# The Effect of Grandparents on Female Labor Force Participation in the United States: Using Fertility Trends in Country of Origin

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**Abstract**

In comparison to other developed countries, female labor force participation in the US has grown at slower rates. One possible explanation is differences in the cost of child care. Since grandparents are able to provide childcare for free, I am interested in the effect that an increase in grandparent-provided childcare has on female employment for immigrant women in the U.S. Due to the availability of grandparents being endogenous, my first empirical strategy uses variation in fertility trends where falling fertility rates at time of birth in country of origin will lead to fewer siblings and thus more access to grandparent-provided childcare since their parents' time will be split between less people. Using the American Community Survey from 2000-2019, I find that a mother's probability of being in the labor force increases if fertility trends were decreasing around her birth year in her country of origin. Using a separate dataset, I confirm that these women received more hours of grandparent-provided childcare. In addition, I also use China's One-Child Policy as a second source of exogenous variation since, theoretically, individuals born during the policy would be less likely to have siblings. Results from this analysis as well as running my fertility trends model separately by continent suggest that the effect of grandparents is heterogeneous across cultures since grandparents may also affect female employment through mechanisms such as social norms and expectations, in addition to providing childcare at low costs.

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# Contents

# 1  Introduction

This paper aims to isolate and understand the effect of grandparents in the household on women's labor force participation (LFP). Child Care Aware writes in their 2018 report that in the U.S, the average cost of caring for one child is greater than 10.6% of the median household income. These high costs in conjunction with America's relatively short maternity leave and limited sick days may contribute to the gap in LFP between men and women. According to a 2021 U.S. Treasury report on child care supply, the female LFP rates in other OECD countries have increased since 2000 while the rate in the U.S, especially for women with children, has stayed flat. Olivetti and Petrongolo (2017) offer one explanation: the US offers much fewer weeks of protected leave in comparison to 14 other developed countries. Cultural and social norms, in conjunction with the lower average earnings of women relative to men, may lead women to disproportionately shoulder childcare responsibilities. The lower average earnings mean that the opportunity cost of women providing household labor is lower than men. Even taking a few years off of work can have drastic decreases in expected lifetime earnings and career advancement, thus perpetuating the cycle of unequal distributions in housework/ childcare, employment, and wages between men and women.

In my thesis, I focus on the effect of grandparents on female LFP since grandparents can provide childcare at low to free costs. In the United States, according to a 2013 report by the Pew Research Center, 10% of children are living in a household with at least one grandparent and for children under 6, that percentage increases to 14%. I predict that in households where there is a co-residing grandparent, women with children, relative to mothers in households without a grandparent, will have higher rates of labor force participation since the grandparents will be able to take care of her children while she is working. This will both allow her to get back into

the workforce sooner after having children as well as allow her to take on employment opportunities that require longer hours. In addition, I expect grandparents to make a larger positive impact on a mother's employment for families that have younger children since kids that are too young for school enrollment require more hours of childcare.

Examining the impact of grandparent availability on female employment poses an identification challenge since co-residence or living in proximity to grandparents is endogenous. Simply regressing mother's LFP on grandparent availability would yield coefficients that could have either a negative or a positive bias, of unknown magnitudes. For example, household income may be positively or negatively correlated with grandparent co-residence depending on the health of the grandparents and if the adult children are living with their parents due to being unable to afford their own home. In my thesis I use two empirical strategies with different sources of exogenous variation in grandparent availability. Both strategies focus on immigrants in the U.S. and changes in fertility around the time of their birth in their country of origin. These strategies share the premise that when adults have fewer siblings, their parents (a child's grandparents) would be more available to provide childcare, because their time is split between fewer adult children. While my findings are focused on immigrants, the results should generalize to a significant population: in 2020, 13.7 percent of the total U.S population were immigrants, according to the Pew Research center. My results may not generalize to native-born families, although native-born households also rely on grandparent-provided childcare. In the Survey of Income and Program Participation, around 3% of native households with children use grandparent provided childcare in comparison to 0.13% of immigrant households.

For my first empirical strategy, I calculate the fall in fertility from 5 years before to 5 years after an immigrant's birth in his or her home country, as a proxy for the

number of adult siblings the immigrant has. If I had data on grandparent availability, I could use this change in fertility as an instrumental variable, but since the American Community Survey does not have grandparent availability while offering sufficient statistical power, I focus on the reduced form regression of labor force participation on the fall in fertility. I run all of my regressions with country, birth year, and survey year fixed effects which control for any time and country varying factors. In addition, I also include additional person-level controls such as education level and the number of years since immigrating to the US as well as country-level additional controls such as GDP. My identifying assumption is that trends in employment are unrelated to changes in trends in fertility at birth, in country of origin, conditional on fixed effects. Fernandez and Fogli (2006) use country of origin fertility rate as a proxy for culture, which is why I am careful to include year of birth and country of birth fixed effects to account for the effect of fertility rates on female employment. I will also offer a falsification test using the change in fertility in the preceding 10 year period. Using both female employment status and female labor force participation as my outcome variables, I found that a one child decrease in total fertility during the 10-year birth year period for U.S. immigrants led to a positive and statistically significant increase of 2 percentage points in the probability of being in the labor force for women with children. For context a one-child decrease is about the median 10-year change in fertility around time of birth for my sample of immigrants.

Next, I used the Survey of Income and Program Participation (SIPP) to better understand the mechanism driving this increase in female labor force participation, since the SIPP data contains questions pertaining to the number of hours that grandparents spend caring for a household's children. Using the same empirical strategy, I find that a one-child decrease in the 10 year period around a mother's birth year increases the weekly hours of grandparent-provided childcare for children under the age of 6 by 0.25 hours. This is a nontrivial increase in hours of child care:

the average amount of time grandparents provide childcare for children under 6 for the overall sample was 0.15 hours per week.

I also offer some specification tests to help rule out alternative explanations or sources of bias. For example, it is possible that variables related to fertility that vary across country and time, such as education trends, are contributing to this change in female LFP. I conduct a validity check using fertility trends from 10 years prior to a mother's birth year and find no statistically significant impact on her labor force participation. Furthermore, I also check for possible sources of bias and find that decreases in the fertility rate did not lead to increased levels of education, fewer children, or increased income for immigrant mothers. A possible source of bias is that immigrant mothers may not be allowed to work if they are on an H1-B visa. I ran my regression with only immigrant mothers that have been in the United States for over 5 years and found slight increases in the effect from 0.020 to 0.022.

Since declines in fertility rate could be endogenous even after controlling for time-invariant differences across countries and ensuring the lack of a relationship between fertility declines and educational attainment or income, I explored using China's One-Child Policy as another source of exogenous variation in adult siblings, and in turn grandparent availability. The One-Child Policy, which passed in 1980 and ended in 2015, directly affected the number of siblings of an individual that was born after 1980 had since their parents were not permitted to have an additional child without paying a fine. Although there were some exceptions to this rule, people born during the One-Child Policy are more likely to be only children in comparison to individuals born before 1980. In addition to variation over time, I compare immigrants from China with immigrants from 30 control countries that were similar to China shortly before the One-Child Strategy. Surprisingly, I find that for mothers affected by the One-Child policy (born in China after 1980), there is a 5.8 percentage point additional decrease in their probability of being in the labor force

in comparison to mothers who immigrated from the control countries. One possible explanation is that grandparents may also affect women's labor force participation by affecting social norms in the household. To explore this, I check if the effect of grandparents on female LFP is heterogeneous across cultures by analyzing the effect of a decrease in fertility on female LFP for specific continents and find that for Asia the effect of grandparents is statistically insignificant while for all continents excluding Asia the effect is positive and statistically significant. These results are consistent with studies in India and China that find that having a father-in-law in the household reduces female labor force participation (Dhanaraj and Mahabare 2019; Debnat 2015; Jayaraman and Khan 2023; Yang et al 2016). On the other hand, Mano and Yamamura (2011), treating family structure as exogenous, found a positive relationship between MIL co-residence and female employment and no effect for FIL for households in Japan, but their results could be biased due to the endogeneity of household formation.

My paper contributes to the literature that studies the effect of grandparents providing childcare on female labor force participation and fits into a larger research field of understanding how female labor force choices are affected by the availability of affordable childcare. Previous research on affordable childcare has found that lowering the price of childcare through public policy or immigration law increases mother's labor force participation (Lefebvre and Merrigan 2008, Cortés and Pan 2013, Cortés and Tessada 2011). Previous research has also studied the effect of grandparents on employment where grandparent co-residence is positively correlated with female LFP ( Liao and Paweenawat 2020; Mauere-Fazio et al. 2008; Aparicio-Fenoll and Vidal-Fernandez 2014). My first empirical strategy that utilizes decreases in fertility as a proxy for fewer siblings and thus more available grandparents finds positive coefficients of smaller magnitudes than the literature. This strategy contributes to the literature by focusing on US immigrants which allows

for policy recommendations surrounding immigration. Furthermore, the lack of affordable childcare in the US may create additional hurdles for immigrant mothers to enter the workforce in comparison to non-immigrant mothers. Using the One-Child policy as an additional source of exogenous variation in conjunction with looking at the effect of decreasing fertility for different continents, my paper contributes to the literature of the different contributions of grandparents and how their overall effect is heterogeneous across different cultures.

My thesis is structured in the following order. Section 2 provides a detailed literature review. Section 3 describes my first empirical strategy using fertility trends. In Section 4 I present my descriptive statistics for my dataset. In Section 5 I show the results from my empirical strategy using fertility trends as well as the results from two validity checks. Section 6 pivots to my second empirical strategy using the One-Child Policy for exogenous variation. Section 7 shows the results from my second empirical strategy. Section 8 delves into the heterogeneous effects of grandparents. Section 9 concludes my findings.

## 2  Literature Review

Previous literature has found a positive effect between an increased supply in affordable childcare and female LFP. Lefebvre and Merrigan (2008) used a 1997 policy change from Quebec where a childcare subsidy meant that 4-year-old children could attend daycare for the reduced cost of $5 per day. Using a difference-in-difference model, they estimate that this policy increased LFP by 8.1 percentage points for mothers with at least one child between 1 and 5 years old in 2002. Studies have also looked at how an increased supply of low cost childcare in the form of immigration is positively correlated with the number of hours worked by mothers. Cortés and Pan (2013) used differences in the foreign domestic worker (FDW) program between Hong Kong and Taiwan over time. Using Taiwan as a control country, they found that policies in Hong Kong that increased the supply of FDW workers increased female LFP for mothers with young children by between 8 and 13 percentage points relative to mothers with older children. In the US, Cortés and Tessada (2011) found that women at the top income quartile worked 20 more minutes per week following increases in the supply of low-skilled immigrants in the 1980s and 1990s. Since grandparents are able to provide childcare for lower costs than FDW, the benefit of having a grandparent should not be consolidated to the top income quartile in comparison.

Previous research has also found that increased grandparent co-residence has a positive correlation with female LFP. Liao and Paweenawat (2020) found a positive relationship between intergenerational co-residence and female labor supply in Thailand. They used the percentage of households with co-resident parents over the age of 70 in the region, a set of regional dummies, and a set of wives and husbands' age interactions as an instrumental variable. Since having a parent over the age of 70 in the household is endogenous to female labor decisions, where older parents

may have higher medical bills and other effects, Liao and Paweeenawat separated the sample into different age cohorts and ran the model for each one individually. Using a fixed effects model, they also found that having young children increases the probability that couples are residing with their parents. Household formation is likely endogenous with other variables that affect female employment such as income so using it as an instrument may violate the exclusion restriction, thus weakening causality.

Using Chinese population census data, Mauere-Fazio et al. (2008) found that having a grandparent in the household increases female LFP by 6.6 percentage points using the same instrument as Liao and Paweenawat. Thus, their results are likely biased due to the endogeneity of household formation. Xiaochu Hu used panel regression methods to find that for new US immigrant mothers, co-residing grandparents increased their probability of being in the workforce by 7.4%. However this estimate is not causal since co-residence is endogenous to female labor force choices. Hu also used variation in retirement age of country of origin as an instrument for grandparent availability. She found retirement age to be a weak instrument since retirement age varies across countries with much less variation over time. Aparicio-Fenoll and Vidal-Fernandez (2014) found that an increase in the retirement age in Italy, which increases the labor supply of grandparents, led to decreases in LFP of their daughters of around 5 percentage points.

Beyond increasing the availability of affordable childcare, grandparents may negatively increase female employment through bringing social norms into the household. Dhanaraj and Mahambare (2019) used the death of a father-in-law (FIL) as an instrument for having a father in law in the household and found that co-residence decreases female employment by 12 percentage points. Debnath (2015) and Jayaraman and Khan (2023) also used the death of a FIL as an instrument for co-residence. Debnath found that co-residing decreases a women's labor force

participation by 11% and Jayaraman and Khan found that co-residing with a father in law decreases female LFP by 4.9 percentage points. Debnath also finds that the effect of co-residence on female labor supply differs across household income, region, and caste. The use of father-in-law death as an instrument assumes that the grandparent's death was completely random. If the father-in-law had been sick for a while, it may affect a household's employment and budgeting choices. A woman may take time off work to care for a sick FIL or she may choose to work more to pay for the change in household income. Yang et al. (2016) found that intergenerational co-residence decreases female LFP in China by about 14 percentage points. They used whether a woman has an older brother as an instrument for grandparent availability since cultural norms lead to parents having a strong preference for living with their son. I contribute to this literature by estimating heterogeneous effects across countries of origin, proxied by continent.

# 3 Empirical Strategy Using Fertility Trends

For my primary empirical strategy to study the effect of grandparents on female labor force participation, I will be using fertility trends as my source of exogenous variation. Looking at immigrants in the United States, I calculated the change in fertility over the 10-year period surrounding an immigrant's birth year in their country of birth to predict variation in the number of siblings. Being born in a 10-year period where fertility rates are falling means that an individual is likely to have fewer siblings than someone born during a period of increasing fertility rates. The number of siblings one has predicts grandparent availability since having fewer siblings means that your parents time is split between fewer of their adult children. For immigrants especially, having fewer siblings also means that the grandparents are more likely to have immigrated to the U.S. In the flowchart below, I provide examples of two individuals born in different countries around the same time (who are therefore of similar ages). Both Individuals A and B are US immigrants. Individual A was born in 1975 in Ethiopia and thus their corresponding 10-year fall in fertility is 0.33. This means that Ethiopia experienced a 0.33 increase in fertility over 10 years. Individual B was born in 1974 in Romania with a corresponding 10-year fall in fertility of -0.7. Therefore, Romania experienced a 0.7 decrease in fertility over 10 years. Comparing individual A to B, individual A was born during a time of increasing fertility rates while individual B was born during a time of falling fertility. Thus after controlling for country, birth year, and survey differences, individual A is expected to have more siblings than individual B, and hence less grandparent availability for childcare since their parent's time will be split between their siblings.
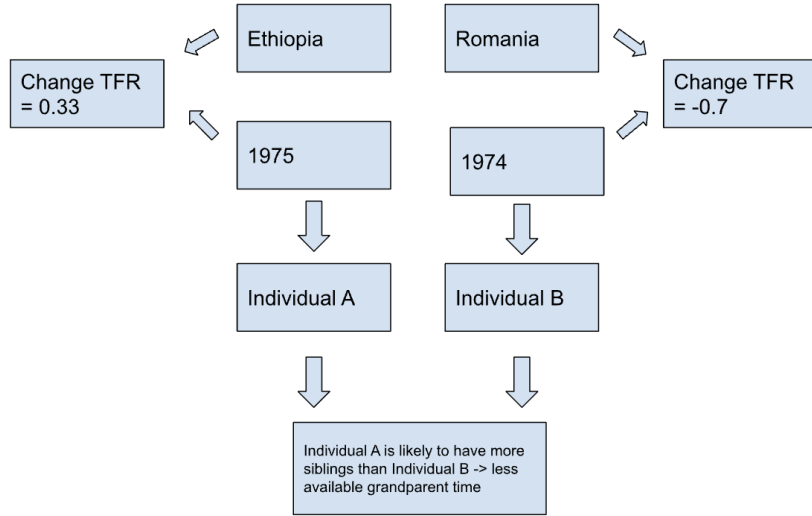
Figure 1: Change in TFR for two individuals born in different countries at different times

My regression equation is the following:

$$Y_{ijt} = \beta_0 + \beta_1 changeTFR_{jt} + \gamma_1 X_{ijt} + \gamma_2 Z_{jt} + \alpha_j + \alpha_t + \alpha_k + \epsilon_{ijt}$$

$Y_{ijt}$ is the measure of female LFP for each individual $i$ born in country $j$ in year $t$. $changeTFR$ is the 10 year fall in fertility rate for country $j$ at year $t$. $X_{ijt}$ are additional individual-level control variables (education, yrs in US). $Z_{jt}$ are additional country-level control variables (GDP). All regressions are run with fixed effects for birth year, survey year, and country.

I regress female labor force participation on my 10-year fall in fertility variable. For my outcome variables, I use female LFP and female employment status. LFP is a dummy variable that equals 1 if a person is either employed or unemployed (0 meaning neither employed nor seeking work) while employment status only equals 1 if a person is employed. By first running my regression with both female and male immigrants and then restricting my regression to only female immigrants and then to only immigrant mothers, I am able to specifically test for the effect of a fall

in fertility on female and mother's employment. Beyond controlling for birth year, survey year and country, I also include individual-level controls such as education and years in the US and country-level controls such as GDP.

My country fixed effects are able to account for differences between countries that are correlated with employment that do not vary over time. My time fixed effects account for shocks that affect all countries throughout time such as global recessions. These control variables are able to account for and eliminate many sources of bias but my coefficient on change TFR may still be biased from other time-varying cross-country differences that are correlated with fertility such as educational trends. Conditioning on the country and birth year fixed effects, I show that education is not correlated with change in fertility by regressing education level on change TFR and found no statistically significant effect. Since previous papers have used fertility as a proxy for culture, I looked at the change in fertility from 10 years before an individual's birth year and found no effect on a mother's probability of being in the labor force. In addition, the literature shows that there may be heterogeneous effects of grandparents. Even though fewer siblings suggests more grandparent availability for childcare, this increased availability of grandparents for childcare may not translate into higher levels of female employment if, for example, grandparents' have strong preferences over their daughter or daughter-in-law's labor force decisions. I study this by estimating different models for immigrants hailing from different parts of the world.

# 4 Data Description

My primary dataset is the IPUMS ACS data from 2000 - 2019. I include, in my sample, all immigrants older than 14. I choose to exclude individuals under the age of 14 since they are legally too young to begin working. Using data from the World Bank's World Development Indicators (WDI), I calculate the fall in fertility over a 10 year period around an immigrant's birth in their country of birth. The WDI dataset also allows me to control for county-level variables such as GDP. Using IPUMS ACS data gives me the most statistical power due to its large sample size; however it does not contain information on whether or not grandparents are providing childcare. Thus I also use data from the Survey of Income and Program Participation (SIPP) from 2001 and 2004 to obtain this information. SIPP data is longitudinal and households are interviewed every 4 months for a total of 9 interviews per wave. In the core waves, the households are asked a smaller set of general questions and in the topical waves there are more specialized questions. I merged core wave 4 with topical wave 4, which contains specific questions regarding grandparents providing childcare, as well as wave 2 which contains information on birthplace.

Table 1: IPUMS Summary Statistics

Immigrants

|  | Mean | Std. Dev | N |
|---|---|---|---|
| Household Income | 79492.32 | 89198.41 | 5,873,414 |
| 10 year Change in TFR | -0.9180233 | 0.6255987 | 3,034,901 |
| LFP | 0.6443873 | 0.4786986 | 5,957,236 |
| Female LFP | 0.552522 | 0.4972339 | 3,121,673 |
| Number of Children | 0.9424163 | 1.19276 | 6,042,035 |
| Highschool Grad | 0.4532589 | 0.4978105 | 6,042,035 |
| College Grad | 0.286639 | 0.4521915 | 6,042,035 |

Figure 2: Ipums summary stats are given in Table 1.

Table 1 provides summary statistics from my IPUMS and WDI merged dataset.

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As expected immigrant female LFP is lower than overall immigrant LFP. The average for the 10-year change in TFR is close to a one-child decline. The max for the 10-year change in TFR is 1.39 and the min is -3.473.

# 5 Empirical Results

Table 2 contains the results. All of the columns examine the effect of a fall in fertility in an individual's country of origin on their labor force participation after immigrating to the United States. All columns have country of origin, survey year, and birth year fixed effects. The sample in Column 1 includes all immigrants, Column 2 presents the results for only female immigrants, while columns 3, 4, 5, and 6 restrict the sample further to only immigrant mothers. Column 4 controls for the number of years the individual has been in the United States as well as their level of education and Column 5 controls for GDP. Standard errors are clustered by country for all columns.

Table 2: The Effect of Fallen Fertility in Country of Origin on Female LFP

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | All | Women | Mothers | Mothers | Mothers | Mothers |
| Change TFR | 0.0026893 | 0.0117189 | 0.0199639** | 0.0204779** | 0.0225971** | 0.0191661 |
| | (0.008506) | (0.0121513) | (0.0089097) | (0.0086877) | (0.0100807) | (0.0127089) |
| | | | | | | |
| Number of observations | 2,952,709 | 1,490,318 | 909,974 | 909,974 | 790,728 | 909,974 |
| R-Squared | 0.064 | 0.0599 | 0.0606 | 0.092 | 0.0585 | 0.0629 |
| | | | | | | |
| | | | | | | |
| Linear trends | No | No | No | No | No | Yes |
| Controlling for yrsusa | No | No | No | Yes | No | No |
| Controlling for education | No | No | No | Yes | No | No |
| Controlling for GDP | No | No | No | No | Yes | No |

Standard errors in parenthesis and clustered by country
*** p<0.01, ** p<0.05, * p<0.1

In Column 1, for all immigrants, the coefficient on Change TFR is 0.002 and not statistically significant. When this sample is restricted to only women, the coefficient increases in magnitude to 0.011 but remains statistically insignificant.

The coefficient on Change TFR becomes significant at the 5% level with magnitude 0.02 in Column 3 when the sample is restricted to women with children. This means that given a one-child decrease in fertility during the 10 years surrounding a mother's birth year, we expect there to be a 2% point increase in the probability that she will be in the labor force, conditional on birth year and country fixed effects. This effect is robust to controlling for individual-level controls (education and number of years in the U.S, in Column 4) and GDP in the country and year of birth (Column 5). In Column 6, I include country of birth linear trends to control, at least linearly, for time-varying cross-country differences. The coefficient on Change TFR is no longer statistically significant but remains similar in magnitude to the coefficient in Column 3. This suggests that time-varying cross-country differences are not driving my point estimate, even though I do not have enough statistical power to identify the effect, once controlling for a separate trend for each country of birth.

Table 3: The Effect of Fallen Fertility in Country of Origin on Female Employment Status

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | All | Women | Mothers | Mothers | Mothers | Mothers |
| Change TFR | 0.0011345 | 0.0099408 | 0.0148556** | 0.0154353** | 0.017691** | 0.0175985 |
| | (0.0075513) | (0.0110349) | (0.0073747) | (0.0071623) | (0.0085381) | (0.0120066) |
| | | | | | | |
| Number of observations | 2,952,709 | 1,490,318 | 909,974 | 909,974 | 790,728 | 909,974 |
| R-Squared | 0.0667 | 0.064 | 0.0635 | 0.0973 | 0.0611 | 0.0655 |
| | | | | | | |
| | | | | | | |
| Linear trends | No | No | No | No | No | Yes |
| Controlling for yrsusa | No | No | No | Yes | No | No |
| Controlling for education | No | No | No | Yes | No | No |
| Controlling for GDP | No | No | No | No | Yes | No |

Standard errors in parenthesis and clustered by country
*** p<0.01, ** p<0.05, * p<0.1

Table 3 provides results using employment status as the dependent variable in-

stead of labor force participation. The difference between these two variables is that the labor force participation dummy variable includes both people who are employed and people who are unemployed and looking for work while the dummy variable for employment status only equals 1 when someone is currently employed. Similar to Table 2, the coefficient on change TFR is only statistically significant for women with children. A coefficient of 0.014 means that a one-child decrease in fertility during the 10-years surrounding a mother's birth year is associated with a 1.4% point increase in the probability that she will be employed. Across the board the coefficients have a smaller magnitude in Table 3. Likewise to Table 2, adding person-level control variables of educational level and number of years in the US or controlling for country GDP does not affect the results. The coefficient in Column 6, when I include country-of-birth linear trends is statistically insignificant but of similar magnitude to the previous results.

## 5.1 Mechanism

Table 4: SIPP Data Summary Statistics

|  | Mean | Std. Dev | N |
| --- | --- | --- | --- |
| Hours of grandcare all | 0.2517365 | 3.868633 | 408,431 |
| Hours of grandcare for age < 6 | 0.1498148 | 2.677741 | 408,431 |
| Employment status | 0.4786209 | 0.4995442 | 168,693 |

To understand and isolate the mechanism that is driving the increase in female employment following a one-child decrease in fertility around her birth year I used SIPP data which contains questions pertaining to sources of childcare. In topical module 4 of the SIPP data, there is a question asking households about the number of hours grandparents provide childcare in a given week for all children and for children under the age of six separately. On average for all households with children, grandparents provide 0.25 hours of childcare per week and 0.15 hours of childcare

for children under 6. In Table 5, I estimate the effect of a fall in fertility on hours of grandparent provided childcare. In Column 1, the outcome variable is the number of hours of grandparent-provided childcare for children of any age. The coefficient on Change TFR was positive but not statistically significant. In Column 2, I focused on childcare for children under the age of 6. I found that the coefficient on change TFR was positive and statistically significant. This means that for a one-child decrease in fertility around the 10-year period surrounding a mother's birth year, we expect the hours of weekly grandparent-provided childcare for children under 6 to increase by 0.25 hours. It makes sense that having fewer adult siblings would increase the amount of time your parents care for your younger children in particular since households are the most dependent on childcare prior to children starting school. The positive and statistically significant coefficient on Change TFR for children under 6 strengthens the explanation that the increase in a mother's LFP is due to increased grandparent availability.

Table 5: The Effect of Fallen Fertility on Hours of Grandparent Provided Childcare

| Variables | (1) | (2) | (3) |
|---|---|---|---|
|  | All | Children under 6 | Children under 6 |
| Change TFR | 0.1820422 | 0.2554774** | 0.2209624** |
|  | (0.1205388) | (0.0999915) | (0.0894932) |
|  |  |  |  |
| Number of observations | 45,432 | 45,432 | 44,729 |
| R-Squared | 0.0104 | 0.0092 | 0.0092 |
|  |  |  |  |
| Controlling for GDP per Capita | No | No | Yes |

Standard errors in parenthesis and clustered by country
*** p<0.01, ** p<0.05, * p<0.1

In Table 6, I estimated regressions similar to Tables 2 and 3 to test for possible sources of bias or alternative mechanisms by examining the relationship between

Change TFR and education, marital status, and other demographic variables. I use possible sources of bias as my outcome variable to see if there is something different between the types of people who are born during times of decreasing or increasing fertility rates beyond having fewer siblings to share their parents' time. I choose these y-variables since it seems plausible that women born during periods of declines in fertility may have higher levels of education because of access to more resources during childhood. Similar to years of education, I also ran these checks with whether or not an individual graduated highschool or college. Since marriage may affect a woman's labor force decisions, I also checked to see if a fall in fertility affected marriage rates. Family income may affect a woman's labor force decisions if higher levels of income allow the family to afford childcare or if lower levels of family income mean that the family cannot afford to live on one income alone. Another factor that could affect women's labor force decisions is the number of years she spends in the US. Spending more time in the US may mean that it is easier for her to get a job. All of the coefficients on Change TFR in these regressions were statistically insignificant which gives me greater confidence that the mechanism behind the positive effect that a fall in fertility has on female LFP is through the channel of increased grandparent availability.

Table 6: The Effect of Fallen Fertility on Different Y-variables

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | | | Highschool Grad | Annual Fmaily Income | |
| Y-variables | Education | Married | College Grad | | | Years in US |
| Change TFR | -0.0011496 | 0.044291 | 0.0035757 | -0.0024868 | 45828.69 | -0.036599 |
| | (0.0674112) | (0.0325753) | (0.0139019) | (0.0071466) | (53120.49) | (0.2088778) |
| | | | | | | |
| Number of observations | 1,527,919 | 1,527,919 | 1,242,209 | 1,527,919 | 1,527,919 | 1,527,919 |
| R-Squared | 0.3262 | 0.2938 | 0.2411 | 0.2224 | 0.0714 | 0.2723 |
| | | | | | | |
| Linear trends | No | No | No | No | No | No |

Standard errors in parenthesis and clustered by country

*** p<0.01, ** p<0.05, * p<0.1

## 5.2  Robustness Checks

For my first robustness test, I reran the regression from Table 2 for only immigrants that have been in the US for greater than 5 years. If immigrants are on a H1-B visa they are not able to start working immediately, which could decrease their likelihood of having grandparents around. Thus the effect of increased grandparent availability on female LFP would have a positive bias. In Column 2 are the results for the regression for only immigrant mothers that have been in the US for over 5 years. Comparing Column 1, which includes all immigrant mothers regardless of the number of years they have been in the US, to Column 2, the coefficient on Change TFR increased in magnitude from 0.0199 to 0.0220. Column 1 is repeated from Table 4 for sake of comparison. It makes sense that the effect of grandparents is stronger for mother's that have been here for longer since the mothers' ability to be employed is not hindered by immigration restrictions.

Table 7: Effect of Fallen Fertility in Country of Origin on Mother's LFP

| Variables | (1) | (2) | (3) |
|---|---|---|---|
| | All mothers | Yrs in US >5 | 10 years before birthyear |
| Change TFR | 0.0199639** | 0.0220597** | -0.0157187 |
| | (0.0089097) | (0.0090293) | (0.0126579) |
| | | | |
| Number of observations | 909,974 | 811,595 | 440,578 |
| R-Squared | 0.0606 | 0.0566 | 0.0603 |

Standard errors clustered by country

Survey year, birthyear, and country fixed effects

For my second falsification test, I wanted to check that it is the reduction in the number of siblings that is driving the increase in labor force participation and that this increase is not due to omitted variables correlated with fertility trends. If omitted variables such as education trends, which are likely positively correlated with female labor force participation, were driving these results, then using the fall in fertility rate 10 years before a mother's birth year would also lead to an increase in her LFP. However, as seen in the table above, comparing the coefficient in Column 3 vs Column 1, the coefficient on change TFR 10 years before birth year is negative and statistically insignificant. This finding strengthens the conclusion that increased grandparent availability is the mechanism behind the increase in mother's LFP.

# 6 Empirical Strategy Using China's One-Child Policy

For my second empirical strategy, I use China's One-Child Policy as a source of variation that is more exogenous than fertility trends in country of origin. Individuals born between 1980 and 2015 in China are much more likely to be only children than individuals born before 1979. Being an only child means that these individuals have more accessible childcare in the form of grandparents providing childcare since their parent's time will be split between fewer siblings. I run a difference-in-difference regression that exploits variation in being born before or after the passage of the One-Child Policy and variation in country of birth. For my control countries of birth I choose 30 countries that were most similar to China before the One-Child Policy. I used the year 1978 since that was shortly before the One-Child policy and created a normalized index across the variables that I thought were most relevant. These variables are GDP per capita, female literacy rate, school enrollment rate, and death rate. I included female literacy rate and school enrollment rate in my variables of interest because both may contribute to future trends in female employment. GDP per capita and death rate are both important variables for comparing economies across countries. The resulting control countries and territories that had indexes closest to China are the following: Bosnia, Armenia, Macau, Aruba, Tonga, Albania, Liechtenstein, South Korea, New Caledonia, Montenegro, French Polynesia, North Macedonia, Faroe Islands, Lebanon, Dominican Republic, Sri Lanka, Samoa, Cuba, Malaysia, Belize, Colombia, Fiji, Thailand, Jamaica, Philippines, Chile, St. Lucia, Azerbaijan, St. Vincent, Antigua and Barbuda,

Figure 3: Difference in Difference Table

My regression equation is the following:

$$B_{ijt} = \beta_0 + \beta_1 A_j \cdot post_t + \gamma X_{ijt} + \alpha_j + \alpha_t + \alpha_k + \epsilon_{ijt}$$

$B_{ijt}$ is the measure of LFP for each individual $i$ born in country $j$ in year $t$. $A_j$ is a dummy variable that equals 1 for individuals born in China and $post_t$ equals 1 for individuals born after 1980. $X_{ijt}$ are additional control variables such as education. All regressions are run with fixed effects for birth year, survey year, and country.

My treated individuals are those who were born in China after 1980. I also include additional control variables such as education in my regression. In order for my results to be causal, the parallel trends assumption must hold. This assumes that without the One-Child policy, the trends in employment from pre1980 to post1980 for people born in China would have been the same as for people born in the control countries. I have country, survey year, and birth year fixed effects to strengthen the validity of my parallel trends assumption. Furthermore, I will be running this regression with possible sources of bias as my outcome variable to see if there is something different between the types of people who are immigrating before and after the One-Child Policy beyond having fewer siblings to share their parents' time.

In addition to having increased grandparent availability for childcare, being an only child may have other effects that may affect future employment opportunities and choices.

# 7   Empirical Results

Table 8 presents the results from estimating regression (2). Column 1 includes all individuals and finds that the effect of being born in China after the One Child Policy on labor force participation was negative and statistically significant. This holds true in Column 2 which focuses on women as well as in Column 3 which only includes mothers. The coefficient on China * Post in Column 3 can be interpreted as being treated ( having increased grandparent availability) is expected to decrease the probability that an immigrant mother is in the labor force by 5.8 percentage points relative to the change in LFP for untreated mothers.

Table 8: Effect of being Treated on LFP

| Variables | (1) | (2) | (3) |
|---|---|---|---|
|  | All | All Women | Only Mothers |
| China * Post | -0.0582819** | -0.0534071*** | -0.0582261*** |
|  | (0.0168079) | (0.0143466) | (0.0162798) |
|  |  |  |  |
| Number of observations | 1,293,308 | 733,219 | 369,138 |
| R-Squared | 0.2594 | 0.2447 | 0.2359 |
|  |  |  |  |
| Linear trends | No | No | No |
| Controlling for yrsusa | No | No | Yes |
| Controlling for education | No | No | Yes |

Standard errors in parenthesis and clustered by country

*** p<0.01, ** p<0.05, * p<0.1

In order to better understand why being an only child, and hence having more access to grandparent-provided childcare decreased a mother's labor force participation, I tested possible sources of bias. From looking at previous literature on the effects of the One-Child policy, I expected the bias to be positive due to increased investments in education after the One Child Policy or increased savings. However it is possible that individuals born during the One-Child policy are choosing to have

more children after growing up as only children. Thus I regressed the number of children on being treated. I found that the effect of having increased grandparent availability on the number of children a woman has was statistically insignificant and positive. As expected, being born during the One-Child policy and having increased grandparent availability increased the level of education for women. This makes sense since reduced fertility means that parents had to allocate resources between fewer children so each child would have more educational investment.

In addition, to see if there were differences in the type of women who immigrated to the US from among those born after 1980 versus those born before 1980, I looked at the effect of being a 'treated' woman on the number of years she spent in the US. I found that the coefficient on Years in US to be statistically significant at the 1% level and positive. The magnitude tells us that we expect that immigrant women from China born during the One Child Policy have been in the U.S. 1.69 years longer than immigrant women from China born before the One Child Policy, relative to the difference in years in the US for women born in these time periods but in other countries. Thus these women who were born following 1980 in China were immigrating on average at younger ages than women born in China before the policy, accounting for changes over time. A possible explanation for why the coefficient on China * Post is negative is because the type of person immigrating to the US from China is different for people born during the One-Child Policy and are subsequently making different employment choices. Thus it may not be that increased grandparent availability is causing the decrease in female labor force participation but that the 'treated' women have different preferences.

Table 9: Effect of Being Treated on Other Y-Variables

| Variables | (1) | (2) | (3) |
|---|---|---|---|
| Explanatory Variable | N Child | Education | Years in US |
| China * Post | 0.0410403 | 5.164958*** | 1.692419*** |
|  | (0.0473482) | (1.409651) | (1.692419) |
|  |  |  |  |
| Number of observations | 737,928 | 737,928 | 737,928 |
| R-Squared | 0.1734 | 0.1804 | 0.3592 |
|  |  |  |  |
| Linear trends | Yes | Yes | Yes |

Standard errors in parenthesis and clustered by country
*** p<0.01, ** p<0.05, * p<0.1

In addition to looking for sources of bias as an explanation for the negative coefficients on China * Post, I graphed China's fertility rate to see when exactly fertility starts to fall following the One- Child policy. I expected fertility to fall shortly after 1980, the start of the policy. However, as you can see from the graph below, fertility rates in China were falling from the mid 1960s to around 1980, before increasing from 1980 to around 1985. There seems to be a lag in when the policy started and when fertility rates actually started to decline. Hence since fertility does not start falling right when the policy is enacted, the change in grandparent availability would also follow this lag and thus the decrease in female LFP may not be due to increased grandparent availability.
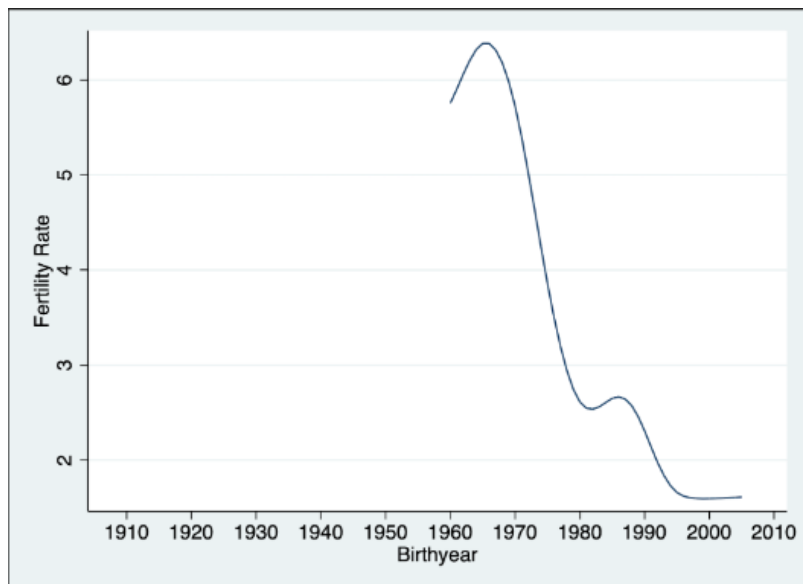
Figure 4: Fertility Rate in China from 1960 to 2005

# 8 Heterogeneous Effects by Continent

A third way to understand why the coefficient on China * Post is negative is to consider other possible effects of grandparents on female labor force participation, beyond just childcare. From previous literature, we saw that grandparents, particularly father in laws, may decrease female LFP through enforcing different cultural norms. To see if the effect of grandparents on female employment differs across different cultures, I looked at the effect of fertility trends in countries of origin on female labor force participation for specific continents. To see if the effect of Asian grandparents is different from the effect of other grandparents, I ran my regression from Table 2 for only mothers that immigrated from either East or South Asia. Table 10 below shows that the effect of a one child decrease in fertility during the 10 year period surrounding a mother's birth on the probability that she is in the labor force differs across continents. For South and East Asia, there was a statistically insignificant effect while for all other continents the coefficient is positive and significant. The coefficient on Change TFR in Column 2 also increased in magnitude, from 0.0199 to 0.031, when comparing to the coefficient on Change TFR for all continents.

Table 10: Effect of Fallen Fertility in Country of Origin on Mothers' LFP

| Variables | (1) | (2) |
|---|---|---|
| | South Asia and East Asia | All Other Continents |
| Change TFR | -0.0007046 | 0.0315118*** |
| | (0.0103805) | (0.0048038) |
| | | |
| Number of observations | 242,150 | 667,823 |
| R-Squared | 0.0737 | 0.0556 |

Standard errors in parenthesis and clustered by country

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

# 9 Conclusion

In conclusion, controlling for country and year effects, the fall in fertility trends has a positive effect on female LFP and employment status. Since being born in a time of decreasing fertility means that you are less likely to have siblings or you are going to have fewer siblings than someone born during a time of increasing fertility, being born in a time of decreasing fertility leads to increased grandparent availability for childcare. Furthermore, the fall in fertility increases the hours of grandparent provided childcare for US immigrants. Thus my results suggest that grandparents overall have a positive effect on female LFP for US immigrants through the mechanism of providing childcare. I find that for a one-child decrease in fertility during the 10-year period surrounding a mother's birth year, we expect that her probability of being in the labor force increases by about 2 percentage points. Using the Survey of Income and Program Participation for information on hours of grandparent provided childcare, I find that a one child decrease in fertility during the 10-year period surrounding a mother's birth year is expected to increase the hours of weekly grandparent-provided childcare for children under the age of 6 by 0.25 hours.

Using the One-Child Policy for more exogenous variation, I used a difference-in-difference model comparing US immigrants from China born before and during the policy change to US immigrants from 30 control countries. I find that being born during the One-Child Policy decreases a mother's probability of being in the labor force by 5.8 percentage points in addition to the change in LFP for untreated mothers. One possible explanation for this negative coefficient is that women from China born after 1980 were immigrating to the US at younger ages and possibly for different reasons. In addition, cultural differences may be a key factor in how grandparents affect a woman's employment. I found that the effect of grandparents on a mother's employment differed across continents.

Since the lack of affordable childcare is currently a major hindrance for mothers to remain in the workforce, understanding the effect of grandparents on female LFP is crucial for increasing female LFP. The overall positive effect that increased grandparent availability has on a mother's LFP shows that policies that encourage intergeneral cohabitation, or more generally increase the supply of affordable childcare, are mechanisms through which policy makers can increase gender parity. Furthermore, the heterogeneous effect of grandparents reveals that increasing grandparent availability through changes in retirement policy or immigration policy in isolation may not increase female employment without also targeting cultural norms and increasing female autonomy. Since women on average earn less than men and thus have a lower opportunity cost of providing childcare, changing the cultural norm will require broader policy changes that increase female employment and career advancement.

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