Grogger (1994), Behrman et al. (1996), Angrist and Evans (1998), Duflo (1998), Jacobsen et al. (1999), Isacsson (2004), Black et al. (2005), Caceres-Delpiano (2006, 2012), Angrist et al. (2010), Vere (2011), and Silles (2016).[1] Most studies in the twin-birth IV literature find that there is indeed a negative causal relationship between fertility and female labor supply, although the magnitudes of the estimates vary across studies and contexts.[2]

In this paper, we estimate the causal effect of fertility on female labor supply in Turkey. We employ an IV strategy based on an unused data source for twin births. The main advantage of this data is that it allows us to identify twin births within the Turkish Household Labor Force Survey—which is the main data set used to calculate the official labor market statistics in Turkey—micro-level data sets; so, our econometric analysis yields nationally representative results. Turkey has the lowest female labor force participation rate (around 35 percent) among the OECD countries, followed by Mexico and Greece. It also has a large informal labor market. More than 30 percent of all employed individuals are employed informally. So, understanding the impact of fertility decisions on labor supply decisions of women in Turkey may be of particular interest for family-planning and labor market policy. We go one step further and investigate the impact of fertility on the labor supply decision of men, and job search behavior and wages of both men and women using the same empirical approach.

[1] For other country- or region-specific studies, see Moschion (2013) for Australia, Cruces and Galiani (2007) for Latin America, de Jong et al. (2017) for Sub-Saharan Africa, and Majbouri (2019) for Iran.

[2] As an alternative source of exogenous variation, Angrist and Evans (1998) use sibling sex composition as an instrument based on the phenomenon that parents of same-sex siblings are more likely to have an additional child (Williamson, 1976). Additionally, they instrument fertility with twins in the second birth for comparison and with both instruments they find that children lead to reduction in female labor supply on average, and the effect is negligible for college educated women and for women whose husbands have high wages. Additionally, Angrist and Evans (2000), Bailey (2006) and Bloom et al. (2009) use changes in abortion and contraceptive pill legislations as instruments for fertility and show that fertility have negative and significant effects on female labor force participation. More recently, papers including Cristia (2008), Aguero and Marks (2011), and Lundborg et al. (2017) use infertility shocks to instrument out endogenous fertility.

We find that increased fertility reduces women's labor force participation, hours of work, earnings, and job search intensity. Almost all of the jobs that females lost after the first twin birth are informal jobs. Informal jobs do not offer social security, they entail poor amenities, and they usually require long/irregular working hours, which makes going back to informal jobs unattractive and infeasible after having kids. Moreover, these jobs are harder to sustain with motherhood. Further increases in the family size introduced by second and third twin births—i.e., unanticipated increase from 1 kid to 3 kids, and from 2 kids to 4 kids—start pushing formally employed women out of the labor force. We also investigate the impact of fertility on males' labor supply behavior. Unlike females, males increase their labor supply, but this mostly comes from the increase in informal employment. Males' reservation wages (since they become less likely to tolerate long unemployment spells) and actual wages decline, and they start using informal job search channels more intensively, which jointly suggest that they become more likely to accept inferior, low-pay, and informal job offers.

This paper makes three main contributions to the female labor supply literature. *First*, it is among the first papers documenting causal evidence on the relationship between fertility and female labor supply by paying particular attention to transitions into and out of informal employment. Informality is a key feature of labor markets in developing countries. In this sense, the closest to our work is Caceres-Delpiano (2012). Using the multiple-births instrument, he documents three types of heterogeneity in the impact of fertility on female labor supply. First, the size of the impact depends on the birth order. Second, informal jobs are more affected from fertility shocks than formal jobs. And, third, the incidence of twin births is higher for higher-educated women residing in urban areas. Similar to Caceres-Delpiano (2012), we also document that informally employed women drop out of the labor force at lower birth parities, while formally employed women start dropping out as fertility increases further. Different from Caceres-Delpiano (2012), we argue that males' involvement in informal labor market goes up as fertility increases, which suggests that fertility increases family-level exposure to labor market risks associated with informal employment.[3] Although the existence of informal labor market opportunities may serve as a stepping-stone to

[3]See also Kunze (2019) for a detailed analysis of the impact of fertility on males' outcomes.

formal jobs (Tumen, 2016b) or absorb refugee shocks (Tumen, 2016a; Ceritoglu et al., 2017) in some settings, our results suggest that it may also feed inequalities and/or poverty traps in the long-term.[4]

Second, this is the first paper providing causal evidence on the link between fertility and parental job search intensity/methods. The novelty here is the informality angle. Similar to our findings, Kunze and Troske (2012, 2015) also show that search intensity of women declines after childbearing and gender differences in job search intensity over the life cycle may be due to fertility. Our paper is different in the sense that our estimates are attributed causal meanings, while Kunze and Troske (2012, 2015) provide evidence based on survival analysis of displaced workers. Another original aspect of our paper is that we distinguish between formal and informal job search methods. Informal job search refers to search effort through social contacts, relatives, friends, and acquaintances, which are known to generate inferior job offers (Holzer, 1988; Pellizzari, 2010). We show that the overall search intensity declines for women as fertility goes up, while men switch from formal to informal search methods consistent with the finding that they become more willing to accept informal job offers.

Finally, this is the first systematic attempt to estimate the causal effect of fertility on female labor supply using twin-birth IV and representative data for the entire labor market in Turkey. Sevinc (2011) also uses a twin-birth IV framework to estimate the causal impact of fertility on female labor supply. However, he uses a demographic survey, which is a rich data source for demographic variables, but not representative for labor market outcomes. In contrast, we work with a larger-scale nationally representative labor force survey. Although the effect of family size on mother's labor supply behavior has been extensively studied, there is less work on husband's labor supply and it appears there is not as much consensus in this line of literature. Although Angrist and Evans (1998) find that the labor market behavior of men is insensitive to family size, Vere (2011) finds that husbands have become more likely to respond to additional children by specializing in market work and increasing their earnings from market work.[5] Our findings for Turkey are along

[4] See Gunther and Launov (2012) for review of the literature on informal labor markets.

[5] See also Pencavel (1986) for a survey of few estimates, which suggests a positive association between father's labor supply and number of children.

these lines.

The plan of the paper is as follows. Section 2 describes our data and variables. Section 3 explains the details of our econometric strategy and identification. Section 4 discusses the results and policy implications. Section 5 concludes.

2 Data and Descriptive Statistics

We use the nationally representative Household Labor Force Survey (HLFS) that have been implemented annually since 1988 by the Turkish Statistical Institute (TurkStat). HLFS contains demographic information of all members in the households, and also includes labor market status, occupation, wages, hours of work, and job search information for individuals that are 15 years old and above. We limit our attention to the 2005-2013 period, because in 2005 and 2014 TurkStat made crucial revisions on HLFS sampling and variable definitions, which restricted the comparability with earlier and later waves. Moreover, individuals below 15 have been excluded from the HLFS sample starting from the 2014 wave, which means that the fertility outcomes cannot be detected after 2014. It is possible to exactly identify twins from the birth dates (month and year of birth) of children in the household.[6] HLFS does not have retrospective fertility information. Therefore, we use contemporaneous family composition and match children still living in the households to their mothers using relationship identifiers. Our main sample consist of married individuals of age 18-49 with at least one child.[7]

Table (1) provides detailed information on births in our sample. Over 9 survey years, 17,187 births—approximately 1 percent of all births—were multiple children births. In total, we have 1,737,908 singletons and 34,570 multiple births, of which 33,990 are twins, 564 are triplets, and 16 are quadruplets.[8] Of these 33,990 twins, 20,448 are same gender twins, and 13,542 are different gender twins. Furthermore, in the sample, 14,954 children are twins at first birth (Multiple 1st), 8,926 children are twins at second birth (Multiple 2nd), and 5,162 children are twins at third birth

[6] Data on the month of birth and year of birth of children in our sample are obtained from TurkStat as a separate module.

[7] We further address this issue in one of our specifications by following Angrist and Evans (1998) and focusing on mothers with at most 32 years old—so that the observed number of children closely follows the total number of children.

[8] We drop households with triplets and quadruplets from the analysis.

(Multiple 3rd).

The empirical literature employs twin occurrences at different parities, and it appears that marginal effects might differ by birth rank. Rosenzweig and Wolpin (1980b) argue that twins-first strategy (having twins in the first birth) is more appropriate, because women with more births who have on average greater desired fertility would be overrepresented in the sample if later twins are also treated as exogenous shocks to fertility. However, Wagner (2013) argues that twins-first strategy estimates are biased because this strategy does not take into account the subsequent fertility behaviors, and shows that the effect of children on mother's labor market outcomes is larger and more persistent at higher birth parities. Having twins in the first birth is equal to adding an additional child to the household, therefore, twins-first might be considered as a timing-failure and, in the long run, families might adjust their subsequent fertility to compensate for this unexpected increase in family size. That said, at higher birth parities the heterogeneity in the subsequent fertility behavior of mothers might be less pronounced. In order to identify the effect of children on labor supply at different margins, in our estimation, we use twins in the first (Multiple 1st), second (Multiple 2nd), and third births (Multiple 3rd) as separate instruments and report the effects by birth parity.

In order to obtain similar treatment and control groups, we only include women having at least one child at the time of the survey, which is consistent with the convention in the literature. Since labor market behavior of women who postpone having children or do not want children at all is potentially different than that of women with children, the zero-children restriction enables us to detect the effect of an exogenous increase in family size on parents' labor market outcomes. In our instrumental strategy, we instrument number of children with twins at the first birth (Multiple 1st) for families that have at least one child, with twins at the second birth (Multiple 2nd) for families that have at least two child, and with twins at the third birth (Multiple 3rd) for families that have at least three children. We also use the sex composition of children as an alternative IV for robustness purposes.

Our employment outcomes consist of employment, unemployment, and not in labor force (NILF) categories. We construct those variables as ratios to the relevant population—married individuals

of age 18-49 with at least one child.[9] We also separately analyze informal versus formal employment defined similarly as ratios to the relevant population. Informal workers are identified in the sample using the question "Are you registered with the Social Security Institution?" in the HLFS. As the earnings outcome, we use the sum of monthly wage and monthly bonuses/performance pay variables.[10] Hours of work is available in the survey as weekly hours, which we directly use in our analysis in log form.

We also construct job search variables using the related questions in the HLFS. The survey includes questions aiming to extract information about the methods used in searching for a job by the respondents. Similar questions are asked for both employed and unemployed individuals; for the unemployed, the questions capture the methods being used at the time of the survey and, for the employed, the survey asks which search methods are used before finding the existing job. There are 11 questions separately asking whether the respondent used the 11 distinct methods—i.e., sending CVs, searching through informal/social contacts, submitting application forms, etc.—in searching for a job. Specifically, we construct two job search variables to be used in our empirical analysis. The first one is a dummy variable indicating whether the individual used informal search methods in searching for a job or not. Informal search refers to job search through one's contacts, friends, relatives, neighbors, or other acquaintances. There is a consensus in the literature that jobs found through informal connections are, in general, associated with lower pay and worse job amenities (Loury, 2006). The second variable is an overall search intensity measure proxied by the total number of methods used—ranging from 0 to 11—in job search.

Table (2) reports descriptive statistics for our main sample—married women and men of age 18-49 with at least one child. The summary statistics suggest that labor force participation is quite low among women (26 percent) and high among men (94 percent). Informal employment is much more

[9] Constructing labor market status variables as ratios to the relevant population has an important advantage over the alternative methods. When other definitions are used—such as the standard unemployment rate or employment rate, which are calculated as the ratios of the number of unemployed and employed, respectively, to the labor force—both numerator and denominator becomes responsive to shocks, which makes the interpretation of the estimates very difficult. For example, unemployment rate may increase either because the number of unemployed is higher or the labor force participation is lower (or a combination of both), which are totally different causes. When the ratios to the relevant population are used, only the numerator is responsive to the shocks. Moreover, unemployment-to-population, employment-to-population, and NILF-to-population ratios sum up to one and, therefore, the estimated coefficients would nicely speak to each other.

[10] There are approximately 25,000 observations who report zero or missing wages. We keep them in our sample when we run employment regressions, which is the core of our analysis. However, for the earnings regressions, we restrict our attention to salaried workers and drop the observations with zero and missing wages.

prevalent among women (63 percent of employed women) than among men (29 percent of employed men).[11] Job search intensity is higher for men (2.18 methods) than for women (1.98 methods), on average. The probability of using informal job search methods is 5 percentage points higher for men relative to women. Men work around 12 hours more than women per week. Monthly wages (including bonus and performance payments) are also slightly higher for men than women. The reason why the number of women is larger than the number of men is that women marry much earlier than men; so, younger married women are overrepresented in our sample. The average number of children per mother is approximately 2.2 and average time duration since the last birth is slightly above 8 years. The sample sizes for women and men are 572,553 and 509,173, respectively.

Our identification strategy relies on treating twin births as a natural experiment. While monozygotic twins are relatively exogenous, the probability of by-zygotic twins may increase with mother's age. Secondly, with the advance of fertility treatments, twinning rates have increased (Fauser et al., 2005) and if women who choose to get fertility treatments are more educated, then there might be concerns about the twin instrument not satisfying the exclusion restriction. We attempt to eliminate these issues by simply controlling for the observables in the estimations. Indeed, as it is shown by Figure (1), in our sample after controlling for mother's observable characteristics (her age and education) the predicted twining rates are fairly stable across years, and therefore, twin births can be interpreted to be conditionally exogenous to fertility. As an alternative specification, we follow the literature and also use the sibling sex composition as an instrument in the empirical analysis.

As suggested by the canonical analysis by Imbens and Angrist (1994), instrumental variable estimations generally capture the average effect on the group of individuals that are treated by the instrument (LATE); therefore, IV estimates may be subject to criticism related to external validity. However, for the twin-based instruments, this is less of a concern; as compliance is perfect when a multiple birth occurs, twin-based instruments identify the effect of treatment on the untreated

[11] Paternalistic social norms negatively affect female labor force participation in Turkey, especially for low-skilled women. Those women typically engage in housework and child care and, when they work, they are forced to look for jobs in the neighborhood. It is hard to make sectoral or occupational generalizations, but most of the informal work available in the neighborhood can be categorized as service-sector jobs with low skill requirements—such as various versions of sales, cleaning, housekeeping, and food preparation tasks.

(Brinch et al., 2017).

3 Empirical strategy

This paper aims to estimate the causal effect of fertility on parental labor supply choices in a developing country with a large informal labor market. The standard OLS framework is plagued with the classical endogeneity problem in the sense that unobserved factors—that affect both fertility and labor supply decisions—may contaminate the least squares estimates. The baseline OLS model can be formulated as follows:

$$y_{it} = \alpha + \beta n_{it} + \boldsymbol{\theta}' \boldsymbol{X}_{it} + \epsilon_{it}, \tag{1}$$

where i and t index individuals and time, respectively, y is the relevant labor market outcome, n is the number of children, $\boldsymbol{X}$ is a vector of covariates, and ϵ is an error term.[12] The main identification problem is that $\mathbb{E}[\epsilon|n, \boldsymbol{X}] \neq 0$, which suggests that OLS would yield biased estimates. For example, families who are more likely to have more children are possibly the ones with less labor market attachment—conditional on $\boldsymbol{X}$.

We use twin births in an IV framework to overcome this selection problem. The baseline IV model can be formulated as follows:

$$y_{it} = \alpha + \beta n_{it} + \boldsymbol{\theta}' \boldsymbol{X}_{it} + \epsilon_{it}, \tag{2}$$

$$n_{it} = \gamma + \lambda z_{it} + \boldsymbol{\eta}' \boldsymbol{X}_{it} + \nu_{it}, \tag{3}$$

where z is the instrumental variable and the other variables are defined as usual. Equation (3) is the first stage of the IV setup, while Equation (2) is the second stage. For this to be a valid IV design, (i) there has to be strong first-stage relationship between z and n and (ii) z should be uncorrelated with ϵ—to put it differently, z should affect y only through its impact on n and not directly. Incidence of a twin birth is regarded as a fertility shock, which brings an additional child (or children) independent from parents' preferences or other attributes. The observed variables

[12] Note that, in Equation (1), y represents labor market outcomes in a general way. The types of the outcome variables may change (i.e., log, continuous, discrete, etc.) across different regressions.

($\boldsymbol{X}$) used in our analysis include a full set of age dummies (between age 18-49), survey-year dummies (2005-2013), dummy variables indicating the number of years passed after the last birth of the mother, mother's education, partner's education and employment, region dummies (NUTS2 level), and an urban-rural dummy. Following the convention in the literature, we focus on married women with at least one child. The instrument z is typically defined as a dummy variable taking 1 for mothers who gave at least k births and the k^{th} birth is a twin birth and 0 for mothers who gave at least k births and the k^{th} birth is a singleton. This IV setting allows us to make an econometric comparison across families with similar preferences over family size. We use multiple first, multiple second, and multiple third IV specifications in our empirical analysis. A more general instrument combining those three specifications to capture the incidence of multiple birth at any size is also used.[13]

Although it sounds plausible to assume that a twin birth can be regarded as a fertility shock, there are several criticisms raised against this approach in the empirical literature. The most important objection, which is supported by evidence presented in health and medical sciences literatures, is that assisted pregnancies are more likely to yield twin births. With the advance of fertility treatment technologies, twinning rates have increased (Fauser et al., 2005) and if women who choose to get fertility treatments have better-than-average education and socio-economic background, there might be concerns about the exogeneity—i.e., the validity of the exclusion restriction—of the twin instrument.

We address these concerns in four steps. First, we attempt to eliminate this problem by simply controlling for the relevant observables in the estimations. Indeed, as it is shown in Figure (1), after controlling for mother's observable characteristics—most importantly, age, age at birth, and education—the twining rates are fairly stable across years, and therefore, the incidence of twin birth is likely conditionally exogenous to fertility in our sample. Second, we restrict our analysis to a narrower age group for which the incidence of fertility treatment is presumably low. Third, it is argued in the literature that mono-zygotic twins are relatively more exogenous than by-zygotic

[13] Note that Angrist et al. (2010) use this combined instrument to improve the precision and efficiency of their IV estimates after finding null effects in each of their samples.

twins. Some data sets—such as the German Socio-Economic Panel—explicitly include mono-zygotic twin identifiers to be directly used in IV analyses so that the researchers can focus solely on exogenous twin births. Unfortunately, our data set does not contain information on whether the twin is mono- or by-zygotic. However, we can observe the sex composition of twins. Mono-zygotic twins are always of the same gender. We drop mix-gender twins and construct an alternative instrument focusing only on same-sex twins. We should note however that this is not a perfect substitute for the mono-zygotic twin instrument. Finally, we use the sex-composition IV of Angrist and Evans (1998), which is based on the idea that if the first two kids are of different genders, then the probability of having the third kid declines significantly. This IV is not based on twins and would serve as a good robustness test to see if the results obtained from twin-birth instruments survive under a different specification. See Farbmacher et al. (2018) for a comprehensive discussion of the potential sources of bias related to the twins instrument.

We use three sets of outcome variables in our analysis. First, we focus on employment outcomes, which include employment-to-population, unemployment-to-population, and not-in-labor-force-to-population ratios. These are three mutually exclusive categories and they span the entire population in a given age interval. As a result, the estimated coefficients of those three outcome variables should sum up to zero. This setting helps us to understand, for example, whether the decline in unemployment is due to an increase in employment or an increased tendency to drop out of the labor force. We further divide the employment-to-population ratio into two: formal-employment-to-population ratio and informal-employment-to-population ratio, which allows us to detect whether a change in employment comes from formal or informal employment components. This is a key aspect in our analysis. We also have weekly hours of work to see the adjustments in the intensive margin of labor supply as a response to changes in fertility. Second, we use wage outcomes—in natural logarithms. Finally, we look at the changes in job search methods in response to changes in fertility. Informal job search is known to yield more inferior outcomes than formal job search. So, it is important to know whether fertility affects the probability of using informal methods in job search or not.

4 Results and discussion

Before we report the 2SLS results, in Table (3) we report the first-stage results for our 7 instruments. The first 3 instruments are twin occurrences in the first, second, and third births, respectively. Fourth column gives the results when we combine all twin occurrences into one dummy variable regardless of the parity. Next, in order to address the concerns about the exogeneity of twin instrument, we take advantage of the fact that mono-zygotic twins are always of same gender and include only same gender twins in our estimations, in Columns 5 and 6. Finally, the Column 7 gives the results for the sex composition instrument. Table (3) shows that all instruments are strongly and positively associated with the total number of kids.

Employing multiple instruments in our empirical strategy has two main advantages. First, since 2SLS estimations capture the effects on individuals affected by that instrument, providing consistent results from a range of instruments reinforces the external validity of our results. And, second, it enables us to examine the effect of fertility shocks at different parities, as the magnitude of the effect of an unexpected child potentially differs by birth order. It should be highlighted at this stage that the first childbirth is a particularly important determinant of labor market decisions of couples—especially females. There is extensive evidence that postponing the first childbirth has extensive positive consequences on labor productivity and longer term labor market outcomes of females.[14] We discuss the impact of the first multiple birth on the labor market outcomes of both men and women in more detail. We then complement our analysis by adding more results from the second and third multiple births.

4.1 Effect of fertility on employment outcomes

We first examine the effect of fertility on employment outcomes of women and men. Table (4), Table (5), and Table (6) report how formal employment, informal employment, unemployment, being not in labor force (NILF), and working hours are affected by the occurrence of twins in the first, second and third births, respectively. Employment, unemployment and NILF are mutually exclusive categories enabling us to detect the transitions among labor market status of parents. IV

[14] See Bratti (2015) for an excellent summary of the relevant literature discussing the importance of the timing of first birth.

estimates presented in Table (4) reveals that the fertility shock caused by twins in the first birth decreases women's employment probability by 2.39 percentage points, increases NILF probability by 2.85 percentage points, but there is no statistically significant impact on the probability of unemployment—see the second row in Table (4) for the magnitudes of the IV estimates. Once we further examine the effect in the formality and informality breakdown, it appears that women who drop out of labor force are mainly the informally employed women. Specifically, the probability of informal employment declines by 2.04 percentage points, while there is no statistically significant impact on formal employment. Finally, hours of work decline by 0.64 percent. Further increases in the family size introduced by twins in the second birth (Table (5)) and third birth (Table (6)) lead to decreases in labor force supply of formally employed women. An unexpected child in second and third birth decreases formal employment by 1 percentage point. Results also suggest that, in addition to decreasing female labor supply in the extensive margin, fertility decreases female labor supply in the intensive margin as well; women who continue to work choose to work for fewer hours.

Table (7) reports the results of estimations where we combine all twin occurrences into one instrument. Overall it appears that fertility shocks introduced by unexpected increases in family size decreases women's labor supply and leads men to informal employment. Results suggest that women bear the time cost of children and drop out of labor force, while men decrease their reservation wage and accept low pay and informal jobs. Joint inferior labor supply decisions of women and men, put poor households even in more vulnerable situations.

To mitigate the potential concerns about the exogeneity of the twin instrument, next we report the results with the other three instruments—with same sex first-twin instrument in Table (8), with same sex twins at all parities instrument in Table (9), and with sibling sex composition instrument in Table (10). In general, the results confirm our previous findings that unexpected increases in family size reinforce traditional family roles of females and males, where women's time allocation between market work and home production shifts toward home, while men assume the breadwinner role.

We repeat our IV analysis after restricting our sample to women of age 20-32—the core group of women effectively trading of labor supply and fertility. This exercise drops the youngest and oldest women from our original sample, and focuses solely on women who recently gave birth. Since the HLFS data set does not have retrospective fertility information (also see our discussion in Section 2), we are forced to calculate fertility based on children who are observed at the time of survey. Angrist and Evans (1998) address this issue by focusing on women younger than 32, so that the observed number of children closely follows the total number of children. Tables (11) and (12) report the IV estimates. Similar to our baseline results, women drop out of the labor force after the first multiple birth, and the ones who leave the labor force are mostly informally employed women. As fertility goes up, formally employed women start dropping out of the labor force. This exercise confirms that our baseline results are widely consistent.

4.2 Effect of fertility on wages

In this section, we discuss our findings regarding the effect of fertility on wages. Tables (13) and (14) display the effect of unexpected increases in family size on monthly wages of women and men with all 7 instrument specifications. Overall, results suggest that increases in family size decreases both women's and men's wage significantly. In general, OLS results underestimate the effect of fertility on wages. 2SLS results show that the effect on women's wages decreases with parity—an unexpected child at first birth and second birth reduces women's wage by 6 percent and 5 percent, respectively—while further unexpected children have no more significant effect on women's wages. On the other hand, the effect on men's wages increases with parity. While an unexpected child at first birth does not affect men's wages, an unexpected child at second birth and third birth reduces men's wage by 3 percent. Results are especially concerning considering the fact that poor and less educated households are also less likely to perform family planning, therefore, increases in family size leads to even more financial constraints in their side and results in intergenerational transmission of poverty. It should also be noted that for the alternative IV specifications presented in Table (14), the wage effects tend to be insignificant.

4.3 Effect of fertility on job search behavior

Lastly, we look at the effect of unexpected increases in family size on job search methods and intensity. First, we test if exogenous fertility shocks force parents to pursue informal job search that are likely to yield inferior outcomes. Formal job search includes applying to job advertisements, going through employment agencies, and having formal job interviews, whereas, informal job search constitutes only the search activity through personal contacts such as friends, relatives, and acquaintances. Informal job search is causally associated with lower pay (Chen et al., 2018) because of the trade-off between job quality and job search duration (Bentolila et al., 2010; Pellizzari, 2010), weak bargaining position of the job applicant (Antoninis, 2006) and negative signaling of workers' labor market attachment and ability (Loury, 2006). Therefore, informal search is potentially important channel in explaining the effect we have reported on wages in the previous section. Table (15) and Table (16) report the results on the use of informal search methods. We find suggestive evidence that unexpected increases in number of children increases men's probability of searching informally significantly, while the effect does not appear to be statistically significant for women.

Next, in Table (17) and Table (18), we examine the effect of fertility on the overall search intensity. The results suggest that, consistent with the effect on employment outcomes, unexpected increases in the number of children decrease women's job search efforts, but has no statistically significant effect on men's job search intensity. At the end, the results suggest that as family size increases, women have fewer incentives to search for jobs, whereas men's probability of informal job search increases as they are more willing to accept low pay jobs—in exchange for reducing unemployment duration—as a means to compensate for the direct costs of childbearing and also women's foregone earnings.

4.4 Alternative specifications

Our analysis focuses on observations coming from married couples for which the wife and husband are observed in the household. However, it is well known that fertility behavior may also change family structure. As a result, focusing only on married women has a potential to generate bias as

the sample in this case focuses on intact families. We address this issue by including into analysis all women who have at least one child. Table (19) presents the estimates, which suggest that the qualitative nature of the baseline results is almost unchanged after focusing on all women with at least one child.

Another potential endogeneity may be due to the inclusion of the partners' characteristics as control variables into the regression. The marriage decision is highly influenced by the assortative mating process, so more educated women tend to match with more educated men. Inclusion of partners' characteristics aims to control for the effect of assortative nature of marital matching on fertility decisions. The downside, however, is that partners' characteristics may be endogenous to fertility decisions and, as Angrist and Pischke (2008) suggest, they may be categorized as bad controls. Table (20) presents the results of IV-2SLS regressions, which do not control for partners' characteristics for women. The results, again, suggest that the qualitative nature of our core results remains unchanged.

5 Concluding remarks

This paper aims to estimate the causal effect of fertility on female labor supply in Turkey—a large developing country with extensive informal employment—using twin births and other alternative variables in an IV design. To address the endogeneity of fertility, we use three different IV specifications: twins (incidence of twin birth in the first, second, and third multiple births separately), same-sex twins, and sibling sex composition. Our data set allows us to identify twins within a large and nationally representative labor market survey, which enables us to investigate the link between fertility and an exhaustive set of labor market outcomes not only for mothers, but for fathers too.

Our finding suggests that transitions to and from informal employment play a key role in understanding the effect of fertility on labor supply decisions of parents in our setting. Informally employed women tend to drop out of the labor force earlier than the formally employed women in response to fertility. After the multiple first birth, almost all the decline in female labor supply

is explained by the decline in informal employment. Informal jobs have many unattractive properties and they require much longer working hours than formal jobs, on average. So, it is very likely that some forms of informal employment are not compatible with motherhood and, as a consequence, females tend to leave informal jobs after having twins in first birth. After the second and third multiple births, women start transitioning from formal employment to out of the labor force, which suggests that opportunity cost of market time goes up substantially as family size goes up further. It should also be noted that low labor market attachment of females, which is typical in Turkey due to various reasons including cultural, religious and/or socio-economic norms, has a potential to amplify the impact of fertility on labor market outcomes of females. Males, on the other hand, become more likely to work in informal jobs as family size increases—probably because their reservation wages decrease as they become less likely to tolerate long unemployment spells.

We also provide some new evidence about the impact of fertility on job search methods and intensity for both men and women. We construct two measures of job search behavior: the probability of using informal methods in job search and the total number of search methods used (to proxy search intensity). We show that the probability of informal job search and search intensity of women both decline after birth regardless of the timing of the twin birth. For men, the probability of informal search increases, but the overall search intensity does not change, which suggests that men switch from formal to informal search methods. This is also consistent with the finding that they become more willing to accept inferior/informal jobs after having kids.

The overall picture suggests that the documented empirical patterns on the link between fertility and informal employment (1) make women less likely to stay in the labor force, (2) make men more likely to get trapped in bad jobs as family size increases, and (3) can feed poverty, inequality, and segregation in the long term.

Informal work is undesirable in many respects, and there is a clear negative relationship between the level of development in a country and informality in labor markets. However, informal employment is sometimes argued to serve as an "informal insurance" mechanism for low-skilled individuals

in developing country settings, and when a negative aggregate shock hits the economy, informal job opportunities provide a source of labor income, albeit low, for individuals who would otherwise lose their jobs. That said, informal employment is an unstable work arrangement and groups with low labor market attachment—who are mostly the disadvantaged groups, such as women, youth, and minorities—are subject to the idiosyncratic risk caused by this instability. This paper highlights the point that having children negatively affects the labor market prospects of informally employed low-skilled women, which can further have extensive implications for family income, spouse's employment decisions, and human capital investment in children in those families. Facilitating post-fertility labor market integration of women is a major policy issue in all countries. Our results highlight that pre-fertility informal employment makes post-fertility transition into employment even harder for low-skilled women, which may feed poverty traps and increase economic inequality in the society.

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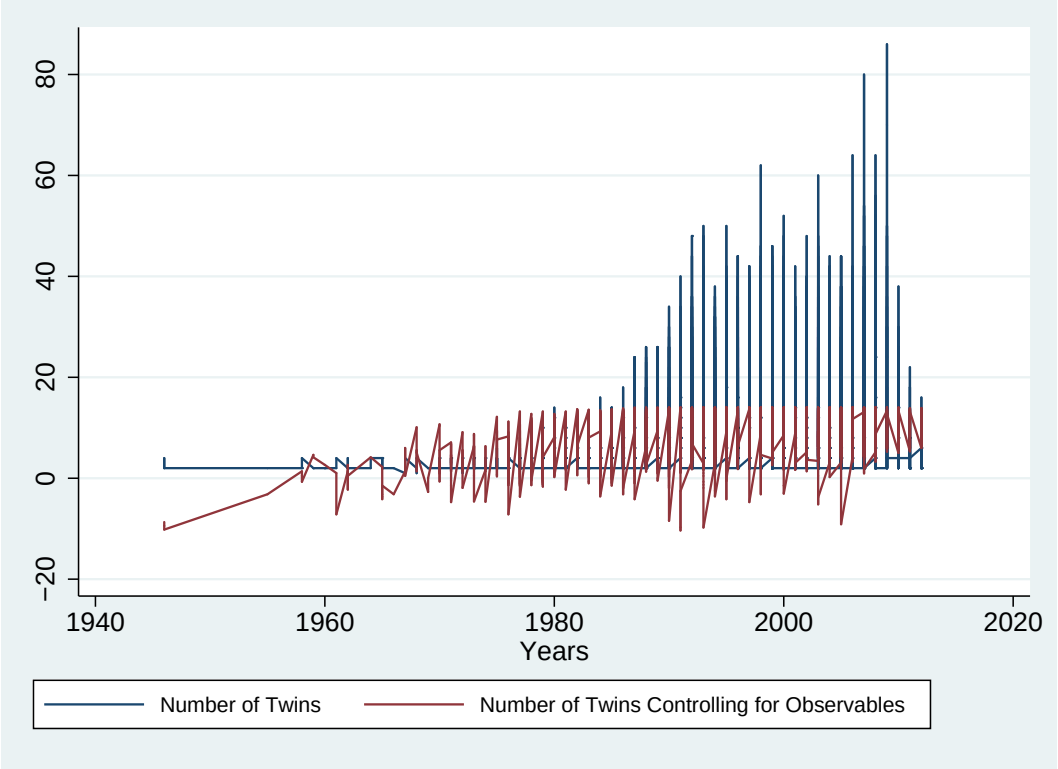

Figure 1: Total number of twins over time. Blue indicates the raw values of twin occurrences. Red indicates the number of twins after controlling for mother's age, age at last birth, and education dummies.

Births	**Observations**
Singletons	1,737,908
Twins	33,990
Same-gender twins	20,448
Different-gender twins	13,542
Twins at first birth (Twins-1)	14,954
Twins at second birth (Twins-2)	8,926
Twins at third birth (Twins-3)	5,162
Triplets	564
Quadruplets	16

Table 1: Births. Table includes all births between 2003 and 2011.

Summary statistics

	N	Mean	Median	Sta. dev.	Min	Max
Mother's characteristics						
Age	572,553	35.47	35	7.69	18	49
Number of kids	572,553	2.23	2	1.29	1	15
Years since last birth	572,553	8.16	7	6.54	0	37
Labor force	572,553	0.26	0	0.44	0	1
NILF	572,553	0.74	1	0.44	0	1
Employed	572,553	0.24	0	0.43	0	1
Unemployed	572,553	0.02	0	0.14	0	1
Formal employment	572,553	0.09	0	0.29	0	1
Informal employment	572,553	0.15	0	0.36	0	1
Hours of work (weekly)	58,850	42.11	40	16.72	1	97
Informal search	11,973	0.88	1	0.33	0	1
Search intensity (# of methods)	11,973	1.98	2	1.17	0	10
Log wages (monthly)	57,490	6.68	6.63	0.72	4.61	12.21
Father's characteristics						
Age	509,173	37.82	38	6.78	18	49
Labor force	509,173	0.94	1	0.25	0	1
NILF	509,173	0.06	0	0.25	0	1
Employed	509,173	0.87	1	0.34	0	1
Unemployed	509,173	0.07	0	0.25	0	1
Formal employment	509,173	0.62	1	0.49	0	1
Informal employment	509,173	0.25	0	0.43	0	1
Hours of work (weekly)	211,445	54.81	54	15.10	1	97
Informal search	35,794	0.93	1	0.25	0	1
Search intensity (# of methods)	35,794	2.18	2	1.14	0	10
Log wages (monthly)	281,866	6.74	6.69	0.59	4.61	12.21

Table 2: Descriptive statistics. Table reports descriptive statistics for married men and women of age 18 and 49. Only households with at least one child are included in the sample. Households with triplets and quadruplets are excluded from the sample. The sample includes HLFS waves 2005-2013.

First-stage regressions

Instruments:	**Multiple 1st**	**Multiple 2nd**	**Multiple 3rd**	**Multiple births combined**	**Same sex multiple 1st**	**Same-sex multiple births combined**	**Sex composition**
Total # of children	0.5062***	0.7693***	0.8898***	0.8911***	0.5093***	0.8956***	0.0856***
	(0.0144)	(0.0161)	(0.0235)	(0.0108)	(0.0175)	(0.0131)	(0.0029)
F-statistic	1,229.52	2,286.22	1,431.50	6,843.90	847.12	4,712.49	882.60
# of obs.	572,553	398,889	170,757	572,553	572,553	572,553	398,845

Table 3: First stage results. ***, **, * indicate 1%, 5%, and 10% significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married women of age 18-49 with at least one children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partner's education, partner's employment status, region fixed effects (NUTS2 level), and an urban-rural dummy.

IV estimation: Employment outcomes (Multiple 1st)

WOMEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0047***	-0.0013***	0.0061***	-0.0098***	0.0050***	-0.0064***
	(0.0005)	(0.0001)	(0.0005)	(0.0003)	(0.0005)	(0.0023)
Total # of children (IV-2SLS)	-0.0239**	-0.0047	0.0285***	-0.0035	-0.0204**	-0.0256
	(0.0099)	(0.0034)	(0.0102)	(0.0066)	(0.0079)	(0.0297)
First stage	0.5062***	0.5062***	0.5062***	0.5062***	0.5062***	0.6054***
	(0.0144)	(0.0144)	(0.0144)	(0.0144)	(0.0144)	(0.0407)
F-statistic	1229.52	1229.52	1229.52	1229.52	1229.52	221.29
# of obs.	572,553	572,553	572,553	572,553	572,553	58,850
MEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0026***	0.0009**	0.0017***	-0.0187***	0.0160***	0.0002
	(0.0006)	(0.0004)	(0.0004)	(0.0006)	(0.0007)	(0.0008)
Total # of children (IV-2SLS)	0.0109	-0.0035	-0.0074	-0.0039	0.0147	0.0130
	(0.0083)	(0.0064)	(0.0060)	(0.0106)	(0.0101)	(0.0128)
First stage	0.5261***	0.5261***	0.5261***	0.5261***	0.5261***	0.5457***
	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0226)
F-statistic	1,241.30	1,241.30	1,241.30	1,241.30	1,241.30	584.64
# of obs.	509,173	509,173	509,173	509,173	509,173	211,445

Table 4: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

IV estimation: Employment outcomes (Multiple 2nd)

WOMEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	0.0025***	-0.0007***	-0.0018***	-0.0048***	0.0074***	0.0026
	(0.0006)	(0.0002)	(0.0006)	(0.0002)	(0.0006)	(0.0030)
Total # of children (IV-2SLS)	-0.0076	-0.0066***	0.0142*	-0.0096*	0.0018	0.0370*
	(0.0083)	(0.0022)	(0.0085)	(0.0046)	(0.0072)	(0.0223)
First stage	0.7693***	0.7693***	0.7693***	0.7693***	0.7693***	0.9312***
	(0.0161)	(0.0161)	(0.0161)	(0.0161)	(0.0161)	(0.0510)
F-statistic	2,286.22	2,286.22	2,286.22	2,286.22	2,286.22	333.19
# of obs.	398,889	398,889	398,889	398,889	398,889	38,422
MEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0063***	0.0024***	0.0039***	-0.0273***	0.0210***	-0.0008
	(0.0007)	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0010)
Total # of children (IV-2SLS)	0.0172*	-0.0091*	-0.0082	0.0111	0.0062	0.0087
	(0.0074)	(0.0055)	(0.0055)	(0.0093)	(0.0091)	(0.0109)
First stage	0.7908***	0.7908***	0.7908***	0.7908***	0.7908***	0.7893***
	(0.0168)	(0.0168)	(0.0168)	(0.0168)	(0.0168)	(0.0252)
F-statistic	2,222.80	2,222.80	2,222.80	2,222.80	2,222.80	981.85
# of obs.	359,979	359,979	359,979	359,979	359,979	147,785

Table 5: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with two or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

IV estimation: Employment outcomes (Multiple 3rd)

WOMEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	0.0060***	0.0001	-0.0061***	-0.0008***	0.0068***	0.0045
	(0.0008)	(0.0002)	(0.0008)	(0.0002)	(0.0008)	(0.0043)
Total # of children (IV-2SLS)	-0.0124	-0.0004	0.0128	-0.0126***	0.0002	-0.1034***
	(0.0090)	(0.0026)	(0.0092)	(0.0029)	(0.0086)	(0.0454)
First stage	0.8898***	0.8898***	0.8898***	0.8898***	0.8898***	0.8080***
	(0.0235)	(0.0235)	(0.0235)	(0.0235)	(0.0235)	(0.0689)
F-statistic	1,431.50	1,431.50	1,431.50	1,431.50	1,431.50	137.69
# of obs.	170,757	170,757	170,757	170,757	170,757	14,880
MEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0078***	0.0025***	0.0053***	-0.0267***	0.0189***	-0.0017
	(0.0011)	(0.0008)	(0.0009)	(0.0011)	(0.0012)	(0.0015)
Total # of children (IV-2SLS)	-0.0052	0.0050	0.0002	-0.0143	0.0092	-1.0920
	(0.0098)	(0.0075)	(0.0074)	(0.0110)	(0.0114)	(0.8410)
First stage	0.9145***	0.9145***	0.9145***	0.9145***	0.9145***	0.8353***
	(0.0248)	(0.0248)	(0.0248)	(0.0248)	(0.0248)	(0.0385)
F-statistic	1,361.87	1,361.87	1,361.87	1,361.87	1,361.87	471.57
# of obs.	153,622	153,622	153,622	153,622	153,622	60,762

Table 6: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with three or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

IV estimation: Employment outcomes (Multiple births combined)

WOMEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0047***	-0.0013***	0.0061***	-0.0098***	0.0050***	-0.0064***
	(0.0005)	(0.0001)	(0.0005)	(0.0003)	(0.0005)	(0.0023)
Total # of children (IV-2SLS)	-0.0147***	-0.0041***	0.0188***	-0.0101***	-0.0046	-0.0116
	(0.0040)	(0.0013)	(0.0041)	(0.0024)	(0.0034)	(0.0129)
First stage	0.8911***	0.8911***	0.8911***	0.8911***	0.8911***	1.0006***
	(0.0108)	(0.0108)	(0.0108)	(0.0108)	(0.0108)	(0.0319)
F-statistic	6,843.90	6,843.90	6,843.90	6,843.90	6,843.90	983.91
# of obs.	572,553	572,553	572,553	572,553	572,553	58,850
MEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0026***	0.0009**	0.0017***	-0.0187***	0.0160***	0.0002
	(0.0006)	(0.0004)	(0.0004)	(0.0006)	(0.0007)	(0.0008)
Total # of children (IV-2SLS)	0.0069*	-0.0024	-0.0046*	-0.0049	0.0119***	0.0026
	(0.0037)	(0.0028)	(0.0027)	(0.0045)	(0.0044)	(0.0057)
First stage	0.9057***	0.9057***	0.9057***	0.9057***	0.9057***	0.9159***
	(0.0112)	(0.0112)	(0.0112)	(0.0112)	(0.0112)	(0.0169)
F-statistic	6,522.39	6,522.39	6,522.39	6,522.39	6,522.39	2,925.84
# of obs.	509,173	509,173	509,173	509,173	509,173	211,445

Table 7: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

IV estimation: Employment outcomes (Same-sex multiple 1st)

WOMEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0047***	-0.0013***	0.0061***	-0.0098***	0.0050***	-0.0064***
	(0.0005)	(0.0001)	(0.0005)	(0.0003)	(0.0005)	(0.0023)
Total # of children (IV-2SLS)	-0.0145	-0.0033	0.0178	0.0032	-0.0177*	0.0021
	(0.0124)	(0.0045)	(0.0128)	(0.0082)	(0.0100)	(0.0338)
First stage	0.5093***	0.5093***	0.5093***	0.5093***	0.5093***	0.6229***
	(0.0175)	(0.0175)	(0.0175)	(0.0175)	(0.0175)	(0.0506)
F-statistic	847.12	847.12	847.12	847.12	847.12	177.15
# of obs.	572,553	572,553	572,553	572,553	572,553	58,850
MEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0026***	0.0009**	0.0017***	-0.0187***	0.0160***	0.0002
	(0.0006)	(0.0004)	(0.0004)	(0.0006)	(0.0007)	(0.0008)
Total # of children (IV-2SLS)	0.0232**	-0.0090	-0.0143**	-0.0008	0.0241*	0.0375***
	(0.0104)	(0.0081)	(0.0071)	(0.0141)	(0.0132)	(0.0142)
First stage	0.5182***	0.5182***	0.5182***	0.5182***	0.5182***	0.5546***
	(0.0183)	(0.0183)	(0.0183)	(0.0183)	(0.0183)	(0.0262)
F-statistic	802.50	802.50	802.50	802.50	802.50	448.44
# of obs.	509,173	509,173	509,173	509,173	509,173	211,445

Table 8: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

IV estimation: Employment outcomes (Same-sex multiple births combined)

WOMEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0047***	-0.0013***	0.0061***	-0.0098***	0.0050***	-0.0064***
	(0.0005)	(0.0001)	(0.0005)	(0.0003)	(0.0005)	(0.0023)
Total # of children (IV-2SLS)	-0.0162***	-0.0041**	0.0203***	-0.0062**	-0.0101**	0.0163
	(0.0050)	(0.0016)	(0.0052)	(0.0030)	(0.0042)	(0.0153)
First stage	0.8956***	0.8956***	0.8956***	0.8956***	0.8956***	1.048***
	(0.0131)	(0.0131)	(0.0131)	(0.0131)	(0.0131)	(0.0387)
F-statistic	4,712.49	4,712.49	4,712.49	4,712.49	4,712.49	732.74
# of obs.	572,553	572,553	572,553	572,553	572,553	58,850
MEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0026***	0.0009**	0.0017***	-0.0187***	0.0160***	0.0002
	(0.0006)	(0.0004)	(0.0004)	(0.0006)	(0.0007)	(0.0008)
Total # of children (IV-2SLS)	0.0128***	-0.0048	-0.0081**	-0.0043	0.0171***	0.0167***
	(0.0045)	(0.0035)	(0.0032)	(0.0059)	(0.0057)	(0.0064)
First stage	0.8985***	0.8985***	0.8985***	0.8985***	0.8985***	0.9199***
	(0.0136)	(0.0136)	(0.0136)	(0.0136)	(0.0136)	(0.0200)
F-statistic	4,397.13	4,397.13	4,397.13	4,397.13	4,397.13	2,124.17
# of obs.	509,173	509,173	509,173	509,173	509,173	211,445

Table 9: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

IV estimation: Employment outcomes (Sex composition instrument)

WOMEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	0.0025***	-0.0007***	-0.0018***	-0.0048***	0.0074***	0.0026
	(0.0006)	(0.0002)	(0.0006)	(0.0002)	(0.0006)	(0.0030)
Total # of children (IV-2SLS)	-0.0246*	0.0038	0.0208	-0.0037	-0.0209*	-0.0572
	(0.0140)	(0.0047)	(0.0144)	(0.0079)	(0.0123)	(0.0536)
First stage	0.0856***	0.0856***	0.0856***	0.0856***	0.0856***	0.0932***
	(0.0029)	(0.0029)	(0.0029)	(0.0029)	(0.0029)	(0.0087)
F-statistic	882.60	882.60	882.60	882.60	882.60	115.04
# of obs.	398,845	398,845	398,845	398,845	398,845	38,417
MEN	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0063***	0.0024***	0.0039***	-0.0273***	0.0210***	-0.0008
	(0.0007)	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0010)
Total # of children (IV-2SLS)	-0.0016	-0.0148	0.0165	-0.0132	0.0116	0.0050
	(0.0128)	(0.0098)	(0.0110)	(0.0167)	(0.0157)	(0.0181)
First stage	0.0867***	0.0867***	0.0867***	0.0867***	0.0867***	0.0888***
	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0045)
F-statistic	832.66	832.66	832.66	832.66	832.66	385.67
# of obs.	359,937	359,937	359,937	359,937	359,937	147,768

Table 10: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with two or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

IV estimation: Employment outcomes

Age 20-32

WOMEN (Multiple 1st)	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0032***	-0.0014***	0.0046***	-0.0163***	0.0131***	-0.0186***
	(0.0009)	(0.0003)	(0.0011)	(0.0008)	(0.0014)	(0.0051)
Total # of children (IV-2SLS)	-0.0395***	-0.0056	0.0451***	-0.0065	-0.0330***	-0.0161
	(0.0139)	(0.0052)	(0.0141)	(0.0093)	(0.0101)	(0.0566)
First stage	0.5234***	0.5234***	0.5234***	0.5234***	0.5234***	0.5622***
	(0.345)	(0.0345)	(0.0345)	(0.0345)	(0.0345)	(0.0723)
F-statistic	501.16	501.16	501.16	501.16	501.16	87.67
# of obs.	145,116	145,116	145,116	145,116	145,116	15,311
WOMEN (Multiple 2nd)	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	0.0045***	-0.0011**	-0.0034***	-0.0057***	0.0102***	-0.0054
	(0.0011)	(0.0005)	(0.0011)	(0.0005)	(0.0012)	(0.0056)
Total # of children (IV-2SLS)	-0.0021	-0.0134***	0.0155	-0.0063	0.0042	-0.0203
	(0.0124)	(0.0026)	(0.0132)	(0.0076)	(0.0115)	(0.0323)
First stage	0.7988***	0.7988***	0.7988***	0.7988***	0.7988***	1.0621***
	(0.0301)	(0.0301)	(0.0301)	(0.0301)	(0.0301)	(0.1176)
F-statistic	766.14	766.14	766.14	766.14	766.14	99.05
# of obs.	119,453	119,453	119,453	119,453	119,453	8,991

Table 11: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 20-32 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

IV estimation: Employment outcomes

Age 20-32

WOMEN (Multiple 3rd)	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	0.0091***	0.0006	-0.0097***	-0.0016***	0.0107***	-0.0026
	(0.0016)	(0.0005)	(0.0014)	(0.0005)	(0.0015)	(0.0071)
Total # of children (IV-2SLS)	-0.0009	-0.0066***	0.0075	-0.0082**	0.0073	-0.0975
	(0.0156)	(0.0019)	(0.0145)	(0.0039)	(0.0141)	(0.0801)
First stage	0.9111***	0.9111***	0.9111***	0.9111***	0.9111***	0.8076***
	(0.0511)	(0.0511)	(0.0511)	(0.0511)	(0.0511)	(0.1432)
F-statistic	480.40	480.40	480.40	480.40	480.40	28.42
# of obs.	51,011	51,011	51,011	51,011	51,011	4,002
WOMEN (Combined)	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0029***	-0.0017***	0.0046***	-0.0151***	0.0122***	-0.0188***
	(0.0009)	(0.0003)	(0.0009)	(0.0006)	(0.0009)	(0.0041)
Total # of children (IV-2SLS)	-0.0176***	-0.0071***	0.0247***	-0.0104***	-0.0072*	-0.0345
	(0.0063)	(0.0021)	(0.0066)	(0.0037)	(0.0042)	(0.0245)
First stage	0.8977***	0.8977***	0.8977***	0.8977***	0.8977***	0.9923***
	(0.0202)	(0.0202)	(0.0202)	(0.0202)	(0.0202)	(0.0654)
F-statistic	2,016.08	2,016.08	2,016.08	2,016.08	2,016.08	226.76
# of obs.	145,116	145,116	145,116	145,116	145,116	15,311

Table 12: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 20-32 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

IV estimation: Log monthly wage

Multiple 1st	**Women**	**Men**
Total # of children (OLS)	-0.0391***	-0.0026***
	(0.0029)	(0.0009)
Total # of children (IV-2SLS)	-0.0606**	-0.0003
	(0.0274)	(0.0160)
First stage	0.5909***	0.4771***
	(0.0191)	(0.0167)
F-statistic	954.14	820.30
# of obs.	57,490	281,866
Multiple 2nd	**Women**	**Men**
Total # of children (OLS)	-0.0444***	-0.0081***
	(0.0048)	(0.0012)
Total # of children (IV-2SLS)	-0.0512**	-0.0288**
	(0.0256)	(0.0138)
First stage	0.9580***	0.7662***
	(0.0404)	(0.0193)
F-statistic	562.29	1,572.33
# of obs.	31,094	190,832
Multiple 3rd	**Women**	**Men**
Total # of children (OLS)	-0.0062	-0.0110***
	(0.0087)	(0.0019)
Total # of children (IV-2SLS)	-0.1082	-0.0317*
	(0.0840)	(0.0165)
First stage	0.9878***	0.9157***
	(0.0812)	(0.0331)
F-statistic	147.97	767.65
# of obs.	6,430	70,283
Multiple births combined	**Women**	**Men**
Total # of children (OLS)	-0.0391***	-0.0026***
	(0.0029)	(0.0009)
Total # of children (IV-2SLS)	-0.0597***	-0.0123*
	(0.0155)	(0.0069)
First stage	0.8701***	0.8362***
	(0.0220)	(0.0135)
F-statistic	1,565.71	3,867.46
# of obs.	57,490	281,866

Table 13: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy.

Alternative IV estimations: Log monthly wage

Same-sex multiple 1st	**Women**	**Men**
Total # of children (OLS)	-0.0391***	-0.0026***
	(0.0029)	(0.0009)
Total # of children (IV-2SLS)	-0.0408	0.0086
	(0.0345)	(0.0200)
First stage	0.6227***	0.4869***
	(0.0228)	(0.0211)
F-statistic	748.19	532.26
# of obs.	57,490	281,866
Same-sex combined multiple	**Women**	**Men**
Total # of children (OLS)	-0.0391***	-0.0026***
	(0.0029)	(0.0009)
Total # of children (IV-2SLS)	-0.0008	-0.0018
	(0.0186)	(0.0084)
First stage	0.9174***	0.8442***
	(0.0277)	(0.0163)
F-statistic	1,094.09	2,688.97
# of obs.	57,490	281,866
Sex composition	**Women**	**Men**
Total # of children (OLS)	-0.0446***	-0.0081***
	(0.0048)	(0.0012)
Total # of children (IV-2SLS)	-0.0751	0.0067
	(0.0791)	(0.0234)
First stage	0.0626***	0.0800***
	(0.0062)	(0.0036)
F-statistic	100.92	495.66
# of obs.	31,091	190,805

Table 14: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy.

IV estimation: Informal job search

Multiple 1st	**Women**	**Men**
Total # of children (OLS)	-0.0038	0.0010
	(0.0041)	(0.0012)
Total # of children (IV-2SLS)	-0.0800	-0.0217
	(0.0656)	(0.0194)
First stage	0.5448***	0.7398***
	(0.0629)	(0.0663)
F-statistic	74.97	124.67
# of obs.	11,973	35,794
Multiple 2nd	**Women**	**Men**
Total # of children (OLS)	-0.0006	-0.0001
	(0.0058)	(0.0015)
Total # of children (IV-2SLS)	-0.1082	0.0347*
	(0.0728)	(0.0200)
First stage	0.9036***	0.7195***
	(0.1064)	(0.0723)
F-statistic	72.13	98.94
# of obs.	6,926	26,232
Multiple 3rd	**Women**	**Men**
Total # of children (OLS)	0.0135	-0.0007
	(0.0108)	(0.0020)
Total # of children (IV-2SLS)	-0.0992	0.0292*
	(0.0808)	(0.0157)
First stage	1.0147***	1.1274***
	(0.1254)	(0.0894)
F-statistic	65.51	159.20
# of obs.	1,865	13,581
Multiple births combined	**Women**	**Men**
Total # of children (OLS)	-0.0038	0.0010
	(0.0041)	(0.0012)
Total # of children (IV-2SLS)	-0.0632*	0.0009
	(0.0334)	(0.0085)
First stage	0.8736***	1.0871***
	(0.0627)	(0.0469)
F-statistic	194.43	538.20
# of obs.	11,973	35,794

Table 15: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy.

Alternative IV estimations: Informal job search

Same-sex multiple 1st	**Women**	**Men**
Total # of children (OLS)	-0.0038	0.0010
	(0.0041)	(0.0012)
Total # of children (IV-2SLS)	-0.0309	0.0643**
	(0.0727)	(0.0295)
First stage	0.5605***	0.7706***
	(0.0777)	(0.0921)
F-statistic	52.05	70.05
# of obs.	11,973	35,794
Same-sex combined multiple	**Women**	**Men**
Total # of children (OLS)	-0.0038	0.0010
	(0.0041)	(0.0012)
Total # of children (IV-2SLS)	-0.0588	-0.0155
	(0.0404)	(0.0125)
First stage	0.8660***	1.0756***
	(0.0738)	(0.0581)
F-statistic	137.75	343.13
# of obs.	11,973	35,794
Sex composition	**Women**	**Men**
Total # of children (OLS)	-0.0006	-0.0001
	(0.0058)	(0.0015)
Total # of children (IV-2SLS)	-0.0718	-0.0209
	(0.1030)	(0.0461)
First stage	0.0734***	0.0658***
	(0.0149)	(0.0132)
F-statistic	24.30	24.72
# of obs.	6,926	26,228

Table 16: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy.

IV estimation: Search intensity

Multiple 1st	**Women**	**Men**
Total # of children (OLS)	-0.0636***	-0.0248***
	(0.0132)	(0.0045)
Total # of children (IV-2SLS)	-0.2958*	-0.0838
	(0.1620)	(0.0689)
First stage	0.5448***	0.7398***
	(0.0629)	(0.0663)
F-statistic	74.97	124.67
# of obs.	11,973	35,794
Multiple 2nd	**Women**	**Men**
Total # of children (OLS)	-0.0293*	-0.0303***
	(0.0176)	(0.0052)
Total # of children (IV-2SLS)	-0.1367	-0.0573
	(0.1554)	(0.0842)
First stage	0.9036***	0.7195***
	(0.1064)	(0.0723)
F-statistic	72.13	98.94
# of obs.	6,926	26,232
Multiple 3rd	**Women**	**Men**
Total # of children (OLS)	-0.0112	-0.0219***
	(0.0295)	(0.0065)
Total # of children (IV-2SLS)	-0.3318**	0.0230
	(0.1538)	(0.0652)
First stage	1.0147***	1.1274***
	(0.1254)	(0.0894)
F-statistic	65.51	159.20
# of obs.	1,865	13,581
Multiple births combined	**Women**	**Men**
Total # of children (OLS)	-0.0636***	0.0248***
	(0.0132)	(0.0045)
Total # of children (IV-2SLS)	-0.2071**	-0.0401
	(0.0909)	(0.0323)
First stage	0.8736***	1.0871***
	(0.0627)	(0.0469)
F-statistic	194.43	538.20
# of obs.	11,973	35,794

Table 17: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy.

Alternative IV estimations: Search intensity

Same-sex multiple 1st	**Women**	**Men**
Total # of children (OLS)	-0.0636***	0.0248***
	(0.0132)	(0.0045)
Total # of children (IV-2SLS)	-0.4653**	-0.1648*
	(0.2146)	(0.0971)
First stage	0.5605***	0.7706***
	(0.0777)	(0.0921)
F-statistic	52.05	70.05
# of obs.	11,973	35,794
Same-sex combined multiple	**Women**	**Men**
Total # of children (OLS)	-0.0636***	0.0248***
	(0.0132)	(0.0045)
Total # of children (IV-2SLS)	-0.3324***	-0.0552
	(0.1035)	(0.0460)
First stage	0.8660***	1.0756***
	(0.0738)	(0.0581)
F-statistic	137.75	343.13
# of obs.	11,973	35,794
Sex composition	**Women**	**Men**
Total # of children (OLS)	-0.0293*	-0.0304***
	(0.0176)	(0.0052)
Total # of children (IV-2SLS)	-0.1763	0.0153
	(0.3398)	(0.1910)
First stage	0.0734***	0.0658***
	(0.0149)	(0.0132)
F-statistic	24.30	24.72
# of obs.	6,926	26,228

Table 18: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy.

Alternative IV estimation

ALL WOMEN

(Multiple 1st)	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0033***	-0.0014***	0.0047***	-0.0148***	0.0115***	-0.0193***
	(0.0006)	(0.0003)	(0.0009)	(0.0003)	(0.0006)	(0.0042)
Total # of children (IV-2SLS)	-0.0392***	-0.0081**	0.0473***	-0.0093	-0.0299***	-0.0197
	(0.0124)	(0.0034)	(0.0123)	(0.0091)	(0.0086)	(0.0404)
First stage	0.5423***	0.5423***	0.5423***	0.5423***	0.5423***	0.5866***
	(0.0245)	(0.0245)	(0.0245)	(0.0245)	(0.0245)	(0.0677)
F-statistic	589.42	589.42	589.42	589.42	589.42	96.96
# of obs.	620,356	620,356	620,356	620,356	620,356	63,012
(Multiple 2nd)	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	0.0055***	-0.0009***	-0.0046***	-0.0068***	0.0123***	-0.0059
	(0.0008)	(0.0002)	(0.0008)	(0.0003)	(0.0011)	(0.0053)
Total # of children (IV-2SLS)	-0.0020	-0.0121***	0.0141	-0.0052	0.0032	-0.0225
	(0.0122)	(0.0019)	(0.0122)	(0.0059)	(0.0101)	(0.0345)
First stage	0.8211***	0.8211***	0.8211***	0.8211***	0.8211***	1.0915***
	(0.0262)	(0.0262)	(0.0262)	(0.0262)	(0.0262)	(0.0986)
F-statistic	901.16	901.16	901.16	901.16	901.16	131.08
# of obs.	417,622	417,622	417,622	417,622	417,622	40,912

Table 19: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes all married women (not only the married ones) with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, partners' education, partners' employment status, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.

Alternative IV estimation

Partners' characteristics are not controlled

Multiple 1st	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	-0.0051***	-0.0012***	0.0063***	-0.0086***	0.0035***	-0.0072***
	(0.0004)	(0.0001)	(0.0004)	(0.0003)	(0.0004)	(0.0019)
Total # of children (IV-2SLS)	-0.0264**	-0.0039	0.0303***	-0.0041	-0.0223**	-0.0218
	(0.0107)	(0.0038)	(0.0099)	(0.0071)	(0.0082)	(0.0289)
First stage	0.5011***	0.5011***	0.5011***	0.5011***	0.5011***	0.5981***
	(0.0132)	(0.0132)	(0.0132)	(0.0132)	(0.0132)	(0.0382)
F-statistic	1298.02	1298.02	1298.02	1298.02	1298.02	266.19
# of obs.	572,553	572,553	572,553	572,553	572,553	58,850
(Multiple 2nd)	**Employment**	**Unemployment**	**NILF**	**Formal emp.**	**Informal emp.**	**Log hours**
Total # of children (OLS)	0.0029***	-0.0006***	-0.0023***	-0.0044***	0.0073***	0.0021
	(0.0007)	(0.0002)	(0.0005)	(0.0003)	(0.0005)	(0.0029)
Total # of children (IV-2SLS)	-0.0079	-0.0076***	0.0155*	-0.0091*	0.0012	0.0393*
	(0.0086)	(0.0019)	(0.0088)	(0.0047)	(0.0069)	(0.0218)
First stage	0.7509***	0.7509***	0.7509***	0.7509***	0.7509***	0.9453***
	(0.0173)	(0.0173)	(0.0173)	(0.0173)	(0.0173)	(0.0643)
F-statistic	2,115.26	2,115.26	2,115.26	2,115.26	2,115.26	319.06
# of obs.	398,889	398,889	398,889	398,889	398,889	38,422

Table 20: ***, **, *, indicate 1%, 5%, and 10%, significance levels, respectively. Huber/White robust standard errors are reported in parentheses. The sample includes married individuals of age 18-49 with one or more children. Controls include age dummies, survey-year dummies, dummies indicating time (years) since the last kid, education, region fixed effects (NUTS2 level), and an urban-rural dummy. The employment variables are defined as ratios to the relevant population.