Birth Order, Gender Attitudes, and Educational Attainment: Evidence from Immigrant Families in the United States

By Andrew Zhao*

This paper investigates how birth order and cultural attitudes interact to shape educational attainment in immigrant families using data from the Panel Study of Income Dynamics (1999-2021) and the World Values Survey. I find that firstborn males complete 1.46 more years of education than their later-born brothers, representing 0.64 standard deviations of educational attainment. While firstborn daughters in families with relatively more progressive gender attitudes gain an additional 0.6 years of education beyond the male firstborn premium, this advantage disappears in families with traditional attitudes. These patterns persist after accounting for family fixed effects and potential fertility-based selection, suggesting that cultural attitudes can override typically beneficial birth order effects. The results highlight how traditional gender norms moderate the relationship between birth order and educational investment in immigrant families.
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In recent decades, substantial research has documented persistent educational disparities across birth order, with first-born children generally achieving better educational outcomes than their younger siblings (De Haan (2011); Black, Devereux and Salvanes (2005)) This 'first-born premium' has been attributed to various mechanisms, including differential parental time investment and resource allocation (Attanasio, Boneva and Rauh (2022); Hao and Yeung (2015)). Meanwhile, Blau (2015) research shows that traditional cultural values, particularly gender norms, often persist after migration and influence parental investment decisions between sons and daughters in immigrant families (Feliciano and Lanuza (2017)).

However, gaps remain in our understanding of how birth order and cultural gender norms interact within immigrant families. While existing research has examined either birth order effects or cultural attitudes separately, the intersection of these forces remains unexplored. This limitation is particularly important given the potential for cultural attitudes to systematically moderate the documented first-born advantage, especially for daughters in immigrant families.

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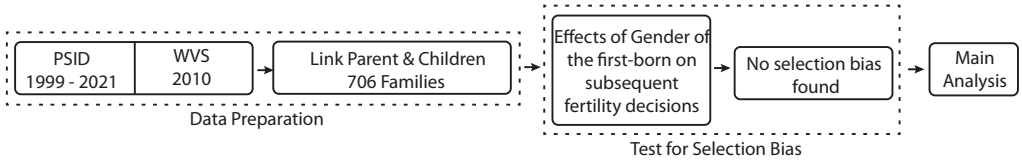

FIGURE 1. WORKFLOW DIAGRAM FOR THE ANALYSIS IN THIS PAPER.

This paper examines how birth order effects intersect with cultural gender attitudes to influence educational attainment in immigrant families. We combine two complementary datasets to address this question. First, we use longitudinal data from the Panel Study of Income Dynamics (PSID) from 1999-2021 University of Michigan (2021), focusing on first-generation immigrant families following the 1997 sample refresh. Second, we incorporate cultural measures from the World Values Survey (WVS) (Inglehart et al. (2014)) to capture variation in gender attitudes across immigrant source countries.

My empirical strategy proceeds in two steps. First, we test for potential selection bias by examining whether first child's gender influences subsequent fertility decisions in immigrant families. Second, we estimate the differential impact of first-born status on educational attainment across gender, incorporating interactions with cultural attitudes. This approach allows us to identify how the first-born premium varies with both gender and cultural context while controlling for family fixed effects and time-varying characteristics.

My study makes three primary contributions to the literature. First, I document substantial heterogeneity in the first-born premium across gender lines, with the advantage being significantly larger for males in families with traditional gender attitudes. Second, we provide evidence that cultural attitudes can override typically beneficial birth order effects, particularly for females in households with more traditional views. Third, we demonstrate how resource allocation patterns in immigrant families vary systematically with both birth order and cultural gender attitudes.

My findings have important implications for understanding educational inequality in immigrant families and proposing targeted interventions. The results suggest that policies aimed at reducing educational disparities may need to account for both birth order and cultural factors, particularly in supporting educational opportunities for first-born daughters in families with traditional gender attitudes and later-born children in general.

I. Literature Review

This paper builds on and connects two strands of literature: gender-based educational investment in immigrant families and birth order effects on educational outcomes.

A. Gender-Based Educational Investment in Immigrant Families

Research documents systematic patterns in how immigrant parents allocate educational resources between sons and daughters, reflecting both traditional values and adaptation to host country contexts. Kao and Turney (2010) find that immigrant parents view education as a primary vehicle for upward mobility, but this investment varies significantly by child gender. Cobb-Clark and Crossley (2001) provide evidence that in traditional immigrant families where males have a labor market advantage, parents allocate resources differently between sons and daughters, following a family investment hypothesis driven by perceived comparative advantages.

The relationship between parental involvement and academic outcomes in immigrants family shows marked gender differences. Moon and Hofferth (2016) demonstrate that home-based parental engagement significantly benefits boys' performance in reading and mathematics from kindergarten through fifth grade, while similar involvement patterns yield minimal benefits for girls. This gender disparity in the effectiveness of parental investment suggests that traditional familial roles and expectations may shape how children respond to parental involvement. Specifically, the benefits of parental engagement could vary substantially between sons and daughters depending on cultural attitudes and gender-specific parenting practices.

Traditional gender roles within immigrant families create distinct educational environments for sons and daughters. Lizama Portillo (2023) suggest that in Latino and Asian immigrant families, daughters often shoulder more household responsibilities than sons, which correlates with less time to be able to put into academic work. Salih et al. (2017) further documents how cultural beliefs shape differential investment in sons' versus daughters' education, with immigrant parents often maintaining gender-specific educational aspirations that mirror their home country practices. These findings suggest that traditional gender norms influence educational achievement through multiple channels, including direct resource allocation and indirect effects through household responsibilities and parental expectations.

These findings provide a foundation for examining how gender-based investment patterns might interact with birth order in immigrant families. While existing research establishes that traditional gender roles create distinct educational environments, my study extends this literature by investigating whether these gender-specific patterns vary systematically with birth order position.

B. Birth Order Effects in Education

A significant body of research establishes systematic relationships between birth order and educational outcomes. Booth and Kee (2009) develop a novel birth order index that isolates family size effects, demonstrating that birth order independently influences educational attainment. Building on this work, Kim (2020) provides evidence of persistent birth order effects across generations, suggesting these patterns reflect fundamental aspects of intrahousehold resource allocation rather than temporary socioeconomic conditions.

The mechanisms driving birth order effects also appear rooted in parental resource allocation decisions. Ejrnæs and Pörtner (2004) develops a theoretical model showing that birth order effects exist. Empirical evidence from France by Mechoulan and Wolff (2015) supports this framework, documenting that parents make systematically different transfers across birth order positions, with first-born children receiving both higher educational investments and subsequent wealth transfers.

Recent research highlights important heterogeneity in birth order effects. Muslimova et al. (2020) find that the advantages of first-born status interact with genetic endowments - children with higher genetic predisposition for education benefit more from being first-born. These findings suggest that birth order effects may amplify initial differences in ability, potentially exacerbating within-family inequality. Moreover, Black (2017) document that first-born children are more likely to enter occupations requiring leadership abilities, indicating that birth order effects extend beyond educational attainment to influence career trajectories.

My study builds on these literatures by examining whether traditional gender attitudes moderate these established birth order effects. While previous research demonstrates robust birth order patterns in educational attainment, we know little about how these effects might vary with cultural context, particularly in immigrant families where gender norms often remain more traditional.

II. Data

Our analysis draws on two complementary data sources: the Panel Study of Income Dynamics (PSID) (University of Michigan (2021)) and the World Values Survey (WVS) (Inglehart (2014)). The PSID provides detailed longitudinal information on family structure and socioeconomic outcomes, while the WVS captures cultural attitudes toward gender and education across different ethnic groups.

A. PSID Sample Construction

I utilize PSID data from 1999 to 2021, following the 1997 sample refresh that substantially expanded immigrant family representation in the survey. Prior to 1997, immigrant families were underrepresented and often not explicitly identified in the data, making earlier periods less suitable for my analysis. I identify

immigrant families using the family identification codes provided in the PSID codebook, which allows us to track these households over time.

My sample consists of immigrant families with at both parents present and biological children from the same parents. I exclude families with adopted children or other family structures to maintain clear interpretation of birth order effects. The final sample includes 706 families, and 2026 individual children, with complete information on all key variables for at least one observed year. Only two families were dropped due to missing data, suggesting minimal concerns about selection bias from incomplete records.

B. Key Variables and Measurement

The PSID provides detailed measurements of my key variables. Educational attainment is measured as years of completed schooling, ranging from 1 to 17 years for both parents and children. Birth order is coded as a continuous variable based on each child's position among siblings. Family size captures the total number of children in each household at the time of observation. Income is measured as annual family income and is treated as a continuous variable in my analysis. I also track maternal age at birth for each child and individual ages throughout the sample period. All these demographic variables are measured continuously, allowing for precise estimation of age-related effects.

C. WVS Sample and Cultural Attitudes Measurement

To capture cultural attitudes toward gender and education, I incorporate data from the 2010 wave of the World Values Survey. My key measure comes from responses to the statement **"A university education is more important for a boy than for a girl."** I use the proportion of respondents from each ethnic group who "strongly agree" or "agree" with this statement from the WVS survey summary statistics and created a continuous measure of traditional gender attitudes that ranges from 0 to 1.

The ethnic categories in the PSID align precisely with those in the WVS, allowing for clean matching between datasets. This matching procedure results in gender attitude scores for 13 distinct regional groups, ranging from 0.100 for Canadian immigrants to 0.694 for Middle Eastern immigrants (see Table II.C for complete regional variations).

Regional Group	Average Attitude Score
Central American	0.225
Western European	0.140
Caribbean	0.253
South Asian	0.505
African	0.378
East Asian	0.340
Middle Eastern	0.694
British	0.158
Pacific Islander	0.108
South American	0.235
Eastern European	0.281
Canadian	0.100
Northern European	0.281

Table 1—Gender Attitudes by Regional Group (WVS 2010 Wave)

D. Parent-Child and Sibling Linkages

To establish family relationships in our sample, we utilize the PSID Family Identification Mapping System (FIMS), a comprehensive tool that enables tracking biological and adoptive relationships across generations. The FIMS system creates customized map files containing identification variables that link children with their parents and siblings, drawing from multiple PSID data sources including family rosters and birth history records collected since 1983.

The linkage process involves three key steps. First, we create the FIMS parents map containing the unique identifiers for each parents-children pair. Second, we construct individual-level datasets containing our variables of interest for both focal children and their parents. Finally, we merge these datasets using the identification variables, following the PSID's recommended procedure to create unique individual identifiers.

E. Summary Statistics

Table II.E presents summary statistic of my sample of 706 immigrant families, focusing on firstborn children and family-level variables. The average family size (child_size) is 2.87 children, with a standard deviation of 1.45, ranging from 1 to 5 children. The variable firstborn_fem indicates whether the firstborn child is female, with a mean of 0.48, suggesting a relatively balanced gender distribution among firstborn children.

Parental education (parent_educ) averages 11 years, with substantial variation (SD = 4.00) ranging from 1 to 17 years of schooling. To measure family economic

status, we construct a comprehensive income measure (log_income) by averaging each family's annual income across all available years in our sample period, adjusting for inflation using the Consumer Price Index (base year 2021). This approach helps smooth out temporary income fluctuations and provides a more stable measure of family resources. The log-transformed average income has a mean of 11.14 and a standard deviation of 1.33.

Mother's age at childbirth is normalized (mother_age_normalized) to facilitate interpretation, with a mean of 0 and standard deviation of 1, ranging from -1.54 to 2.04 standard deviations from the mean.

Finally, the gender attitude measure (gender_att), derived from the World Values Survey, has a mean of 0.27 with a standard deviation of 0.14, ranging from 0.10 to 0.69. Higher values indicate more traditional views regarding gender roles in education.

Table 2—Base Sample Summary Statistics

Variable	Obs	Mean	SD	Min	P25	Med	P75	Max
child_size	706	2.87	1.45	1.00	2.00	3.00	4.00	5.00
firstborn_fem	706	0.48	0.15	0.00	0.00	0.00	1.00	1.00
parent_educ	706	11.00	4.00	1.00	9.00	12.00	15.00	17.00
log_income	706	11.14	1.33	0.00	10.61	11.15	11.70	16.79
gender_att	706	0.27	0.14	0.10	0.23	0.23	0.28	0.69
mother_age_normalized	706	0.00	1.00	-1.54	-0.80	-0.11	0.71	2.04

III. First-Born Gender and Family Size

A key concern in studying educational investment in immigrant families is whether the gender of the first-born child influences subsequent fertility decisions. Such behavior could indicate both selection bias in our analysis and the persistence of cultural preferences regarding child gender. Previous research by Blau et al. (2020) documents that immigrant families from countries with strong son preference traditions often adjust fertility based on first-born gender, while Blau (1991) emphasizes the importance of accounting for selection effects when studying immigrant fertility patterns.

A. Empirical Framework

I model family size as a function of first-born gender and cultural attitudes:

$$\begin{aligned} ChildSize_i = \beta_0 &+ \beta_1 FirstbornFemale_i + \beta_2 ParentEduc_i \\ &+ \beta_3 \log(Income_i) + \beta_4 GenderAttitude_i \\ &+ \beta_5 (Female \times GenderAttitude)_i \\ &+ \beta_6 MotherAge_i + \epsilon_i \end{aligned} \tag{1}$$

where ChildSize represents completed family size and FirstbornFemale indicates a female first-born child. Following Marcén, Molina and Morales (2018), I include GenderAttitude to capture cultural views toward gender roles in education and interact it with first-born gender to test whether traditional attitudes amplify potential gender-based fertility adjustments. I control for parental education, the logarithm of average family income (adjusted for inflation), and normalized maternal age at first birth.

B. Results

Table 3 presents regression results examining whether the gender of firstborn children influences subsequent fertility decisions. The key coefficient of interest is that of firstborn female, which is statistically insignificant (-0.225, SE = 0.245, $p > 0.1$). This suggests that immigrant families do not systematically adjust their fertility based on their firstborn's gender.

To test whether this relationship varies with cultural attitudes, I interact first-born female with gender attitudes toward education. The interaction coefficient is also statistically insignificant (-0.497, SE = 0.825, $p > 0.1$), indicating that even in families with more traditional views about gender roles in education, having a firstborn daughter does not systematically affect subsequent fertility decisions

Among my control variables, parental education shows a significant negative relationship with family size (-0.115, SE = 0.014, $p < 0.01$), suggesting that more educated parents tend to have fewer children. Family income (0.030, SE = 0.040, $p > 0.1$) and the direct effect of gender attitudes (-0.152, SE = 0.417, $p > 0.1$) show no significant association with family size. Similarly, normalized maternal age at first birth (0.238, SE = 0.51, $p > 0.1$) does not significantly predict family size in my sample

These findings differ from previous research by Ezdi and Baş (2020), who found significant son-preference effects in fertility decisions among Turkish immigrants in Germany. However, this difference likely reflects the scope of analysis rather than conflicting evidence. While Ezdi and Bas focused specifically on Turkish immigrants in Germany, my sample spans multiple immigrant communities with varying cultural backgrounds in the United States. The absence of systematic fertility responses to firstborn gender in our broader sample suggests that son

preference in fertility decisions may be specific to certain immigrant groups rather than a general pattern.

The lack of evidence for gender-based fertility decisions in my sample has important implications for our subsequent analysis of educational investments. It suggests that any differences we observe in educational outcomes between firstborn sons and daughters are unlikely to be driven by selective fertility behavior.

Table 3—Selection Bias Regression Results

	Dependent Variable: Number of Children in a Family			
	Estimate	Std. Error	t-value	p-value
Firstborn Female	-0.225	0.245	-0.918	0.359
Parent Education	-0.115***	0.014	-8.214	0.000
Log Income	0.030	0.040	0.750	0.453
Gender Attitude	-0.152	0.417	-0.364	0.716
Female × Attitude	-0.497	0.825	-0.602	0.547
Mother Age (Normalized)	0.238	0.051	4.667	0.000

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable measures progressive views on gender roles on a standardized scale. Age is centered and scaled.

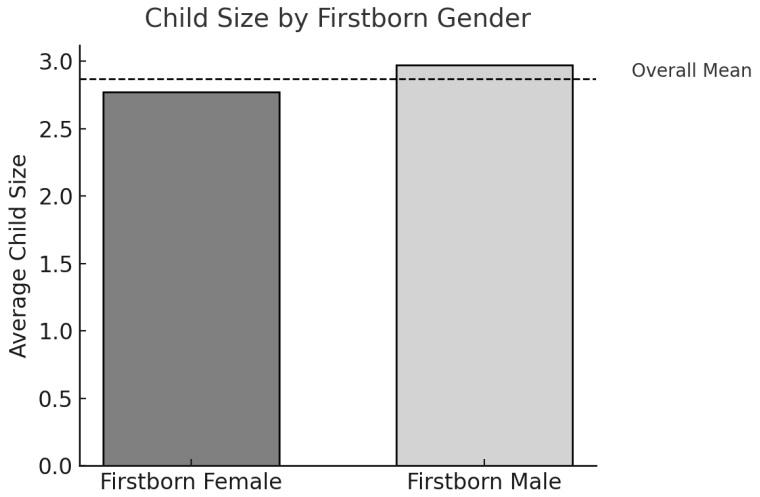

Figure 2. Average number of children in families with a firstborn female compared to families with a firstborn male. The dashed line represents the overall mean child size across the sample. Families with a firstborn female have slightly smaller families on average, but the difference is minimal.

IV. Birth Order Effects and Educational Attainment

I have established that fertility decisions are not systematically influenced by firstborn gender in my sample, I now examine how birth order and gender interact to shape educational investment in immigrant families.

A. Sample Construction and Descriptive Statistics

For this analysis, I construct a sample of 1,098 individuals from 345 immigrant families with two or more children. This sample represents a subset of my original PSID sample, focusing specifically on families where I observe complete educational histories for all siblings aged 18-35 in a given year. I impose this age restriction to ensure individuals have largely completed their educational trajectories while maintaining sufficient variation to identify age effects.

Table 4 presents summary statistics. The average educational attainment in my sample is 13.45 years (SD = 2.31), ranging from nearly no education completion (1 year) to master/doctoral degree attainment (17 years). This distribution reflects considerable variation in human capital investment across families. The average family has 3.18 children (SD = 1.15), with 31 percent of individuals being firstborn and 49 percent female.

Table 4—Summary Statistics of Birth Order and Gender Attitudes Analysis

Variable	Obs	Mean	SD	Min	P25	Med	P75	Max
years_education	1,098	13.45	2.31	1.00	8.00	13.00	16.00	17.00
child_size	1,098	3.18	1.15	2.00	2.00	3.00	5.00	5.00
is_firstborn	1,098	0.31	0.46	0.00	0.00	0.00	1.00	1.00
female	1,098	0.49	0.50	0.00	0.00	0.00	1.00	1.00
orig_age	1,098	28.36	5.74	18.00	23.00	29.00	34.00	35.00
gender_att	1,098	0.27	0.14	0.10	0.23	0.23	0.28	0.69

B. Empirical Strategy

To examine how birth order and gender interact to shape educational outcomes in immigrant families, I estimate:

$$\begin{aligned} EducationOutcomes_{ij} = \beta_1 Firstborn_i + \beta_2 Female_i \\ + \beta_3 (Firstborn \times Female)_i \\ + \beta_4 Age_i + \beta_5 Age_i^2 + \beta_6 Age_i^3 \\ + \alpha_j + \epsilon_{ij} \end{aligned} \tag{2}$$

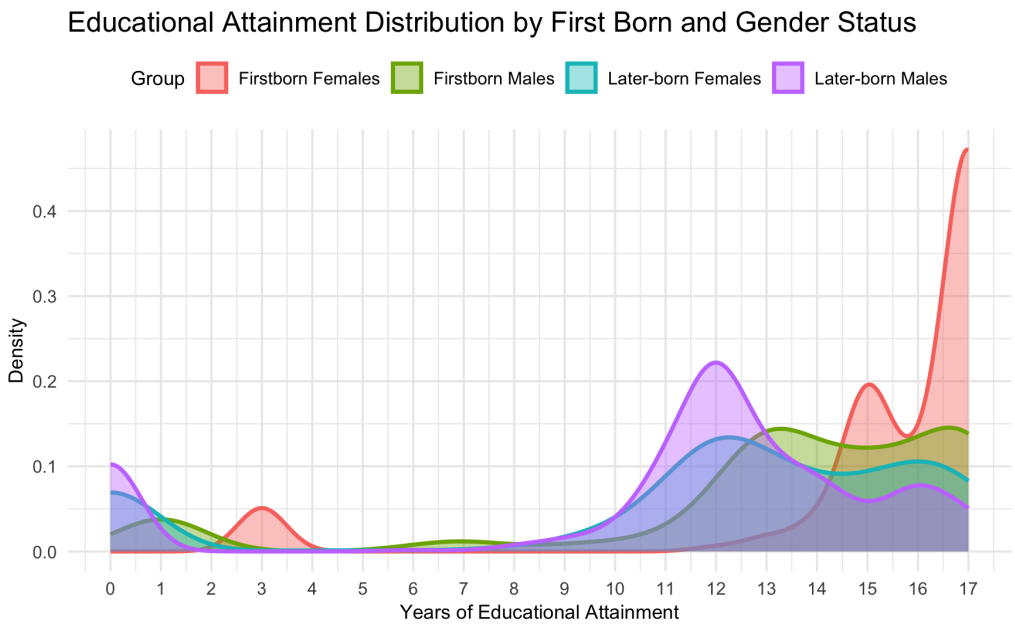

FIGURE 3. DISTRIBUTION OF EDUCATIONAL ATTAINMENT BY BIRTH ORDER AND GENDER. THE GROUPS SHOWN ARE FIRSTBORN MALES, LATER-BORN MALES, FIRSTBORN FEMALES, AND LATER-BORN FEMALES. THE X-AXIS INDICATES YEARS OF COMPLETED EDUCATION, AND THE Y-AXIS SHOWS THE DENSITY WITHIN EACH GROUP.

where $EducationOutcomes_{ij}$ represents years of completed education for individual i in family j. The coefficient β_1 captures the effect of firstborn status for males, while β_3 identifies any additional effects specific to firstborn females. We include family fixed effects (α_j) to account for unobserved household characteristics and cubic age controls to capture non-linear life-cycle patterns in educational attainment.

C. Results

Table 5 presents estimates from my preferred specification. The results reveal a substantial firstborn premium that varies systematically by gender. Firstborn males complete 1.467 more years of education than their later-born brothers ($p < 0.01$), representing approximately 0.64 standard deviations of educational attainment in my sample. This magnitude is economically significant and comparable to effects documented in studies of native-born populationsBlack, Devereux and Salvanes (2005).

The age controls reveal significant non-linearities in educational trajectories,

with positive linear (51.084, $p < 0.01$), negative quadratic (-10.259, $p < 0.05$), and positive cubic (8.834, $p < 0.05$) components. This pattern is consistent with life-cycle variation in educational investment, where the relationship between age and completed education follows a complex trajectory reflecting both cohort effects and the timing of educational decisions.

The firstborn advantage is even more pronounced for females. The positive and significant interaction between firstborn status and female gender (0.287, $p < 0.05$) indicates that firstborn daughters receive an additional quarter-year premium beyond the substantial base effect observed for firstborn sons. The combined effect—approximately 1.75 years of additional education—suggests that traditional firstborn advantages may actually amplify educational opportunities for daughters in immigrant families.

While these initial results suggest a substantial educational advantage for first-born daughters in immigrant families, this aggregate effect may mask important heterogeneity across cultural contexts. The strong positive interaction between firstborn status and female gender in my base specification raises an important question: does this firstborn daughter premium persist across all immigrant communities, or is it moderated by cultural attitudes toward gender roles in education? To investigate this question, I now examine how these birth order effects interact with cultural values.

Table 5—The Effect of Birth Order and Gender

	Dependent Variable: Years of Education Attainment			
	Estimate	Std. Error	t-value	p-value
Firstborn	1.467***	0.301	4.881	0.000
	(0.301)			
Female	0.384	0.283	1.359	0.174
	(0.283)			
Age (Linear)	51.084***	7.005	7.293	0.000
	(7.005)			
Age (Quadratic)	-10.259*	5.181	-1.980	0.048
	(5.181)			
Age (Cubic)	8.834*	4.408	2.004	0.046
	(4.408)			
Firstborn × Female	0.287**	0.187	2.435	0.015
	(0.487)			

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable measures progressive views on gender roles on a standardized scale. Age is centered and scaled.

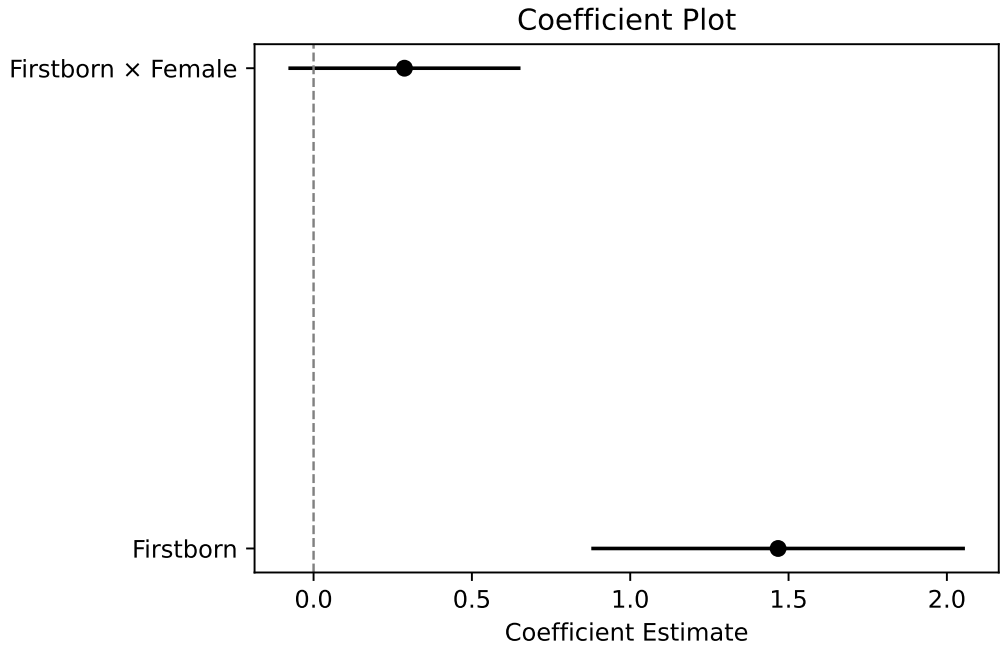

Figure 4. Coefficient estimates and 95% confidence intervals for the effect of being firstborn and the interaction between being firstborn and female on years of educational attainment. Point estimates are marked by dots, and horizontal lines represent confidence intervals. The vertical dashed line indicates the null hypothesis value of zero.

V. Birth Order, Gender Attitudes, and Educational Attainment

The robust firstborn premium for females documented in Section IV suggests firstborn daughters benefit substantially from their birth position, however, I suspect that traditional gender attitudes could counteract this advantage. In this section, we examine how cultural views about gender roles in education moderate the relationship between birth order, gender, and educational attainment. This analysis helps distinguish whether the firstborn advantage reflects universal family dynamics or varies systematically with cultural context

A. Extended Empirical Framework

I used the same sample of 1,098 individuals from 345 immigrant families. This sample has rich variation in cultural attitudes (See Figure 5 for detailed distrbution.) toward gender and education across immigrant source regions. The gender attitudes ranges from highly progressive (0.10) to more traditional values (0.69),

with a mean of 0.27 (SD = 0.14). I estimate an augmented specification that interacts birth order and gender with traditional gender attitudes that includes robust standard errors clustered at the intersection of base region and year to account for potential within-region and within-year correlation in outcomes. The estimated model is:

$$
\begin{aligned}
EducationOutcomes_{ij} = \beta_1 Firstborn_i + \beta_2 Female_i \\
+ \beta_3 (Firstborn \times Female)_i \\
+ \beta_4 (Firstborn \times GenderAtt)_i \\
+ \beta_5 (Female \times GenderAtt)_i \\
+ \beta_6 (Firstborn \times Female \times GenderAtt)_i \\
+ \beta_7 Age_i + \beta_8 Age_i^2 + \beta_9 Age_i^3 \\
+ \alpha_j + \epsilon_{ij}
\end{aligned} \tag{3}
$$

where GenderAtt captures views about gender differences in the importance of university education from the World Values Survey. This measure ranges from 0.10 (most progressive) to 0.69 (most traditional) in my sample, with a mean of 0.27.

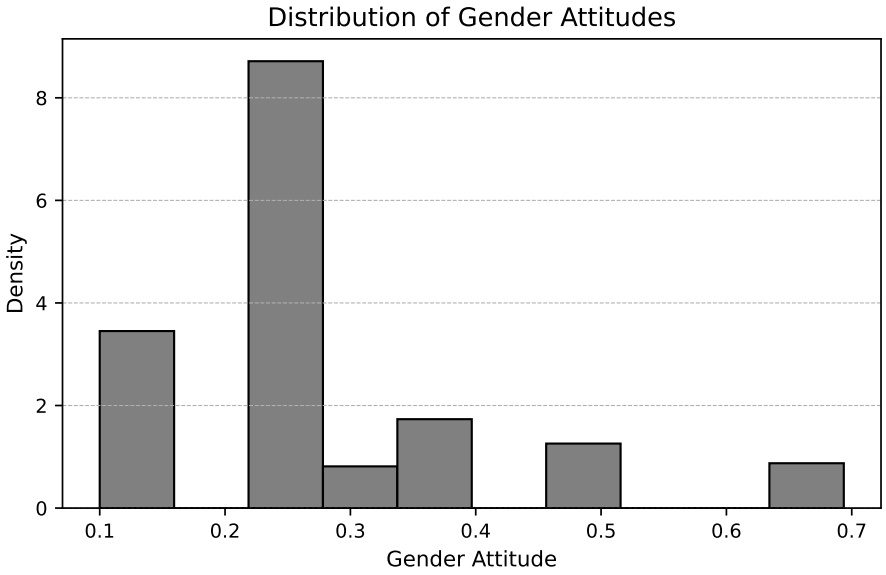

Figure 5. Distribution of Gender Attitudes. This figure shows the density of the gender attitude variable in the sample.

B. Results

Table V.B presents these estimates. The results reveal substantial heterogeneity in the firstborn premium across gender and cultural contexts.

For firstborn males from regions with mean gender attitudes (0.27), we find a total education premium of 1.46 years (β_1 - 0.039 $\times$ 0.27), significant at ($p < 0.5$). This effect diminishes modestly in regions with more traditional gender attitudes, as indicated by the negative Firstborn $\times$ Gender Attitude interaction (-0.039, $p < 0.10$). This magnitude represents approximately 0.63 standard deviations of educational attainment in our sample, remains comparable to effects documented in studies of native-born populations Black, Devereux and Salvanes (2005).

The Female coefficient (0.441) and Female $\times$ Gender Attitude interaction (-0.220) capture how gender attitudes affect the educational attainment of later-born daughters relative to later-born sons. While not statistically significant at conventional levels ($p < 0.1$), they are nearly to be statistically significant($p = 0.138$), thus the negative interaction is economically important to consider. It suggests that traditional gender attitudes may reduce educational investments in later-born daughters.

The interaction terms reveal striking patterns in how cultural attitudes modify these birth order effects. In regions with progressive gender attitudes, firstborn females receive an additional premium beyond the male firstborn advantage ($p < 0.10$). However, this female premium exhibits substantial sensitivity to cultural context, as indicated by the negative three-way interaction coefficient of -1.518 (p = 0.123).

To interpret these effects jointly, consider outcomes at different points in the gender attitudes distribution (See Figure 6). At one standard deviation below the mean (more progressive, score = 0.13), firstborn daughters receive approximately 0.8 additional years of education relative to other first-born sons. This advantage diminishes and firstborn daughters receive marginally less education than first born sons at around one standard deviation above the mean (more traditional, score = 0.41). The pattern suggests that traditional gender attitudes substantially erode the educational benefits typically associated with firstborn status for daughters.

These findings demonstrate that while birth order effects persist across immigrant families, their magnitude—particularly for daughters—depends crucially on cultural context. Traditional gender attitudes appear to put educational investments toward first born sons.

Table 6—The Effect of Birth Order and Gender Attitudes

	Dependent Variable: Years of Education Attainment			
	Estimate	Std. Error	t-value	p-value
Firstborn	1.476*	0.756	2.067	0.040
Female	0.441	0.759	0.582	0.561
Age (Linear)	51.121***	8.38	7.278	0.000
Age (Quadratic)	-10.241*	8.22	-1.967	0.050
Age (Cubic)	8.836*	3.91	2.003	0.046
Firstborn × Female	0.676*	0.344	1.671	0.095
Firstborn × Gender Attitude	-0.039*	0.023	-1.696	0.090
Female × Gender Attitude	-0.220	0.148	-1.486	0.138
Firstborn × Female × Gender Attitude	- 1.518	0.726	-1.543	0.123

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The dependent variable measures progressive views on gender roles on a standardized scale.
Age is centered and scaled. Sample includes individuals aged 18-65. N = 1,098. $R^2 = 0.284$.

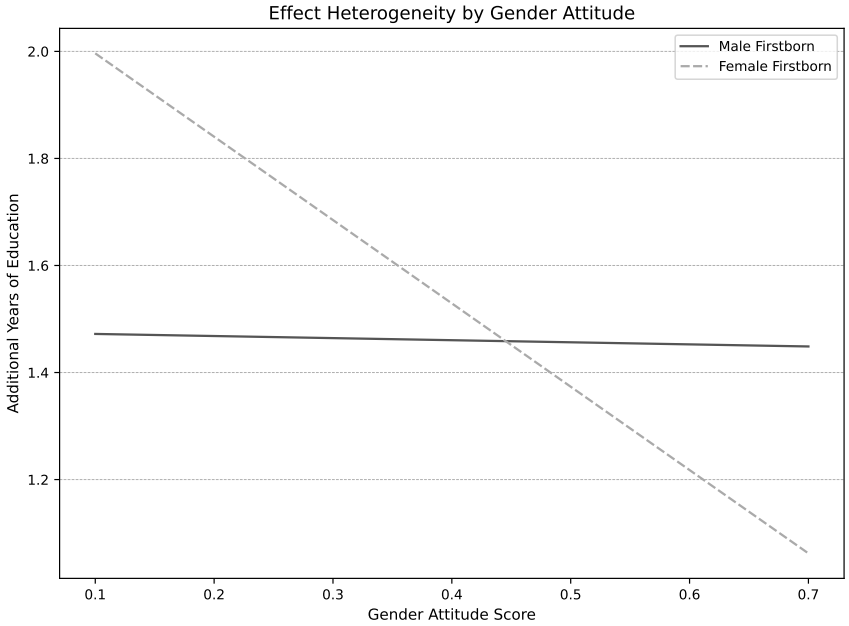

Figure 6. Effect Heterogeneity Plot. This figure shows how the firstborn premium varies across the gender attitude distribution,

VI. Discussion

This paper's findings reveal complex interactions between birth order, gender, and cultural attitudes in shaping educational investment within immigrant families. Three key patterns emerge from my analysis that contribute to our understanding of human capital formation in immigrant households.

First, my results demonstrate that the widely documented firstborn advantage in education attainment differently across cultural contexts. While firstborn males consistently receive additional years of education regardless of cultural background, the magnitude of this premium—approximately 1.46 years in our baseline specification, which representing approximately 0.64 standard deviations of educational attainment in my sample — shows modest sensitivity to traditional gender attitudes. This finding extends previous work by Black, Devereux and Salvanes (2005) by highlighting how cultural context can moderate even well-established patterns in educational investment.

Second, I provide evidence that cultural attitudes can substantially alter the relationship between birth order and gender in educational attainment. The striking variation in firstborn daughter premium across cultural contexts—from an additional 0.6 years in progressive households to a slight disadvantage in traditional ones—suggests that cultural values may override typically beneficial birth order effects. This finding builds on Blau (2015) work on cultural persistence in immigrant families by demonstrating how traditional attitudes specifically interact with family structure to shape educational outcomes.

Third, my analysis reveals important heterogeneity in how immigrant families allocate educational resources across children. The differential effects of traditional gender attitudes on firstborn versus later-born daughters suggest that birth order may either amplify or mitigate cultural constraints on female education. This pattern aligns with recent work by Maralani and Pinar (2024) on how spousal agreement about gender roles shapes children's educational outcomes, while extending their findings to consider birth order effects.

These results have important implications for understanding educational mobility in immigrant families. The substantial variation in firstborn effects across cultural contexts suggests that policies aimed at promoting educational equity may need to account for both family structure and cultural background. Programs targeting educational support for immigrant children might be more effective if they consider how birth order and gender intersect with cultural attitudes to create distinct educational environments within families.

My findings also speak to broader debates about cultural assimilation and the persistence of gender norms. The fact that traditional gender attitudes can override typically beneficial birth order effects for daughters suggests that certain cultural values may be particularly resistant to change, even in the face of strong family dynamics that usually advantage firstborn children.

While my analysis provides important insights into the interplay between birth order and gender, several questions remain for future investigation. A particularly

promising direction would be examining how sibling gender composition influences these patterns. Understanding whether having a second-born brother versus sister differentially affects educational attainment could reveal additional mechanisms through which gender and cultural attitudes shape family investment decisions. Such analysis could help distinguish whether the effects we document stem from pure birth order advantages or from more complex dynamics related to sibling gender composition.

Finally, these results raise important questions about intergenerational mobility in immigrant families. The interaction between cultural attitudes and birth order effects suggests that the transmission of educational advantage may follow systematically different patterns across immigrant communities, potentially contributing to persistent differences in educational attainment across groups.

VII. Limitations

A. Identification Challenges

This study's identification strategy faces several important challenges that warrant careful consideration. The potential correlation between female firstborn status and unobserved family characteristics presents a central identification concern. If families systematically adjust their fertility decisions based on firstborn gender, our estimated effects may capture the influence of endogenous family size rather than true gender effects. While our empirical specification controls for observable family characteristics, the possibility of confounding through other unobserved factors remains.

B. Sample Selection

The PSID data structure, though rich in longitudinal detail, constrains our analysis in important ways. By focusing on educational outcomes from 1999-2021, we potentially miss recent shifts in immigrant families' educational investment patterns. Our sample construction requirement of complete educational histories for siblings aged 18-35 may introduce selection bias by systematically excluding certain family types, particularly recent immigrants or those with larger child age gaps.

C. Measurement of Cultural Attitudes

My measurement of cultural attitudes through the World Values Survey introduces additional empirical challenges. While the survey's question about gender differences in university education importance provides a consistent metric across immigrant source countries, this single measure may not fully capture the complex nature of gender-related cultural values. The use of country-level averages

necessarily obscures within-country heterogeneity in cultural attitudes and their evolution over time.

D. Time-Varying Confounder

The family fixed effects approach, while addressing many time-invariant confounders, cannot account for temporal changes that might simultaneously affect cultural attitudes and educational investments. Local economic conditions and immigration policy shifts during my sample period could influence both educational opportunities and the persistence of traditional gender attitudes. These time-varying factors may be particularly relevant for families that adjust their investment decisions based on firstborn gender.

E. Mechanisms

My empirical framework, while documenting substantial heterogeneity in birth order effects across cultural contexts, cannot definitively isolate the mechanisms driving these patterns. A more complete understanding of whether these effects operate through fertility decisions, resource allocation, or other family dynamics would require detailed data on family decision-making processes beyond what is currently available.

VIII. Conclusion

This paper provides new evidence on how cultural attitudes moderate birth order effects on educational attainment in immigrant families. The analysis yields three main results. First, I find a substantial firstborn premium of 1.46 years of education for males, representing approximately 0.64 standard deviations of educational attainment. This effect shows modest sensitivity to traditional gender attitudes. Second, cultural attitudes significantly interact with birth order effects for females - in households with progressive gender attitudes (one standard deviation below the mean gender attitudes), firstborn daughters receive an additional 0.6 years of education relative to firstborn sons, while this advantage disappears or becomes slightly negative in households with traditional attitudes. Third, these patterns persist even after accounting for family fixed effects and controlling for potential selection through fertility decisions.

These findings extend our understanding of both birth order effects and cultural persistence in immigrant families in several ways. The results demonstrate that widely-documented birth order advantages are not universal but rather vary systematically with cultural context. This suggests that policies aimed at supporting educational achievement in immigrant communities may need to consider how family structure interacts with cultural background to create distinct educational environments. Future work could productively examine the specific mechanisms

driving these effects, particularly how sibling gender composition and parental investment decisions may vary with cultural attitudes.

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