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Equal Opportunity Stagnation: Intergenerational Income Mobility in Iran

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Abstract

This paper examines intergenerational economic mobility in Iran using a synthetic panel constructed from repeated cross-sections of the Household Income and Expenditure Survey. We document a strong U-shaped pattern of relative mobility: children from both the lowest and highest parental deciles are highly likely to remain in the same position as adults, while mobility is greater among the middle deciles. At the same time, average absolute mobility is relatively high; about three-quarters of children achieve a higher real living standard than their parents. The coexistence of limited rank mobility and broadly rising living standards suggests that opportunity has not expanded proportionately with material progress. We show that these patterns are consistent with persistent disparities in access to high-quality education, regional economic opportunities, and intergenerational transfers. The results highlight a case where moderate inequality coexists with low mobility.

Keywords: Social mobility, Intergenerational mobility, Synthetic panel, Relative mobility, Absolute mobility, Inequality and mobility, Great Gatsby paradox.

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1 Introduction

A central goal of societies is to provide equal opportunities, so that children can achieve a standard of living independent of their parents' socioeconomic background. Governments have sought to promote this objective through policies that expand access to education, healthcare, and other basic services. Whether these interventions succeed in reducing intergenerational persistence remains an open question. Cross-country evidence shows substantial variation: Nordic economies show relatively high mobility, other European countries fall in the middle, and the United States exhibits comparatively high persistence (Chetty et al. 2017, Corak 2013). Evidence from middle-income economies is mixed and largely limited. Much of the variation in the findings reflects data constraints due to the lack of panel income data (Genicot et al. 2024), reliance on coarse measures such as education or occupation, or the use of co-resident parent–child samples that can bias estimates (Blanden and Machin 2008, Bukodi and Goldthorpe 2011). Consequently, while some estimates of educational mobility in developing countries are available based on existing panel data, less is known about income mobility in these settings. To address this gap, this paper estimates intergenerational income mobility in Iran, a middle-income country with significant macroeconomic fluctuations and changes in inequality, using synthetic panel methods that do not require long-run panel data.

A central empirical challenge in the study of intergenerational mobility is the lack of longitudinal panel data that track both the incomes of parents and children once the children reach adulthood. Such datasets exist for a few high-income countries (e.g., the U.S. PSID, Scandinavian registers), but are rarely available in developing or middle-income contexts. To overcome this constraint, researchers have relied on a range of indirect approaches. Two-sample instrumental variable methods (Angrist and Krueger 1992, Arellano and Meghir 1992, Olivetti and Paserman 2015) combine separate datasets on parents and children using overlapping instruments such as parental education, but estimates are often sensitive to instrument validity. Co-resident parent-child samples (Ahsan et al. 2025, Emran and Shilpi 2015) provide true income observations across generations, yet are biased toward young adults who have not left the parental household (Celhay and Gallegos 2025, Emran et al. 2018, Francesconi and Nicoletti 2006). Copula-based approaches (Chetty et al. 2017) flexibly model the joint distribution of parental and child income and yield mobility bounds, but rely on strong distributional assumptions.

In recent years, synthetic panel methods have emerged as a widely applied alternative in development economics (Dang and Lanjouw 2013, 2023, Foster and Rothbaum 2015). By constructing "pseudo-cohorts" across repeated cross-sectional surveys, this method allows for approximating parent–child comparisons and estimating intergenerational persistence even in the absence of true panels. The method's strength lies in its ability to exploit nationally representative survey data that are available for many countries, thus enabling cross-cohort and cross-country comparisons. Its main weakness is that it relies on the assumption that cohort composition remains stable across survey waves, such that observed differences reflect true intergenerational change rather than sampling artifacts. In this paper, we address this limitation directly by providing evidence consistent with the key identifying assumptions of the synthetic panel approach, thereby reinforcing the credibility of our estimates.

Intergenerational mobility can be measured in both relative and absolute terms. Relative mobility measures whether children's position in the income distribution depends on parental rank, thereby reflecting the rigidity of opportunity structures. Absolute mo-

bility, by contrast, captures whether children surpass their parents in real income terms, reflecting both economic growth and distributional change. The two measures can move in opposite directions: even if most children earn more than their parents due to growth (high absolute mobility), relative mobility may remain low if inequality of opportunity persists. Understanding both is therefore essential for assessing the inclusiveness of development. We apply the synthetic panel method to examine both relative and absolute intergenerational income mobility in Iran over the period 1998-2023. Iran offers a compelling case: it is a middle-income economy with repeated exposure to macroeconomic shocks, sanctions, and distributional changes, yet little is known about its long-run patterns of intergenerational mobility. Using nationally representative household survey data, we construct synthetic panels to compare the incomes of children (observed as adults in 2023) with those of their parents in 1998.

Our results reveal four key patterns, capturing two fundamental dimensions of immobility in Iran: gains in absolute living standards without corresponding equalization of opportunity, and high persistence despite moderate inequality. First, our findings show a low relative mobility and high persistence. Our findings indicate that relative mobility in Iran is low, with approximately two-thirds of children born in the bottom or top deciles remaining in their parents' decile. This suggests a high degree of income persistence across generations, a pattern similar to other middle-income countries like South Africa and Brazil (Blanden 2013).

The second key finding shows the disconnect between absolute and relative mobility. We find that absolute mobility remains positive, with roughly three-quarters of children surpassing their parents' expenditures. However, this rate has declined markedly over the last decade, consistent with global trends (Chetty et al. 2017). The combination of positive absolute mobility alongside low relative mobility is a central result, indicating that overall income gains in the economy have not translated into a corresponding increase in equality of opportunity.

Third, our study shows that mobility dynamics in Iran align closely with broader inequality trends, positioning the country as an informative case for understanding the determinants of mobility in middle-income settings. This observation is in line with the findings of Van der Weide et al. (2021), who noted that countries with increasing inequality often experience declining intergenerational mobility.

Fourth, we uncover a striking paradox in the relationship between inequality and intergenerational mobility in Iran. Despite exhibiting a Gini coefficient of roughly 0.35 (comparable to many advanced economies and far below the levels observed in Brazil, Mexico, or South Africa) Iran displays exceptionally high intergenerational persistence. Both relative and absolute mobility move independently of inequality over time, and Iran sits far above the cross-country Great Gatsby relationship, even when compared to much more unequal societies. This pattern suggests that income inequality alone is insufficient to explain mobility outcomes in Iran. Instead, deeply rooted structural barriers (such as unequal access to high-quality education, spatial disparities in economic opportunity, and segmented labor markets that reward networks and sectoral affiliation over merit) sustain high persistence despite moderate and stable inequality. Supporting this interpretation, we find that mobility remains limited despite substantial improvements in children's educational attainment, and that spatial disparities account for only a small share of the observed persistence. Moreover, we find that declining household size largely explains Iran's high absolute mobility by mechanically raising per-capita resources, even as the structural forces underlying low relative mobility remain unchanged.

Overall, our results underscore the complex interplay between income distribution, mobility, and inequality in Iran. While absolute mobility remains positive, its decline over time, coupled with low relative mobility, mirrors patterns observed in other middle-income countries. Yet the Iranian case stands out because this persistence occurs despite only moderate and relatively stable inequality. This puzzle suggests that the barriers sustaining immobility are structural rather than purely distributional, rooted in unequal access to quality education, segmented labor markets, and macroeconomic volatility that shapes opportunities unevenly across regions and social groups. The Iranian case, therefore, illustrates how moderate inequality can coexist with limited mobility, underscoring the need to look beyond income dispersion alone when assessing the inclusiveness of economic development.

Our study contributes to the literature in three ways. First, we document a distinctive pattern in Iran in which absolute mobility is high (children generally achieve higher real incomes than their parents) while relative mobility remains low, with children largely retaining their parents' positions in the income distribution. This combination occurs under moderate levels of income inequality, challenging the common expectation that lower inequality is associated with greater intergenerational fluidity. The empirical pattern therefore, reveals a systematic decoupling of absolute and relative mobility.

Second, we bring together measures of both relative and absolute mobility in a setting without linked parent–child data by constructing synthetic panels across cohorts. While most existing studies on intergenerational mobility focus on advanced economies with rich genuine panel data, much less is known about mobility in developing and middle-income countries, where data limitations are severe and findings are often mixed (see Emran et al. 2018 and Narayan et al. 2018). Also, our paper broadens the scope of mobility research by documenting both relative and absolute mobility patterns across cohorts. Analyzing both dimensions provides a more complete picture of intergenerational progress: for example, high absolute mobility alongside low relative mobility indicates that growth lifts incomes overall but opportunity remains unequal, whereas low absolute mobility despite high relative mobility suggests that children may move up the distribution but still earn less than their parents in real terms. While relative mobility has dominated the scholarly discourse, absolute mobility remains under-researched outside the United States (Berman 2022, Chetty et al. 2017). Our study builds on Chetty et al. (2017) by applying synthetic panels to measure absolute income mobility in a developing country setting with repeated cross-sections. This contributes substantively by providing evidence on how growth and inequality dynamics shape generational progress. It also contributes methodologically by showing how synthetic panels can be used to estimate mobility in the absence of linked parent–child data.

Third, we contribute to the literature on the inequality–mobility nexus by challenging the presumed universality of the Great Gatsby Curve. While prior studies typically find that high inequality is associated with low mobility, our results from Iran reveal that very low mobility can persist even in a moderately unequal society. This divergence underscores the importance of distinguishing between inequality of income and inequality of opportunity, and it suggests that structural and institutional factors can dominate the mobility process in middle-income economies. By documenting this anomaly in a context of alternating inequality compression and expansion, our study extends the debate beyond high-inequality settings and demonstrates that moderate inequality does not necessarily translate into a more fluid society. In doing so, it refines the empirical foundations of the Great Gatsby hypothesis by illustrating conditions under which inequality fails

to predict mobility. We also shed light on the mechanisms underlying this paradox. Unequal school quality, spatial segmentation of labor markets, and intergenerational asset transmission combine to generate high persistence despite moderate observed inequality. These patterns align with a broader literature emphasizing inequality of opportunity in the MENA region and highlight the importance of structural constraints that remain invisible in standard inequality statistics.

The remainder of this paper is organized as follows. Section 2 details the data sources and the methodological framework used to estimate intergenerational mobility. Section 3 presents the empirical findings and provides their economic interpretation. Section 4 conducts robustness checks through: (i) relaxation of key model assumptions and (ii) sensitivity analysis across different age ranges in the study sample. Section 5 discusses the mechanisms that generate the persistence patterns and help explain the observed paradox. Finally, Section 6 concludes with a synthesis of key findings and their implications.

2 Method and Data

To study intergenerational mobility in the absence of linked parent–child panel data, we employ the synthetic panel method, which constructs pseudo-cohorts from repeated cross-sectional surveys (Dang and Lanjouw 2023). This approach allows us to approximate the intertemporal association between parents' and children's economic outcomes and to recover both relative and absolute mobility measures.

A key empirical choice concerns the welfare indicator. While income is the standard metric, reported household income is subject to considerable measurement error, short-term volatility, and selective underreporting, particularly in middle-income settings (Browning et al. 2014, Deaton 1987). Studies in similar contexts often use education as a proxy, but educational mobility reflects human capital transmission rather than broader economic well-being. We instead use real per capita household expenditure as a proxy for permanent income, following evidence that expenditure is more stable over time and better reflects consumption capacity (Fisher and Johnson 2022, Mazumder 2018)

2.1 Synthetic panel method

To study intergenerational economic mobility with cross-sectional data, we use the synthetic panel method, which allows us to approximate longitudinal outcomes when panel data are unavailable. The method constructs pseudo-cohorts by linking individuals across two cross-sectional surveys from the same population. This approach provides estimates of the intertemporal relationship between parents' and children's socioeconomic outcomes, without directly observing the same individuals in both periods. We begin by estimating period-specific regression models:

$$y_{i1} = \beta'_1 x_{i1} + \varepsilon_{i1} \tag{1}$$

$$y_{i2} = \beta'_2 x_{i2} + \varepsilon_{i2} \tag{2}$$

where y_{it} denotes the outcome of interest for individual i in period t, and x_{it} represents explanatory variables that are time-invariant or predictable across periods. Using these models, we can predict outcomes in the alternate period, despite not observing the same

individuals longitudinally. This requires the assumption that the population remains statistically stable across the two periods.

A key challenge in the synthetic panel method is that part of the outcomes remains unobserved, captured in the regression error term (ε_{it}). Understanding the correlation of these unobserved components across periods is crucial, because it affects estimates of intergenerational mobility.

Two complementary approaches are commonly used for estimating error terms: (i) Nonparametric method, which imposes minimal assumptions and requires only that error terms are non-negatively correlated across periods. For example, children of parents whose expenditures deviate from predicted values in the first period tend to exhibit similar deviations from predicted values in the second period. This correlation may reflect persistent unobserved factors, such as wealth, preferences, or constraints, that are partially transmitted across generations. This approach provides upper and lower bounds on mobility without assuming a specific error distribution. (ii) Parametric method, which assumes that the error terms follow a bivariate normal distribution. By combining observed correlations of outcomes with covariances of explanatory variables, this approach produces a point estimate of the error term correlation, allowing a more precise assessment of mobility while relying on the normality assumption. In this study, we estimate the correlation coefficient of the error terms following the method developed by Dang and Lanjouw (2023), which is widely used in the literature; full details are provided in Appendix A.

The synthetic panel method follows the validation framework of Foster and Rothbaum (2015), which shows that under stable cohort composition and monotonic rank structure, pseudo-panels provide consistent approximations to true parent–child rank mobility. Taken together, these considerations ensure that our mobility estimates capture long-run intergenerational position rather than short-term fluctuations.

2.2 Relative mobility

Relative mobility measures the extent to which children change their position in the socioeconomic distribution relative to their parents. In this study, it is defined as the probability that a child's expenditure falls into a given quantile conditional on their parents' quantile. Formally, let l and m denote arbitrary quantiles in the parental and child expenditure distributions, respectively. The probability that a parent's expenditure is in quantile l and the corresponding child's expenditure is in quantile m is given by

$$P^{l.m} = P(z_1^{l-1} < y_{i1} < z_1^{l} \;\&\; z_2^{m-1} < y_{i2} < z_2^{m}) \tag{3}$$

where y_{i1} and y_{i2} represent expenditures for parent i and their child, respectively, and z_t^q denotes the threshold for quantile q in period t. Substituting the period-specific regression models, Eq (1) and (2), for y_{i1} and y_{i2}, we obtain:

$$P^{l.m} = P(z_1^{l-1} < \beta_1' x_{i1} + \varepsilon_{i1} < z_1^{l} \;\&\; z_2^{m-1} < \beta_2' x_{i2} + \varepsilon_{i2} < z_2^{m}) \tag{4}$$

Thus, the probability of expenditures falling in quantiles l and m in the first and second periods, respectively, equals the probability of the error terms falling within specified ranges:

$$P^{l.m} = P(z_1^{l-1} - \beta_1' x_{i1} < \varepsilon_{i1} < z_1^{l} - \beta_1' x_{i1} \;\&\; z_2^{m-1} - \beta_2' x_{i2} < \varepsilon_{i2} < z_2^{m} - \beta_2' x_{i2}) \tag{5}$$

Assuming a bivariate normal distribution of the error terms, this probability is computed as:

$$\begin{aligned} P^{l.m} = & \Phi_2\left(\frac{z_1^l - \beta_1' x_{i1}}{\sigma_{\varepsilon_1}}, \frac{z_2^m - \beta_2' x_{i2}}{\sigma_{\varepsilon_2}}; \rho\right) \\ & - \Phi_2\left(\frac{z_1^l - \beta_1' x_{i1}}{\sigma_{\varepsilon_1}}, \frac{z_2^{m-1} - \beta_2' x_{i2}}{\sigma_{\varepsilon_2}}; \rho\right) \\ & - \Phi_2\left(\frac{z_1^{l-1} - \beta_1' x_{i1}}{\sigma_{\varepsilon_1}}, \frac{z_2^m - \beta_2' x_{i2}}{\sigma_{\varepsilon_2}}; \rho\right) \\ & + \Phi_2\left(\frac{z_1^{l-1} - \beta_1' x_{i1}}{\sigma_{\varepsilon_1}}, \frac{z_2^{m-1} - \beta_2' x_{i2}}{\sigma_{\varepsilon_2}}; \rho\right) \end{aligned} \tag{6}$$

where Φ_2 denotes the cumulative distribution function of the bivariate normal distribution with correlation coefficient ρ.

The transition probability between different quantiles can be computed for each individual, and averaging these probabilities across all sample members produces the intergenerational transition matrix. For example, the probability of moving from the first parental decile to the second child decile equals the average of the corresponding individual probabilities. The decile boundaries are determined based on the study sample.

2.3 Absolute mobility

Absolute mobility is defined as the proportion of children who achieve a higher economic status than their parents (Chetty et al. 2017). Consequently, to estimate absolute income mobility, one must identify for which pairs of parental and offspring income quantiles the children's expenditures exceed those of their parents, indicating upward income mobility. The intergenerational absolute income mobility equals the sum of transition probabilities between quantiles where the child's income exceeds the parent's income. The following equation, adapted from Chetty et al. (2017)'s research, provides the mathematical representation of this calculation:

$$A_c = \int 1\left\{Q_c^k\left(r^k\right) \geq Q_c^p\left(r^p\right)\right\} C_c\left(r^k, r^p\right) dr^k dr^p \tag{7}$$

where r^p and r^k denote the income percentiles of parents and children, respectively. The function $C_c\left(r^k, r^p\right)$ represents the joint probability that a child falls into percentile r^k within their cohort's income distribution while their parent occupies percentile r^p in the parental income distribution. Formally, $C_c\left(r^k, r^p\right)$ is computed as the proportion of children in percentile r^k whose parents are in percentile r^p, relative to the total number of children in the sample.

The terms $Q_c^p\left(r^p\right)$ and $Q_c^k\left(r^k\right)$ correspond to the inflation-adjusted real income values at percentile r^p in the parental distribution and percentile r^k in the children's distribution, respectively. This formulation provides a continuous representation of absolute mobility by integrating across all parent-child percentile pairs where the child's income meets or exceeds that of the parent. To do so, we divide the income distributions of both parents and children into n quantiles; each ordered pair of parental and child incomes falls into one of n^2 possible states. We then determine what fraction of all parent-child pairs falls into each of these states. The measure of social mobility equals the sum of those fractions where, for the given income quantiles of parents and children, the

child experiences positive income mobility relative to their parents. Suppose the lower bound of expenditures in the child's quantile exceeds the upper bound of expenditures in the parent's quantile. In that case, we can conclude that positive income mobility has occurred for that quantile pair.[1]

2.4 Data

We use data from the Household Income and Expenditure Survey (HIES), which is publicly available through the Statistical Center of Iran (SCI). The HIES is a nationally representative survey that provides detailed information on household demographics, income, expenditure, and educational attainment. Its broad coverage and high-quality measurement make it suitable for analyzing intergenerational income mobility. As explained above, we use net per capita household expenditure as a proxy for income, following established evidence that expenditure data tend to be less affected by measurement errors and short-term fluctuations than reported income. Expenditures are equivalized using the OECD scale (assigning a weight of 1 to the household head, 0.7 to other adults, and 0.5 to children) and adjusted for inflation using annual Consumer Price Indices (CPI) to obtain real values.

To analyze intergenerational mobility, we employ a synthetic panel approach, which allows us to estimate relationships between adolescent characteristics in the baseline period (1998) and adult outcomes in the follow-up period (2023) despite the absence of longitudinal tracking at the individual level. In this framework, we define cohorts based on time-invariant characteristics, such as age, county of residence, and educational attainment relative to peers, and use these variables to impute household expenditures in periods that cannot be directly observed. By constructing cohort-level averages for the dependent and independent variables, we approximate intertemporal correlations in expenditure, and thereby estimate intergenerational mobility measures. This approach takes advantage of the rich cross-sectional information in the HIES while addressing the lack of longitudinal follow-up for individual respondents. Summary statistics for the variables used in the analysis are presented in Table 1.

Despite the many strengths of the HIES, several limitations require careful consideration. First, the survey does not include retrospective questions regarding household welfare, which prevents the direct tracking of individual income or consumption across periods. To mitigate this limitation, we rely on time-invariant covariates, such as educational attainment differentials relative to peers, county of residence, and urban/rural status, to impute expenditures for the period that cannot be directly observed. This strategy allows us to construct a reliable measure of household welfare in both periods despite the absence of retrospective data.[2]

[1] To enhance the precision of absolute mobility calculations, we assume a uniform distribution of expenditures within each quantile for those parent-child quantile pairs where the lower and upper bounds of children's and parents' expenditures overlap. Furthermore, the transition probabilities have been computed between by dividing per capita expenditure distributions into 50 parts for parents and children.

[2] To estimate predicted household expenditures in each period, we regress real per capita expenditure on household head characteristics and geographic indicators. For 1998, explanatory variables include the household head's age group, educational attainment, occupation, and sector of economic activity, as well as urban/rural status and county of residence. This specification explains about 40% of the variation in household expenditure ($R^2 = 0.40$). When the model is restricted to variables available in both survey years, the explanatory power remains relatively high ($R^2 = 0.33$). For the 2023 sample, we use a parsimonious model including urban/rural classification, county, and educational differential,

Table 1: Summary Statistics for Baseline (1998) and Follow-Up (2023)

	1998 (Ages 13–19)		2023 (Ages 38–44)	
Variable	Mean	SD	Mean	SD
Demographic Characteristics				
Age	15.7	1.92	40.9	1.97
Urbanization rate	0.629	0.483	0.784	0.411
Parental Education				
Illiterate	0.380	0.485	–	–
Primary education	0.388	0.487	–	–
Middle school	0.076	0.265	–	–
High school	0.082	0.274	–	–
University education	0.074	0.262	–	–
Educational Differential				
Binary indicator	0.612	0.487	0.565	0.496
Continuous measure	-0.381	2.73	-1.087	4.45
Number of observations	16,602		12,392	

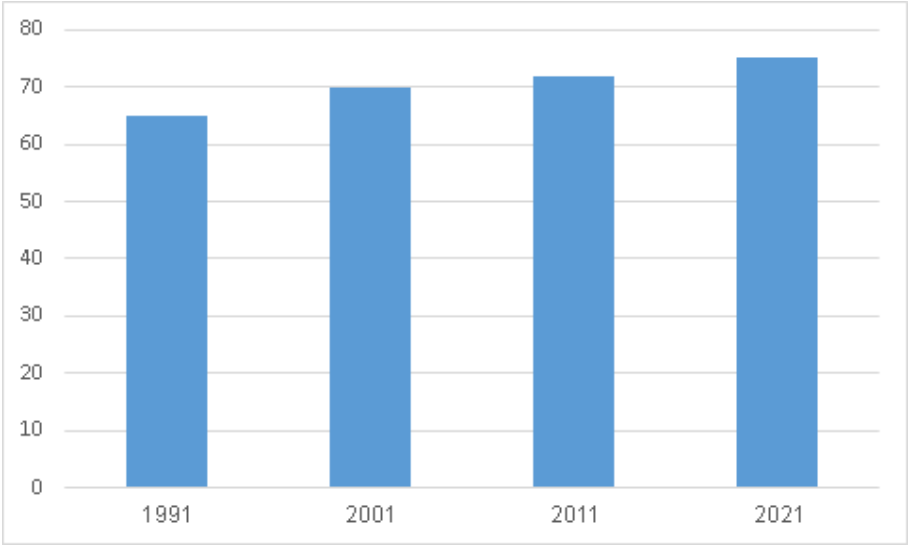
Note: The baseline sample includes individuals aged 13–19 in 1998, when co-residence with parents is highly prevalent. The follow-up sample includes the same cohort observed as household heads or spouses aged 38–44 in 2023. Education-level indicators are collected only at baseline. The continuous educational differential variable measures the difference between an individual's years of schooling and the median years of schooling among peers of the same age, region, and gender.
Source: Authors' calculations using the Household Income and Expenditure Surveys (HIES).

Second, the synthetic-panel approach relies on a stable population structure between the baseline (1998) and follow-up (2023) surveys. In practice, the 16,602 children observed at ages 13–19 in 1998 do not map perfectly onto the 12,392 adults observed at ages 38–44 in 2023. Attrition occurs because some individuals leave the sampling frame, through mortality, migration, extended co-residence with parents, or non-response. Conversely, some adults observed in 2023 may have been early home-leavers who were already living independently at age 13–19 and therefore were not captured in the 1998 baseline. While the mortality of some children during the inter-period interval could theoretically affect sample composition, substantial improvements in life expectancy in recent decades suggest that this factor has a negligible impact on our study population (Figure 1).

We address the other concerns by defining the age range of the study sample. In the baseline period, we restrict the sample to adolescents aged 13–19 in 1998, a group for which more than 90 percent still reside with their parents (Figure 2). This ensures that almost all children are observed within their parental households and implies that, at most, about 10 percent of the follow-up adults may have been early home-leavers who were not captured in the baseline. In the follow-up period, we then focus on adults aged 38–44 in 2023 (the exact cohort corresponding to those who were 13–19 in 1998). Figure 3 shows that headship and marriage rates in this mature age range are high (around 85 percent in 2023), though no universal. This suggests that up to 15 percent of baseline

which yields an R^2 of 0.48. These values are well within the range considered acceptable for synthetic panel estimation in the existing literature (e.g., Ronen 2021).

Figure 1: Life Expectancy In Iran, 1991-2021



Note: Life expectancy at birth rose steadily in Iran during the period corresponding to the baseline (1998) and follow-up (2023) survey years in this study. Because the cohort we analyze was aged 13–19 in 1998 and reached ages 38–44 in 2023, the sustained improvement in survival probabilities implies that mortality-driven sample attrition is likely to be minimal.
Source: Civil Registration Organization of Iran; Statistical Center of Iran.

children may not be observed as independent adults in the later survey. Crucially, this attrition does not vary systematically across the parental distribution: among adults aged 38–44 in 2023 who are not independent, each decile contributes approximately 10 percent, indicating no concentration of missingness at any point in the distribution. We, therefore, interpret the resulting 10–15 percent mismatch as a moderate but broadly non-selective source of measurement error, comparable to attrition rates in long-running panel surveys.

This age-based design has two additional advantages. First, selecting adolescents aged 13–19 in 1998 ensures meaningful variation in schooling attainment for the intergenerational education differential, as younger adolescents (e.g., ages 10–12) exhibit much more homogeneous schooling levels. Second, aligning parents and children at the same stage of the life cycle—parental expenditure measured when parents were aged 38–44 in 1998 and children's expenditure measured when the same cohort reaches ages 38–44 in 2023—mitigates concerns that our results reflect differences in age–earnings profiles rather than genuine intergenerational mobility.[3]

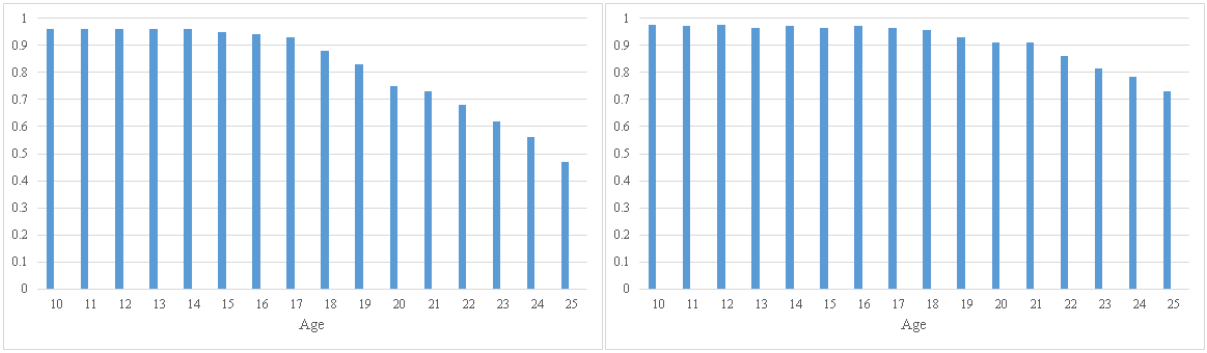
Finally, potential migration between counties or between urban and rural areas could introduce deviations from population stability. Evidence from Iran's Statistical Center indicates that inter-county migration is relatively low (approximately 1% per year), suggesting that any resulting bias is likely minimal. Nonetheless, by including county and urban/rural residence as covariates in the expenditure regressions, we account for regional variation in household welfare and further reduce potential distortions arising from geographic mobility.

Although these strategies mitigate the main sources of bias, to assess their impact, we perform a series of robustness checks. Specifically, we test the sensitivity of our results to alternative age ranges, examine the stability of the educational attainment

[3]Aligning generations at a comparable mature age is standard in the intergenerational mobility literature; see, for example, Chetty, Hendren, Kline and Saez (2014) and Mazumder (2005).

Figure 2: Share of Individuals Living with Parents, Ages 10–25

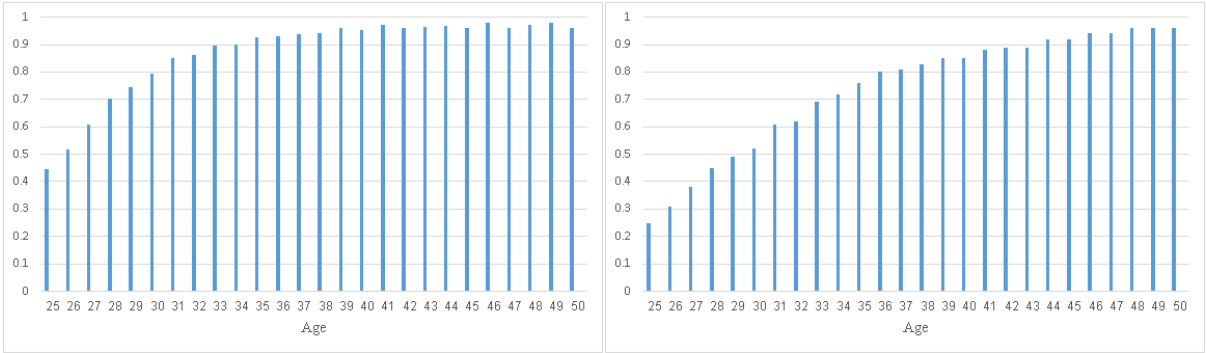
(a) 1998 (b) 2023



Note: The figure shows the proportion of adolescents and young adults who reside in their parents' households in 1998 and 2023. The high co-residence rates for ages 13–19 in 1998 support the selection of this age group as the baseline cohort, since it ensures that children are observed within their parental households with minimal attrition due to early household departure. The follow-up cohort is defined accordingly at ages 38–44 in 2023 to maintain intergenerational comparability.
Source: Authors' calculations using the Household Income and Expenditure Surveys (HIES).

Figure 3: Share of Individuals Who Are Household Heads or Spouses, Ages 25–50

(a) 1998 (b) 2023



Note: The figure shows the share of individuals who are household heads or spouses among the population aged 25–50 in 1998 and 2023. Headship rates rise sharply through young adulthood and stabilize by the late 30s. This pattern supports defining the follow-up sample as household heads or spouses aged 38–44 in 2023, as individuals in this age range are highly likely to have formed independent households.
Source: Authors' calculations using Household Income and Expenditure Surveys (HIES).

differential across cohorts, and consider the potential effects of rural–urban migration. The results, presented in Section 4, indicate that our main findings are robust to these alternative specifications and confirm that the assumptions underlying the synthetic panel are empirically reasonable.

3 Results

This section presents the empirical findings on both relative and absolute intergenerational mobility between parents (1998) and their children (2023) in Iran. We begin by examining relative intergenerational mobility, which reflects how an individual's position in the expenditure distribution depends on their parents' position. Relative mobility captures the extent to which economic advantage or disadvantage persists across generations and thus provides insight into the degree of inequality of opportunity in Iran.

3.1 Relative mobility

Table 2 presents the conditional transition matrix of children's expenditure deciles in 2023, conditional on their parents' deciles in 1998. Figure 4 illustrates the corresponding persistence rates along the diagonal of this matrix. This structure captures how closely children's economic positions mirror those of their parents.

The results reveal a strong U-shaped pattern of intergenerational persistence: mobility is lowest at the extremes of the distribution and highest in the middle.

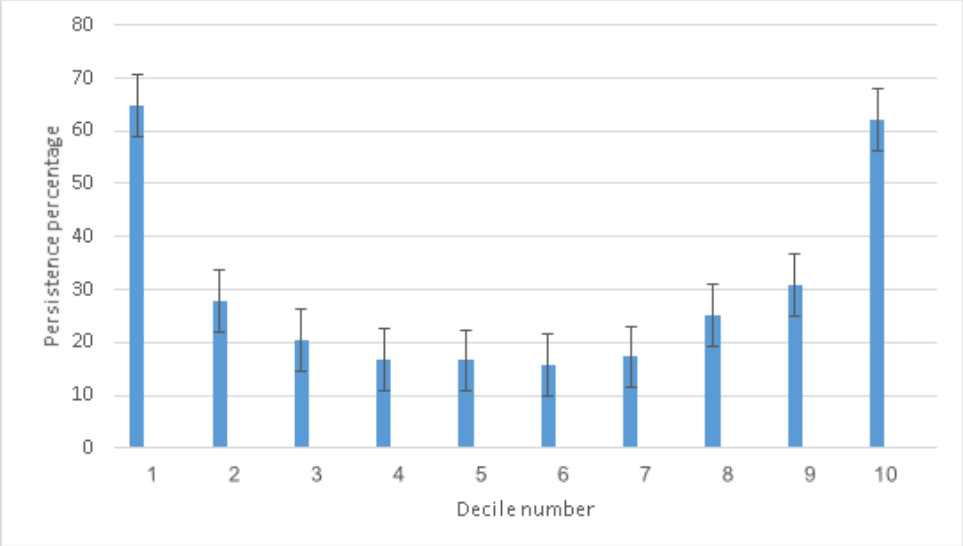
Table 2: Intergenerational Transition Matrix Between Parental (1998) and Child (2023) Expenditure Deciles

Parent Decile	Child Decile									
	1	2	3	4	5	6	7	8	9	10
1	64.8	21.0	8.7	3.5	1.5	0.5	0.1	0	0	0
2	28.7	27.8	19.2	11.7	7.1	3.5	1.6	0.5	0	0
3	13.6	22.2	20.5	16.0	12.5	7.9	4.7	2.2	0.3	0
4	6.5	15.3	17.9	16.8	15.8	11.9	8.8	5.7	1.2	0
5	3.0	9.2	14.0	15.1	16.6	14.8	12.8	10.8	3.5	0.2
6	1.3	5.2	10.0	12.3	15.0	15.7	16.0	16.3	7.8	0.8
7	0.5	2.6	5.5	8.7	12.4	14.2	17.3	21.7	14.1	2.9
8	0.1	1.1	2.7	4.8	8.5	11.5	15.4	25.1	22.4	8.4
9	0.0	0.3	0.9	1.9	3.8	6.5	11.1	22.2	30.8	22.6
10	0.0	0.0	0.0	0.3	0.7	1.4	3.1	9.8	22.6	62.1

Note: Each cell reports the percentage of individuals in a given child expenditure decile in 2023, conditional on their parents' expenditure decile in 1998. The sample consists of individuals aged 13–19 in 1998 and the same cohort observed at ages 38–44 in 2023. The diagonal elements indicate intergenerational persistence. The high persistence at the bottom and top deciles, combined with greater mobility in the middle of the distribution, reflects a U-shaped pattern of intergenerational immobility.
Source: Authors' estimates using the Household Income and Expenditure Survey (HIES).

Children of the poorest parents face severe mobility constraints; around 85 percent remain in the bottom two deciles as adults, and nearly 65 percent stay in the very

Figure 4: Intergenerational Persistence Rates Across the Expenditure Distribution



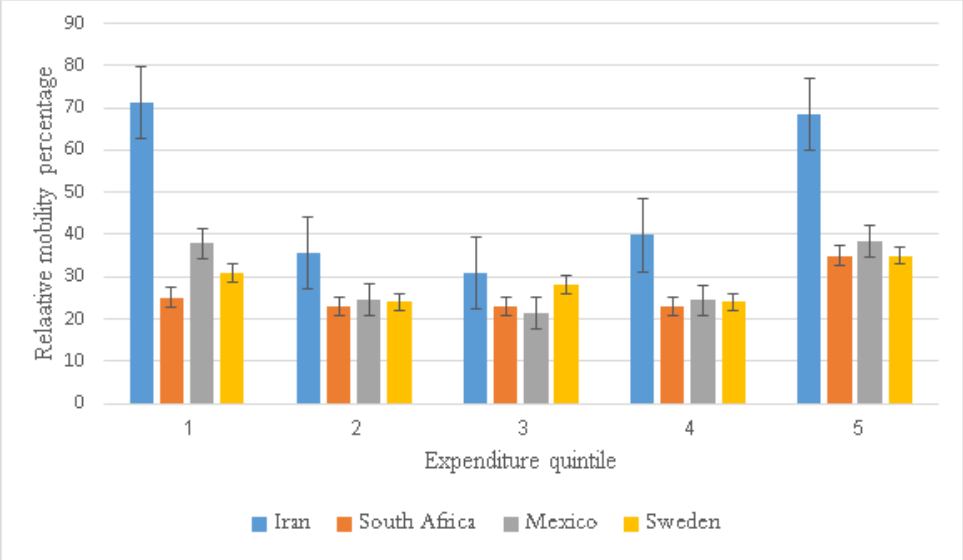
Note: The figure plots the probability that children remain in the same expenditure decile as their parents, using the diagonal elements of the intergenerational transition matrix. The sample consists of individuals aged 13–19 in 1998 and the same cohort observed at ages 38–44 in 2023. Persistence is highest in the lowest and highest deciles and lowest in the middle of the distribution, reflecting a U-shaped pattern of intergenerational immobility.
Source: Authors' estimates using the Household Income and Expenditure Survey (HIES).

bottom decile. At the opposite end, a similar degree of rigidity is observed: 85 percent of children from the wealthiest families remain within the top two deciles, and more than 60 percent remain in the very top decile. By contrast, persistence among middle-decile families is substantially lower, below 30 percent, with wider dispersion of outcomes across adjacent deciles. These patterns indicate that both poverty and affluence tend to be transmitted across generations in Iran, while the middle of the expenditure distribution exhibits greater fluidity. These patterns indicate that both poverty and affluence tend to be transmitted across generations in Iran, while the middle of the expenditure distribution exhibits greater fluidity. The U-shaped profile demonstrates that immobility is most pronounced at both tails of the distribution.

Compared internationally, Iran's intergenerational persistence is strikingly high. In OECD economies, remaining in the same parental income quintile typically occurs with a probability of 30–40 percent, and in the United States, tail persistence below 40 percent (Chetty, Hendren, Kline, Saez and Turner 2014). In contrast, comparable estimates for South Africa and Mexico (Finn et al. 2017, Foster and Rothbaum 2015) show persistence of 60–70 percent at the distribution extremes. Among the limited emerging-market evidence, for example, Turkey's IGE is estimated at around 30 percent. Compared with the few available emerging-market estimates and the only partial evidence from the MENA region, Iran's tail persistence appears high. Figure 5 compares Iran with countries representing high (e.g., Sweden), middle (Mexico), and low (South Africa) mobility contexts. While all exhibit the U-shaped structure, Iran's persistence is substantially higher at both ends, approaching the rigidity observed in highly unequal economies.

This pattern indicates that the observed intergenerational persistence in Iran arises from two distinct sources. The first is the transmission of inherent traits and endowments across generations, such as abilities, preferences, or motivation, that naturally influence

Figure 5: Intergenerational Persistence Across Expenditure Quintiles: International Comparison



Note: The figure plots the probability that children remain in the same expenditure (or income) quintile as their parents across four countries. All cases show a U-shaped pattern of persistence, with higher rigidity at the bottom and top of the distribution. Iran exhibits substantially higher persistence at both tails compared to South Africa, Mexico, and Sweden, positioning it among the least mobile middle-income economies. Cross-country differences in estimation methods reflect data availability but do not alter the qualitative pattern.
Sources: Iran: Authors' estimates using a parametric synthetic panel based on HIES 1998–2023; South Africa: Finn et al. (2017), father–son income persistence estimates; Mexico: Foster and Rothbaum (2015), transition probabilities using normal copula method; Sweden: Lindahl et al. (2012), father–child income transition estimates.

economic outcomes. The second, and empirically more consequential, is the transmission of opportunity barriers, including unequal access to education, regional disparities, and differences in social networks or labor-market access. While both factors contribute to overall persistence, our evidence suggests that inequality of opportunity plays the more significant role. Limited upward mobility from the bottom likely stems from barriers such as unequal access to quality education, regional disparities in economic opportunity, and labor-market segmentation that restrict advancement. Conversely, high persistence among affluent households may arise from intergenerational transfers of wealth, privileged access to higher education, and concentration of elite occupations. The relative importance of these mechanisms and the extent to which persistence reflects opportunity rather than ability transmission is examined in section 5, where we provide supporting evidence from subgroup, regional, and policy-shock analyses.

3.2 Absolute mobility

Absolute and relative mobility capture the distinct dimensions of intergenerational economic progress. Absolute mobility measures whether children are better off than their parents in real terms, while relative mobility captures changes in rank within the expenditure distribution. We examine the two jointly because broad improvements in living standards can occur even when the intergenerational hierarchy remains unchanged. In

other words, children may experience higher real expenditures than their parents without moving upward in the socioeconomic ordering of society.

Absolute mobility is defined as the probability that a child achieves a higher real per-capita household expenditure than their parents at comparable ages. Understanding absolute mobility is particularly important in the Iranian context, where persistent inflation and macroeconomic volatility may distort expenditure comparisons over time. During high-inflation periods, the real dispersion of expenditures often narrows if nominal incomes adjust unevenly across the distribution. In such settings, even modest real gains may be recorded as upward movement relative to parents, potentially overstating intergenerational progress. Our empirical approach, therefore, distinguishes genuine improvements in material well-being from inflation-driven shifts in expenditure levels. We begin by documenting overall levels of absolute mobility and then examine how these gains vary across the expenditure distribution.

Absolute mobility is defined as the probability that a child achieves a higher real per-capita household expenditure than their parents at comparable ages. Understanding absolute mobility is especially important in the Iranian context, where persistent inflation and macroeconomic volatility can distort expenditure rankings. During high-inflation periods, the real range of household expenditures (i.e., the difference between maximum and minimum values) tends to shrink, mechanically increasing the likelihood that children appear to surpass their parents' expenditure levels without a corresponding rise in real welfare. Accounting for these dynamics allows us to distinguish genuine intergenerational progress from nominal, inflation-driven shifts in expenditure categories.

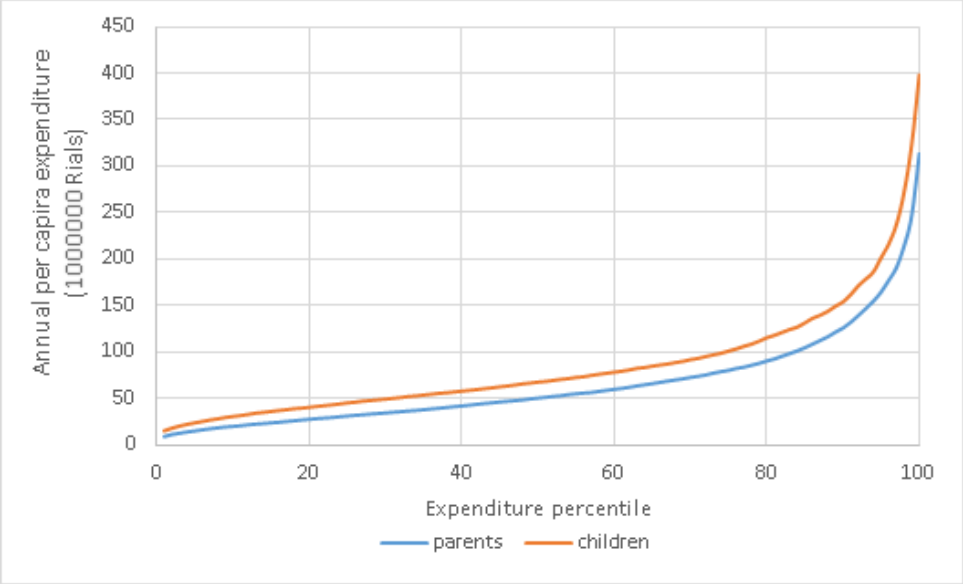
Figure 6 compares the per-capita expenditure distributions of parents in 1998 and their children in 2023. The entire distribution for the children has shifted upward, indicating that, on average, children enjoy higher expenditures than their parents. Mean annual per-capita expenditure increased from approximately 67.9 million rials in 1998 to 88.1 million rials in 2023, representing roughly a 30 percent rise in real terms over 25 years. However, this upward shift is not uniform: gains are concentrated in the middle and upper segments of the distribution, while the lower tail shows only modest improvement.

We estimate that 74.2 percent of individuals aged 38–44 in 2023 have higher real expenditures than their parents at the same age (standard error = 0.0056). This increase in real expenditure reflects aggregate welfare improvement. Nevertheless, several caveats must be noted. Regional cost-of-living differences, household composition, or item-weight variations may still affect comparability. Moreover, because macroeconomic growth or contraction shifts the entire expenditure distribution, high absolute mobility can coexist with persistent inequality of opportunity.

This average also conceals substantial heterogeneity. As shown in Appendix Table X, absolute mobility rates vary markedly across parental deciles, regions, and education levels. Mobility gains are concentrated among children of middle-income parents, whereas those from the lowest and highest deciles exhibit significantly lower rates of surpassing their parents—a pattern that mirrors the U-shaped persistence found in relative mobility. Thus, the Iranian mobility structure is characterized by high average absolute mobility but low positional mobility, indicating that while most households experienced improvements in living standards, these gains did not disrupt the intergenerational hierarchy.

This divergence between absolute and relative mobility is a central finding of the analysis. It suggests that economic growth, while sufficient to raise average real expenditures, has not translated into greater equality of opportunity or increased social fluidity. Rather, opportunity structures remain stratified, with limited upward movement for those at the

Figure 6: Per Capita Expenditure Distributions for Parents (1998) and Children (2023)



Note: The figure compares the distributions of real annual per-capita household expenditure for the baseline cohort (observed as adolescents aged 13–19 in 1998) and the same cohort observed in adulthood (aged 38–44 in 2023). Expenditures are expressed in constant 2016 prices using the Consumer Price Index. The upward shift of the distribution indicates that a majority of the cohort experienced higher real expenditures than their parents at comparable ages, although the gains are concentrated in the middle and upper parts of the distribution, with limited improvement at the lower tail.
Source: Authors' estimates using the Household Income and Expenditure Surveys (HIES).

bottom and strong status retention among those at the top. These dynamics motivate the mechanism-based analysis in section 5, where we examine the roles of regional disparities, educational inequality, and labor-market segmentation in shaping intergenerational outcomes.

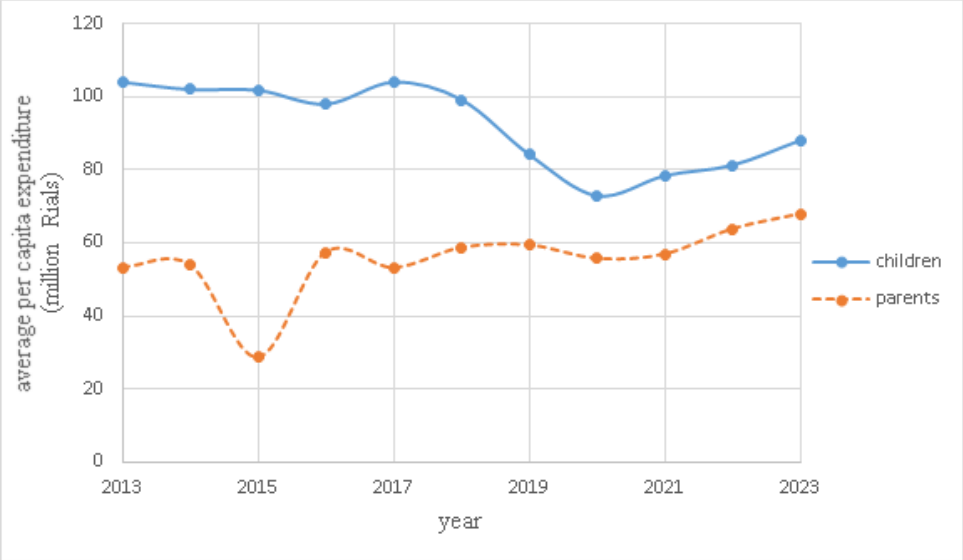
The next section traces the evolution of both relative and absolute mobility across cohorts, allowing us to assess whether opportunity has widened or narrowed over the past twenty-five years.

3.3 Intergenerational mobility over time

Tracking intergenerational mobility across cohorts provides insight into whether societies are moving toward greater equality of opportunity or entrenching inequality. In Iran, mobility trends have evolved under the influence of macroeconomic volatility, persistent inflation, and international sanctions. Because high inflation compresses the real expenditure distribution, we interpret relative and absolute mobility jointly, which allows us to distinguish true improvements in welfare from inflation-induced shifts in expenditure levels.

Figure 7 illustrates the evolution of mean per-capita expenditure over time for parents and their children. The figure shows that, despite cyclical fluctuations, the children's expenditure series lies consistently above that of their parents, reflecting aggregate growth in living standards but also highlighting the compression of real expenditure differences during inflationary periods. These dynamics provide the background for interpreting the mobility estimates reported in the following sections.

Figure 7: Mean Per Capita Expenditure Over Time for Parents (1988-1998) and Children (2013-2023)



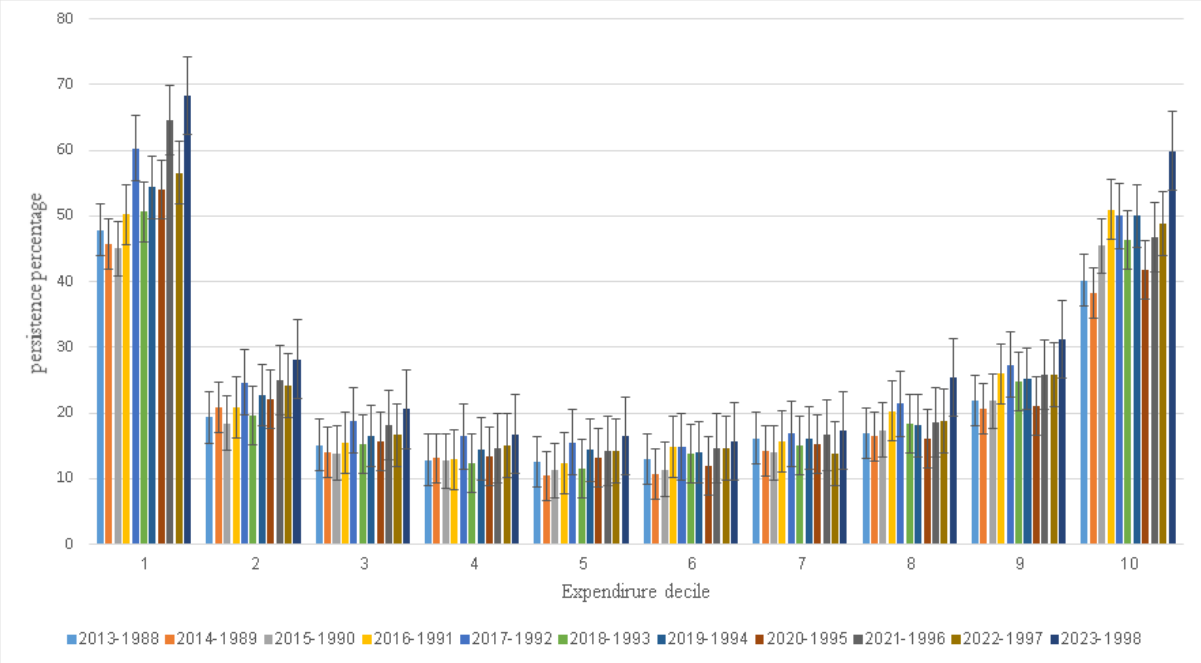
Note: The figure plots mean annual per-capita household expenditure for the baseline cohort observed as adolescents in 1998 (parents' expenditure shown over 1988–1998) and the same cohort observed as adults in 2023 (children's expenditure shown over 2013–2023). The parental series is shifted forward by 25 years to align both generations at comparable ages in the life cycle. All expenditure values are expressed in real terms using the Consumer Price Index (base year = 2016). The children's series lies persistently above the parents' series, indicating aggregate welfare gains, while the narrowing distance between the two during high-inflation periods reflects compression of the real expenditure distribution. *Source:* Authors' calculations using the Household Income and Expenditure Surveys (HIES).

Our analysis relies on two comparable intergenerational links: 1997–2022 and 1998–2023. The choice of these intervals reflects the limits of available micro-data from the Household Income and Expenditure Survey (HIES); no reliable micro-data exist prior to 1997 or beyond 2023. Both generations are evaluated at ages 38–44, capturing individuals at similar stages of the life cycle when incomes and expenditures are relatively stable.

Figure 8 and Table 3 present the evolution of the conditional transition matrix across cohorts. The results reveal a decline in relative mobility between the late 1990s and early 2020s. Intergenerational persistence, especially in the lowest and highest expenditure deciles, has strengthened, while mobility among middle-decile families has weakened modestly. For instance, the probability that children of bottom-decile parents remain in the same decile rose from 48 percent for the 2013 child cohort (adults aged 38–44 in 2013 compared to the 1988 parental reference cohort) to 68 percent for the 2023 cohort (adults aged 38–44 in 2023 compared to the 1998 parental reference cohort). A similar increase is observed among children of top-decile parents. This intensification of persistence at both tails reinforces the U-shaped mobility pattern observed earlier and suggests that privilege and deprivation have both become more enduring. Although the spatial identifiers in the HIES differ before 1998 (province-level) and after 1998 (county-level), robustness checks using common provincial identifiers yield consistent patterns. This indicates that the rise in persistence is not a data artifact but reflects substantive structural changes in opportunity distribution.

Figure 9 shows the evolution of the absolute mobility trend. The results show a significant decline: absolute mobility fell from about 90 percent in 2013 to 74.2 percent

Figure 8: Intergenerational Persistence Across Expenditure Deciles Over Time



Note: The figure compares intergenerational persistence rates by expenditure decile for two cohorts: the baseline cohort observed as adolescents in 1997–1998 and again as adults in 2022–2023, and an earlier cohort observed 25 years earlier. Persistence is defined as the probability that children remain in the same expenditure decile as their parents. Both cohorts are evaluated at ages 38–44. Persistence has increased at the bottom and top deciles over time, indicating greater rigidity at the tails of the distribution. Middle-decile persistence remains lower, consistent with a U-shaped pattern of intergenerational immobility. More details in Table 3.
Source: Authors' estimates using the Household Income and Expenditure Surveys (HIES).

in 2023. Despite aggregate growth in mean expenditures, fewer children now surpass their parents' living standards. This decline coincides with a period of sluggish GDP growth, rising inequality, and repeated waves of international sanctions that constrained household incomes and reduced educational investment, particularly among lower- and middle-income families.

Taken together, these findings point to a dual deterioration in intergenerational mobility in Iran. Relative mobility has declined as persistence at the tails intensified, while absolute mobility has fallen due to stagnant or declining real welfare for large segments of the population. Economic growth over the past two decades has been insufficiently inclusive: gains have accrued disproportionately to upper-income households, reinforcing inequality of opportunity.

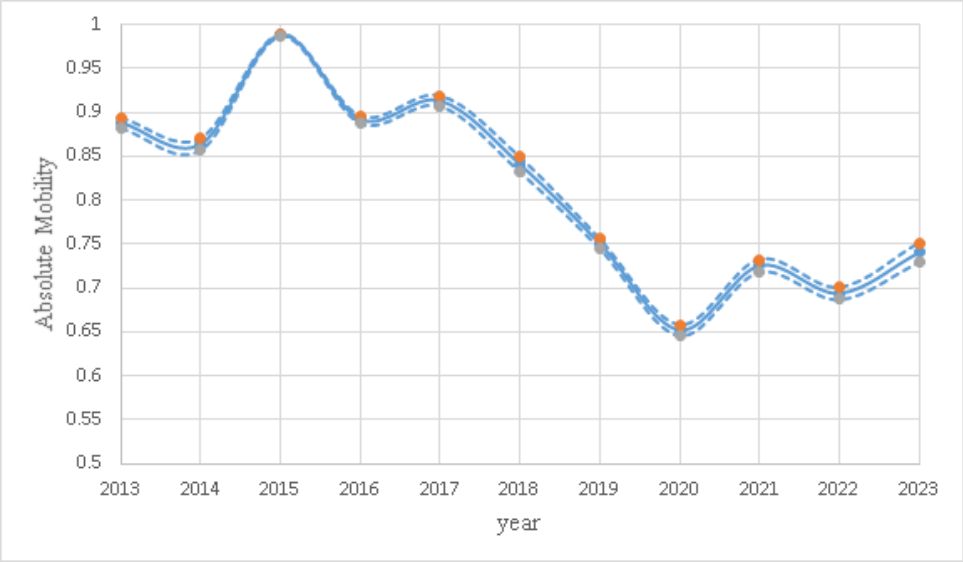
These dynamics mirror those documented in other middle-income countries. In Mexico and South Africa, for example, Foster and Rothbaum (2015) and Finn et al. (2017) find that periods of economic volatility and inequality expansion were accompanied by rising intergenerational persistence. In contrast, advanced economies such as the United States and United Kingdom also experienced falling absolute mobility (Chetty et al., 2017) but smaller increases in relative immobility, suggesting that institutional fragility and inequality amplify the rigidity of opportunity in developing contexts. Iran's trajectory thus aligns with the "stalled mobility" phenomenon observed in emerging economies under prolonged economic shocks: rising welfare without widening opportunity (World

Table 3: Intergenerational Persistence Across Expenditure Deciles and Cohorts

Cohort	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
1988-2013	47.90	19.30	15.10	12.80	12.55	13.00	16.15	16.90	21.86	40.20
1989-2014	45.70	20.90	14.00	13.10	10.40	10.74	14.20	16.40	20.60	38.25
1990-2015	45.00	18.45	13.82	12.70	11.30	11.40	14.00	17.40	21.80	45.50
1991-2016	50.20	20.90	15.44	12.90	12.40	14.85	15.70	20.30	25.94	51.00
1992-2017	60.30	24.60	18.85	16.40	15.50	14.84	16.90	21.40	27.30	50.00
1993-2018	50.60	19.60	15.20	12.40	11.55	13.80	15.00	18.45	24.76	46.40
1994-2019	54.35	22.70	16.50	14.50	14.40	14.00	16.10	18.10	25.20	50.00
1995-2020	54.10	22.00	15.70	13.30	13.10	12.00	15.30	16.10	21.10	41.80
1996-2021	64.50	24.90	18.15	14.60	14.26	14.54	16.60	18.55	25.80	46.80
1997-2022	56.60	24.20	16.60	15.10	14.20	14.70	13.80	18.80	25.80	48.90
1998-2023	68.35	28.20	20.55	16.77	16.52	15.67	17.35	25.41	31.21	59.89
Mean	54.33	22.34	16.36	14.05	13.29	13.59	15.55	18.89	24.67	47.16

Note: Table shows the probability (in percent) that children remain in the same expenditure decile as their parents. Estimates are for cohorts observed at ages 38–44. Persistence is highest at the bottom (D1) and top (D10) deciles, indicating greater rigidity at the extremes of the expenditure distribution.

Figure 9: Intergenerational Absolute Mobility Trends, 2013–2023



Note: The figure shows the share of individuals whose real per-capita household expenditure exceeds that of their parents at the same age (absolute mobility). Each point reports the absolute mobility rate for adults observed in a given survey year, compared with the expenditure of their parents measured 25 years earlier. Dashed lines represent 95% confidence intervals. Absolute mobility declines significantly over the decade, indicating that fewer children surpass their parents' living standards despite aggregate expenditure growth.
Source: Authors' estimates using the Household Income and Expenditure Surveys (HIES).

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Bank, 2020; OECD, 2021).

The simultaneous decline in both relative and absolute mobility indicates that opportunity inequality in Iran has deepened over the past quarter-century. These patterns are consistent with weakening returns to education for low-income households, persistent regional disparities in access to quality schooling and employment, and the unequal burden of sanctions on household investment capacity. In section 5, we examine these mechanisms in greater depth, drawing on subgroup, regional, and policy-shock analyses to assess whether the observed persistence primarily reflects structural barriers to opportunity rather than intergenerational transmission of ability.

The coexistence of high absolute mobility and strong intergenerational persistence reflects the dual nature of Iran's recent economic development. On one hand, sustained growth in average household expenditure has enabled most children to surpass their parents in real terms, generating high absolute mobility. On the other hand, the persistence of rank positions across generations indicates that these gains have not reshaped the intergenerational distribution of economic status. Economic growth appears to have benefited households proportionally, without altering the relative structure of opportunity. Structural barriers—unequal access to quality education, segmented labor markets, and pronounced regional disparities—continue to limit upward mobility for those at the bottom, while intergenerational wealth transfers and privileged networks help maintain status among the affluent.

This combination of broad welfare gains and persistent positional inequality is not unique to Iran. A growing cross-country literature (Genicot et al. 2024, Narayan et al. 2018) documents similar patterns in several developing economies, where rising living standards coexist with limited intergenerational rank mobility. In such "growth without equalization" contexts, aggregate progress does not translate into greater equality of opportunity. Yet Iran stands out within this group: unlike countries such as Brazil, Mexico, or South Africa, where low mobility accompanies high income inequality (Gini > 0.45); Iran exhibits comparable or even greater persistence despite maintaining a moderate Gini coefficient of around 0.35. This contrast indicates that the level of income inequality alone cannot explain the rigidity of economic status across generations. The Iranian case, therefore, motivates a deeper examination of the structural mechanisms that produce low mobility in a seemingly moderately unequal society, which we turn to in the next section.

3.4 Moderate Inequality and Low Mobility

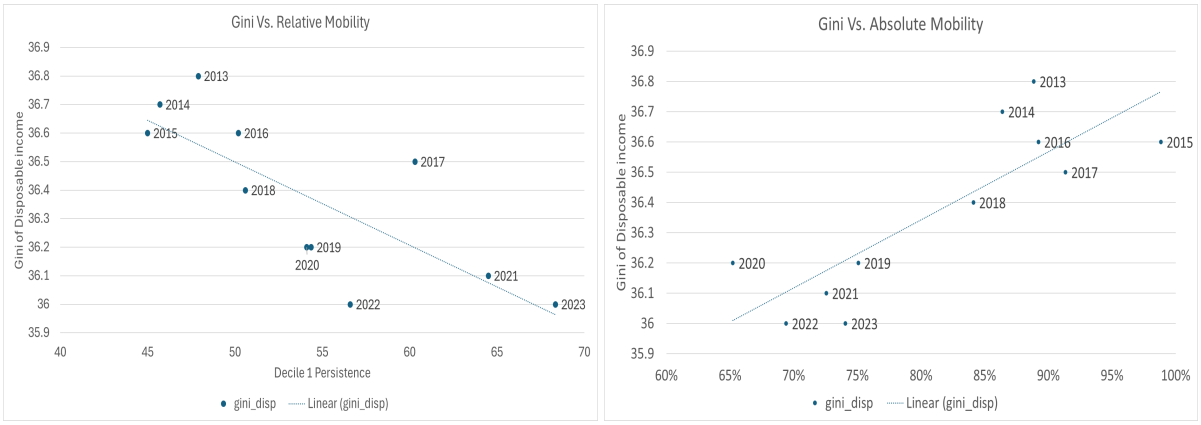
Iran presents a striking paradox in the global landscape of intergenerational mobility. Despite a Gini coefficient of roughly 0.35 (comparable to many OECD economies) the country exhibits relative mobility levels typically observed in much more unequal settings. In countries such as Brazil, Chile, or South Africa, where inequality exceeds 0.45–0.50, high persistence is expected. Iran, however, combines moderate inequality with very low mobility, placing it well above the pattern predicted by the canonical Great Gatsby Curve.

Figure 10 illustrates this anomaly within Iran over time. Panel (a) shows that bottom-decile persistence rises sharply, from about 45% to nearly 70% between 2013 and 2023, despite a Gini coefficient that remains flat or slightly declines over the same period. Standard Great Gatsby logic would predict that falling inequality increases mobility; instead, Iran exhibits the opposite trend. Panel (b) reveals a similarly atypical pattern for

absolute mobility: while international evidence (e.g., Chetty et al. 2017, Berman 2022) typically shows absolute mobility falling as inequality rises, in Iran, absolute upward mobility increases even as inequality slightly declines. These patterns indicate that mobility dynamics in Iran evolve independently of changes in inequlity.

Figure 10: Gatsby Patterns in Iran Over Time: Inequality vs. Mobility

(a) Relative Mobility vs. Inequality (b) Absolute Mobility vs. Inequality



Notes: The figures show the relationship between annual Gini coefficients and two mobility measures: relative persistence at the bottom decile (Panel a) and absolute upward mobility (Panel b), for the 2013–2023 period. Unlike the pattern documented in many countries, Iran shows no evidence of a Great Gatsby relationship. In Panel (a), relative mobility exhibits an increasing persistence while inequality remains nearly constant or slightly declines, producing a negative association opposite to standard predictions. In Panel (b), absolute mobility fluctuates at very high levels (70–90 percent) despite similarly stable inequality. Taken together, the figures demonstrate that changes in inequality do not track changes in either relative or absolute mobility in Iran, reinforcing the puzzle that moderate and stable inequality coexist with unusually high persistence across the income distribution.
Source: (Solt 2019), and Authors' calculations based on the HIES 1998 and 2023

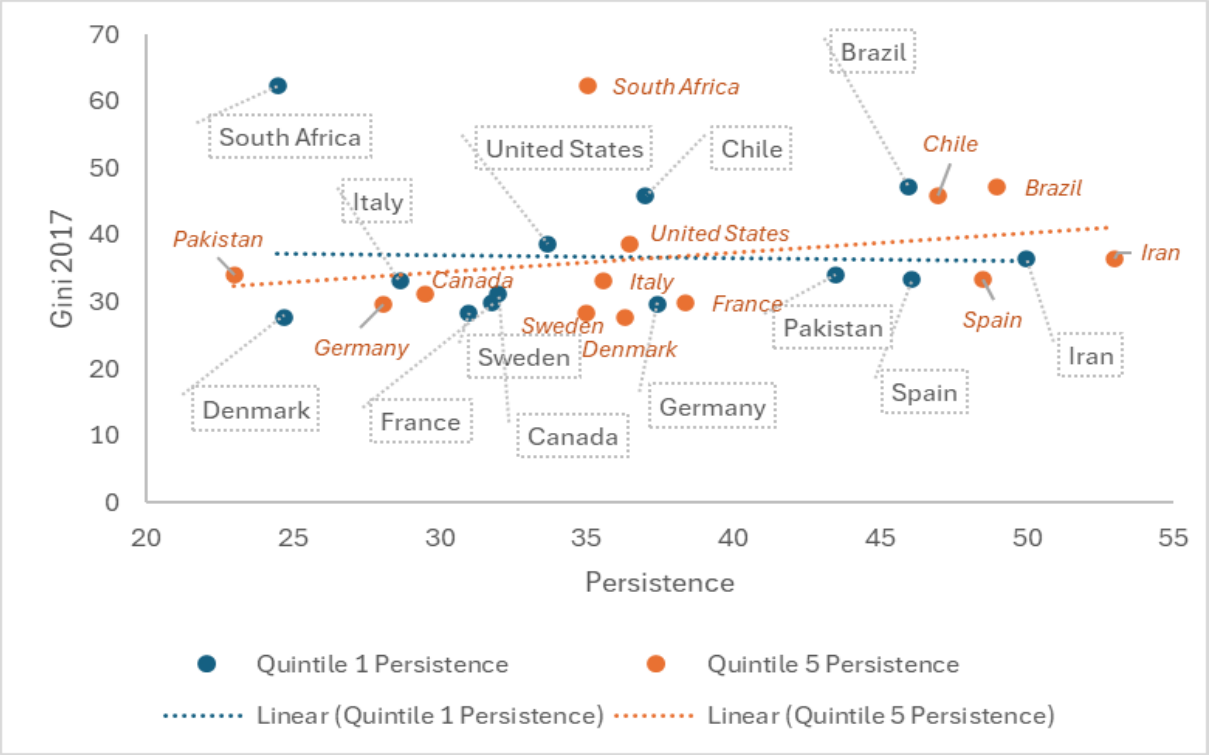
Cross-country comparisons reinforce the puzzle. Figure 11 plots bottom- and top-quintile persistence against inequality for a broad set of middle- and high-income economies.[4] The expected cross-national Great Gatsby pattern emerges clearly: mobility declines as inequality rises, with Nordic countries at one end of the distribution and Latin American economies at the other. Iran, however, sits well above this trend line. Despite having a Gini coefficient similar to developed countries, its persistence levels exceed those of Brazil and South Africa. Iran's position as a clear outlier demonstrates that the level of inequality alone cannot explain the rigidity of intergenerational mobility.

These findings highlight three empirical facts. First, Iran's inequality is moderate by international standards and far below that of other low-mobility countries. Second, mobility—both relative and absolute—changes markedly over time despite minimal variation in inequality. Third, the relationship between inequality and mobility in Iran contradicts the negative gradient documented in cross-country studies. These results suggest that Iran's high intergenerational persistence cannot be attributed to the magnitude or evolution of inequality, but rather arises from deeper structural mechanisms that shape the transmission of opportunity.

Several comparative cases reinforce the distinctiveness of the Iranian pattern. Turkey,

[4]Quintiles are used because decile-level persistence estimates are not consistently available across countries.

Figure 11: Cross-Country Gatsby Patterns: Inequality vs. Mobility



Notes: Figure shows the relationship between Gini coefficient and intergenerational mobility across a set of middle- and high-income economies. Persistence is measured for the bottom and top quintiles. Consistent with the Great Gatsby Curve, countries with higher inequality generally exhibit higher persistence (lower mobility). However, Iran stands out as an exception: despite having a moderate Gini coefficient (around 0.35–0.37), Iran displays persistence levels comparable to—or higher than—those observed in much more unequal countries such as Brazil and Chile.
Source: United States (Chetty, Hendren, Kline and Saez 2014). United Kingdom and Denmark (Jäntti et al. 2006). Germany (Kyzyma and Groh-Samberg 2018). France (Kenedi and Sirugue 2023). Italy (Acciari et al. 2022). Spain (Cervini-Plá et al. 2015). Brazil (Britto et al. 2024). Canada (Connolly et al. 2019). Pakistan (Javed and Irfan 2014), and (Solt 2019) for GINIs.

for example, exhibits a similar combination of moderate inequality (Gini $\approx$ 0.40) and relatively low intergenerational mobility (Demirtaş and Torul 2023). Yet Iran stands out even within this group: despite a lower Gini coefficient (around 0.35), persistence levels are higher than those observed in Turkey, Brazil, Chile, or South Africa. These comparisons show that Iran is not an outlier because it is uniquely unequal, but because its mobility outcomes are unusually rigid given its level of inequality.

Taken together, these patterns suggest that the standard inequality–mobility gradient is insufficient to explain mobility outcomes in Iran. Moderate and stable inequality coexists with exceptionally high persistence, indicating that mobility is shaped by structural forces beyond the degree of income dispersion. In section 5, we examine the possible mechanisms that underpin the persistence patterns documented above.

4 Robustness check

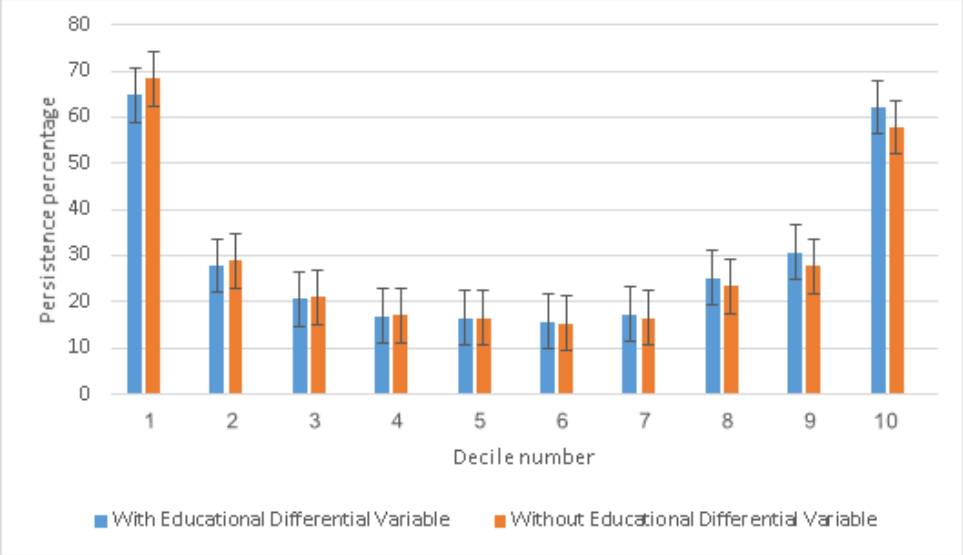
To ensure that our findings are not artifacts of model specification or data limitations, we conduct a series of robustness and sensitivity analyses. These checks test whether our

results hold under alternative assumptions regarding education, residential status, and sample age ranges. Together, they validate that the observed intergenerational persistence primarily reflects structural inequality in opportunity rather than methodological bias.

4.1 Sensitivity to Empirical Specifications

First, we relax the assumption of constant educational differentials across generations by omitting the education-gap variable from the second-period expenditure regression. As shown in Figure 12, the exclusion of this variable yields similar persistence and mobility estimates: intergenerational persistence differs by less than four percentage points across deciles, and the overall absolute mobility rate declines only modestly from 0.742 to 0.714. This stability indicates that our findings are not driven by how education is parameterized in the expenditure model, reinforcing the interpretation that educational inequality operates through opportunity barriers rather than specification artifacts.

Figure 12: Intergenerational Persistence With and Without the Educational Differential Variable



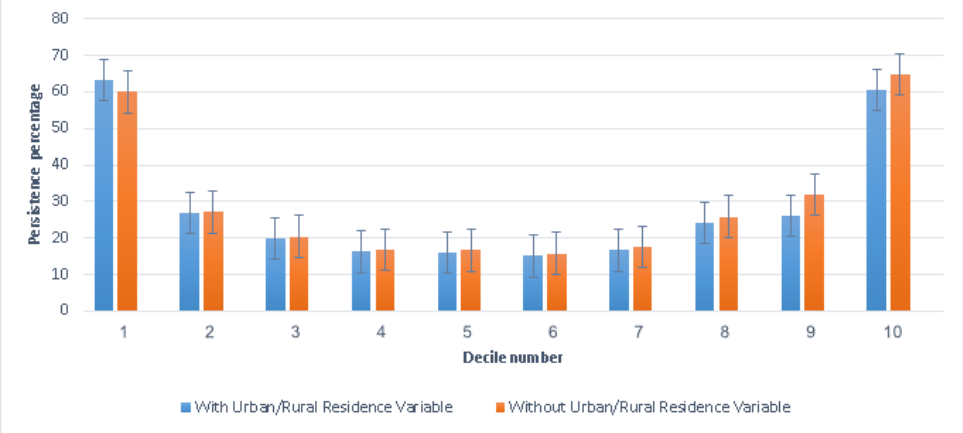
Note: The figure compares estimated intergenerational persistence rates across expenditure deciles under two specifications: (i) the baseline model including the educational differential variable, and (ii) a model excluding this variable from the second-period expenditure regression. The two series closely overlap, with differences generally below four percentage points. The corresponding absolute mobility estimate declines modestly from 0.742 to 0.714 when the variable is excluded, indicating that persistence patterns are not sensitive to how educational attainment is parameterized.
Source: Authors' estimates using the Household Income and Expenditure Surveys (HIES).

4.2 Rural–Urban Migration and Misclassification

Second, we test whether rural–urban migration or misclassification biases the results. Excluding the residential status variable from both period regressions slightly reduces explanatory power (R^2 falling from 0.46 to 0.35–0.38) but leaves intergenerational patterns virtually unchanged. As Figure 13 shows, the exclusion of this variable yields similar persistence and mobility estimates. The estimated absolute mobility rate rises marginally

from 0.733 to 0.759, suggesting that geographic mobility and measurement error do not materially affect the results.

Figure 13: Intergenerational Persistence With and Without the Urban/Rural Residence Variable



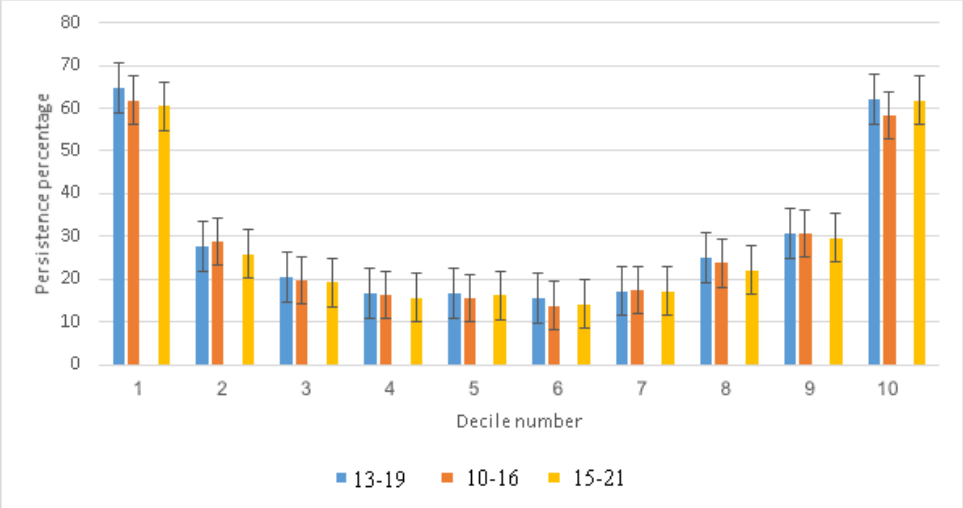
Note: This figure compares persistence estimates when the urban/rural residence indicator is included or excluded from both period regressions. Excluding the variable reduces explanatory power (second-period R^2 declines from 0.46 to approximately 0.35–0.38) but leaves persistence patterns nearly unchanged. The estimated absolute mobility rate increases slightly from 0.733 to 0.759, indicating that rural–urban migration or misclassification does not materially bias the results.
Source: Authors' estimates using the Household Income and Expenditure Surveys (HIES).

4.3 Sensitivity to Age at Observation

Finally, we examine the sensitivity of estimates to the definition of children's age cohorts by re-estimating persistence for alternative windows (10–16, 13–19, and 15–21 years). The estimated absolute intergenerational mobility remains highly stable, varying only within a few percentage points. Specifically, the mobility rate equals 0.752 for the 10–16 cohort, 0.742 for the 13–19 cohort (baseline), and 0.714 for the 15–21 cohort. Figure 14 shows that the persistence pattern remains qualitatively unchanged across these cohorts, confirming that the results are not sensitive to moderate shifts in the age range used to link generations.

Taken together, these robustness exercises demonstrate that our findings are not driven by modeling assumptions, the definition of educational attainment, residential classification, or the choice of age window used to link generations. The U-shaped pattern of intergenerational persistence remains stable across specifications, and estimated absolute mobility varies only within a narrow band. The consistency of results across these checks strengthens our interpretation that the observed persistence reflects durable structural inequalities in opportunity—rather than artifacts of specification, sample selection, or measurement error.

Figure 14: Intergenerational Persistence Across Alternative Age Cohorts



Note: Persistence estimates are shown for three adolescent age windows used to construct the intergenerational link: 10–16, 13–19 (baseline), and 15–21 years. The persistence profile remains U-shaped in all cases. Absolute mobility varies only within a narrow range (0.714–0.752), confirming that the results are not sensitive to reasonable adjustments in the age range used to identify children in the baseline period. *Source:* Authors' estimates using the Household Income and Expenditure Surveys (HIES).

5 Mechanisms

Intergenerational persistence may arise from two broad channels: (i) the transmission of innate traits or preferences, and (ii) structural barriers that limit access to opportunities. Because the former is not policy-relevant and evolves slowly over time, the sharp changes in mobility documented in earlier sections point toward the second channel. This section examines three mechanisms consistent with inequality of opportunity in Iran: (i) demographic change, especially the rapid decline in fertility and household size; (ii) unequal access to high-quality education and differential labor-market returns to schooling; and (iii) spatial disparities in economic opportunity across provinces.

5.1 Demographic Change and Household Size

A notable demographic shift in Iran over recent decades is the substantial decline in fertility and average household size. Because our baseline measures of absolute mobility are based on per-capita household expenditure, reductions in household size can mechanically raise per-person expenditure even when total household resources remain unchanged. This raises the possibility that part of the observed upward mobility reflects demographic change rather than improvements in aggregate economic well-being. The average household size declines from 5.5 persons in the parental cohort to 3.5 persons in the children's cohort, in the whole nationwide samples,[5] confirming a substantial demographic contraction consistent with nationwide fertility decline.

To assess the magnitude of this mechanism, we recompute intergenerational transition matrices and absolute mobility measures using total household expenditure instead of per-

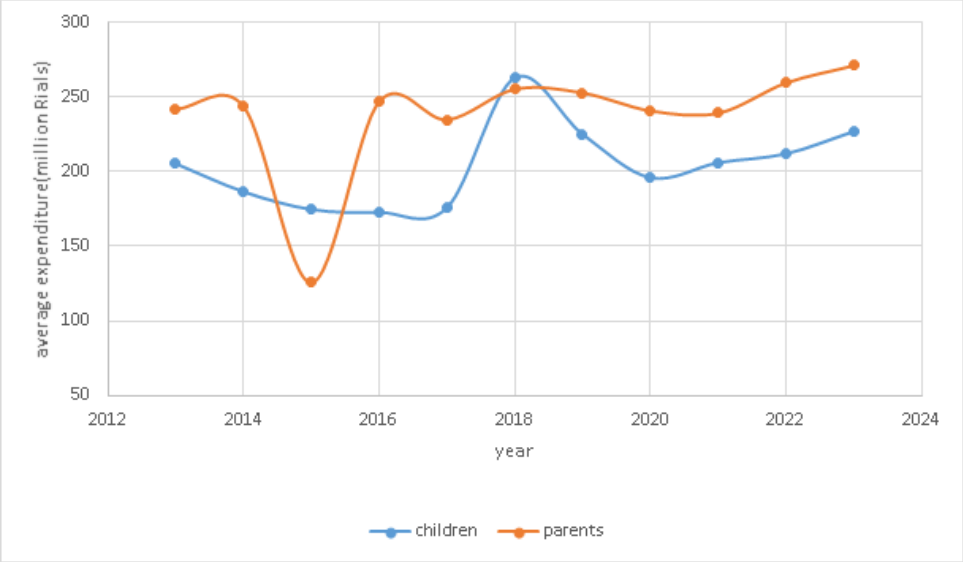
[5]In our data, to ensure an unbiased comparison, we can consider only parents aged 38-44 in the parental generation and only those who have children in the children's generation. In this case, the average household size for these two generations is 6.27 and 4.09 for parents and children, respectively.

capita expenditure. This comparison allows us to distinguish genuine improvements in household resources from changes arising solely through smaller family size.

The comparison yields a clear pattern. As shown earlier, per-capita expenditure is substantially higher for the children's generation (Figure 7), suggesting strong upward mobility. In contrast, total household expenditure is consistently lower for children than for their parents (Figure 15). Thus, improvements in per-capita welfare arise primarily because children's households share resources among fewer members rather than because they command greater aggregate resources.

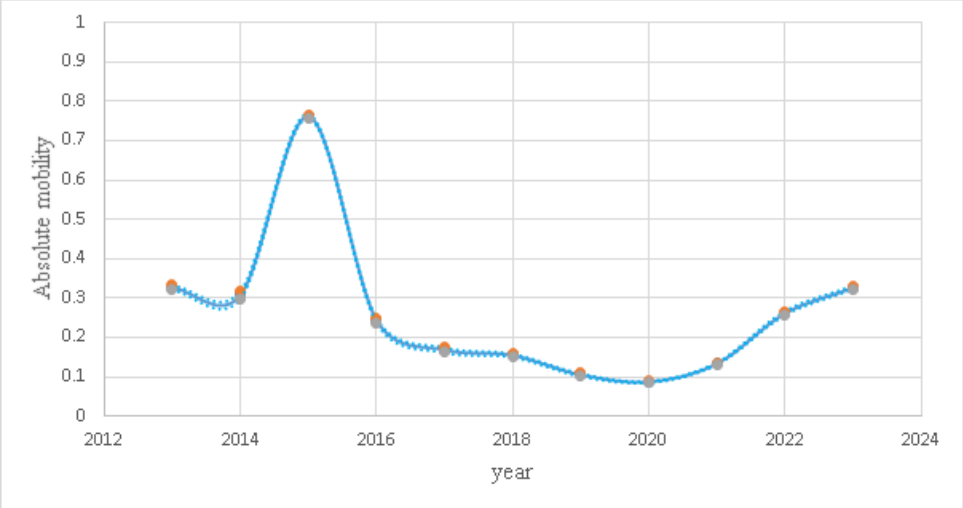
This result is reinforced by the mobility estimates. Per-capita absolute mobility remains high (70 to 95 percent over 2013–2023), reflecting strong upward movement. However, when mobility is recalculated using total household expenditure (Figure 16), upward mobility falls sharply to below 20 percent in most years, and exhibits a statistically significant downward trend. The divergence between the two series implies that much of the observed upward mobility is demographic rather than economic.

Figure 15: Intergenerational Trends in Mean Expenditure: Children (2013–2023) vs. Parents (1988–1998)



Note: Reported years correspond to measurement years for children's status, with parental status measured 25 years prior. All expenditure values are inflation-adjusted to constant 2016 prices.
Source: Authors' estimates using the Household Income and Expenditure Surveys (HIES).

Figure 16: Intergenerational Absolute Mobility (based on total household expenditure) Trends, 2013–2023



Note: The reported year refers to the measurement year for children's status, with parental status measured 25 years prior. The dashed curves represent 95% confidence intervals for the estimated values. The observed decline in absolute mobility is statistically significant at the 95% confidence level.
Source: Authors' estimates using the Household Income and Expenditure Surveys (HIES).

Taken together, these results indicate that declining household size is a major mechanism behind Iran's high measured absolute mobility. This demographic channel also helps explain the central puzzle of the paper: absolute mobility is high despite stagnant or declining total household resources, and relative mobility remains low despite moderate inequality. Fertility decline raises per-capita expenditure without altering the structural barriers that sustain intergenerational persistence.

5.2 Educational Inequality

Educational expansion is one of the most striking generational changes in Iran. Children in our sample attain substantially more schooling than their parents, with a large rise in high-school completion and university entry. If education served as an effective equalizer, this sharp improvement should translate into greater intergenerational mobility. Yet mobility remains low. The evidence in this subsection shows that schooling has not weakened the link between parental background and children's economic outcomes, suggesting that unequal opportunities, rather than inherited abilities, remain the dominant mechanism behind intergenerational persistence.

A first indication comes from conditioning intergenerational regressions on children's years of schooling. As shown in section 4, controlling for educational attainment reduces the intergenerational coefficient only modestly and leaves the rank–rank slope virtually unchanged. If ability transmission were central, conditioning on schooling (which is highly correlated with cognitive skills) would meaningfully reduce persistence. Instead, children with similar schooling levels continue to experience systematically different economic trajectories depending on parental background.

A second piece of evidence comes from the transition matrices constructed separately for children of low-educated and highly educated parents (Table 4 and Table 5). Despite major improvements in schooling for both groups, their mobility patterns remain

strikingly similar. Bottom-decile persistence is high, 65.7 percent among children of low-educated parents and even higher at 77.2 percent among children of highly educated parents.[6] Mobility in the middle of the distribution displays nearly the same dome-shaped pattern in both groups. Only at the top do we observe a wider gap: top-decile persistence is 69.1 percent for children of highly educated parents versus 56.8 percent for children of less educated parents, reflecting continued advantage at the upper end of the distribution.

Table 4: Intergenerational Transition Matrix Between Parental in (1998) and Child (2023) Expenditure Deciles for Children of Low-Educated Parents

Parent Decile	Child Decile									
	1	2	3	4	5	6	7	8	9	10
1	65.7	21.0	8.3	3.2	1.3	0.4	0.1	0.0	0.0	0.0
2	28.3	28.4	19.7	11.7	6.9	3.3	1.3	0.4	0.0	0.0
3	12.8	22.2	20.9	16.7	12.9	7.9	4.5	1.9	0.2	0.0
4	5.9	14.6	17.9	17.1	16.5	12.5	9.0	5.6	1.0	0.0
5	2.6	8.3	13.3	15.0	16.8	15.6	13.8	11.2	3.3	0.2
6	1.0	4.4	8.5	11.7	14.8	15.9	17.0	17.9	8.0	0.7
7	0.3	2.1	4.6	7.6	11.6	13.9	17.5	23.7	16.0	2.8
8	0.1	0.8	2.1	3.8	7.1	10.3	14.8	25.7	26.0	9.4
9	0.0	0.1	0.6	1.4	2.8	5.0	9.2	20.4	32.1	28.4
10	0.0	0.0	0.0	0.1	0.4	1.0	2.2	7.5	19.6	69.1

Note: Each cell reports the percentage of children in a given expenditure decile in 2023, conditional on having low-educated parents (defined as fathers or mothers with at most a diploma) whose expenditure decile is measured in 1998. The sample includes individuals aged 13–19 in 1998 and the same cohort observed at ages 38–44 in 2023. The diagonal elements indicate intergenerational persistence. Patterns of upward and downward mobility illustrate how children of low-educated parents transition across the expenditure distribution over 25 years.
Source: Authors' estimates using the Household Income and Expenditure Survey (HIES).

These patterns show clearly that education has expanded, but its mobility-enhancing power has not. Children of less educated parents attain more schooling than their parents, yet they do not escape low mobility. Children of highly educated parents retain strong positional advantages even as average schooling rises. Absolute and relative mobility remain tightly anchored to parental background.

Why does rising education fail to translate into greater mobility in Iran? Several structural features are likely responsible. School quality is highly segmented (across provinces, across public and private schools, and between urban and rural areas), so gains in schooling do not yield equal gains in human capital. At the same time, labor markets remain segmented, with access to high-return occupations often mediated by social networks, state-linked institutions, or rationed recruitment processes. The rapid expansion of tertiary education has outpaced the creation of skilled jobs, reducing returns to schooling for children from less advantaged backgrounds. Finally, families with highly educated

[6]The higher bottom-decile persistence among children of highly educated parents reflects negative selection into the bottom for this group: many such families possess education but face adverse local labor-market shocks, misallocation, or credential inflation, which keep their children trapped despite nominal schooling gains.

Table 5: Intergenerational Transition Matrix Between Parental (1998) and Child (2023) Expenditure Deciles for Children of High-Educated Parents

Parent Decile	Child Decile									
	1	2	3	4	5	6	7	8	9	10
1	77.2	18.5	3.7	0.5	0.1	0.0	0.0	0.0	0.0	0.0
2	43.5	33.2	16.1	5.5	1.4	0.2	0.0	0.0	0.0	0.0
3	22.6	31.5	23.9	13.6	6.3	1.7	0.3	0.1	0.0	0.0
4	11.3	23.5	24.4	19.2	13.4	6.0	1.8	0.3	0.0	0.0
5	5.4	14.9	20.6	20.2	18.6	12.5	6.2	1.6	0.1	0.0
6	2.5	8.4	14.7	17.9	19.8	17.4	13.0	5.8	0.5	0.0
7	1.1	4.0	8.9	13.1	17.6	18.7	19.0	15.3	2.4	0.1
8	0.3	1.6	4.0	7.5	12.4	16.1	20.4	26.5	10.8	0.4
9	0.0	0.4	1.2	2.5	5.5	9.1	15.0	28.8	30.8	6.5
10	0.0	0.0	0.1	0.3	0.7	1.5	3.6	11.1	26.0	56.8

Note: Each cell reports the percentage of children in a given expenditure decile in 2023, conditional on having highly educated parents (defined as fathers or mothers with a university degree) whose expenditure decile is measured in 1998. The sample includes individuals aged 13–19 in 1998 and the same cohort observed at ages 38–44 in 2023. The diagonal elements indicate intergenerational persistence. Mobility patterns reflect how children of highly educated parents transition across the expenditure distribution over 25 years.
Source: Authors' estimates using the Household Income and Expenditure Survey (HIES).

parents continue to reinforce advantages through tutoring, access to elite universities, and stronger job-market networks.

In sum, education in Iran has expanded, but has not democratized opportunity. Rising schooling has not loosened the grip of family background on economic outcomes, helping explain why intergenerational persistence remains high.

5.3 Spatial and Regional Disparities

Geographic variation in economic opportunity represents a potential mechanism shaping intergenerational persistence in Iran. Provinces differ substantially in average expenditure, labor market conditions, educational quality, and access to public services. To assess whether these spatial inequalities translate into differences in mobility, we divide provinces into two groups, more advantaged provinces and less advantaged provinces. This classification captures structural economic differences that, in theory, could shape both parents' initial economic status and the opportunities available to their children.

We begin by comparing absolute mobility across these two sets of provinces. In 2023, the probability that children exceed their parents' real expenditure is 0.774 in more advantaged provinces and 0.718 in less advantaged provinces, indicating slightly higher absolute progress in more developed regions.

To examine relative mobility patterns, we construct transition matrices separately for the two groups (Table 6 and Table 7). The matrices reveal broadly similar U-shaped persistence patterns across regions: rigidity is highest at the bottom and top of the expenditure distribution, while mobility is greater in the middle deciles. However, several quantitative differences emerge.

Table 6: Intergenerational Transition Matrix Between Parental (1998) and Child (2023) Expenditure Deciles for More Advantaged Provinces

Parent Decile	Child Decile									
	1	2	3	4	5	6	7	8	9	10
1	65.01	22.16	8.42	3.02	1.04	0.26	0.06	0.01	0	0
2	26.15	30.53	20.68	11.82	6.72	2.85	0.99	0.23	0.20	0
3	10.76	22.53	22.44	17.53	13.13	7.82	4.16	1.47	0.13	0
4	4.64	13.38	18.67	18.24	17.33	12.82	9.02	5.13	0.70	0.03
5	2.08	6.77	12.98	15.70	17.87	16.37	14.04	11.17	2.86	0.12
6	0.93	3.28	7.45	11.73	15.59	16.89	17.79	18.03	7.73	0.54
7	0.35	1.55	3.56	6.91	11.75	14.66	18.59	24.37	15.73	2.49
8	0.08	0.64	1.48	2.99	6.49	10.56	15.76	27.38	25.78	8.80
9	0.01	0.14	0.46	0.92	2.09	4.38	9.30	22.24	34.21	26.21
10	0.00	0.00	0.04	0.11	0.27	0.58	1.52	6.56	20.47	70.44

Note: Each cell reports the percentage of individuals in a given child expenditure decile in 2023, conditional on their parents' expenditure decile in 1998, conditional on living in more advantaged provinces. The sample consists of individuals aged 13–19 in 1998 and the same cohort observed at ages 38–44 in 2023 in rich provinces. The diagonal elements indicate intergenerational persistence. The high persistence at the bottom and top deciles, combined with greater mobility in the middle of the distribution, reflects a U-shaped pattern of intergenerational immobility.
Source: Authors' estimates using the Household Income and Expenditure Survey (HIES).

Table 7: Intergenerational Transition Matrix Between Parental (1998) and Child (2023) Expenditure Deciles for Less Advantaged Provinces

Parent Decile	Child Decile									
	1	2	3	4	5	6	7	8	9	10
1	66.57	19.93	8.12	3.33	1.44	0.45	0.12	0.02	0	0
2	31.38	26.62	18.57	11.10	6.76	3.48	1.57	0.46	0.03	0
3	16.18	22.79	19.58	15.33	11.85	7.24	4.49	2.19	0.26	0
4	8.18	17.38	17.99	16.02	14.92	11.16	7.87	5.28	1.12	0.04
5	3.85	11.78	15.33	15.13	15.74	13.83	11.75	9.24	3.13	0.19
6	1.61	7.33	11.82	13.46	15.16	14.83	14.68	14.11	6.25	0.71
7	0.56	3.85	8.06	10.88	13.68	14.49	16.21	19.16	10.91	2.15
8	0.15	1.46	4.42	7.50	11.11	13.05	16.04	23.00	17.80	5.44
9	0.02	0.31	1.38	3.38	6.79	9.97	14.00	23.63	26.34	14.15
10	0.00	0.01	0.11	0.43	1.37	3.21	6.99	17.04	28.63	42.17

Note: Each cell reports the percentage of individuals in a given child expenditure decile in 2023, conditional on their parents' expenditure decile in 1998, conditional on living in more advantaged provinces. The sample consists of individuals aged 13-19 in 1998 and the same cohort observed at ages 38-44 in 2023 in poor provinces. The diagonal elements indicate intergenerational persistence. The high persistence at the bottom and top deciles, combined with greater mobility in the middle of the distribution, reflects a U-shaped pattern of intergenerational immobility.
Source: Authors' estimates using the Household Income and Expenditure Survey (HIES).

First, bottom-decile persistence is nearly identical across the two groups(65.0% in more advantaged provinces versus 66.6% in less advantaged provinces). Upward movement from the very bottom (decile 1 to decile 5 or higher) remains low everywhere, ranging between 4–5% across regions.

Second, mobility in the middle deciles follows the same dome-shaped structure regardless of regional development levels. For example, among parents in decile 5, the probability of reaching deciles 6–8 is 41% in more advantaged provinces and 39% in less advantaged provinces.

Third, the clearest contrast appears at the top of the distribution. Persistence into the top decile (decile 10→10) is 70.4% in more advantaged provinces but only 42.2% in less advantaged provinces. This difference reflects the much higher threshold for reaching the top decile in economically stronger provinces, which makes upward movement into this group more difficult, rather than reflecting a fundamentally different intergenerational process.

Overall, the regional comparison reveals modest differences in mobility despite sizeable provincial disparities in labor market opportunities. This weak spatial gradient mirrors evidence from other developing countries. Narayan et al. (2018) show that despite large regional income disparities, subnational variation in intergenerational mobility is modest once national institutional factors are accounted for. Similarly, recent evidence from Brazil Britto et al. (2022) finds limited mobility differences across highly unequal regions. These studies, consistent with our findings for Iran, suggest that national structures, such as centralized education systems, credentialing mechanisms, and segmented labor markets, dominate the mobility process, dampening the influence of local economic conditions.

Taken together, these results indicate that while spatial disparities contribute to differences in living standards, they appear to play a limited role in shaping intergenerational persistence. Children in more advantaged provinces exhibit slightly higher absolute and relative mobility, but the overall rigidity of mobility in Iran is driven primarily by nationwide structural factors rather than provincial economic conditions.

The evidence across all three mechanisms is consistent with the puzzle documented earlier: (i) absolute mobility is high, but primarily because households are smaller, not because total resources rise, (ii) relative mobility is low, and neither inequality trends nor regional disparities explain the rigidity, (iii) structural features of opportunity (educational inequality, labor-market segmentation, and institutional barriers) drive persistence, while demographic change inflates per-capita improvements. Together, these mechanisms show that moderate inequality does not translate into higher mobility when the opportunity structure itself is rigid.

6 Conclusion

This paper provides new evidence on intergenerational mobility in Iran by linking adolescents observed in 1998 to their economic outcomes as adults in 2023, using a synthetic panel constructed from repeated cross-sectional household surveys. The findings indicate that mobility is limited, particularly at the lower and upper ends of the expenditure distribution. Children from the bottom decile have a high probability of remaining near the bottom as adults, while those from the top decile show similarly high rates of remaining at the top. In contrast, mobility is relatively higher among middle-decile households.

This U-shaped pattern is consistent with the persistence structures observed in several middle-income economies, but the degree of persistence in Iran is comparatively high.

Absolute mobility (the probability that children exceed their parents in real expenditure terms) remains relatively high on average, although it has declined over the past decade. This pattern suggests that while economy-wide growth has raised living standards across generations, it has not substantially altered the relative distribution of economic status. In other words, many individuals are better off in real terms than their parents were, yet their position within the broader distribution is largely unchanged. Taken together, the coexistence of high absolute mobility and low relative mobility points to improvements in material welfare without corresponding gains in equality of opportunity.

The analysis of mechanisms indicates that several structural factors are likely to contribute to these outcomes. Differences in access to educational opportunities and labor-market returns appear to play a meaningful role, as persistence remains substantial even after conditioning on schooling. Spatial disparities in economic development and public service provision coincide with lower upward mobility in rural and economically underdeveloped areas. In addition, proxies for wealth—such as home ownership and non-labor income—are associated with lower downward mobility risks and greater access to formal and higher-skilled employment. While each of these factors requires further causal investigation, the evidence is consistent with the view that unequal access to opportunities, rather than inherited traits alone, contributes to intergenerational persistence in Iran.

The results have broader implications for research on mobility in developing economies. Iran represents a case in which moderate measured inequality coexists with limited intergenerational mobility, suggesting that income dispersion alone may be an incomplete indicator of opportunity structure. Understanding how institutional, geographic, and wealth-related factors shape mobility may therefore be essential for interpreting social mobility patterns in settings where income inequality is compressed by subsidies, administered prices, or public sector wage structures.

Future work could build on this analysis in several directions. First, linking these findings to education quality, school tracking, or university admission data would help clarify the role of human capital pathways. Second, longer-run migration and occupational histories could provide additional insight into how spatial and labor-market frictions shape mobility. Finally, integrating data on private wealth or inheritance, where available, would allow for a more direct assessment of how asset accumulation affects intergenerational outcomes. Such extensions would help to deepen our understanding of the mechanisms underlying mobility patterns and how they respond to economic and institutional change.

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A Details of the Parametric Method for Estimating Error Term Correlation

In this appendix, we provide the detailed derivation of the correlation coefficient of the regression error terms across two periods, following the method developed by Dang and Lanjouw (2023).

Let the period-specific regression models be:

$$y_{i1} = \beta'_1 x_{i1} + \varepsilon_{i1},$$
$$y_{i2} = \beta'_2 x_{i2} + \varepsilon_{i2}$$

where y_{it} is the outcome variable for individual i in period t, x_{it} is a vector of explanatory variables, and ε_{it} is the regression error. The simple correlation coefficient of the dependent variable across periods is:

$$\rho_{y_{i1}y_{i2}} = \frac{cov(y_{i1}.y_{i2})}{\sqrt{var\,(y_{i1})\,var(y_{i2})}}$$

Substituting the regression models and assuming the errors are uncorrelated with the explanatory variables, we obtain:

$$\rho_{y_{i1}y_{i2}} = \frac{\beta'_1 cov\,(x_{i1}.x_{i2})\,\beta_2 + \rho\sqrt{{\sigma_{\varepsilon_1}}^2 {\sigma_{\epsilon_2}}^2}}{\sqrt{var\,(y_{i1})\,var(y_{i2})}}$$

where ρ is the correlation coefficient of the error terms. Solving for ρ gives:

$$\rho = \frac{\rho_{y_{i1}y_{i2}}\sqrt{var\,(y_{i1})\,var(y_{i2})} - \beta'_1 cov\,(x_{i1}.x_{i2})\,\beta_2}{\sigma_{\varepsilon_1}\sigma_{\epsilon_2}} \tag{8}$$

When the explanatory variables used in both period regressions are identical and time-invariant, and assuming population stability across periods, x_{i1} and x_{i2} become equivalent and can be denoted as x_i. Under these conditions, the error term correlation coefficient is calculated as follows:

$$\rho = \frac{\rho_{y_{i1}y_{i2}}\sqrt{var\,(y_{i1})\,var(y_{i2})} - \beta'_1 var(x_i)\beta_2}{\sigma_{\varepsilon_1}\sigma_{\epsilon_2}} \tag{9}$$

We use this approach to estimate the error term correlation coefficient (ρ). This generalization is necessary because the explanatory variables in the first-period (parents) and second-period (children) regressions are partially distinct in this study. In most social mobility studies using the synthetic panel method, the second-period sample is typically used as the computational baseline, and identical variables are employed to estimate the dependent variable across both periods. Values of variables in the second period are obtained directly from the data, while the corresponding values in the first period are determined either from retrospective questions in the survey or by assuming their time invariance