To Grandmother's House We Go: Childcare Time Transfers and Female Labor Mobility*

Garrett Anstreicher†   Joanna Venator‡

September 16, 2022

Abstract

Women in the United States frequently rely on childcare from extended family but can only do so if they live in the same location as them. This paper studies how child care costs, the location of extended family, and fertility events influence both the labor force attachment and labor mobility of women in the United States. We begin by empirically documenting strong patterns of women returning to their home locations in anticipation of fertility events, indicating that the desire for intergenerational time transfers is an important motivator of home migration. Moreover, women who reside in their parent's location experience a substantial long-run reduction in their child earnings penalty. Next, we build a dynamic model of labor force participation and migration to assess the incidence of counterfactual scenarios and childcare policies. We find that childcare subsidies increase lifetime earnings and labor mobility for women, with particularly strong effects for women who are ever single mothers and Blacks. Ignoring migration can understate the welfare benefits of these policies by a meaningful extent.

Keywords: Migration, childcare, female labor supply, human capital.

*We thank Peter Arcidiacono, Orazio Attanasio, John Kennan, Ilse Lindenlaub, Corina Mommaerts, Ronni Pavan, Jeff Smith, Chris Taber, Matt Wiswall, and seminar participants at the University of Wisconsin, University of Rochester, and Arizona State University for helpful feedback. Additionally, this material is based upon work supported by the National Science Foundation Graduate Research Fellowship Program under Grant No. DGE-1747503. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation. Support was also provided by the Graduate School and the Office of the Vice Chancellor for Research and Graduate Education at the University of Wisconsin-Madison with funding from the Wisconsin Alumni Research Foundation. All remaining errors are our own.

†University of Wisconsin-Madison.

‡Boston College.

1 Introduction

markets, we might expect that there is a secondary effect on earnings and welfare stemming from reduced frictions in labor mobility.

To explore this mechanism, we construct and estimate a model that nests a canonical model of dynamic labor force participation in a model of dynamic migration. Women receive shocks to their fertility and marriage status at the beginning of every period, after which they choose their labor force attachment and whether/where to move. The women in the model with children must balance the trade-off between building experience (Eckstein and Wolpin, 1989) through labor force participation and paying more in child care costs, though they retain the option to move to their parent's location so as to receive their assistance. Results from the model suggest that fully subsidizing childcare would increase lifetime wages for women who are ever single parents by over 10 percent on average and over 5.8 percent for women who are never single parents. These subsidies also encourage labor mobility for single mothers substantially, raising lifetime labor mobility by 3 percent. Ignoring migration when estimating the welfare gains of the policies results in understating them by a considerable extent, particularly for single mothers. Moreover, we find that labor mobility increases in counterfactual settings where children are born only to married women, suggesting that the recent increases in the share of single-parent families may have played a role in concurrent declines in labor mobility. We also estimate our model separately for Black and white women and find considerably stronger effects for the former group.

Our paper expands upon and ties together three broad areas of research: the literature on child care costs and women's labor force participation, the literature on the determinants of migration, and the literature on the implications of family-based ties for labor market outcomes.

First, our paper introduces a new mechanism that contributes to the `child penalty' faced by mothers: increased job mobility frictions caused by location-specific child care access. A long existing literature has documented the fact that women experience large dips in earnings following the birth of a child (Kleven et al., 2019, Cortes and Pan, 2020, Goldin and Mitchell, 2017, Budig and England, 2001, Angrist et al., 1998). One explanation for mother's dip in earnings is that the lack of affordable child care forces women either out of the labor force or into part-time work, resulting in periods of low or zero earnings and lower earnings growth over time to due slower human capital accumulation. Analyses of programs which provide free or subsidized child-care/early childhood education in Canada (Baker et al., 2008, Lefebvre and Merrigan, 2008), Europe (Bauernschuster and Schlotter, 2015, Bettendorf et al., 2015, Havnes and Mogstad, 2011, Lundin et al., 2008), and the United

States (

Bishop, 2008) considers non-monetary factors agents weigh when making repeated moving and location choices, but these papers typically condense preferences for living in one's home location into a single utility premium. A small literature has documented the role of emotional attachment to places' characteristics and the role of concentration of extended family in location decisions. (Boyd et al., 2005; Spilimbergo and Ubeda, 2004; Zabek, 2019; Spring et al., 2017). Through focusing on fertility as a new driver of home migration, we aim to contribute to the endeavor to unpack the specific determinants of return migration and add to the literature that studies how individuals balance pecuniary and non-pecuniary factors when making migration decisions in the United States.

In particular, these analyses may help to understand the factors underpinning recent declines in long-distance migration (Molloy et al., 2011). Recent research (Johnson and Schulhofer-Wohl, 2019) suggests that declines in the long-distance migration rate in recent generations is primarily a consequence of a decline in return migration. Johnson and Schulhofer-Wohl focus, however, on a different definition of return migration than the current paper – a move to any location one once lived in, rather than a move to the location one was raised in. Nonetheless, our results point to recent declines in U.S. fertility rates as a potential component of this observed drop in return migration.

Lastly, by focusing on home-based return migration, our results also marry the literature on migration with a growing literature on the implications of family-based ties for labor market outcomes. Proximity to family can mitigate child or elder care needs, allowing greater attachment to the labor force. Geographic distance from one's mother or mother-in-law is associated with a greater likelihood of child care transfers, allowing for higher labor force participation for women (Compton and Pollak, 2015, 2014; Chan and Ermisch, 2015). To identify the effects of access to grandparent care, past research has used variation in pension generosity and retirement age (Dimova and Wolff, 2011; Aparicio-Fenoll and Vidal-Fernandez, 2015; Zamarro, 2020; Bratti et al., 2018; Posadas and Vidal-Fernandez, 2013) and the death of grandparents (Arpino et al., 2014; McMurry, 2021) to show that larger grandparent time transfers are associated with higher labor force participation and earnings for mothers. Beyond the realm of child care, co-location near parents acts as a buffer against earnings losses for adult children following a job displacement (Coate et al., 2017; Kaplan, 2012). Conversely, care needs may flow in the opposite direction, with adult children living near parents having greater care responsibilities for aging or ill parents, resulting in worse economic outcomes (Charles and Sevak, 2005; Konrad et al., 2002; Rainer and Siedler, 2009).

To our knowledge, the only other paper that directly assess the role of informal child care in influencing the migration choices of women is García-Moran and Kuehn (2017), who build a model of residence choice, fertility decisions, and female labor force participation in the context of Germany. Our contribution relative to their paper comes from our focus on dynamics: the authors model migration, working, and fertility decisions as one-shot choices the agent solves at the start of the model. However, labor force participation and migration are dynamic processes[3], which means our dynamic framework will better capture the life-cycle implications of childcare availability and policies. Our model of migration decisions is most complementary to Coate (2013), who considers a dynamic model of migration where agents take the location of their parents into account and are willing to accept lower wages in exchange for closer proximity to their parents. His model, however, focuses on early adulthood migration decisions and does not take fertility into consideration.

The paper is organized as follows: Section 2 motivates our research question by providing descriptive evidence regarding the timing of home migration and fertility events observed in U.S. data. Section 3 details our model, and Section 4 describes our estimation procedure. Section 5 presents model estimates and evaluates the model's fit, while Section 6 presents the results of counterfactual simulations. Finally, Section 7 considers potential avenues for future research before concluding.

2 Motivation

In this section, we present empirical evidence to suggest that U.S. women respond to the incentives discussed in the introduction. We begin by showing in the American Community Survey (Ruggles et al., 2020) that U.S women frequently return to the birth state (which we take as a proxy for their parent's location for lack of a better alternative) in anticipation of fertility events and that those who have children in their home state exhibit markedly higher labor force attachment than those who live elsewhere. Next, to further motivate our focus on dynamics, we construct event-study representations of the child earnings penalty in the style of Kleven et al. (2019) using the Panel Study of Income Dynamics (PSID) and

2.1 Fertility and Return Migration among U.S. Women

With how costly child care is in the United States, one may expect women with small children

Table 2: Effects of Young Child on Home Migration Probability (HMP)

	(1)	(2)	(3)	(4)
VARIABLES	HMP	HMP	HMP	HMP
Mean Dep Var	4.03	4.44	3.58	4.44
Young Child (YC)	-0.0212	0.174	0.0240	0.156
	(0.0743)	(0.134)	(0.0889)	(0.175)
YC × High Childcare Costs				0.0398
				(0.260)
Age	-1.570	-1.844	-1.752	-1.843
	(0.141)	(0.195)	(0.233)	(0.195)
High School Degree	0.0132	-0.0259	0.0676	-0.0260
	(0.195)	(0.253)	(0.304)	(0.253)
College Degree	0.867	1.558	0.234	1.556
	(0.194)	(0.258)	(0.301)	(0.258)
Sample	All	Non-Married	Married	Non-Married
Observations	572,964	279,471	293,493	279,471
R-squared	0.008	0.010	0.008	0.010

Notes: Robust standard errors in parentheses. Sample is US-native women aged 22-35 in the 2005-2017 ACS who completed at least one year of high school and were not located in birth state the previous year. Additional controls include fixed effects for birth state and calendar year, a quadratic in age, an indicator for some college attained, amenity measures for state lived in last year (college share, unemployment rate, rates of violent and property crime, population, per-capital government student expenditure, student-teacher ratios, and share of days warmer than 70 degrees), and Black and hispanic indicators. Young child defined as presence of own child aged at most 4 in household.

These predictions are well born-out in the data. While Table 2 indicates that the presence of small children does not meaningfully influence the likelihood of a home move, Table 1 suggests that initial fertility events make women noticeably more likely to home-migrate. These effects are also much stronger for single women than married women — indeed, the subgroup analysis indicates that married women respond to initial fertility events by migrating quite little. However, with a base home rate of migration of around 4 percent in the data, initial fertility events make single women roughly 50% more likely to move home compared to the rest of the sample. We also find that having previously lived in a state with high child care costs[5] is associated with a slightly higher likelihood of moving back home, though this effect is not statistically significant.

While higher child care costs do not seem to substantially influence the extensive margin of probability of a move itself, they may still have intensive margin impacts in that they could distort the location choices of women conditional on moving in the first place. We next investigate whether the presence of young children distort the location choices of women who choose to migrate. We limit our ACS sample to women who are observed to have moved from their previous-year state and have not moved to their state of birth. We then test whether the presence of young children result in women being less likely to locate in high childcare-cost states, defined as being above-median as before. Table 3 presents the results of this test and affirms the hypothesis — moving women with young children on average choose to locate to states with lower childcare costs than those without, with the effects again being noticeably stronger for single women than married ones.

Finally, we investigate how location and the presence of children influence the labor force attachment of women in the ACS. The ACS records usual hours worked per week for all employed respondents — for unemployed respondents or respondents not in the labor force, we code usual hours worked per week as zero. We then regress usual hours worked per week on a variety of covariates to do with the presence of children, location, child care costs, and marital status. Intuitively, higher child care costs ought to decrease hours worked by women because it makes working relatively more expensive. Being proximal to parents ought to increase labor force attachment if parents primarily provide time transfers in child-rearing, but effects of marital status on labor force attachment are a-priori ambiguous. Women with husbands may exhibit higher labor force attachment if their husbands also provide time

[5] Defined as having above median costs, with numbers coming from Child Care Aware (2017), who survey state child care resource and referral networks to obtain average prices for full time child care centers for three age groups in each U.S. state. For a visual representation of average full-time infant childcare expenses across U.S. states, refer to Figure A.1a.

Table 3: E ects of Children on Probability of Moving to High CCC State (HCS)

	(1)	(2)	(3)	(4)	(5)
VARIABLES	HCS (0-100)	HCS (0-100)	HCS (0-100)	HCS (0-100)	HCS (0-100)
Mean Dep Var	50.48	52.86	47.96	42.86	47.96
Young Child	-1.693	-4.816	-0.412	-4.647	-0.387
	(0.654)	(1.271)	(0.763)	(1.258)	(0.760)
High School Degree	3.895	2.590	5.240	2.153	5.519
	(1.897)	(2.521)	(2.831)	(2.518)	(2.796)
College Degree	13.52	10.88	15.07	10.61	15.28
	(1.853)	(2.478)	(2.786)	(2.481)	(2.751)
Sample	All	Non-Married	Married	Non-Married	Married
Home State FE	YES	YES	YES	YES	YES
Previous State FE	NO	NO	NO	YES	YES
Observations	54,233	26,582	27,651	26,582	27,651
R-squared	0.069	0.088	0.052	0.106	0.063

Notes: Robust standard errors in parentheses. Sample is US-native women aged 22-35 in the 2005-2017 ACS who completed at least one year of high school and who moved in the previous year and not to their state of birth. Additional controls include xed e ects for birth state and calendar year, a quadratic in age, an indicator for some college attained, amenity measures for state lived in last year (college share, unemployment rate, rates of violent and property crime, population, per-capital government student expenditure, student-teacher ratios, and share of days warmer than 70 degrees), and Black and hispanic indicators. Young child de ned as presence of own child

of interest is woman i's earnings Y_{ist} in year s and at event time t. The regression is as follows:

$$Y_{ist} = \sum_{j \neq -1} {}_{j} \mathbb{1}[j ==$$

long-term child penalty women face following their first birth.

2.2.1 Data

For this analysis, we need a panel of income data for women in the years prior to and the years following their first birth. To create this, we use the PSID's full retrospective history of births and adoptions, which provides the full history of births for those interviewed in the years 1985 onward. Using this data set, we create a sample of all PSID women who have at least one birth, the year their first birth occurred, their age at that birth, and whether they were married at the time of that birth. We then combine this data with information from the PSID family files on earned income in each year of the women's life, the US state they live in in each year, and the US state that their parents live in each year. Earned income is defined as the reported total income including wages and other income.[7]

Following the restrictions used by Kleven et al. (2019), the panel of years includes five years pre-birth and ten years post-birth. Women are excluded from the sample if they are missing more than 8 years in this period, missing all years pre-birth, or all years post-birth. We also restrict the data to be from 1985 onward in part to reduce measurement error from retrospective birth histories and in part to match the data sample cleaned for the estimation sample, which only contains locations from 1985 onward.

We look at differences in the child penalty across three categories of mothers, as well as the interaction between these categories:

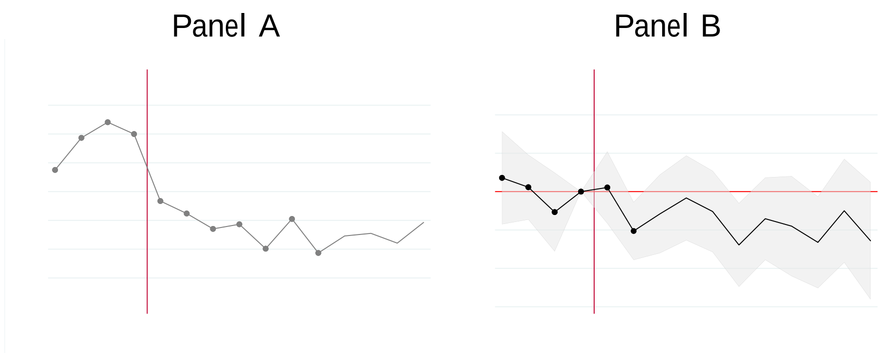
1. Near vs. Far to Grandma: A woman is near to Grandma if the mother is in the same state as her own mother in the year of her first birth.

2. High vs. Low Child Care Costs: A woman is a high child care cost type if she lives in a state that has child care costs above the median of our CC cost index in the year of her first birth.

3. Married vs. Unmarried: A woman is married if she was married in the year of her first birth.

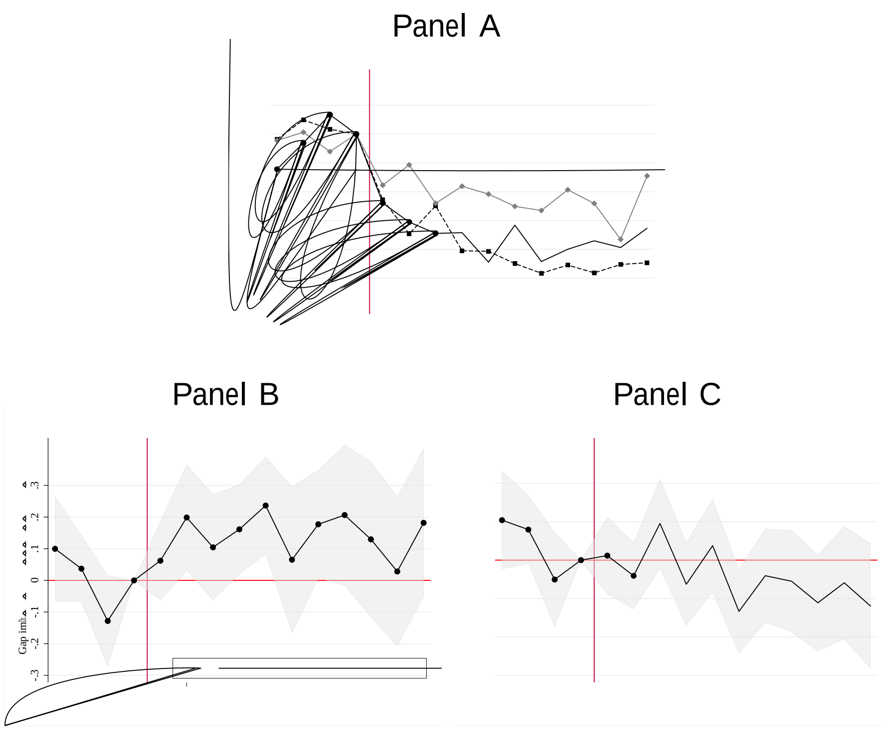
[7] For women who were household heads, this is based on reported income from `wages and other income". For women who were spouses in the data, the measurement of income changes in 1993 when they begin separating out business and farm income. Due to this change, we create total income for spouses by adding together the total income excluding business and farms and total income from businesses for all years post 1993. Income is then assigned by the sex of the head of household.

Figure 1: Child Penalty for Women Living Near or Far from Grandmother



Notes: Figure 1A (left) plots coe cients from event studies of earnings on indicators for years surrounding a woman's rst birth for both women who live in the same state as the grandmother (near) or di erent states (far). The unit are percent changes (0 to 1) in earnings relative to the year prior to birth. The regression includes controls for age of mother at rst birth and year of birth. Figure 1

Figure 2: Child Penalty for Women Living Near or Far from Grandmother, by Marital Status



Notes: Figure 2A (top) plots coe cients from event studies of earnings on indicators for years surrounding a woman's rst birth for married women who live in the same state as the grandmother, married women who live in di erent states, and unmarried women who live in the same state as the grandmother. The

7292 are percentage changes (y) (0 ig n t) -32 (y) pe32fa14-422fcup-315(y)326(Mobiut9626 T112 202.874 532418 Td [re)]TJ $9626 TT

Table 5: Aggregated Child Penalty, by Distance to Grandmother

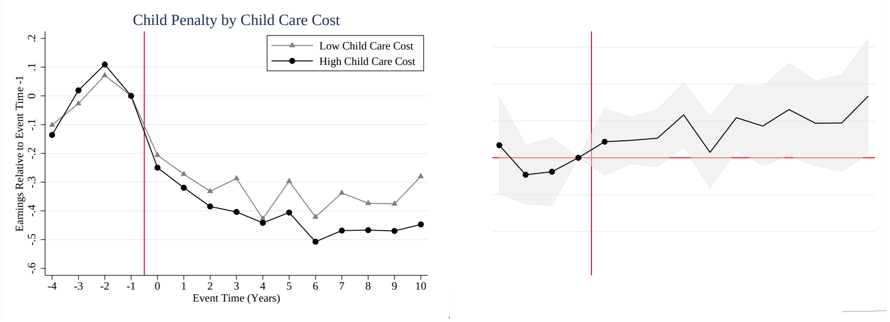
		(1)	(2)	(3)
		Full Sample	Unmarried	Married
Pre-period		-430.3	-7218.8	493.8
		(1096.6)	(2714.4)	(1174.1)
Year of birth		-5113.4	-5644.1	-5094.2
		(1262.3)	(4771.6)	(1279.9)
Post-period		-12068.9	-12836.3	-12454.1
		(1042.8)	(3124.9)	(1135.1)
Near Grandma	Pre-period	19.38	6885.0	-851.5
		(1331.3)	(2849.9)	(1459.2)
Near Grandma	Year of birth	-169.1	2541.9	-662.7
		(1462.7)	(4703.6)	(1572.4)
Near Grandma	Post-period	2721.8	8418.1	1927.6
		(1203.7)	(3174.8)	(1381.3)
Women-Year Obs.		13530	2201	11329

Note. This table reports the coe cients of a regression of earnings on indicators for years surrounding a woman's rst birth, collapsed into the pre-period (2 to 5 years pre-birth), year of the birth, and post-period (1 to 10 years post-birth). The year prior to birth is omitted. All indicators are interacted with an indicator for is the woman is living in the same state as her own mother (Near Grandma). Controls for year of survey and age of mother are also included. Column 1 is the full sample; column 2 are unmarried at year of birth; column 3 are married at year of birth. Standard errors clustered at the individual level in parentheses; $p < 0{:}05$, $p < 0{:}01$, $p < 0{:}001$

We next do a similar exercise for those living in high or low child care cost states. Figure 3 reports the coe cients for event studies of earnings on indicators for years surrounding a woman's rst birth for both women who live in the low or high childcare cost states. We see that the child penalty is larger in states with high child care costs. The di erence across child care cost regions is of similar magnitude to the di erence in the child penalty for those near vs. far from the child's grandmother. Interestingly, the e ects of child care on the child penalty seem to primarily occur for married mothers, as shown in Table 6, which reports the aggregated post-birth e ects of a child by child care cost region for the full sample (column 1), unmarried mothers (column 2), and married mothers (column 3). While the child penalty

Figure 3: Child Penalty for Women Living in High or Low Child Care Cost States

Panel A Panel B



Notes: Figure 3A (left) plots coe cients from event studies of earnings on indicators for years surrounding a woman's rst birth for both women who live in the low or high childcare cost states. The unit are percent changes (0 to 1) in earnings relative to the year prior to birth. The regression includes controls for age of mother at rst birth and year of birth. Figure 3B (right) calculates the gap in the percent decline for those in high cost relative to those in low cost states and reports 10% con dence intervals for a test of the null that this gap is equal to zero.

is una ected by child care costs for unmarried mothers, married mothers' child penalty is approximately $4000 larger in a high child care cost state.

3 Model30(3)]TJ 0 g 0 G [(B)eximatelycostBhch3tel 0 -14.4

Table 6: Aggregated Child Penalty, by Child Care Costs

	(1) Full Sample	(2) Unmarried	(3) Married
Pre-period	-293.2	-1731.5	427.3
	(676.3)	(999.8)	(774.7)
Year of Birth	-4208.6	-1194.3	-4762.2
	(915.3)	(1984.0)	(1194.6)
Post-period	-8435.2	-6255.9	-9075.2
	(733.6)	(3361.0)	(1158.3)
High CCC Pre-period	-858.9	1517.6	-1564.4
	(1226.2)	(2362.3)	(1324.1)
High CCC Year of Birth	-1924.4	-1593.0	-1465.7
	(1403.0)	(2990.3)	(1659.4)
High CCC Post-period	-3738.6	235.0	-3955.1
	(1514.4)	(4570.2)	(1858.1)
N	9568	1674	7894
Women-Year Obs.	9568	1674	7894

Note. This table reports the coe cients of a regression of earnings on indicators for years surrounding a woman's rst birth, collapsed into the pre-period (2 to 5 years pre-birth), year of the birth, and post-period (1 to 10 years post-birth). The year prior to birth is omitted. All indicators are interacted with an indicator for is the woman is living in the top half of the state child care cost distribution (High CCC). Controls for year of survey and age of mother are also included. Column 1 is the full sample; column 2 are unmarried at year of birth; column 3 are married at year of birth. Standard errors clustered at the individual level in parentheses; $p < 0{:}05$, $p < 0{:}01$, $p < 0{:}001$

In particular, we are interested in how policies that may substitute for intergenerational time transfers (such as subsidized childcare) would in uence the migration decisions and subsequent earnings of women who might otherwise rely on their parents to assist in child-rearing. Using, we will be able to explore the e ectiveness of such policies in improving welfare for di erent types of parents (e.g., single vs. married), as well as decompose any e ects on earnings into a direct e ect of changes in attachment to the labor force due to child care policies versus the secondary e ects of the policies such as allowing households to sort into better paying labor markets.

Lastly, we plan to estimate the model separately by race to explore heterogeneity in the value of these policies for Black mothers relative to White mothers. The frictions associated with child care access may be particularly important in explaining racial gaps in migration rates and wages, as single motherhood is more common for Black mothers. Our reduced form analysis suggests that single mothers are more dependent on geographic proximity of family for access to care. The model will allow us precisely quantify the extent to which fertility events drive migration across demographic groups in the United States and speak to the extent to which recent changes in family structure in the U.S. may be related to ongoing changes in labor mobility.

3.1 Setup and Timing of Decisions

Our model adapts the dynamic migration labor force participation of Eckstein and Wolpin (1989) and nests it in a simple framework of dynamic migration (Kennan and Walker, 2011) while incorporating multiple dimensions of family structure. The model is a dynamic discrete choice model that follows the labor force participation and migration decisions of women. We focus on women due to their stronger geographical attachment to their children compared to men and due to the wealth of evidence that points to fertility events being more in uential on female labor force attachment than male.

A period is one year. Agents enter the model at age 22 and are at risk of pregnancy until age 35. Between ages 35 to 40, though agents cannot get pregnant, they may either have young children or have no children. After age 35, we additionally assume that the agent's current marital status remains xed for the rest of the lifecycle. Agents choose whether to supply labor and, afterward, whether and where to move until making a nal labor force decision at age 65, after which they accrue no further utility[8]. We select age 22 as the starting point to allow the bulk of higher educationorati Td [5re-22changes in sep 7venume

Table 7: Model Notation

Description	Values
Locations	ℓ $\ell^P; \{1, \ldots, 9\}$
Location Daycare Cost Types	$\ell; \ell \in \{1, \ldots, 9\}$
Location Wage Effects	

marriage and fertility realizations are determined, refer to Section 4.

Women are assumed to be endowed with a single unit of time period and may choose to work full time (h = 1) or not at all (h = 0). Spouses are also assumed to be endowed with a xed e ect $_S$ that a ects their earnings potential. Subsuming all the state variables outside of the agent's current location into the vector , the value function for a woman without young children in the model is as follows:

$$V(\;;\ell) = \max_h \Big(\quad _1(c) + (1 \quad h$$

perience, while the agent's observables X contain the same standard Mincerian combination along with dummies for having a child aged 0-1 or a child aged 2-4.[16] With the assumption

Moving costs involve a xed cost, are potentialy smaller for college graduates, and are assumed to be larger for married agents and for agents that already have young children. Furthermore, we allow for moves to larger locations (N_ℓ represents the population of division ℓ in tens of millions) to less costly as in Kennan and Walker (2011).

Finally, a woman with young children enjoys utility:

$$V(\;;\ell) = \max_h \Big(\;_5(c) + (1\quad h)(\;_6 + \;_e e + \;_x x + \;_c c) + \;_3\mathbb{1}(h \neq p) + \;_7\mathbb{1}(\ell = \ell^P) \Big) + \quad + \mathbb{E}_{\ell'}[V'(\;;\ell;h)] \;; \quad (3)$$

$$\ell c = w_S\mathbb{1}(m = 1) + wh \quad \ell \max \Big\{ 0; h$$

procedure is as follows:

1. Solve for cuto values of " that govern labor force participation for the terminal age-65 period, where continuation values are zero by construction.

2. Using properties of the normal distribution, solve for *expected* utility $\mathbb{E}_{"}[V_{65}(\; ; `)]$ following the optimal hours decision in the age-65 state space.

3. Apply the type-1 extreme value formula to construct the agent's expected utility from choosing their optimal next-period location at age 64:

$$\mathbb{E}_{`0}[V^{0}_{64}( \; ; `; h)] = \; + \log \sum_{`}$$

labor force participation, experience, and wages. Moreover, the discretization of geography into nine locations means that we may be suppressing the role that geography plays in wages, which may also have implications for our counterfactual policy predictions. Allowing for a richer geographic structure and potentially an urban/rural distinction while retaining computational tractability in the model may be desirable. Extending the model to account for additional unobserved heterogeneity in wages such that the agents as well as their spouses differ in fixed effects and, possibly, location-specific match effects may also be worthwhile (a la Kennan and Walker (2011)).

4 Estimation

4.1 Data

We use data on women aged 22-35 in the 2000-onward PSID. All women must be observed at age 22 to be included in our sample. The PSID shifted to a bi-annual schedule starting in

Table 8: Observations by Age

Age	# Observations
22	909
23	909
24	909
25	909
26	813
27	741
28	631
29	554
30	479
31	434
32	362
33	297
34	233
35	174

Notes: Table presents number of individuals observed at each age in PSID analysis sample. See text for details on sample construction.

woman was aware of the impending birth in year t 1 | in other words, f = 1 in year t 1. We limit our sample to women who are coded as either household heads or the spouses of household heads | thus, information about marital transitions and spousal earnings can be easily obtained from household head information for women labeled as spouses.

We categorize the educational attainment of our sample based on their college status at age 35[19]. Earnings in the data are de ated to real 2012 dollars using the PCE de ator. To constrain the measurement error for wages in the data to reasonable levels, we windsorize hourly wages at the bottom at $7.25 per hour and at the top at the 95th percentile. Observations that report positive hours and zero income are dropped. Observations that reported working 30 hours per week or more are coded as full-time workers, while individuals coded

Table 9: Summary Statistics of PSID Estimation Sample

Sample	All		College		Non-College	
Age	22/23	34/35	22/23	34/35	22/23	34/35
LFP Rate	50.00	46.93	51.61	55.13	49.28	41.83
	(50.01)	(49.97)	(50.02)	(49.90)	(50.01)	(49.43)
Years of Experience	3.01	8.92	0.23	7.44	4.25	9.84
	(1.91)	(4.15)	(0.42)	(3.88)	(0.43)	(4.05)
Hourly Wage	13.26	17.90	16.07	20.87	11.95	15.47
	(5.56)	(7.35)	(5.95)	(7.57)	(4.85)	(6.21)
Share Married	43.40	57.00	45.00	73.08	42.69	47.01
	(49.58)	(49.57)	(49.79)	(44.50)	(49.48)	(50.01)
Young Child Present	50.99	30.47	26.79	38.46	61.76	25.50
	(50.00)	(46.08)	(44.32)	(48.81)	(48.62)	(43.67)
Observations	1818	407	560	156	1258	251

(a) Demographic and Economic Statistics

Sample	All	College	Non-College
Annual Migration Rate	4.35	6.63	3.2
	(20.39)	(24.88)	(17.61)
With Children	3.38	4.83	2.83
	(18.08)	(21.45)	(16.58)
If Married	3.66	5.73	2.35
	(18.77)	(23.25)	(15.17)
Ever Migrated	25.33	40.35.130 Sa5Sample All	

Eve526(Married)-4174(326(EstiMo)28(igrate(Exp)-2to52 Tf 135.268 0 Td [9(852305(5.7

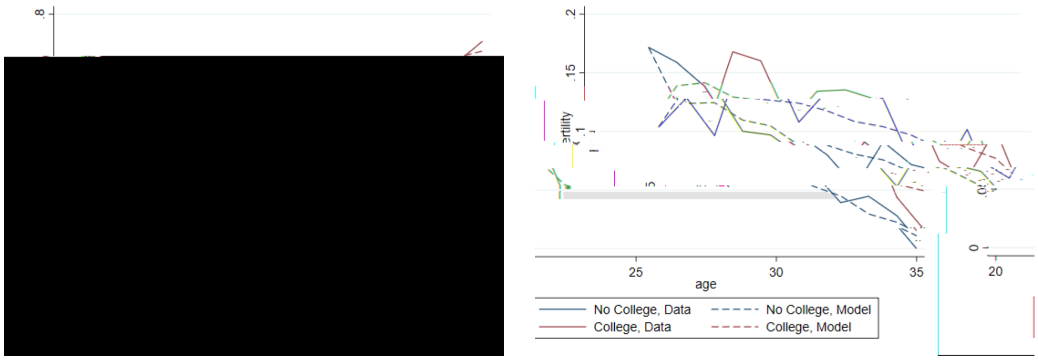
Table 10: Parameters Estimated Outside the Model

Parameter		Value
Discount rate		0.95
Childcare cost levels	ℓ	Various
Location wage effects	ℓ	Various
Location living costs	ℓ	Various
Location populations	N_ℓ	Various
Spouse wage, constant	$_{S;0}$	2.234
Spouse wage, education	$_{S;1}$	0.571
Spouse wage, experience (linear)	$_{S;2}$	0.047
Spouse wage, experience (quadratic)	$_{S;3}$	-0.0007
Spouse wage, fixed effects	$^{L}_{S};\ ^{H}_{S}$	-0.39, 0.39

Notes: Table reports values of parameters that are estimated outside the model. Columns 1 and 2 describe the parameters and presents their symbolic representation. Column 3 reports parameter values. See text for details on model and sample construction. See Figure A.1 for representations of state-level childcare costs, wage effects, and living costs.

Marriage, divorce, and conception probabilities are estimated via linear probability models that admit as inputs whether the agent is currently married, pregnant, or a parent to

Figure 4: Model Fit | Marriage and Fertility Life-Cycle Pro les



(a) Marriage (b) Fertility

Notes: Figure presents model t of marriage and fertility rates over lifecycle for women in PSID analysis sample and in data simulated from model. Probabilities estimated separately for women with and without a college degree and depend on marital status, pregnancy, presence of young children, a cubic in age, and spouse wage type. See text for details on sample construction.

We employ a mixture model over unobserved heterogeneity in grandparent transfers, letting Pr( ) denote the probability of the agent being unobserved type . The probability of observing wages and hour decisions joint with a location are separable using the assumption that the next-period location shocks are independently distributed from labor supply shocks in each period. For any given element in the state space $({}_{it}; \ell_{it})$, a reservation value of the transient component of the wage o er $\varepsilon ({}_{it}; \ell_{it})$ can be found that governs whether the woman supplies labor in the period[24]. Recall further that wages are measured with error:

$$\log(w) = {}_0 + X + \ell + \varepsilon + ;$$

with $\varepsilon \; N(0; {}^2_\varepsilon)$ and $N(0; {}^2)$ distributed both i.i.d. and independently from one another. With this assumption, following Eckstein and Wolpin (1989) the rst two components of the likelihood function corresponding to labor supply decisions and wages can be de ned

[24] For details on deriving these reservation values, refer to Appendix B.

as

$$L = \prod_i \sum_{\nu} \Pr(\nu) \prod_{t=1}^{T_i} \left[\frac{\phi\left(\frac{\varepsilon(\nu_{it};\ell_{it})}{\sigma_\varepsilon}\right)}{\sigma_\varepsilon} \right]^{1-h_{it}} \left[\left(1 - \Phi\left(\frac{\varepsilon(\nu_{it};\ell_{it}) - \rho\frac{\sigma_\varepsilon}{\sigma_\xi}\xi_{it}}{\sigma_\varepsilon\sqrt{1-\rho^2}} \right) \right) \frac{1}{\sigma_\xi}\phi\left(\frac{\xi_{it}}{\sigma_\xi}\right) \right]^{h_{it}}$$

$$\Pr(l' = l'_{it} \mid \nu_{it};\ell_{it};h_{it});$$

where ϕ and Φ are the standard normal density and cumulative, respectively, $\xi_{it} = \varepsilon_{it} + \eta_{it}$, $\rho = \sigma_\varepsilon / \sigma_\xi$, and $\sigma_\xi = \sqrt{\sigma_\varepsilon^2 + \sigma_\eta^2}$; leading to $1 - \rho^2$ having the interpretation of the fraction of the wage variance attributable to measurement error. The third component of the likelihood function $\Pr(l' = l'_{it} \mid \nu_{it};\ell_{it};h_{it})$ can be derived easily following the assumption that the location shocks $\zeta_{\ell'}$ are distributed type-1 extreme value. Denote $V(\nu;\ell;h;\ell')$ as the expected utility gained from selecting location ℓ' following labor supply decision h after starting in state $(\nu;\ell)$, so:

$$V(\nu;\ell;h;\ell') = \sum_{\nu'} \mathbb{E}_\varepsilon[V(\nu';\ell')]\Pr(\nu' \mid \nu;h;\ell') - \kappa \mathbb{1}\{\ell' \neq \ell\}.$$

Recall that $\mathbb{E}_\varepsilon[V(\nu';\ell')]$ represents the expected value of $V(\nu';\ell')$ after optimizing over the labor supply decision given ε. The method for deriving closed-form expressions of these values is presented in Appendix B, but their recursive nature renders it infeasible to write them out fully. With this, we can now derive the following final representation of the likelihood:

$$L = \prod_i \sum_{\nu} \Pr(\nu) \prod_{t=1}^{T_i} \left[\frac{\phi\left(\frac{\varepsilon(\nu_{it};\ell_{it})}{\sigma_\varepsilon}\right)}{\sigma_\varepsilon} \right]^{1-h_{it}} \left[\left(1 - \Phi\left(\frac{\varepsilon(\nu_{it};\ell_{it}) - \rho\frac{\sigma_\varepsilon}{\sigma_\xi}\xi_{it}}{\sigma_\varepsilon\sqrt{1-\rho^2}} \right) \right) \frac{1}{\sigma_\xi}\phi\left(\frac{\xi_{it}}{\sigma_\xi}\right) \right]^{h_{it}}$$

$$\frac{\exp(V(\nu_{it};\ell_{it};h_{it};\ell'_{it}))}{\sum_{l'} \exp(V(\nu_{it};\ell_{it};h_{it};\ell'))}.$$

4.4 Model Assumptions and Identification

The relationship between labor force participation and migration decisions in our model are identified from jointly observing participation, earnings, and location choices for women, conditional on demographic characteristics and location of grand-parents.

First, we assume that the shocks drawn in the model { location preferences, earnings shocks, fertility realization, marriage realization { are all independently and identically dis-

Table 11: Parameters Estimated via Maximum Likelihood

Parameter		^	^	^	^	^	^
Utility							
Consumption, no children	1	0.103	0.011	0.097	0.014	0.112	0.029
Leisure, no children	2	1.173	0.127	1.105	0.174	1.243	0.257
LFP switch penalty	3	-0.127	0.015	-0.138	0.020	-0.104	0.028
Parent preference, no children	4	-0.402	0.024	-0.408	0.033	-0.409	0.031
Consumption, with children	5	0.089	0.010	0.087	0.012	0.084	0.015
Leisure, with children	6	0.765	0.086	0.742	0.127	0.724	0.050
Parent preference, with children	7	-0.405	0.104	-0.046	0.204	-0.634	0.120
Consumption/leisure complementarity	c	0.002	0.001	0.004	0.001	0.000	0.001
College leisure preference modi er	e	0.503	0.060	0.493	0.094	0.501	0.018
Experience leisure preference modi er	x	-0.002	0.003	-0.003	0.004	-0.003	0.004
Amenity preference: distance to shore	;1	-0.007	0.010	-0.009	0.017	-0.016	0.015
Amenity preference: amenity index	;2	0.045	0.057	0.059	0.097	0.022	0.063
Amenity preference: warm days	;3	0.149	0.057	0.076	0.112	0.182	0.057
Time Transfers							
Spouse time transfer	S	0.229	0.046	0.209	0.066	0.180	0.101
Parent time transfer, unmarried	P;0	0.997	0.085	0.999	0.151	0.938	0.160
Parent time transfer, married	P;1	0.388	0.077	0.394	0.105	0.460	0.204
Probability of P = 0	P	0.687	0.032	0.708	0.054	0.658	0.056
Wages							
Wage intercept	0	1.972	0.020	2.000	0.031	1.928	0.007
College e ect	1	0.458	0.016	0.440	0.022	0.488	0.024
Experience e ect, linear	2	0.058	0.002	0.062	0.003	0.059	0.003
Experience e ect, quadratic	3	-0.002	0.000	-0.002	0.000	-0.002	0.000
Child aged 0-1	4	-0.085	0.016	-0.082	0.021	-0.069	0.028
Child aged 2-4	5	-0.028	0.015	-0.026	0.021	-0.028	0.024
Wage shock SD	"	0.265	0.010	0.274	0.013	0.251	0.017
Wage measurement error		0.356	0.006	0.355	0.008	0.351	0.010
Moving Costs							
Fixed cost	0	3.840	0.208	3.804	0.265	3.906	0.326
College e ect	1	0.153	0.115	0.096	0.142	0.340	0.191
Child e ect	2	0.277	0.138	0.261	0.173	0.422	0.250
Marriage e ect	3	0.480	0.134	0.496	0.165	0.250	0.295
Population e ect	4	0.007	0.054	-0.022	0.068	0.042	0.092
Sample		All		Whites		Blacks	
N		8,354		4,837		2,964	
Individuals		909		519		324	
Log Likelihood		-7,429		-4,227		-2,750	

Notes: Table presents estimates and standard errors of parameters estimated via maximum likelihood. Data from PSID. See text for details on sample construction and formation of likelihood function.

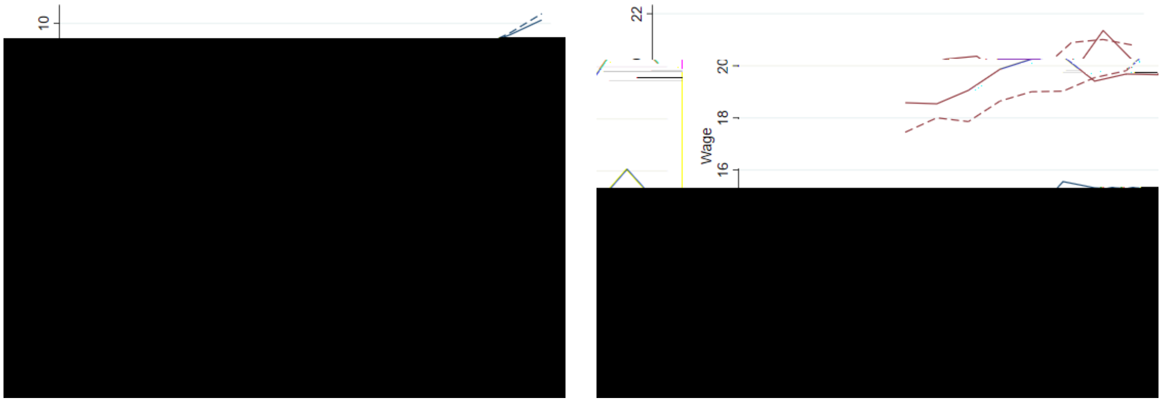
Of note is that preferences for home location $_4; \ _7$ are estimated to be negative. Since most individuals in our estimation sample start in their parent's location, parameters such as the moving fixed cost $_1$ are most directly identified from rates of migration out of parent locations. On the other hand, the parent location preference parameters are identified from the rates at which women with and without children *return* to their parent's location. Since parent time transfers are substantial, the model estimates negative values for these preferences to rationalize why we do not see a larger proportion of women moving back to their parents than we would if childcare time transfers were the only factor that influenced the utility from doing so. Amenity preference estimates indicate that the agents in our model prefer higher levels of the Diamond (2016) amenity index, shorter distances to shores, and warmer weather, but only the last of these factors is estimated to be statistically significant.

Because utility is linear in consumption, we are able to convert the moving parameters into dollars by dividing by the consumption scaling parameter and then multiplying by the consumption equivalence unit (i.e., one unit of consumption equal $2000). For the "average" mover, the moving cost is about $86,000 ignoring the value of the payoffs shocks.[25] For comparison, a woman's life earnings gain would be $97,000 if, holding all other behavior constant, she moved from the lowest paid region to the highest paid region in age 22 and then stayed in that region for the remainder of her life. Though this is an extreme example of the potential earnings gains from a move, it demonstrates that our moving costs net of payoff shocks are lower than, but of similar scale to the potential earnings gains. However, we will note that these moving costs are the estimated costs for a hypothetical move to an arbitrary location, whereas in the model people will only choose to move to high pay-off locations. Thus, these average costs are higher than the costs that households which actually choose to move will face once pay-off shocks are accounted for.[26]

We estimate our model with our entire analysis sample as well as separately with Blacks and whites, allowing us to compare estimates between the two groups. The primary differences we see between races is in moving costs: we see that Black women have higher moving costs than White women if they have a college degree and if they have a young child. Conversely, they have lower moving costs if married than White women. Our model also shows a

[25] To calculate, we sum for all individuals who move, discounted by the relevant consumption scaling. That is $= 2000 \frac{1}{N_{move}} \sum_{i=1}^{N_{move}} (^{1(a_c \neq the}$

Figure 5: Model Fit | Labor Force Lifecycle Profiles



(a) Experience

(b) Hourly Wage

Notes: Data from PSID. Figures compare life-cycle trends of experience and wages for women with and without a college degree in estimation sample and data simulated from model. Fit reported for all ages for women with a high school degree and ages 25-onward for women with a college degree. See text for details on sample construction.

larger negative preference for parents if one has a child for Black women than White women. As previously mentioned, this parameter is negative in large part to explain why women do not move home given the high value of being able to use relative care; because Black women are more likely to be single mothers in our data, these time transfers are greater on average for Black women than White women, requiring a larger negative preference parameter to explain why Black women live outside their home location. Other than these parameters,

Table 12: Model Fit | Labor Force Participation by Location, Marital Status, and Fertility

Panel A: Data

Marital Status	No Kids	Pregnant	Kids	No Kids, $\ell = \ell^P$	Pregnant, $\ell = \ell^P$	Kids, $\ell = \ell^P$	No Kids, $\ell \neq \ell^P$	Pregnant, $\ell \neq \ell^P$	Kids, $\ell \neq \ell^P$
All	0.617	0.645	0.395	0.602	0.636	0.405	0.672	0.674	0.350
$m = 0$	0.626	0.626	0.435	0.608	0.618	0.436	0.698	0.667	0.425
$m = 1$	0.568	0.558	0.386	0.556	0.543	0.398	0.624	0.609	0.332

Panel B: Model

Marital Status	No Kids	Pregnant	Kids	No Kids, $\ell = \ell^P$	Pregnant, $\ell = \ell^P$	Kids, $\ell = \ell^P$	No Kids, $\ell \neq \ell^P$	Pregnant, $\ell \neq \ell^P$	Kids, $\ell \neq \ell^P$
All	0.633	0.515	0.380	0.628	0.518	0.397	0.654	0.503	0.293
$m = 0$	0.661	0.546	0.381	0.658	0.550	0.402	0.676	0.529	0.247
$m = 1$	0.615	0.521	0.396	0.608	0.526	0.413	0.650	0.500	0.306

Notes: Data from PSID. Table compares labor force participation rates for women in estimation sample and data simulated from model. Pregnancy corresponds to woman being pregnant with their first child. See text for details on sample construction.

Table 13: Model Fit | Migration by Fertility

Panel A: Data

Direction	All	No Kids	Pregnant	Kids
ℓ^p Out-Migration Rate	2.06	2.69	2.69	1.52
ℓ^p In-Migration Rate	4.90	4.96	4.35	4.90

Panel B: Out of Sample (ACS)

Direction	All	No Kids	Pregnant	Kids
ℓ^p Out-Migration Rate	1.80	2.03	1.64	1.31
ℓ^p In-Migration Rate	4.04	4.15	4.52	3.45

Panel C: Model

Direction	All	No Kids	Pregnant	Kids

outputs over different locations and fertility statuses is reasonable. However, the model does slightly understate the gap in participation between married and single women and understates participation for pregnant women as a whole. Notably, the model also understates participation for single mothers who live outside their parents' location.

Next, we assess the model's fit of migration decisions by breaking down moves according

Table 14: E ects of Alternate Demographic Scenarios

Panel A: Impacts of Children only Being Born to Married Women

Sample	Wages	Wages, $_1 = \mathit{1}$	Years x	Years x, $_1 = \mathit{1}$	WTP	WTP, $_1 = \mathit{1}$	# Moves	Share Time with Parents
All	0.11	-0.32	0.02	-0.01	23.20	15.34	0.32	-0.03
$^P \neq 0$	-8.18	-8.16	-0.50	-0.51	16.99	7.28	0.37	-0.04
$^P = 0$	3.66	3.03	0.24	0.21	25.92	18.74	0.30	-0.03
Never SM	-4.96	-6.42	-0.24	-0.30	4.37	0.00	0.17	-0.02
Ever SM	4.66	5.14	0.25	0.25	40.10	29.03	0.46	-0.05
Whites	-1.00	-2.86	-0.02	-0.09	12.68	4.54	0.22	-0.03
Blacks	1.53	0.79	0.01	-0.03	44.29	36.43	0.43	-0.04

Panel B: Impacts of Removal of Grandparents

Sample	Wages	Wages, $_1 = \mathit{1}$	Years x	Years x, $_1 = \mathit{1}$	WTP	WTP, $_1 = \mathit{1}$	# Moves	Share Time with Parents
All	-8.37	-9.88	-0.49	-0.56	-5.34	-7.18	0.03	-0.01
$^P \neq 0$	-27.95	-32.99	-1.63	-1.87	-17.67	-23.88	0.11	-0.02
$^P = 0$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Never SM	-5.64	-7.63	-0.31	-0.40	-2.82	-4.47	0.02	-0.01
Ever SM	-10.81	-11.89	-0.65	-0.71	-7.57	-9.51	0.04	-0.01
Whites	-6.68	-7.24	-0.37	-0.41	-4.95	-5.67	0.01	0.00
Blacks	-11.03	-12.00	-0.75	-0.82	-6.52	-8.75	0.04	-0.01

Notes: SM = Single Mother. The table presents impacts of counterfactual scenarios on mean change in lifetime wages, mean change in years of experience, mean change in number of moves, and mean change in fraction of time spent in parent's location. The second column for wage and experience changes and WTP show results from the counterfactual experiment when moving costs are in nite. Wages in units of \$

6.1 Migration and the Family

We begin by predicting lifecycle earnings and migration profiles under alternate demographic scenarios. In a first experiment, we impose that children are only born to married women, that is $P(f = 1|m = 0) = 0$, allowing our model to speak to how recent changes in out-of-wedlock births in the U.S. may have impacted female labor mobility. In a second counterfactual, we evaluate the role of grandparents in wage formation by removing them from the model entirely, setting parent location preferences parameters $_{4}; {}_{7}$ as well as grandparent time transfers ^{P,m} to zero. Conceptually, the presence of grandparents on wages is ambiguous, since residing with them may increase labor supply and experience in the short run but may also impact wages negatively by discouraging moving to higher-paying locations. In all counterfactuals, we evaluate impacts in the age span of 22 to 55.

Table 14 presents the results of these exercises. For each counterfactual, we estimate impacts in terms of median percent changes in lifetime wages, mean change in years of experience, mean change in number of lifetime moves, and mean change in share of time spent with parents. We also calculate a willingness to pay metric (WTP) by taking the change in utility resulting from the counterfactual scenario and dividing it by $_1$, the utility scaling parameter for consumption for women without children. We conduct demographic heterogeneity analyses by assessing impacts for women by grandparent helpfulness type and who were or were not ever single mothers in the baseline simulation. We additionally conduct racial heterogeneity analyses for estimating the impacts for whites and Blacks separately while using the separate parameters estimated for them in Table 11. We also compute changes in wages, experience, and WTP in a scenario for moving costs are infinite ($_1 = \infty$) to assess the importance of accounting for migration when making counterfactual predictions.

The effects of children being born to only married women on wages and experience are generally quite limited. Surprisingly, the effects on work experience are slightly negative, which happens because women acquire experience in part to insure against the state of being a single mother — when the probability of this occurring vanishes, incentives to work decline slightly. While the effects on wages are generally small, we do observe that the counterfactual increases the number of moves made by individuals over the lifecycle by 0.32 on average, with stronger effects for Blacks and women who are ever single mothers, resulting from women who would have had moves encumbered by the presence of children facing smaller moving costs. On a base rate of approximately 1.75 moves over the life cycle in our simulated data, this constitutes an increase of roughly 25%, suggesting that recent increases in single parenthood may have been a contributor to concurrent declines in female labor mobility.

The removal of grandparents is associated with more substantial reductions in wages and experience for women who are ever single parents and Blacks. For example, we see that the existence of grandparents as a potential source of childcare is associated with approximately half a year of experience and subsequently earnings, which corresponds to a percentage increase of about 2.3%. To put these effects in context with the reduced form estimates earlier in the paper, the child penalty gap was about 10 p.p. smaller for mothers living near their grandparents. Removing grandmothers is thus able to account for about 25% of the child penalty we documented, which is reasonable given that not all mothers in our model are living near the grandparents even when they are an available option (and are thus presumably unaffected by the removal of grandmothers) and not all grandparents actually provide childcare assistance.

Additionally, these results demonstrate that parents' mobility is not only influenced by grandparents but also by regional costs for child care: ignoring migration results in overstating the effects of the counterfactual, since when moving is allowed the affected individuals can migrate to areas with lower child care costs or higher wages as a means of insurance. As such, the utility cost of the counterfactual is greater when moving is prohibited, and the difference in utility between the world where moving is allowed is larger for more-affected groups. Eliminating the pull of the parent location, however, does result in increased migration for the same groups of women who see the largest declines in earnings, suggesting that

Table 15: E ects of Childcare Subsidies

Panel A: Impacts of Halving Childcare Costs

Sample	Wages	Wages, $_1$ = *1*	Years x	Years x, $_1$ = *1*	WTP	WTP, $_1$ = *1*	# Moves	Share Time with Parents
All	19.96	22.06	1.21	1.29	16.80	16.12	0.01	0.00
$^P \neq 0$	7.77	9.40	0.47	0.55	8.64	6.80	0.04	-0.01
$^P = 0$	25.17	27.46	1.52	1.61	20.29	20.10	0.00	0.00
Never SM	14.87	17.22	0.88	0.99	12.52	11.84	0.00	0.00
Ever SM	24.52	26.39	1.50	1.56	20.58	20.00	0.03	0.00
Whites	20.79	25.73	1.14	1.36	18.14	17.73	0.01	0.002
Blacks	18.89	19.10	1.26	1.26	14.02	12.86	0.03	0.00

Panel B: Impacts of Removing Childcare Costs

Sample	Wages	Wages, $_1$ = *1*	Years x	Years x, $_1$ = *1*	WTP	WTP, $_1$ = *1*	# Moves	Share Time with Parents
All	26.82	29.93	1.72	1.86	28.35	26.60	0.03	-0.01
$^P \neq 0$	11.39	13.08	0.72	0.79	17.96	11.84	0.10	-0.03
$^P = 0$	33.41	37.13	2.15	2.31	32.72	33.01	0.00	0.00
Never SM	20.28	23.69	1.27	1.42	21.55	19.90	0.01	-0.01
Ever SM	32.67	35.51	2.12	2.24	34.47	32.62	0.05	-0.01
Whites	28.49	36.50	1.64	1.97	30.72	29.90	0.02	-0.01
Blacks	25.26	25.59	1.79	1.79	23.57	21.07	0.07	-0.01

Notes: SM = Single Mother. The table presents impacts of counterfactual scenarios on mean change in lifetime wages, mean change in years of experience, mean change in number of moves, and mean change in fraction of timespent in parent's location. The second column for wage and experience changes and WTP show results from the counterfactual experiment when moving costs are in nite. Wages in units of $2,000. Results for Whites and Blacks computed using separate parameter estimates shown in Table 11. See text for details on estimation sample and procedure.

In all cases, these policies increase years of experience, labor mobility, and lifetime wages, with particularly strong effects for women who are ever single parents and larger effects for the complete removal of child care costs than halving them. Fully subsidizing childcare increases the lifetime earnings of women by about $27 (with monetary units in the model scaled by $2,000, this corresponds to around a $54,000 impact), which on a basis of $334 average lifetime earnings in the simulated data corresponds to an approximately 8% increase. For comparison, in the reduced form estimates, we saw that the child penalty for women living in low child care cost states was about 10% lower than for women in high cost states. These wage effects are stronger for women who are single mothers than for women who never are, with percentage wage impacts of around 10% and 5.8% respectively.

Among all women in our sample, the complete removal of childcare costs raises lifetime moves by 0.03, or roughly 2 percent. Similar to before, the effects on earnings are concentrated among women who are at any point single mothers (for whom the percentage effect is closer to 3 percent), and the migration effects are particularly strong for single mothers and Blacks. The effects on earnings and wages are stronger for women who do not have helpful grandparents, since grandparent childcare does crowd out the labor force effects of the policies. However, the migration effects are largest for women who *do* have helpful grandparents, since it is these women for whom the geographic constraint induced by grandparent childcare applies.

A key feature of our results is that they demonstrate that ignoring labor mobility may misstate certain effects of childcare policies. Notably, the effects of the policies on experience and wages are typically larger in the version of the model where moving is prohibited — while this may seem counterintuitive, this happens because women in the no-moving world choose to move to locations that induce labor force participation, such as higher-paying locations or locations with grandparents. This depresses labor force participation in the baseline world with no moving, leaving more room for improvement from the counterfactual policies. Overall, though, the wage effects are fairly comparable regardless of whether moving is allowed.

However, ignoring migration results in the welfare effects of the policies being consistently understated. Across all individuals, the average willingness to pay for the full removal of childcare costs is approximately $56,700, which compared to the average cost in our model of full-time childcare for five years ($50,000) suggests that the policies on a whole may be

Bettendorf, L. J., E. L. Jongen, and P. Muller (2015). Childcare subsidies and labour supply | evidence from a large dutch reform. *Labour Economics 36*, 112{123.

Bick, A. (2016). The quantitative role of child care for female labor force participation and fertility. *Journal of the European Economic Association 14* (3), 639{668.

Bishop, K. (2008). A dynamic model of location choice and hedonic valuation.

Blau, D. and E. Tekin (2007). The determinants and consequences of child care subsidies for single mothers in the usa. *Journal of Population Economics 20* (4), 719{741.

Borowsky, J., J. H. Brown, E. E. Davis, C. Gibbs, C. M. Herbst, A. Sojourner, E. Tekin, and M. J. Wiswall (2022). An equilibrium model of the impact of increased public investment in early childhood education. Technical report, National Bureau of Economic Research.

Boyd, D., H. Lankford, S. Loeb, and J. Wycko (2005). The draw of home: How teachers' preferences for proximity disadvantage urban schools. *Journal of Policy Analysis and Management 24* (1), 113{132.

Bratti, M., T. Frattini, and F. Scervini (2018). Grandparental availability for child care and maternal labor forceodeeboly

Coate, P., P. M. Krolikowski, and M. Zabek (2017). Parental Proximity and Earnings after Job Displacements.

Compton, J. and R. A. Pollak (2014). Family proximity, childcare, and women's labor force attachment. *Journal of Urban Economics 79*, 72{90.

Compton, J. and R. A. Pollak (2015). Proximity and Coresidence of Adult Children and their Parents in the United States: Description and Correlates. *Annals of Economics and Statistics* (117-118), 91{114.

Cortes, P. and J. Pan (2020). Children and the remaining gender gaps in the labor market. Technical report, National Bureau of Economic Research.

Davanzo, J. (1983). Repeat Migration in the United States: Who Moves Back and Who Moves On? *The Review of Economics and Statistics 65* (4), 552{559.

Del Boca, D. (2015). Child care arrangements and labor supply. Technical report, IDB Working Paper Series.

Diamond, R. (2016). The Determinants and Welfare Implications of US Workers' Diverging Location Choices by Skill : 1980-2000. *American Economic Review 106* (3), 479{524.

Dierx, A. (1988). A Life-Cycle Model of Repeat Migration. *Regional Science and Urban Economics 18*, 383{397.

Dimova, R. and F.-C. Wol (2011). Do downward private transfers enhance maternal labor supply? evidence from around europe. *Journal of Population Economics 24* (3), 911{933.

Eckstein, Z. and K. I. Wolpin (1989). Dynamic labour force participation of married women and endogenous work experience. *Review of Economic Studies 56* (3), 375{390.

Edin, K. and M. Kefalas (2011). *Promises I can keep: Why poor women put motherhood before marriage*. Univ of California Press.

Francesconi, M. (2002). A joint dynamic model of fertility and work of married women. *Journal of labor Economics 20* (2), 336{380.

Garc a-Moran, E. and Z. Kuehn (2017). With strings attached: Grandparent-provided child care and female labor market outcomes. *Review of Economic Dynamics 23*, 80{98.

Gemici, A. (2011). Family Migration and Labor Market Outcomes.

Goldin, C. and J. Mitchell (2017). The new life cycle of women's employment: Disappearing humps, sagging middles, expanding tops. *Journal of Economic Perspectives 31* (1), 161{82.

Guner, N., R. Kaygusuz, and G. Ventura (2020, 03). Child-Related Transfers, Household Labour Supply, and Welfare. *The Review of Economic Studies 87* (5), 2290{2321.

Haan, P. and K. Wrohlich (2011). Can child care policy encourage employment and fertility?: Evidence from a structural model. *Labour Economics 18* (4), 498{512.

Havnes, T. and M. Mogstad (2011). Money for nothing? universal child care and maternal employment. *Journal of Public Economics 95* (11-12), 1455{1465.

Johnson, J. E. and S. Schulhofer-Wohl (2019). Changing Patterns of Geographic Mobility and the Labor Market for Young Adults. *Journal of Labor Economics 37* (S1), S199{S241.

Kaplan, G. (2012). Moving Back Home: Insurance against Labor Market Risk. *Journal of Political Economy 120* (3), 446{512.

Kennan, J. and J. R. Walker (2011). The E ect of Expected Income on Individual Migration Decisions. *Econometrica 79* (1), 211{251.

Kleven, H., C. Landais, J. Posch, A. Steinhauer, and J. Zweimuller (2019). Child Penalties across Countries: Evidence and Explanations. *AEA Papers and Proceedings 109*, 122{126.

Kleven, H., C. Landais, and J. E. S gaard (2019). Children and gender inequality: Evidence from Denmark. *American Economic Journal: Applied Economics 11* (4), 181{209.

Konrad, K. A., H. Kunemund, K. E. Lommerud, and J. R. Robledo (2002, Sept). Geography of the family. *American Economic Review 92* (4), 981{998.

Lee, S. and J. Lin (2017, 03). Natural Amenities, Neighbourhood Dynamics, and Persistence in the Spatial Distribution of Income. *The Review of Economic Studies 85* (1), 663{694.

Lefebvre, P. and P. Merrigan (2008). Child-care policy and the labor supply of mothers with young children: A natural experiment from canada. *Journal of Labor Economics 26* (3), 519{548.

Lundin, D., E. Mork, and B. Ockert (2008). How far can reduced childcare prices push female labour supply? *Labour Economics 15* (4), 647{659.

Maddow-Zimet, I. and K. Kost (2020). E ect of changes in response options on reported pregnancy intentions: A natural experiment in the united states. *Public Health Reports 135* (3), 354{363.

McMurry, J. (2021). Child Care Policy and Informal Care.

Molloy, R., C. L. Smith, and A. Wozniak (2011). Internal Migration in the United States. *Journal of Economic Perspectives 25* (3), 173{196.

Posadas, J. and M. Vidal-Fernandez (2013). Grandparents' childcare and female labor force participation. *IZA Journal of Labor Policy 2* (1), 1{20.

Rainer, H. and T. Siedler (2009). O brother, where art thou? The e ects of having a sibling on geographic mobility and labour market outcomes. *Economica 76* (303), 528{556.

Rosenzweig, M. and K. I. Wolpin (1980). Testing the Quantity-Quality Fertility Model: The Use of Twins as a Natural Experiment. *Econometrica 48* (1), 227{240.

Ruggles, S., S. Flood, R. Goeken, E. Meyer, J. Pacas, and M. Sobek (2020). IPUMS USA: Version 10.0 American Community Survey.

Spilimbergo, A. and L. Ubeda (2004). Family attachment and the decision to move by race. *Journal of Urban Economics 55* (3), 478{497.

Spring, A., E. Ackert, K. Crowder, and S. J. South (2017). In uence of Proximity to Kin on Residential Mobility and Destination Choice: Examining Local Movers in Metropolitan Areas. *Demography 54* (4), 1277{1304.

Tekin, E. (2007). Childcare subsidies, wages, and employment of single mothers. *Journal of Human Resources 42* (2), 453{487.

Zabek, M. (2019). Local Ties in Spatial Equilibrium. Technical report.

Zamarro, G. (2020). Family labor participation and child care decisions: the role of grannies. *SERIEs 11* (3), 287{312.

Zolna, M. and L. D. Lindberg (2012). Unintended pregnancy: Incidence and outcomes among young adult unmarried women in the united states, 2001 and 2008. Technical report, Alan Guttmacher Institute New York.

A Supplementary Figures and Tables

Figure A.1: State Characteristics

(a) Childcare Costs

(b) Wage E ects

(c) Costs of Living

Notes:

Table A.1: Effects of Childcare Subsidies with Fertilty Response

Panel A: Impacts of Halving Childcare Costs

Sample	Wages	Wages, $_1 = 1$	Years x	Years x, $_1 = 1$	WTP	WTP, $_1 = 1$	# Moves	Share Time with Parents
All	28.82	32.32	1.75	1.90	9.51	15.83	-0.24	0.02
$^P \neq 0$	16.04	19.01	0.95	1.09	0.49	6.31	-0.20	0.02
$^P = 0$	34.28	38.00	2.09	2.25	13.30	19.90	-0.25	0.03
Never SM	25.50	29.55	1.52	1.71	5.15	10.87	-0.25	0.02
Ever SM	31.79	34.79	1.95	2.08	13.30	20.29	-0.22	0.03
Whites	31.52	45.40	1.73	2.36	25.46	78.25	-0.10	-0.03
Blacks	26.22	25.83	1.67	1.72	2.95	36.25	-0.22	0.04

Panel B: Impacts of Removing Childcare Costs

Sample	Wages	Wages, $_1 = 1$	Years x	Years x, $_1 = 1$	WTP	WTP, $_1 = 1$	# Moves	Share Time with Parents
All	33.82	37.10	2.16	2.30	18.74	24.37	-0.26	0.02
$^P \neq 0$	19.27	21.41	1.20	1.29	7.96	9.61	-0.18	0.00
$^P = 0$	40.03	43.81	2.57	2.74	23.40	30.58	-0.29	0.02
Never SM	29.99	33.75	1.87	2.05	11.75	16.80	-0.30	0.02
Ever SM	37.24	40.11	2.41	2.54	25.05	31.07	-0.23	0.02
Whites	37.25	51.06	2.16	2.80	38.97	91.75	-0.13	-0.05
Blacks	30.83	30.39	2.08	2.13	8.39	41.61	-0.23	0.04

Notes: SM = Single Mother. Table presents average impacts of counterfactual scenarios on lifetime wages, years of experience, number of moves, and fraction of time spent in parent's location. Second columns for wage and experience changes and WTP conduct counterfactual experiment when moving costs are infinite. Monetary units scaled by $2,000. Results for whites and Blacks computed using separate parameter estimates shown in Table 11. Fertility probability increases by 10% in halved childcare cost counterfactual and 20% in full subsidy counterfactual. See text for details on estimation sample and procedure.

(`):

$$\ell' = \arg\max_{k \in N_{\ell}} \left(\mathbb{1}(k \neq \ell) \underbrace{\left({}_0 + {}_1 e + {}_3 m + {}_4 N^k \right)}_{z_k} + \mathbb{E}_{\epsilon} \sum_{'} [V_{65}(' ; k)] \Pr(' | ; h; k) \right) + {}_k$$

With the assumption that these shocks are drawn from the type-1 extreme value location with a variance normalized to 1, we can calculate the probability of choosing location ℓ':

$$Pr(\ell_{64} = \ell' | ; \ell; h) = \frac{\exp \left(\mathbb{1}(\ell' \neq \ell) \; {}_{\ell'} + (\mathbb{E}_{\epsilon} \sum_{'} [V_{65}(' ; \ell')] \Pr(' | ; h; \ell')) \right)}{\sum_k \exp \left(\mathbb{1}(k \neq \ell) \; {}_k + (\mathbb{E}_{\epsilon} \sum_{'} [V_{65}(' ; k)] \Pr(' | ; h; k)) \right)}$$

and the expected utility following the optimal decision as:

$\mathbb{E}_{\ell'}[$

as follows:

$$
\begin{aligned}
\mathbb{E}_{''}[V_{64}(\ ;`)] = &\ {}_1 w_S + {}_4 \mathbb{1}(` = `^P) \\
&+ 1 \quad \frac{''_{64}}{''} \quad {}_3 \mathbb{1}[p = 0] + \mathbb{E}_{`_\theta}[V^{\theta}_{64}(\ ;`;1)] \\
&+ 1 \quad \frac{''_{64} \quad {}^2_{''}}{''} \quad {}_1 e^{0:5\ {}^2_{''} + G_{64}(\ ;`)} \\
&+ \quad \frac{''_{64}}{''} \quad {}_2 + {}_e e + {}_x x + {}_c w_S(\ ;`) + {}_3 \mathbb{1}[p = 1] + \mathbb{E}_{`_\theta}[V^{\theta}_{64}(\ ;`;0)] \quad ;
\end{aligned}
$$

which in turn allows us to compute age-63 continuation values, and so on. This continues recursively in the same fashion until we reach age 39, which is the last year in which an agent may have a young child. For those without children at 39, the decision process is unchanged. For those with a child, they now have the costs of child care to consider in their

h = 0 otherwise.

There are two notable differences in the reservation wage for women with children relative to those without. First, the parameters governing valuation of consumption ($_5$) and the value of leisure ($_6$) differ, potentially raising the reservation wage relative to non-mothers if $_6$

C Divisional Groupings of States

- **New England (NE):** Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont.
- **Mid-Atlantic (MA):** New Jersey, New York, Pennsylvania.
- **East North Central (ENC):** Illinois, Indiana, Michigan, Ohio, Wisconsin.
- **West North Central (WNC):** Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota.
- **South Atlantic (SA):** Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, District of Columbia, West Virginia.
- **East South Central (ESC):** Alabama, Kentucky, Mississippi, Tennessee.
- **West South Central (WSC):** Arkansas, Louisiana, Oklahoma, Texas.
- **Mountain (MO):** Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming.
- **Paci c (PA):** Alaska, California, Hawaii, Oregon, Washington.