Investigating the Impact of Childbirth on Female Labor Force Participation in Turkey: A Natural Experiment Using Twin Births

by

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Submitted to

Central European University

Department of Economics and Business

In partial fulfillment of the requirements for the degree of

Master of Arts in Economics

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Vienna, Austria

2023

Abstract

In this study, I investigate the influence of the number of young children in a household on women's employment in Turkey, using microdata from the 2018 Demographic and Health Survey (DHS). By employing a natural experimental framework, I implement the instrumental variable methodology, using the quasi-random occurrence of twin births during a woman's initial childbirth as an instrumental variable for the number of young children in the household to estimate the causal effect. My findings reveal an inverse causal correlation between female employment and the number of children. Specifically, each additional child under the age of four results in a decrease in a woman's employment probability by 11.6 percentage points. A smaller yet still significant effect is observed from the number of children beyond this age bracket. When controlling for place of residence, the impact escalates to a decrease of 15.7 percentage points for women in urban areas. Upon disaggregating the sample of women into distinct educational categories, the effect of each additional child younger than four is associated with a statistically insignificant 70 percentage point reduction in the likelihood of employment for women with higher education. The impact is lesser and again statistically insignificant for women with primary or secondary education levels.

Acknowledgements

I would like to extend my appreciation to my supervisor, Professor Robert Lieli, for his guidance and insights which have been instrumental in shaping this work. I am also thankful to my friends and family for their support and encouragement.

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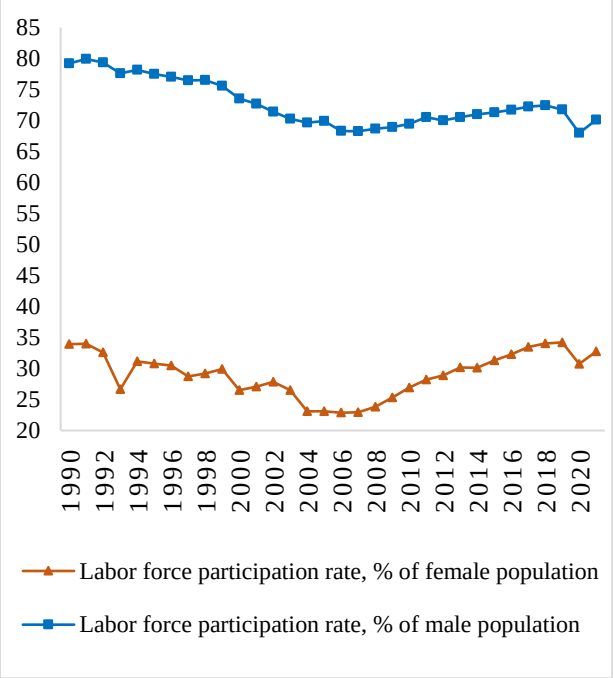
1. Introduction

Exploring the relationship between childbirth and female labor supply represents one of the most enduring research themes in economics, continuing to captivate both academics and policymakers. Its significance is manifold, influencing diverse areas such as population policy, labor market regulations including parental leave provisions, and developments in childcare systems (Chen, 2022). The prior literature predominantly establishes a negative causal link between fertility and female labor force participation. However, the extent of this relationship's validity, its applicability across different countries and residential settings, or its prevalence across varying educational levels in unique national contexts, remains a ground for further exploration.

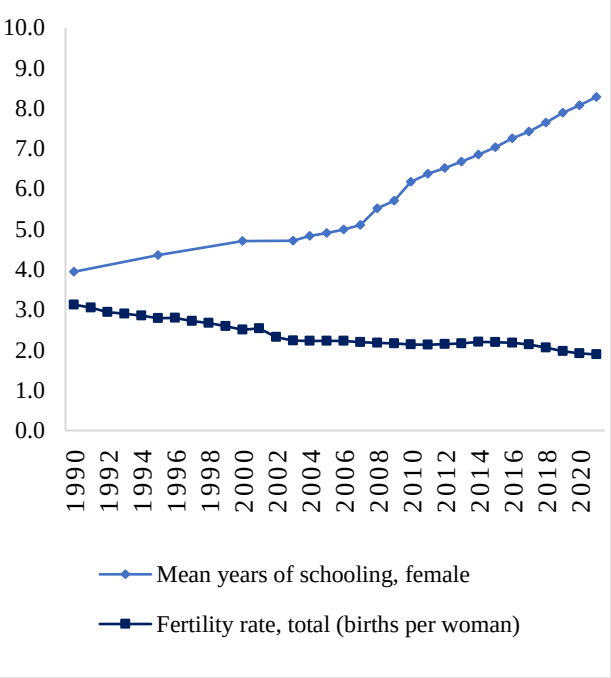
The impetus to examine this relationship in the Turkish context arises from several motivations. Turkey has been experiencing a puzzling relationship between the female fertility rates, women's average education levels, and female labor force participation rates. Primarily, the Turkish labor market is predominantly male, with male labor force participation consistently outpacing female participation, as shown in Figure 1 (Panel A). The trajectory of the female labor force participation rate has paralleled that of male participation over the past four decades. Despite this parallel trend, female participation levels in 2020 remain marginally below those of 1990, resulting in a persistent and yet-to-be-bridged gap between that of male participation. In Panel B of Figure 1, we observe additional factors contributing to the aforementioned puzzle. Despite the stagnation of female labor force participation, which consistently trails behind male labor force participation, there is a concurrent decrease in fertility rates and an increase in the average years of education for women. These patterns amplify the complexity of the issue at hand.

Figure 1. Labor Force Participation, Education, and Fertility in Turkey

Panel A. Labor Force Participation Rates, % by gender



Panel B. Fertility Rate and Mean Years of Schooling[1]



Sources: World Bank (2023); TurkStat (2023); Barro, R., & Lee, J. W. (2013).

While women's education is continually advancing in Turkey, this factor alone does not provide a comprehensive picture of the state of gender inequality in the country, encompassing both education and economic participation. The Global Gender Gap Report (World Economic Forum, 2022) reveals that Turkey occupies the 124th place out of 146 nations in the Global Gender Gap Index rankings. Within the economic participation and opportunity sub index, Turkey sits at 134th place, and ranks 101st in the educational attainment sub index. These rankings indicate that Turkey lags significantly behind the developed world's gender equality standards across multiple dimensions.

Girls, particularly those in rural areas of Turkey, often confront discouragement from their families to pursue further education and employment, as they are traditionally expected to assume domestic

[1] TurkStat data on mean years of education is not available for years before 2003. Data for that period is complemented from the Barro and Lee Educational Attainment dataset.

roles. The UNICEF child marriage dataset[2] shows that 15 percent of girls are coerced into teenage marriages, exacerbating the gender inequality in both educational and employment spheres. The Global Gender Gap Report (World Economic Forum, 2022) also highlights that Turkey exhibits one of the largest disparities in the percentage of time devoted to unpaid childcare work between fathers and mothers of children under the age of six. This differential significantly contributes to the persistent gap between male and female labor force participation rates. In addition, Ilkkaracan (2012) posits that the substantial gender disparity in employment in Turkey can be attributed not only to entrenched gender-based labor divisions and women's prevalence in informal sector employment, but also to the more constrained social conservatism that women face.

For the past decade, Turkey's government under the rule of Erdogan has actively promoted a pro-natalist policy, urging families to bear at least three children. The intended result is to preserve the country's youthful demographic and amplify its young labor force. Nevertheless, this policy's potential impact on women's labor force participation during and post-pregnancy has been largely unconsidered, with a significant lack of supportive measures in place. This scenario emphasizes the need for a thorough examination of policies that are populist and male-centric and may inadvertently marginalize women's role in the workforce. Putting the spotlight on enhancing women's employment could lead to crafting policies designed to narrow the gender gap in labor force participation. Such a focus would not only fortify women's role in society but also enrich their economic contribution. Thus, in the Turkish context, it is of utmost importance to foster further research aimed at identifying potential factors influencing women's labor supply behavior.

[2] UNICEF. (2021). Child marriage dataset. Retrieved from https://data.unicef.org/resources/dataset/child-marriage/.

The objective of my thesis is to delve into one of these influencing factors, fertility, and enhance the existing body of knowledge by employing recent data. This will help me unravel at least part of the relationship that exists between persistently low rates of female labor force participation, declining fertility rates, and increasing average years of women's education. My approach involves the application of Instrumental Variable (IV) methodology, leveraging the presence of young children in the household, to investigate one of the fertility-associated determinants affecting labor force participation. I use giving birth to twins at first birth as an instrument for the number of young children -defined as children below the age of four. The rationale behind considering the number of young children is grounded in two hypotheses proposed by Bruce (1978): firstly, the maternal care hypothesis posits that women inherently feel a profound responsibility to personally attend to their pre-school-aged children. Secondly, the cost of care hypothesis proposes that the substantial financial burden of childcare could dissuade women from maintaining employment, opting instead to care for their pre-school-aged children at home. The reasoning for selecting twin births as an instrumental variable for the number of children stems from two key factors: firstly, twin births are significantly correlated with the number of children, as they inherently increase this number. Secondly, twin births serve as an exogenous shock to the typically endogenous decision of fertility, thus establishing a natural experiment setting. Through this lens, one can observe alterations in women's labor supply behavior that are induced solely by an unanticipated expansion in family size.

The effort to better understand the causal relationship between fertility and labor force participation has led to an extensive body of research with significant findings. The majority of this literature suggests a negative correlation between these two variables (Rosenzweig and Wolpin, 1980a; Angrist and Evans, 1998; Caceres-Delpiano, 2012). Certain theoretical

perspectives posit that fertility and labor force participation are determined concurrently (Bloom et al. 2009), and that there exist unobservable factors influencing both: for instance, a woman's choice to participate in the labor force could reciprocally affect her family planning decisions, and inversely, women with professional ambitions might opt for smaller families or choose not to have children at all (Agüero and Marks, 2008).

To address the nature of endogeneity in fertility, numerous studies have leveraged exogenous changes in family size to ascertain the causal link between the number of children and female labor supply. The twin birth instrument is frequently and broadly employed in prior research and in most cases these methodologies result significant impact of children on female labor force participation. Illustrative examples of this approach include Bronars and Grogger (1994) which utilizes twin births as a natural experiment, revealing a negative causal relationship between fertility and labor force participation. Angrist and Evans (1998) leverage parental preference for a mixed-sex sibling composition alongside twinning as an instrument, identifying a significant effect on women's labor force participation. In the context of developing countries, Cáceres-Delpiano (2012) applies multiple births as an instrument for fertility, revealing that an increase in family size through childbirth negatively affects female labor force participation. Their study also finds that this unanticipated change in family size influences primarily informal or self-employed jobs. Moreover, the effect is notably more pronounced among women with higher education and those residing in urban areas. On a different approach, Agüero and Marks (2008) use infertility shocks as an instrument and identifies no significant influence of childbirth on women's paid employment.

The contribution of my thesis to the Turkish academic literature on female labor force participation is that it represents, to my understanding, the first endeavor to estimate the causal relationship between the number of young children (under the age 4) a woman has and female employment,

employing the Instrumental Variable (IV) methodology. Dayioglu and Kirdar (2010) conducted an in-depth analysis of the determinants of women's labor force participation in Turkey, utilizing tools such as logit regression. While their research effectively demonstrates the fluctuating probabilities of labor force participation among women from diverse educational backgrounds and age groups, it does not consider the number of young children in a household. However, it does account for the presence of children up to age 14 within the household. Interestingly, their findings indicate both significant negative and positive correlations between the likelihood of labor force participation and the presence of children, contingent upon the type of residence. My thesis goes beyond correlations between the two variables and tries to capture the causal relationship. Sevinc (2011) previously endeavored to estimate the causal relationship between fertility and female employment, using the twin-birth instrument as a proxy for total number of children, with an exploration into the gender composition of twins and familial gender-preference dynamics. Varol (2017), through the application of a binary logit model to examine key factors influencing female labor force participation in Turkey, also finds a parallel outcome. The study reveals a negative correlation between the number of children and female labor force participation within the country. More recently, Tümen and Turan (2020) examined the influence of informal employment on women's post-fertility labor supply preferences, focusing on both intensive and extensive margins, using the twin births instrument. However, their study did not consider the impact of the number of young children a woman has.

My findings indicate that an additional child of any age causes 8.4 percentage points decrease in the women's probability of labor force participation for women with at least one child in Turkey; but a larger negative effect of 11.6 percentage points is observed when we consider the number of young children (children under the age of 4) in a household as the independent variable. This

negative effect becomes more pronounced to 15.7 percentage points when considering women residing in urban areas. Furthermore, the likelihood of employment for women with higher education is larger but insignificant for each additional child under 4, with a smaller impact for women with only primary or secondary education levels.

The structure of this paper is organized as follows: the upcoming section will introduce the dataset used in this research and detail the econometric methodology employed. The subsequent section will present the findings. The final section includes conclusion, limitations, and discusses policy implications.

2. Data and Methodology

In my thesis I use a cross-sectional survey data from the Demographic and Health Surveys for Turkey from the year 2018. Demographic and Health Surveys are a nationally representative household surveys providing detailed information on women's employment status, birth history, education level, type of residence, socioeconomic status, and a detailed account of health and household background characteristics of each household for developing countries. The program conducted its first survey in Turkey in 1993 and it has been conducted once in every five years by the Hacettepe University Institute of Population Studies. The datasets are available on request at the Demographic Health Surveys (DHS) Program website. The DHS data provides a comprehensive record of birth histories, including all instances of multiple births. It also records women's current employment status. However, the data from Turkey lacks information on mothers actively seeking employment, thus not fully capturing the extent of female participation in the labor market. The dataset does not explicitly provide information on the sequence of twin births, such as whether twins were born on the first or second birth. To identify twin births, I match the birth order and birth month and year of a child to the case ID of the surveyed women from the birth records dataset, as well as to the household ID associated with each woman. If the birth month and year of two children with birth orders one or two match exactly, value 1 is assigned to those unique women. The age of each child is also not available in the women's individual records dataset. However, by examining the birth records dataset for all children a woman has, I can assign a count of children under the age of four to a new variable. Subsequently, I match this newly created variable with the individual records dataset.

The main sample consists of 7346 women between the ages 15 and 49. I restrict my sample to women between the ages 18-40 who gave first birth before the age 35 -in order to focus on the years where women are more reproductive-, who are married, and have at least one child. Also, to tackle the possible endogeneity of household formation I consider mothers with children younger than 14. After excluding these observations from the sample, I have 3400 observations left, which represents 46 percent of the main sample. (Table 1)

Table 1. Summary Statistics of the Sample of Mothers (N = 3400)

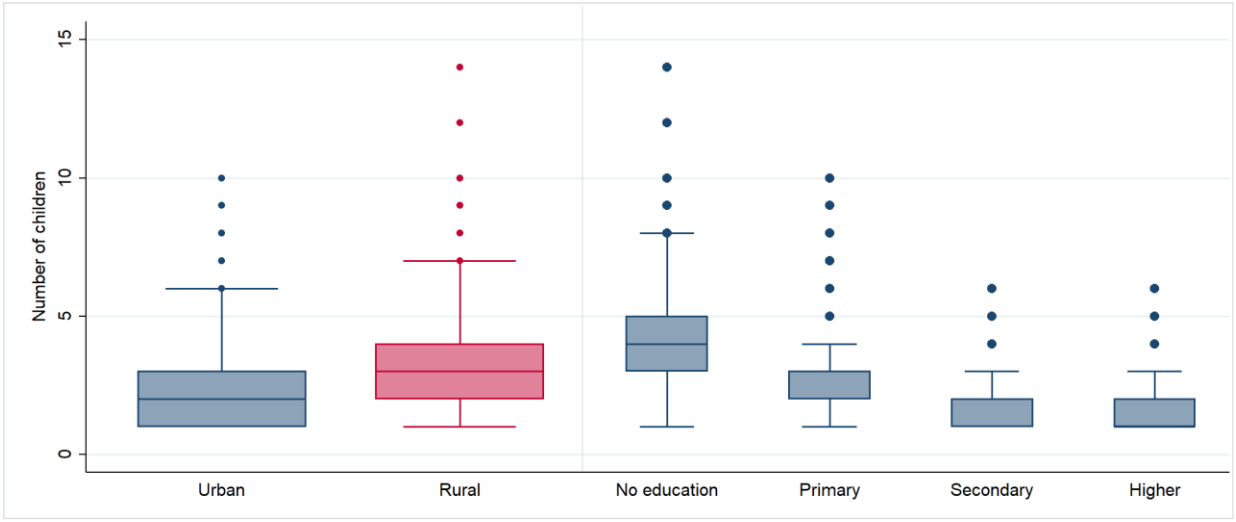
Variable	Mean	St. dev.	Min	Max
Employment	0.26	0.44	0	1
Total number of children	2.44	1.35	1	14
Number of small children (age < 4)	0.60	0.67	0	4
Twins at first birth	0.02	0.13	0	1
Age	32.03	5.44	18	40
Age at first birth	21.86	4.10	12	35
Urban	0.72	0.45	0	1
Household Wealth				
Below middle class	0.44	0.50	0	1
Above middle class	0.56	0.50	0	1
Education in single years	7.50	4.38	0	21
Education				
No education	0.10	0.30	0	1
Primary	0.35	0.48	0	1
Secondary	0.40	0.49	0	1
Higher	0.15	0.35	0	1

In the restricted sample, I observe that approximately 26 percent of women are currently employed. The women in the dataset, on average, have about 2.44 children, with an average of 0.60 children under the age of four. Notably, around 2 percent of women experienced twin births during their first pregnancy. The average age of the women is approximately 32 years old, and they typically

gave birth to their first child at about 22 years old. A significant majority of these women, 72 percent, reside in urban areas. Regarding wealth distribution[3], my sample is almost evenly divided, with a slight lean towards households above the middle class at 56 percent, while those below the middle-class account for 44 percent. In terms of education, the women in my sample have, on average, about 7.5 years of education. When I break down education levels, I find that 10 percent of women have no formal education, while the largest group, 40 percent, has completed secondary education. 35 percent of the women have completed primary education, and only 15 percent have pursued higher education.

The correlation between a woman's level of education and her fertility choices is illustrated on the right panel of Figure 2 below. As anticipated, the data suggests that as educational attainment rises, women in the sample demonstrated a diminished propensity for having a larger number of children. This trend holds for both urban and rural residences, although with rural areas showing a greater average number of children per woman.

Figure 2. Total Number of children per women in Turkey, by place of residence (left) and level of education (right)

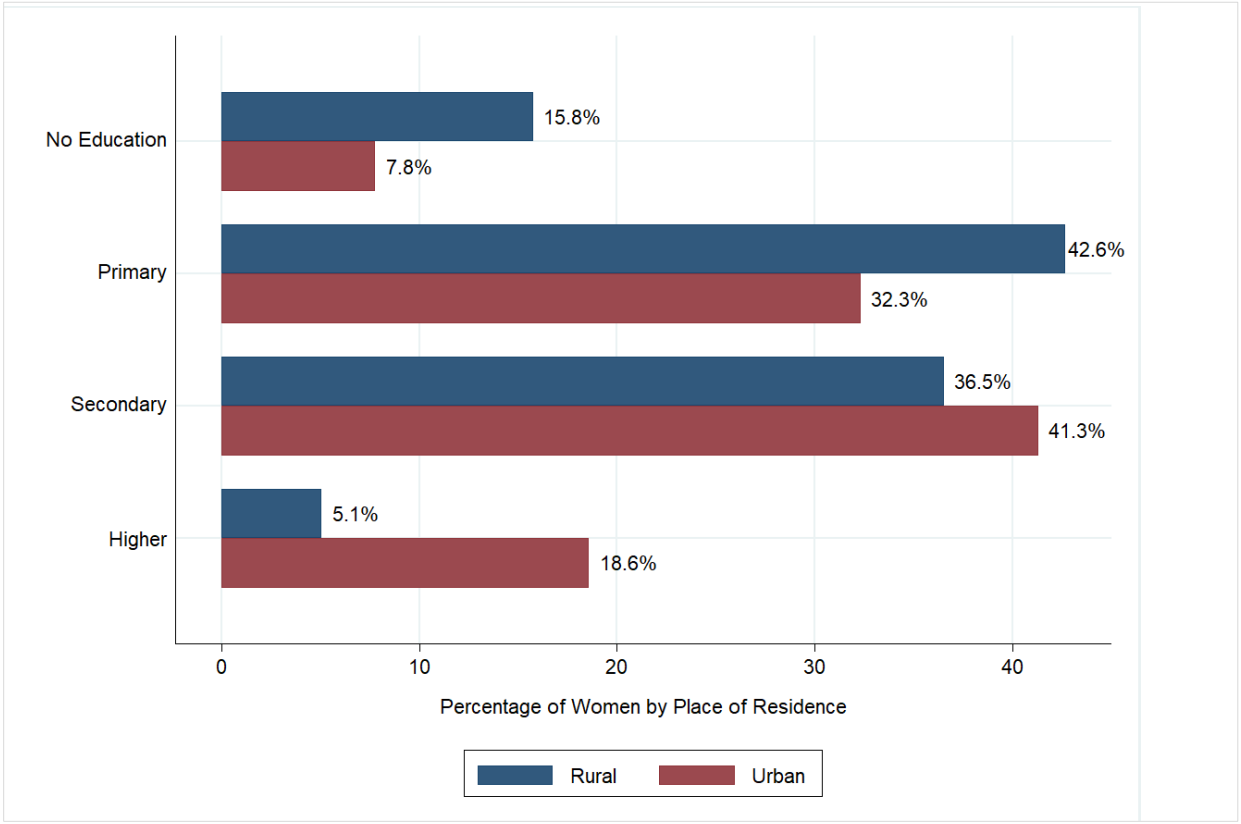


Source: Turkey 2018 DHS dataset.

[3] The wealth indices are constructed based on durables in the household and the condition of facilities.

Figure 3, displayed below, illustrates the education levels of women categorized by their place of residence. As anticipated, the proportion of women who have attained higher education is noticeably greater in urban areas as opposed to rural settings. Specifically, 18.6 percent of women in urban areas have achieved a higher level of education, contrasted with a mere 5.1 percent in rural areas. Similarly, the trend extends to those with no formal education: only 7.8 percent of women in urban regions fit this category, while the figure escalates to 15.7 percent among their rural counterparts. When juxtaposed with Figure 2, which presents the distribution of total number of children based on place of residence of women, a pattern emerges. As we transition from urban to rural areas, there is a simultaneous decrease in the educational attainment of women and an increase in the number of children they have. This correlation suggests a direct link between a woman's level of education and their fertility rate across different residential contexts.

Figure 3. Highest Level of Education Achieved by Women in Turkey, by Place of Residence



Source: Author's own calculations based on the Turkey DHS dataset (2018).

The factors influencing a woman's decision to have more children are intrinsically linked to her decision to work. In econometric terms, ordinary least squares (OLS) estimates are likely to be biased due to the inherent endogeneity of fertility and the unobserved variation in the error term. Consequently, if an exogenous variable impacts the number of children a woman has, but does not directly influence her labor supply decisions, then this exogenous variation can be utilized to estimate the true effect of fertility on women's labor supply.

The existing literature concerning the relationship between fertility and female labor supply proposes that twin births are a prime example of an exogenous factor that directly influences fertility but impacts labor supply only through this channel. However, this doesn't account for all aspects of endogeneity. For example, the fact that a woman gave birth to twins may imply a pre-existing decision to have children. Therefore, such women may not be directly comparable to women who do not have any children, as the decision to have children is endogenous to the decision to work. This underpins my rationale for restricting the sample to women with at least one child. Bronnars and Grogger (1994) point out that having twins at the first birth is strongly correlated with a woman's age at her first birth. This factor, in turn, also influences a woman's labor supply decision, which constitutes a violation of the exclusion restriction. To address this, I have included the *age at first birth* variable in the regressions to randomize the occurrence of twin births.

Following this, I employ a two-stage least-squares regression, utilizing twins at first birth as an instrument for the number of children, and additionally for the number of children under the age of four in separate regressions. With the sample of women obtained after the exclusions, the first-stage regression equation below estimates the influence of twin birth on the total number of

children a woman has (or the number of children under age four):

$$C_i = a + \beta\, TW_i + \gamma\, X'_i + e_i \quad (1)$$

where C_i denotes the number of children ever birthed by woman, TW_i is a dummy variable that equals 1 if a woman gave birth to twins at first birth and 0 otherwise, and X'_i encompasses a control vector for women's and household background attributes, such as age, age squared, education in years, education squared, age at first birth, household wealth, and type of residence, and e_i represents the error term.

The second-stage regression is given by equation 2 below:

$$Y_i = \theta + \delta\, C_i + \mu\, X'_i + \varepsilon_i \quad (2)$$

where Y_i symbolizes the labor force participation of woman i and equals 1 if the woman reported being currently employed at the time of the survey, and 0 otherwise. C_i represents total number of children woman i has, and X'_i denotes the above-mentioned vector of covariates, and ε_i the error term.

For the results to be valid, there has to be robust relationship between the instrument TW_i and the dependent variable C_i.

3. Results

Table 2 below reports the two-stage least squares estimation to assess the impact of the number of children on women's employment. I find that, on average, an increase in the number of children of any age is associated with an 8.4 percentage points decrease in the probability of women's labor force participation.[4] Although this is an economically large effect, it is statistically not significant.[5] Tümen and Turan (2020) similarly identified a negative correlation between the total number of children and women's labor force participation. However, their estimates reveal a comparatively smaller decrease of 2.4 percentage points but statistically significant owing to the much larger sample size utilized in their study.

Table 2. Two-Stage Least Squares Estimates of the Effect of Number of Children and Number of Small Children on Women's Labor Force Participation *(IV = First-birth twin)*

	All	
	1	2
Number of children	-0.0840	
	(0.0737)	
Number of small children (age < 4)		-0.116
		(0.145)
Number of children (age > 4)		-0.0538***
		(0.0126)
Number of observations	3400	3400
R-squared	0.115	0.119
First-stage	0.8460***	0.4260***
	(0.1153)	(0.1267)
F-statistic	205.37	164.06

Notes: Covariates in the regressions include age, age-squared, education (years), education squared, residence (urban = 1), wealth indicator (below middle class = 1) for sample of women aged 18-40 who gave first birth before the age of 35. Robust standard errors reported in the parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions have first-stage F-statistics higher than 10 (which is a rule of thumb cutoff for weak instruments; see Staiger & Stock, 1997)

[4] 2SLS estimates reflect Local Average Treatment Effects (LATEs), signifying that they represent the average effect of a treatment on a particular subgroup that is influenced by the treatment. For instance, these estimates depict the average effect of having additional children on those women who unexpectedly gave birth to twins and consequently expanded their families beyond their initial plans but wouldn't have chosen to have more children otherwise.

[5] It is not uncommon to have large standard errors in 2SLS estimates, although the strong first-stage relationship shows robustness.

This suggests that having an additional children discourage women from participating in the labor force, possibly due to increased childcare responsibilities. The first-stage regression shows a strong and significant relationship between the instrument (having twins at first birth) and control variable (number of children of any age).

In the second regression (Column 2), I differentiate between number of young children (those under age 4) and number of older children (those aged 4 and above) to test the hypothesis that the effect of children on women's employment probability is only significant when the child is young. The effect increases to 11.6 percentage points, but not statistically significant. This finding aligns with that of De Jong et al. (2017), who reported that having children under the age of 6 (instrumented with twin birth) resulted in a 10.7 percentage point decrease in the probability of women's labor force participation in Africa. This might imply that the demand for care for younger children, who need more constant attention in the pre-schooling period, may prevent women from being able to work. On the other hand, the number of older children significantly negatively impacts women's labor force participation by 5.4 percentage points. However, it's worth noting that the magnitude of the effect is smaller compared to the one for younger children, which could suggest that as children grow older and start schooling, the barrier to women's labor force participation may decrease somewhat. The first-stage regression reveals once again a strong and significant relationship between the instrument and the control variable, indicating that giving birth to twins is a strong predictor for the number of children a woman has.

Urbanization plays an important role in the decrease of female labor force participation. Women migrating from rural areas, who were primarily engaged in unpaid domestic chores, often face unemployment, or find themselves unable to participate in the labor market when they migrate to urban areas (Uraz et. al., 2010). In order to observe those differences between urban and rural areas

of Turkey, I run four separate regressions (Table 3), where I disaggregate the effects of the number of children and small children on women's labor force participation (LFP) by place of residence, looking separately at urban and rural residents.

Table 3. Two-Stage Least Squares Estimates of the Effect of Number of Children and Number of Small Children on Women's Labor Force Participation, by Place of Residence *(IV = First-birth twin)*

	Urban		**Rural**	
	1	2	3	4
Number of children	-0.118		0.0238	
	(0.0810)		(0.150)	
Number of small children (age < 4)		-0.157		0.553
		(0.126)		(1.738)
Number of children (age > 4)		-0.0625***		-0.0499***
		(0.0192)		(0.0181)
Number of observations	2436	2436	964	964
R-squared	0.123	0.130	0.0547	.
First-stage	0.8942***	0.5571***	0.8270***	0.1052
	(0.1459)	(0.1459)	(0.1677)	(0.2373)
F-statistic	166.33	131.72	68.44	56.81

Notes: Covariates in the regressions include age, age-squared, education (years), education squared, wealth indicator (below middle class = 1) for sample of women aged 18-40 who gave first birth before the age of 35. Robust standard errors reported in the parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions have first-stage F-statistics higher than 10 (which is a rule of thumb cutoff for weak instruments; see Staiger & Stock, 1997)

For urban residents, in the first regression, the effect of each additional child of any age is 11.8 percentage points decrease in the probability of a women participation in the labor force, although the effect is not statistically significant. In the second regression (column 2) I differentiate between the number of young children (those under age 4) and older children (those aged 4 and above). The results suggest that having an additional young child in the household is associated with a 15.7 percentage point decrease in the likelihood of women's labor force participation. However, the effect of each older child is smaller but significant in the same direction. These findings for urban areas might be related to the availability of limited employment opportunities for women with low levels of education, cultural norms that prevent women from interacting with males who are not

part of their family (Palaz, 2005), or the accessibility and affordability of childcare services before schooling in urban settings.

Turning to rural residents, the relationship between the number of children and women's labor force participation appears to change. In the first regression (column 3), the coefficient for the number of children of any age is positive but not statistically significant. This result could suggest that in rural areas, having more children does not necessarily discourage women from participating in the labor force partly due to differences in family structures or the nature of available work. For instance, it is very common to have large households where extended family live together in rural areas providing support for care for children in the household, enabling mothers of young children to participate in the labor force. Also, the predominant economic activity in rural areas of Turkey is largely agricultural, a sector in which women have traditionally been able to bring their children to the fields, thus enabling them to maintain their work routines. However, this outcome requires careful interpretation, given that the initial labor force participation rate for women in rural areas stands only at 27 percent - a significantly low figure for such a large coefficient.

In the last regression (column 4), for rural residents the number of young children has a very large positive effect, with 55.3 percentage point increase in the likelihood of women's labor force participation, but the estimate is not reliable as it is associated with a very large standard error and a weak first-stage relationship between the instrument and the control variable.

Table 4 presents the results of regression analyses examining the effect of the number of children on mother's labor force participation (LFP) across different levels of educational attainment.

Table 4. Two-Stage Least Squares Estimates of the Effect of Number of Children on Women's Labor Force Participation, by Level of Education *(IV = First-birth twin)*

	No Education	**Primary Education**	**Secondary Education**	**Higher Education**
	1	2	3	4
Number of children	0.132	-0.0974	-0.0761	-0.288**
	(0.104)	(0.174)	(0.116)	(0.128)
Number of observations	342	1198	1358	502
R-squared	.	0.0801	0.0909	0.0573
First-stage	1.7741***	0.5725**	0.8368***	0.7595***
	(0.6210)	(0.2307)	(0.1267)	(0.1484)
F-statistic	40.61	51.26	91.08	30.23

Notes: Covariates in the regressions include age, age-squared, residence (urban = 1), wealth indicator (below middle class = 1) for sample of women aged 18-40 who gave first birth before the age of 35. Robust standard errors reported in the parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions have first-stage F-statistics higher than 10 (which is a rule of thumb cutoff for weak instruments; see Staiger & Stock, 1997)

For women with no education, an additional child is associated with an increase in their likelihood to participate in the labor force by 13.2 percentage points, a very large coefficient given the very low labor force participation rate for women with no education, 13 percent. Considering this, this outcome could potentially be attributed to a variety of factors. For instance, women lacking formal education often depend more on informal and lower-paying jobs, where an increased number of children doesn't necessarily inhibit their ability to work. Moreover, low educational attainment usually corresponds to lower income, hence the need to provide for additional family members might compel a mother to seek employment. This circumstance could account for the observed increase in the likelihood to participate on the labor force.

For women with primary education, the effect of having an additional child appears to reduce their labor force participation by 9.74 percentage points, although this effect is not statistically significant. The results are similar for women with secondary education, a decrease of 7.61 percentage points. This result suggests that primary or secondary-educated women may experience childcare responsibilities as a constraint to entering the labor market.

Finally, among women with higher education, an additional child significantly reduces their likelihood to participate in the labor force by 28.8 percentage points. This result suggests that the "child penalty" is particularly severe for highly educated women. This could be because highly educated women often hold jobs that require time commitments and offer less flexibility, making it harder for them to balance work and family life. Another plausible explanation could be that highly educated women often pair up with men of similar educational levels, typically leading to a higher household income. This dynamic might contribute to the observed decline in a woman's likelihood to participate in the labor force with each additional child, as the financial necessity to compensate for lost income by working is less pronounced.

Table 5. Two-Stage Least Squares Estimates of the Effect of Number of Small Children on Women's Labor Force Participation, by Level of Education *(IV = First-birth twin)*

	No Education	**Primary Education**	**Secondary Education**	**Higher Education**
	1	2	3	4
Number of small children (age < 4)	0.470	-0.183	-0.0844	-0.700*
	(0.363)	(0.699)	(0.135)	(0.372)
Number of children (age > 4)	-0.0220	-0.0682***	-0.0394	-0.133*
	(0.0236)	(0.0154)	(0.0395)	(0.0798)
Number of observations	342	1198	1358	502
R-squared	.	0.0789	0.0942	.
First-stage	0.5566	0.1380	0.7160***	0.3241*
	(0.5875)	(0.2001)	(0.1803)	(0.2107)
F-statistic	17.34	53.62	114.09	29.42

Notes: Covariates in the regressions include age, age-squared, residence (urban = 1), wealth indicator (below middle class = 1) for sample of women aged 18-40 who gave first birth before the age of 35. Robust standard errors reported in the parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions have first-stage F-statistics higher than 10 (which is a rule of thumb cutoff for weak instruments; see Staiger & Stock, 1997)

Table 5 further disaggregates the effect into having young children (age < 4) for across different education levels. For women with no education, having an additional young child is associated with an increase in their likelihood to participate in the labor force by a large 47.0 percentage points. However, this relationship is not statistically significant, along with an insignificant first-

stage relationship of the instrument with the control variable and a low F-stat value. This insignificant effect is also observed in women with primary education. For women with secondary education, each additional young child decreases their likelihood to participate in the labor force by 8.44 percentage points, whereas the effect of each additional older child reduces is lower.

Finally, for women with higher education, each additional young child reduces their likelihood to participate in the labor force by a very large 70.0 percentage points. But this should be interpreted with caution as the first-stage relationship is weak hence the second-stage estimates are not very robust.

These disparities between the impact of an additional child on women's labor force participation among different education levels underscore the need for flexible work and substantial childcare support, especially for highly educated women facing stark work-family trade-offs. It highlights the importance of taking societal norms and structural differences in urban and rural settings into account when designing policies addressing these disparities, such as improved childcare support for educated women and flexible work arrangements, to better accommodate women's labor market experiences across different educational backgrounds in Turkey.

4. Conclusion

In this study, I investigated the influence of the number of young children in a household on women's employment in Turkey, using microdata from the 2018 Demographic and Health Survey (DHS). In conclusion, my study offers causal evidence of the significant impact the number of total children and number of children younger than age 4 has on women's labor force participation in Turkey.

My findings show a clear inverse causal relationship between the number of children and women's labor force participation, as also observed in many industrialized countries and consistent with the literature. While this study found an 8.4 percentage point decrease in women's likelihood to participate in the labor force -a finding parallel to those of Tümen and Turan (2020) in Turkey and Chen (2022) in China- Caceres-Delpiano's (2012) results for a sample of 40 developing countries revealed a comparatively smaller effect. Furthermore, each additional child under the age of 4 leads to a 11.6 percentage point reduction in a woman's probability to participate in the labor force in Turkey, similarly to that of De Jong et al (2017) in Africa. The impact of having additional children beyond this age bracket also has a significant effect, albeit smaller. The primary finding of this study is the increased impact on women's labor force participation when considering the number of younger children—that has remained unexplored within the context of Turkey in the current literature.

Furthermore, when segregating the data by different levels of education, it becomes evident that women with higher education are disproportionately affected. In contrast, for women with primary or secondary education levels, the effect, while still present, is lesser and statistically insignificant.

The differences in the magnitude, direction, and the significance of the results when considering different subpopulations based on place of residence and education levels likely stem from the heterogeneity of the effects across different subpopulations (Sevinc, 2011), highlighting the need for targeted policy interventions.

Nonetheless, this study has some potential limitations. One of the potential limitations is that the existence of fertility treatments, which are common in Turkey, could potentially invalidate the instrumental variable design's exclusion restriction. Despite the dataset offering some information on reasons for not using fertility treatments, this was incomplete and thus, not utilized. However,

research by Braakmann and Wildman (2016) suggests that even in scenarios where fertility treatments are common, the bias caused by not controlling for this factor is relatively small. Another limitation of this study is the limited sample size. The principal challenge in employing twin birth as an instrument is its infrequent occurrence, which results in a notably small treatment group of women. For more robust results, future studies in the Turkish context should aim to utilize larger census samples or combine datasets from multiple years with year fixed effects, thereby ensuring a more substantial sample size.

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