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# Relative Intergenerational Mobility: A Normative Framework and Evidence from Indonesia

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# Relative Intergenerational Mobility: A Normative Framework and Evidence from Indonesia*

## Abstract

We propose a simple and flexible framework to assess relative intergenerational mobility. The approach defines a dynasty as a parent–child pair, measuring achievement by each individual's rank within their own generational outcome distribution, and mobility by the change in this rank across generations. This measure accommodates both continuous outcomes, such as potential earnings, and discrete or ordinal outcomes, such as education levels. It also allows for dominance characterizations (e.g., the relative progress made by women vs. men) consistent with social preferences over desirable mobility patterns. We apply the framework to Indonesia using long-panel data linking parents observed in 1993 to their children in 2014. Results show that a large share of the population escaped illiteracy—an instance of absolute mobility possibly driven by major education reforms. However, relative educational mobility was regressive, as dynasties from higher socio-economic backgrounds progressed faster. This pattern limited the overall progressivity of relative earnings mobility. Mobility in both education and potential earnings was markedly more favorable to women.

## JEL classification

J6, J62, O12, I2, D6

## Keywords

intergenerational mobility, education, earnings, social welfare, gender

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# 1 Introduction

Inequality within a society may be more tolerable when it is accompanied by high economic mobility across generations. A growing body of academic literature has sought to address this issue by proposing various ways to measure and characterize patterns of intergenerational mobility.[1] Many studies rely on a single-valued indicator of mobility—typically, the elasticity derived from regressing children's outcomes on those of their parents—while more disaggregated characterizations of intergenerational mobility may be useful. Moreover, such measures typically capture *absolute* mobility, i.e., whether children fare better than their parents. As a complement, it may be interesting to assess whether richer or poorer families experience greater *relative* progress in key outcomes such as education and earnings prospects, for instance.

This paper offers a contribution on both fronts. We propose a simple criterion for evaluating and comparing *relative* intergenerational mobility processes in a *flexible* way across the initial distribution. We illustrate the approach using data from Indonesia—a country where dramatic structural changes and policies (such as massive educational reforms) are likely to have strongly influenced both education and earnings mobility, making it an especially interesting case for joint assessment along these two dimensions. Our framework builds on information about mobility observed at the level of a parent–child *dynasty*, defined as a parent–child pair uniquely identified by the parents' rank in the welfare distribution of their generation.[2] Our relative mobility measure captures whether children progress or fall back in relative terms, compared to their parents, when considering any type of outcomes, such as earnings or education categories. We rely on *dynastic curves* to produce partial yet robust rankings of mobility processes.

The approach offers several advantages. *First*, it allows studying mobility across the distribution and not as a scalar. Since each dynasty is identified by the socio-economic status of parents, it makes it possible to assess whether and how mobility differs across segments of the population. *Second*, it can be used to compare mobility between subgroups, for instance to examine gender differences in mobility patterns. *Third*, some studies propose

[1] See the reviews in Solon (1999), Van de Gaer et al. (2001), Björklund and Jäntti (2009), Black and Devereux (2011), Bourguignon (2011), Brunori et al. (2013), Jäntti and Jenkins (2015), and Deutscher and Mazumder (2022). This topic has also attracted much attention among policymakers and international organizations (e.g., Ferreira et al., 2012; OECD, 2018) and is closely associated with (in)equality of opportunity (Ferreira and Gignoux, 2011).

[2] A dynasty is simply a parent–child pair observed across two generations, which is distinct from its use in the theoretical literature on dynastic altruism or infinitely lived households.

disaggregated measures based on mobility curves (e.g., Bratberg et al., 2017), generally tailored to the specific variable used to represent individual achievement. Our framework allows measuring relative mobility more comprehensively, accommodating different types of achievement indicators—such as discrete ordinal outcomes (e.g., education classes) or continuous and cardinal ones (e.g., earnings). *Fourth*, the framework can incorporate weighting mechanisms that take into account not only the position of each dynasty in successive generations but also the distance separating them from others. This allows the analysis to move beyond simple re-ranking measures by accounting for structural shifts in the overall distribution. *Fifth*, we provide a normative justification for the approach, grounded in the inequality and social welfare literature. Specifically, we propose higher-order dominance results for cases in which mobility curves alone cannot fully rank alternative mobility patterns—for example, when evaluating the relative progress achieved by women compared to men in our Indonesian application.

Empirically, we also suggest one of the rare assessments of intergenerational mobility in low- and middle-income countries based on longitudinal data. For rich countries, long panel data, often from administrative sources, are becoming increasingly available and provide researchers with the possibility to compare various sorts of achievements across generations (Black and Devereux, 2011). However, the literature remains very scant for poorer countries, precisely because of the limited availability of long and robust panels. As documented hereafter, existing studies use retrospective information on parents' labor market outcomes and human capital, or focus on specific households, namely those where the two generations are still cohabiting. In contrast, Indonesia is one of the rare developing countries for which a long representative panel data exists and can be used to measure intergenerational mobility. We exploit two important features of the IFLS data, namely the long duration of this panel and its exceptionally low attrition. This enables us to match parents in 1993 with their children in 2014 in order to extract and compare the relative outcomes of both groups.

The results point to broad improvements in education levels over a generation, lifting a large part of the population out of illiteracy.[3] Mobility patterns reveal that, independently of the outcome considered, women have progressed faster than men. Yet, despite

[3] It is likely that large-scale education policies implemented in Indonesia have played an important role in that process. Several reforms have indeed provided universal primary education and expanded access to secondary education in the second generation considered in our analysis (see Appendix A1). We highlight the fact that this is not the purpose of the present paper to attribute causality from the reforms to the mobility patterns we observe.

absolute mobility, patterns of relative mobility are regressive: progress in education was more pronounced among high-status dynasties. A decomposition analysis shows that these trends have also contributed to limit the progressivity of relative mobility in terms of earnings prospects. These results shed new light on the long-term progress in education and motivate the use of relative mobility measures along absolute ones.

The structure of the paper is as follows. Section 2 suggests a brief survey of the related literatures. Section 3 outlines the approach and suggests a normative characterization of patterns of mobility. Section 4 presents the data and our empirical strategy. Section 5 discusses the results of our intergenerational mobility analysis for education and earnings. Section 6 concludes.

# 2 A Brief Account of the Literature

**Methods to Measure Mobility.** Most intergenerational mobility studies are based on a single linear parameter derived from regressions of children's outcomes on parents' outcomes and controls (see, among others, Corak, 2013, Neidhöfer et al., 2018, Mocetti et al., 2020). These are useful single-valued summary measures of absolute mobility, widely used and comparable across countries and over time. However, as previously discussed, they do not indicate which groups (for instance men vs. women) or segments of the distribution (richer vs. poorer) experience faster intergenerational progress. Quantile regressions (Eide and Showalter, 1999) or nonlinearity tests (Bratsberg et al., 2007; Connolly et al., 2019; Kurtellos et al., 2020) overcome some of these limitations. However, these procedures are based on parametric estimations and do not enable comprehensive disaggregated evaluations as those sought in this paper.[4]

Closer to us, disaggregated approaches have been suggested that capture the mobility experienced at different points of the distribution, highlighting the specific features of the mobility process under analysis. These measures are sometimes specifically designed according to the achievement variable under consideration. For instance, Bratberg et al. (2017) consider changes in income rank and income share between parents and children. A more general framework would encompass mobility for different types of outcomes, for

[4]See also Hertz (2008) for a detailed discussion of how intergenerational mobility measures can vary across population subgroups, and Chetty et al. (2014) for a rank-based approach that documents heterogeneity in mobility across geographic areas in the US. While their method summarizes mobility using a single rank–rank slope, our framework instead traces mobility at every point of the parental distribution, allowing us to assess whether mobility is progressive or regressive across socio-economic groups.

instance for both ordinal and cardinal outcomes. This is suggested by Klasen (2008) for anonymous growth incidence curves (GIC), and Markussen and Røed (2019) for rank-rank correlation between parent and children, focusing on both income and non-income variables. Our framework is related to the latter study and suggests more formally a relative intergenerational mobility measure that can be used interchangeably with cardinal and ordinal variables, while providing a normative support and dominance results.

**Empirical Challenges.** Intergenerational mobility has been an active field of research. In the case of educational mobility, early studies include Bowles (1972), Blake (1985) and Spady (1967), while Card et al. (2018) investigate education mobility in the US and Hertz et al. (2008) estimate country-level mobility coefficients across 42 countries. Because of the difficulty of matching information on both parents and children, studies on low- and middle-income countries are more limited. Several studies explore education or occupational mobility across many African countries (Alesina et al., 2020; Bossuroy and Cogneau, 2013), Latin American countries (Neidhöfer et al., 2019), or globally (Narayan et al., 2018; van der Weide et al., 2024). Others look at specific contexts.[5] Importantly, many of these studies do not rely on panel data and must find ways to retrieve information for both parents and children using specific selections (e.g. cohabiting families) or recall information.[6]

**Normative Approaches to Assess Mobility.** We extend our flexible measure of relative intergenerational mobility to dominance results. Thus, this work relates to the normative characterizations suggested in the context of multidimensional inequality and *intra*-generational mobility (Jäntti and Jenkins, 2015). Dominance results for mobility patterns find their origins in results for multivariate distributions of income (Atkinson and Bourguignon, 1982, Markandya, 1984, Gottschalk and Spolaore, 2002), interpreted as an aggregation of intertemporal utilities defined over two periods. A closer interpretation is the concept of non-anonymous GIC, which describes process of individual income growth where mobility is origin-dependent.[7] Our approach is related but adapted to the inter-

[5]For instance, some studies focus on Cameroon (Fontep and Sen, 2020), India (Azam and Bhatt, 2015, Emran and Shilpi 2015, Asher et al., 2018) or China (Golley and Kong, 2013, Emran and Sun, 2015, Emran et al., 2020).

[6]For example, Alesina et al. (2020) match individuals to their parents using data on cohabitants of different generations, while Fontep and Sen (2020) retrieve parents' information thanks to retrospective questions.

[7]See Bourguignon (2011) for dominance results and Fields et al. (2002), van Kerm (2009), and Jenkins and van Kerm (2016) for social welfare characterizations of intra-generational income mobility. See also Grimm (2007), Palmisano (2018), Lo Bue and Palmisano (2020), Berman and Bourguignon (2023).

generational perspective while departing from the usual focus on income and suggesting a flexible way to accommodates both cardinal and ordinal outcomes.[8]

# 3 Theoretical Framework

We first describe the methodology used to measure intergenerational mobility, then propose a social welfare characterization of mobility patterns.

## 3.1 Measuring Intergenerational Mobility

Mobility can mean different things to different people (Fields, 2008). In this paper, mobility refers to the extent to which the achievements of families improve or deteriorate across two generations. The unit of observation is what we call a *dynasty*—that is, a parent–child pair linking two successive generations. Each dynasty is identified by the socio-economic position of the parents within their generation, which defines its initial rank in the social hierarchy. This rank allows us to track how the corresponding descendants fare in the next generation, thereby retaining the principle of *non-anonymity*. Individual achievements are measured in relative terms, comparing the position of each dynasty within its generation's distribution. We now describe in detail these concepts and the resulting measure of intergenerational mobility.

**Dynasties.** We define a dynasty as the observational unit linking parents and children across two generations. Each dynasty is identified by the socio-economic status of the parents in their generation, which determines its initial position in the parental distribution of achievements. Formally, we denote by $t$ the generation of the parents, by $t+1$ that of their children, and by $z$ the outcome used to characterize the first-generation distribution. In our application, we use per-capita expenditure; as justified below, it reflects welfare concerns and provides a finely disaggregated view of the population (at least compared with broader indicators such as education classes). Let the distribution of $z$ in generation $t$ be represented by its cumulative distribution function (CDF), $F_z(z_t) = P(\tilde{z}_t \in \Re_+ : \tilde{z}_t \leq z_t)$. As is standard, we can express the CDF as $F_z(z_t) = p_t$. Each dynasty is therefore identified by its parental rank $p_t \in [0, 1]$, which captures the parents' socio-economic status–that is, the children's socio-economic background.

[8]For social evaluations in a multiperiod context, see also Decancq and Zoli (2014).

**Achievements: Ranks vs. Levels.** The second step is to define individual achievements. In general, the outcome used to measure achievements may differ from $z$. For instance, we may examine mobility in terms of *educational* or *earnings* achievements at different points of the distribution of living standards $z$. As noted in the literature (Fields and Ok, 1999; D'Agostino and Dardanoni, 2009), different studies adopt different definitions of achievement depending on their focus. A common approach interprets achievement in terms of the *level* of the outcome variable, while another defines achievement in terms of an individual's *rank* within the relevant outcome distribution. Because our framework is designed to handle both continuous and ordinal outcomes (e.g., earnings and education), we need a definition of achievement that is meaningful for both. Yet a mobility measure based on the first approach would implicitly treat ordinal variables (such as education categories) as if they were cardinal, which is problematic. Unlike continuous cardinal variables (e.g., income), ordinal variables do not necessary have meaningful magnitudes (e.g., tertiary education is not "three times" primary education), and their mean is not order-preserving under scale transformations (Allison and Foster, 2004). In contrast, orderings based on CDFs can be easily compared and remain robust to scale transformations. This provides a strong rationale for using a rank-based approch when dealing with ordinal data (as suggested by Cowell and Flachaire, 2017, 2018; Jenkins, 2019, 2020), and, a fortiori, in a comprehensive framework such as ours.

**Achievements: Continuous Outcomes.** We first consider the case of a *continuous* outcome, denoted by $y$, such as individual earnings. Let $y_t(p_t) : [0,1] \to \Re_+$ denote outcome of parents (generation $t$) in dynasty $p_t$ and $y_{t+1}(p_t)$ the outcome of their children (generation $t+1$). We denote $f$ and $F$ the PDF and CDF of this outcome ($F$ should be distinguished from $F_z$, the CDF of variable $z$ previously used to identify dynasties). The achievement of parents and children in dynasty $p_t$ are respectively defined as:

$$\forall p_t \in [0,1], \begin{cases} a_t^{(1)}(p_t) = F(y_t(p_t)) \\ a_{t+1}^{(1)}(p_t) = F(y_{t+1}(p_t)). \end{cases} \tag{1}$$

For a continuous outcome such as earnings, the achievement of parents in dynasty $p_t$ is represented by their rank in the distribution of this outcome. Similarly, the achievement of children in this dynasty corresponds to the children's rank in the distribution of the outcome in generation $t+1$.

**Achievements: Discrete Outcomes.** We now turn to *discrete* outcomes, typically non-monetary ordinal variables such as education classes, health status or occupation types.

Let there be an ordered set of $K > 2$ classes, each class $k$ corresponding to a latent outcome level, for instance educational attainment. Let $k_t(p_t)$ (resp. $k_{t+1}(p_t)$) denote the class occupied by the parents (resp. children) of dynasty $p_t$, $n_{k,t}$ (resp. $n_{k,t+1}$) the number of individuals in class $k$, and $N_t$ (resp. $N_{t+1}$) the total number of individuals in the parents' (resp. children's) generation. Achievements for parents and children are then defined as:

$$\forall p_t \in [0,1], \quad \begin{cases} a_t^{(2)}(p_t) = \dfrac{\sum_{i=1}^{k_t(p_t)} n_{i,t}}{N_t} \\ a_{t+1}^{(2)}(p_t) = \dfrac{\sum_{i=1}^{k_{t+1}(p_t)} n_{i,t+1}}{N_{t+1}} \end{cases} \tag{2}$$

The achievement of the parents in dynasty $p_t$ is defined as the share of individuals in generation $t$ who belong to the same or a lower class than that reached by the parents. Children's achievement is defined analogously for generation $t+1$. This rank-based concept of achievement is inherently scale-independent, allowing cardinal and ordinal variables to be treated within a unified framework.

**Weighted Achievements.** We can incorporate *weights* into the achievement schemes defined above. For continuous outcomes, these weighted achievements can be expressed as follows:

$$\forall p_t \in [0,1], \quad \begin{cases} a_t^{(3)}(p_t) = \displaystyle\int_0^{y_t(p_t)} f(y_t(s_t))(F(y_t(p_t)) - F(y_t(s_t)))dy(s_t) \\ a_{t+1}^{(3)}(p_t) = \displaystyle\int_0^{y_{t+1}(p_t)} f(y_{t+1}(s_t))(F(y_{t+1}(p_t)) - F(y_{t+1}(s_t)))dy(s_t). \end{cases} \tag{3}$$

In the case of discrete outcomes, they are written as follows:

$$\forall p_t \in [0,1], \quad \begin{cases} a_t^{(4)}(p_t) = \dfrac{\sum_{i=1}^{k_t(p_t)} n_{i,t} \sum_{s=i+1}^{k_t(p_t)} n_{s,t}}{N_t^2} \\ a_{t+1}^{(4)}(p_t) = \dfrac{\sum_{i=1}^{k_{t+1}(p_t)} n_{i,t+1} \sum_{s=i+1}^{k_t+1(p_t)} n_{s,t+1}}{N_{t+1}^2}. \end{cases} \tag{4}$$

The individual achievement of parents (resp. children) in dynasty $p_t$ corresponds to the fraction of individuals below them–by level or class–in the outcome distribution of generation $t$ (resp. $t+1$), weighted by the distance separating them. This distance is defined as the density of individuals between the dynasty and those it dominates, measured as differences in ranks (equation 3) or as the number of intermediate classes (equation 4).

Weighted achievements makes it possible to account for changes in the marginal distribution of outcomes between generations, as further discussed below.

**Mobility Measure.** The final step is to construct a measure of mobility, the *Dynastic Curve* (DynaC hereafter). DynaC assigns to each dynasty $p_t$ the difference between the achievement of the children and that of their parents. Formally, we write:

$$d\left(a^{(s)}(p_t)\right) = a_{t+1}^{(s)}\left(p_t\right) - a_t^{(s)}\left(p_t\right), \forall\, p_t \in [0,1] \tag{5}$$

for the different definitions of achievements $s = 1, 2, 3, 4$, as defined in equations (1)-(4) above. Specifically, $s = 1$ corresponds to a DynaC based on unweighted cardinal achievements; $s = 2$ refers to a DynaC based on unweighted ordinal achievements; $s = 3$ corresponds to a weighted DynaC for cardinal achievements; and $s = 4$ to a weighted DynaC for ordinal achievements. Since achievement is defined relative to the outcome distribution, $d(a^{(s)}(p_t))$ represents a *relative* measure of mobility. Intergenerational mobility is thus evaluated according to whether the children of dynasty $p_t$ are better or worse positioned in their generation's outcome distribution than their parents were in theirs. This criterion applies for $s = 1, 2$. As motivated before, DynaC allows measuring relative intergenerational mobility at a disaggregated level and in a consistent way for both cardinal and ordinal outcomes.

We can comment on what is expected graphically from these definitions, that is, on what the plot of the mobility score $d(a^{(s)}(p_t))$ against each $p_t$ may reveal. In terms of *levels*, a value of zero corresponds to perfect immobility. A negative DynaC value indicates relative downward mobility, meaning that the children of dynasty $p_t$ achieve a lower rank than their parents and, hence, dominate a smaller share of the population. Conversely, a positive mobility score reflects relative upward mobility, i.e. the children achieve a higher rank than their parents. Regarding the *slope* of the DynaC curve, it conveys a normative assessment of the mobility profile. If the curve is increasing in $p_t$, the mobility process is regressive, as higher-status dynasties progress more. If it is decreasing, the process is progressive, with lower-status dynasties gaining more in relative terms. The normative evaluation is always made with respect to the welfare/status variable $z$ used to identify dynasties, i.e. to define the quantiles $p_t$.

## 3.2 Discussion

**A Rank-Based Approach.** Assessing mobility through relative movements of individuals within the distribution allows us to focus on comparisons that are independent of the marginal distributions. Unlike levels, which may fluctuate mechanically when inequality changes, ranks indeed provide a stable benchmark for comparison. Moreover, a rank-based approach facilitates the comprehensive treatment of both continuous and discrete outcomes, as previously motivated. Beyond these analytical advantages, relative mobility is also meaningful from a behavioral perspective: focusing on how relative positions evolve across generations aligns with evidence on the role of relative concerns. This empirical literature shows that higher positions within an outcome distribution can be disproportionately more important for well-being than higher absolute levels (e.g., in Easterlin, 1974, Senik, 2007, Clark et al. 2009, and for mobility results, see Dolan and Lordan, 2020, Simandan 2018). As a result, other-regarding preferences are increasingly incorporated into theoretical frameworks that highlight how status shape individuals' perceptions of success (Fleurbaey, 2012, Decerf and van der Linden, 2016, Treibich 2018). These models provide further support for a 'downward-looking' definition of achievement such as ours (Hopkins, 2008, Hopkins and Kornienko 2009).

**The Weighted Case.** We also suggest an interpretation of DynaC in the weighted case, i.e. for $s = 3, 4$. For a given dynasty, the unweighted DynaC may be null–i.e., the mobility process is rank-preserving–but the weighted Dynac positive (negative), indicating that the distance to the people below becomes larger (smaller) and reflecting an increase (a decrease) in inequality below that dynasty. Thus, while the unweighted DynaC can be seen as a simple measure of reranking, the weighted approach adds more information on how the shape of the underlying distribution changes.

**A Flexible Framework.** The outcome variables $y$ (or $k$) used for mobility measures may differ from the variable $z$ used to identify a dynasty, namely per-capita consumption in our empirical implementation. This modeling choice provides a more flexible and versatile characterization compared to the settings usually adopted in the literature. For instance when comparing the mobility process between subgroups (e.g., men and women), we can rank individuals on the basis of a variable that is not sub-group dependent and see how these two groups perform differently within a given dynasty. From a normative perspective, $z$ defined as a broad welfare/status measure aims to capture the progressivity of mobility patterns. For instance, we may want to check whether relative education progress is faster among the $z$-poor. In the case of education in particular, it seems more meaningful than using education-based dynasties, especially when the number of education categories is small and education is weakly correlated with welfare (as is the case in Indonesia, where a large majority of individuals in the first generation were education-poor, as we shall see). Even for potential earnings, we may want to assess whether poorer dynasties, as identified by a broader welfare/status concept, progress faster than dynasties above them. That said, a special case of the DynaC can be obtained when $z$ corresponds to outcome variables. For instance, when it coincides with earnings, our DynaC plots the intergenerational progress in earnings rank against ranks of the parental earnings distribution, as used in several studies (e.g., Bratsberg et al., 2017, and Aaberge and Mogstad, 2014).

### 3.3 Normative Justification

We now provide a normative support to the use of DynaC to evaluate and compare mobility episodes. We assume that social preferences upon mobility patterns are an abstraction of some relevance, either because 'movement' is desirable per se (see Van de gaer et al., 2001), because it has specific properties (e.g. people tolerate long-term inequalities more when there is more mobility), or because we want to judge the relative progress of population subgroups (e.g. women vs. men). The last motivation is perhaps the one best supported by our application hereafter.

Let $D^{(s)} = \{d(a^s(p_t)) \mid p_t \in [0, 1]\}$ be the set of all possible mobility of outcome $s = 1, ..., 4$ for each dynasty $p_t \in [0, 1]$ in a given population. It is interpreted as the general process of mobility between two generations in that population. We assume that a social planner is endowed with cardinal preferences $W(D)$ over mobility processes and denote $P$ the set of social preferences. A social planner with preferences $W \in P$ may assess whether the mobility of a given process, say $D^{(s)}_\pi$, is socially superior to immobility by evaluating whether $W(D^{(s)}_\pi)$ is larger than a benchmark process of immobility for all the dynasties. Considering two mobility processes $D^{(s)}_\pi$ and $D^{(s)}_\omega$, the planner may deem the first process socially preferred to the second if $W(D^{(s)}_\pi) \geq W(D^{(s)}_\omega)$.

We can reformulate the dominance in terms of observables, i.e. social preferences over mobility processes are specified as functions of the observed distributions of achievements. To represent such preferences, we adapt the rank-dependent model proposed by Yaari (1987), which offers theoretical and empirical tractability. It assumes that social welfare can be written as a weighted average of all possible realizations, where the weights are a function of the ranks of the realizations. Transposed to our mobility problem, it becomes the weighted average of mobility measures $d\left(a^{(s)}(p_t)\right)$ over all dynasties in the population, with a weight $w(p_t) \geq 0$ assigned to the mobility of dynasty $p_t$. Thus, the social evaluation of any intergenerational mobility process, indexed by $\pi$, is written as:

$$W(D_\pi^{(s)}) = \int_0^1 w(p_t) d_\pi(a^{(s)}(p_t)) dp_t. \tag{6}$$

Our departing point is a class of rank-dependent social evaluation functions, which are explicitly sensitive to information about the change in the relative position of parents and children. This is consistent with the growing interest in individual relative positions, as discussed before. The extent of mobility, as measured by the DynaC, is computed for one of the $s = 1, 2, 3, 4$ definitions of achievement introduced in the previous section. Let us rewrite $D_\pi^{(s)}$ as $D_\pi$ and $d_\pi(a^{(s)}(p_t))$ as $d_\pi(p_t)$ hereafter to simplify notations. We will restrict to a set of social preferences

$$P^* = \{W : w(p_t) \geq 0 \; \forall p_t \in [0,1]\} \tag{7}$$

such that the social marginal effect of each dynasty's mobility is positive. We suggest three propositions, the proofs of which are reported in Appendix B.

**Proposition 1.** *Given two mobility processes $D_\pi$ and $D_\omega$, $D_\pi$ is socially preferred to $D_\omega$, $\forall\, W \in P^*$, if and only if*

$$d_\pi(p_t) \geq d_\omega(p_t), \forall p_t \in [0,1]. \tag{8}$$

Proposition 1 characterizes the *first-order dominance* criterion based on DynaC. It requires checking the DynaC dominance of one mobility process over the other for every dynasty. The intuition is simple: if at least one dynasty experiences a higher mobility in process $D_\pi$ than in process $D_\omega$, while there is no difference for the other dynasties, then the former process is socially preferred to the latter. When assessing whether a single process yields some mobility, the proposition simply becomes $d_\pi(p_t) \geq 0, \forall p_t \in [0,1]$.

If the DynaCs of two mobility processes are crossing, it is possible to follow the social choice tradition and suggest higher-order dominance results. These are the minimal refinements on the set of admissible preferences that may lead to an unambiguous assessment of the mobility processes. We can use cumulative DynaCs to increasingly put more social weight on the mobility of the poorest dynasties. We start with second-order dominance and general social weights that decline with the dynasty percentile (Proposition 2).

**Proposition 2** *Given two mobility processes $D_\pi$ and $D_\omega$, $D_\pi$ is socially preferred to $D_\omega$, $\forall\, W \in P^*$ for which $\frac{\delta w(p_t)}{\delta p_t} \leq 0$ for all $p_t \in [0,1]$, if and only if*

$$\int_0^{p_t} d_\pi(q_t)dq_t \geq \int_0^{p_t} d_\omega(q_t)dq_t, \forall p_t \in [0,1]. \tag{9}$$

If we allow social preferences to be more sensitive to the mobility experienced by the more disadvantaged dynasties in the initial period, a comparison between two alternative mobility processes can be carried out by testing for cumulative DynaC dominance, as suggested in this proposition. When assessing the mobility of a single process, we simply write $\int_0^{p_t} d(q_t)dq_t \geq 0$ ($\int_0^{p_t} d(q_t)dq_t \leq 0$) for all $p_t$ as a situation of weak relative positive (negative) mobility according to the idea that there should be a priority for lifting up the poor. Then, we introduce convexity in the social weighting scheme:

**Proposition 3** *Given two mobility processes $D_\pi$ and $D_\omega$, $D_\pi$ is socially preferred to $D_\omega$ $\forall\, W \in P^*$ for which $\frac{\delta w(p_t)}{\delta p_t} \leq 0$ and $\frac{\delta^2 w(p_t)}{\delta p_t^2} \geq 0$ for all $p_t \in [0,1]$ if and only if*

$$\int_0^{p_t}\int_0^{q_t} d_\pi(s_t)ds_t dq_t \geq \int_0^{p_t}\int_0^{q_t} d_\omega(s_t)ds_t dq_t,\ \forall q_t \in [0,1]\ \forall p_t \in [0,1]. \tag{10}$$

According to this proposition, we can perform a test based on a third-order upward DynaC dominance, which finds its justification in social preferences that give more weight to the mobility experienced by the poorest of the poor.

Alternatively, it is possible to obtain a ranking criterion that is based on the idea of preserving the mobility of less advantaged dynasties while, at the same time, focusing on the dynamics of the richest dynasties. This alternative proposition 3' is discussed in Appendix C. We also propose an extension of the mobility measure that incorporates a Rawlsian-type of social valuation, presented in proposition 4 in Appendix D.

# 4 Empirical Approach

## 4.1 Data

**Overview.** Our empirical analysis draws on the Indonesian Family Life Survey (IFLS), a longitudinal survey of individuals, households, and communities that covers 13 provinces and represents roughly 83% of the Indonesian population. Several features make the IFLS particularly well suited to our study. First, it spans a long period—from 1993 to 2014—allowing for intergenerational linkages over more than two decades. Second, it exhibits exceptionally low attrition: intensive tracking efforts in each of the five survey waves (1993, 1997, 2000, 2007, and 2014) achieved a recontact rate of 92% in the final wave (Strauss et al., 2016; Strauss and Witoelar, 2019). This ensures both cross-sectional and longitudinal representativeness, which is crucial for reliable intergenerational comparisons. Third, the survey provides detailed information on a wide range of socio-economic characteristics—including education, income, and consumption expenditure—along with standard demographic variables, making it uniquely suited to the joint analysis of educational and earnings mobility. For these reasons, the IFLS has been widely used in development research, including studies of intra-generational mobility (e.g., Grimm, 2007; Lo Bue and Palmisano, 2020) and evaluations of education programs (Ashraf et al., 2020; Mazumder et al., 2019; Akresh et al., 2018). In this paper, we exploit the exceptional length of the IFLS panel to measure *intergenerational* mobility. As previously noted, the possibility of linking parents and their children when both generations are observed at comparable ages remains rare in low- and middle-income countries. Mobility patterns across the two generations covered by the IFLS possibly capture not only the effects of large-scale education reforms on the second generation's potential earnings (see their description in Appendix A1), but also broader structural changes influencing men's and women's economic opportunities over time.

**Generation Matching and Selection.** We use the first and last waves of the IFLS to link generations. Specifically, we identify fathers and mothers in 1993 using IFLS 1 (Frankenberg and Karoly, 1995) and match them to their offspring observed in 2014 in IFLS 5 (Strauss et al., 2016). Our baseline relies on like-for-like comparisons, i.e., matching daughters to mothers and fathers to sons, but our conclusions hold with alternative definitions, including references points that are common to both daughters and sons (for instance the maximum or minimum achievement of the parents). We seek to observe both generations at broadly similar ages. This is not a concern for education outcomes, as the individuals in both generations have completed their schooling. However, it is an issue for meaningful intergenerational comparisons of earnings. To construct profiles of earnings mobility, we must account for age-related effects and therefore apply an age correction when predicting earnings, as described below. We restrict the analysis to dynasties in which both parents and children are observed between ages 20 and 40 (born 1952–1974 for parents and 1974–1994 for children), except for fathers, who are included up to age 50. This asymmetry reflects the fact that men in the first generation are generally older than their spouses and tend to have children later. Extending the upper age limit for fathers helps preserve sample size and representativeness of the matched dynastic sample.[9] This leaves us with a sample of 2,164 daughters and 2,060 sons matched with 2,284 mothers and 2,284 fathers.

## 4.2 Dynasties, Achievements and DynaC Implementation

The concept $z$ used to identify dynasties is the per-capita expenditure of households observed in 1993 (parents' generation). As explained before, this welfare/status measure is a suitable backdrop against which we can assess individual mobility in terms of earnings or education. However, we refrain from using it as an outcome. The main reason is that it would induce much persistence due to the fact that some children still live with their parents in 2014. We rather focus on men's and women's individual mobility in terms of education level or potential earnings. DynaC curves are defined at individual levels, but tractable representations require some averaging. In our empirical implementation, dynasties are defined over quantile intervals of the parental distribution of $z$, namely over ventiles of per-capita consumption in parental households.[10]

Our first measure of achievements is the rank based on *discrete* outcomes $k$, corresponding to education classes and implemented according to equation 2. Education is defined as the highest level attended and completed, with eight categories ranging from no education to university degree. The second type of achievement is the rank based on *continuous* outcomes $y$, corresponding to potential earnings and implemented according to equation 1. We focus on potential rather than actual earnings for several reasons. First, a substantial share of adults—particularly women—do not hold paid jobs, so actual earnings would provide a truncated and biased view of intergenerational mobility. Second, predicted earnings allow us to evaluate how educational mobility translates into monetary terms. More precisely, since education is a key determinant in earnings equations, we can construct counterfactual earnings distributions by fixing children's education at their parents' level. This makes it possible to assess how much educational mobility has contributed to earnings mobility at

[9] In sensitivity checks, we apply the 20-40 age bracket to everyone or the 20-50 bracket to both mothers and fathers. We do not find radically different conclusions.

[10] These bins combine possibly very different situations, in particular quite different patterns between men and women, as we shall see. We will also provide sensitivity analyses using alternative smoothing approaches.

different points of the initial distribution.

To impute gender- and generation-specific earnings, we estimate a series of earnings equations separately for fathers, mothers, sons, and daughters, using a standard Heckman selection model. We use average earnings for the years surrounding 1994 (for parents) and 2013 (for children) to mitigate measurement errors (see also Berman and Bourguignon, 2023). The age distributions of parents and children broadly overlap (cf. Figure A1), but some mechanical differences remain.[11] Thus, to eliminate age-related differences across generations in imputed earnings, we predict 2014 earnings for sons (daughters) using the age their father (mother) had in 1993. The detailed estimation and imputation procedure is described in Appendix A2, with estimates reported in Table A2 and distributions of predicted earnings in Figure A4.

Descriptive statistics, including predicted earnings, are presented in Table A1. On average, the offspring generation performs substantially better than their parents, indicating strong *absolute* mobility. Their households' real per-capita expenditure has more than doubled, and their average education level reaches about 5.9—equivalent to 10–11 years of schooling—almost twice that of their parents (around 3–3.6, or roughly 6 years of schooling). Their potential earnings have also improved markedly: in real terms, i.e., after accounting for changes in living costs over twenty years, their potential earnings are five to six times higher than their parents'.

# 5 Empirical Results

We turn to our main results. We start with educational mobility, contrasting absolute and relative mobility patterns. We then move to mobility in potential earnings, extracting the role of educational mobility. We end with sensitivity checks and extensions, including weighted mobility curves.

## 5.1 Educational Mobility

**Change in Education Levels and Absolute Mobility.** Education mobility in Indonesia is particularly interesting to examine given the large-scale education reforms implemented by this country over the past decades (see Appendix A1). We suggest a preliminary

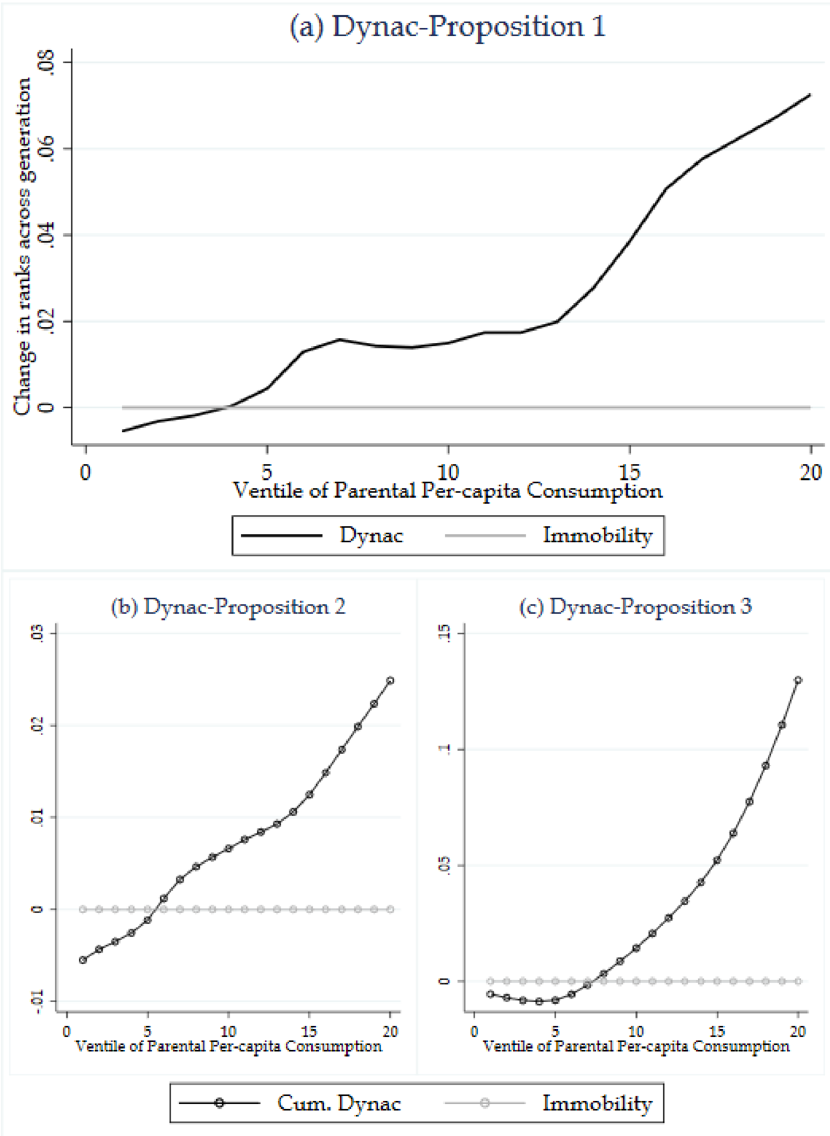
[11] They reflect the fixed observation years (1993 and 2014) and the fact that men are generally older than their spouses.

analysis of changes in education levels and, matching generations in our data, of absolute educational mobility by welfare groups. Presented in detail in Appendix A2, it conveys that illiteracy prevailed among parents but diminish drastically in the next generation. Upward education mobility is, as expected, found in groups of parents who themselves had the lowest educational levels (this is confirmed by the special-case Dynac curve obtained for educational mobility when the variable $z$ used to identify dynasties also corresponds to education classes, cf. Figure A6). However, we also find that low-educated parents are present in all quantiles of per-capita expenditure and not just among the consumption poor. Decomposing absolute mobility by welfare groups reveals that the strongest educational mobility is observed among affluent dynasties, i.e. those with the highest parental consumption levels.

**Relative Education Mobility by Per-Capita Consumption Percentile.** This analysis explains the relative mobility pattern obtained in Figure 1 (a). The DynaC curve shows changes in educational ranks by ventile of parental per-capita consumption. The relative mobility is negative for low-status dynasties only, translating some relative progress for all other dynasties.[12] The DynaC curve is flat or increasing, especially in the upper half of the status index, thus confirming the regressive pattern of educational mobility: faster educational progress are recorded among higher-status dynasties. Thus, despite the absolute educational mobility likely driven by education reforms and other structural changes, DynaCs illustrate the degree of regressivity in relative mobility.

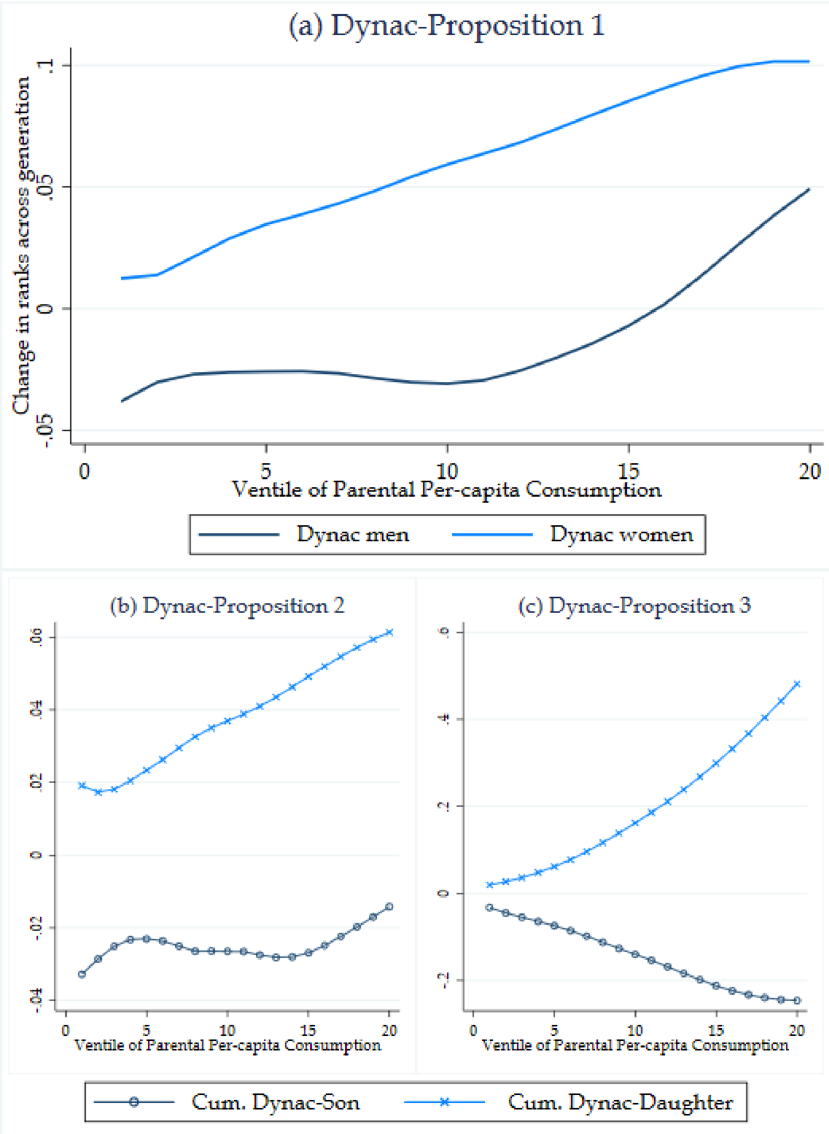
[12]Note that mobility scores do not need to sum to zero. First, this is mechanically the case when outcomes are categorical. To see this, consider two equally sized groups of dynasties ('poor' and 'rich' in terms of parental status), where both start in education level 1 and 2 respectively in generation t, but all reach level 2 in generation t+1. The 'poor' move from dominating 50% of the population to 100%, yielding a mobility score of 1-0.5=0.5. The 'rich' remain at the top, with a score of 1-1=0. The average mobility across dynasties is therefore strictly positive (0.25). Second, the empirical DynaC curves are based on mobility scores averaged within ventiles of the parental distribution, which means the plotted values reflect the net mobility within each group rather than a simple count of upward vs. downward moves. As a result, even a 50–50 split between upward and downward mobility at the individual level will not necessarily produce an equal number of positive and negative ventile-level scores. This is visible in the case of education: daughters show positive mobility and sons mostly negative mobility, cf. Figure 2 (a), yet once averaged by ventile, the overall DynaC is slightly positive, cf. Figure 1 (a).

Figure 1: Relative Education Mobility (DynaCs, Baseline)




Source: authors' elaboration based on IFLS 1 and IFLS 5. Notes: intergenerational relative mobility, DynaC, is calculated as the change in achievement (outcome ranks) across generations. It is computed at the dynasty level, identified by parents' per-capita expenditure, and comparing daughters to mothers and boys to fathers (like-for-like). For exposition, DynaCs are averaged by ventile of per-capita expenditure and smoothed using kernel-weighted local polynomial regression.

Figure 2: Relative Education Mobility (DynaCs, by Gender)




Source: authors' elaboration based on IFLS 1 and IFLS 5. Notes: intergenerational relative mobility, DynaC, is calculated as the change in achievement (outcome ranks) across generations. It is computed at the dynasty level, identified by parents' per-capita expenditure, and comparing daughters to mothers and boys to fathers (like-for-like). For exposition, DynaCs are averaged by ventile of per-capita expenditure and smoothed using kernel-weighted local polynomial regression.

**Broad Dominance Results.** We first examine DynaC mobility relative to the immobility benchmark. In Figure 1(a), we find dominance of mobility over immobility if we ignore the first three ventiles. If we now ackwonwledge this crossing of the immobility line, we conclude that there is negative mobility, i.e., a slower pace of educational improvement, for the poorest dynasties compared to others. Moving to second- and third-order dominance results, we see in Figure 1(b) that immobility prevails over a larger segment (i.e. up to to the fifth ventile) when priority is put on the poorest, and further still in Figure 1(c) (up to to the seventh ventile) when priority goes to the poorest of the poor.

**Gender Heterogeneity.** We can also address dominance between two groups, for instance between men and women, using propositions 1-3. Results are reported in Figure 2. In graph (a), relative mobility is experienced by all women and by men in top dynasties. In other words, daughters have systematically improved their relative position compared to their mothers while only the sons of the top five ventiles are better ranked than their fathers. There is a clear dominance of women's mobility patterns over men's throughout the distribution of living standards.[13] This is true at the first-order and, subsequently, at higher orders of dominance, i.e. in graphs (b) and (c).[14] For women, DynaC curves reveal a steadily regressive pattern: the higher the parents' initial status, the larger the relative progress in education.

## 5.2 Earnings Mobility

**Relative Mobility of Potential Earnings.** We now turn to mobility results for our continuous outcome, i.e. potential earnings. Figure 3 (a) depicts the main DynaC curve (solid line), revealing positive mobility for the first three-quarter of the distribution. The pattern is broadly progressive, with most of the progressivity concentrated in the upper half of the distribution: in that segment, the lower-status dynasties experience faster education progress. Negative values at the top indicate that children from more affluent backgrounds progressed relatively less quickly, in terms of earnings-generating capacity, than the rest of the population.

**The Role of Education.** We also report a counterfactual (dashed line) obtained by

[13]Figure A3 in the Appendix shows that overall, boys and girls now attain very similar education levels while mothers were less educated than fathers. Hence, when daughters are compared to mothers and sons to fathers in our baseline (like-for-like matching), it is expected that the relative position of women increases more than that of men.

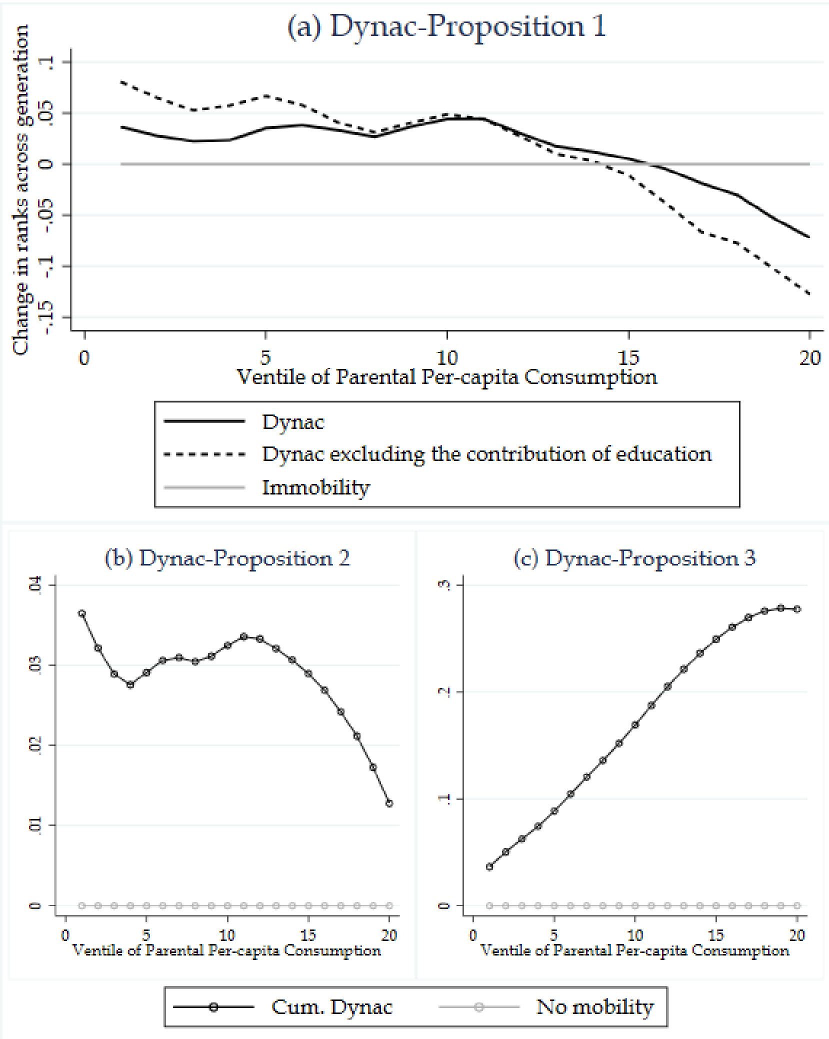
[14]Because proposition 2 (resp. 3) is based on a sub-set of social preferences compared to proposition 1 (resp. 2), dominance of the first order implies dominance of second and third orders.

setting children's education level to their parents' level. It conveys that progressivity would have been more pronounced throughout, had education levels not changed between generations. In other words, the regressive nature of education mobility reflects into a reduced progressivity in terms of intergenerational mobility of earnings capacities.

**Broad Dominance Results.** Figure 3(a) is inconclusive because the DynaC curve crosses the zero line (around the 17th ventile). Yet, if we put the emphasis on the poor, positive mobility prevails all along the distribution. Higher-order dominance results go in the opposite direction compared to education mobility. Indeed, since the crossing with the immobility line occurs relatively high in the welfare/status distribution, consistent with the broad progressivity pattern, mobility results that give more social weight to the poor become unambiguously positive, as can be seen in Figures 3 (b) and (c).

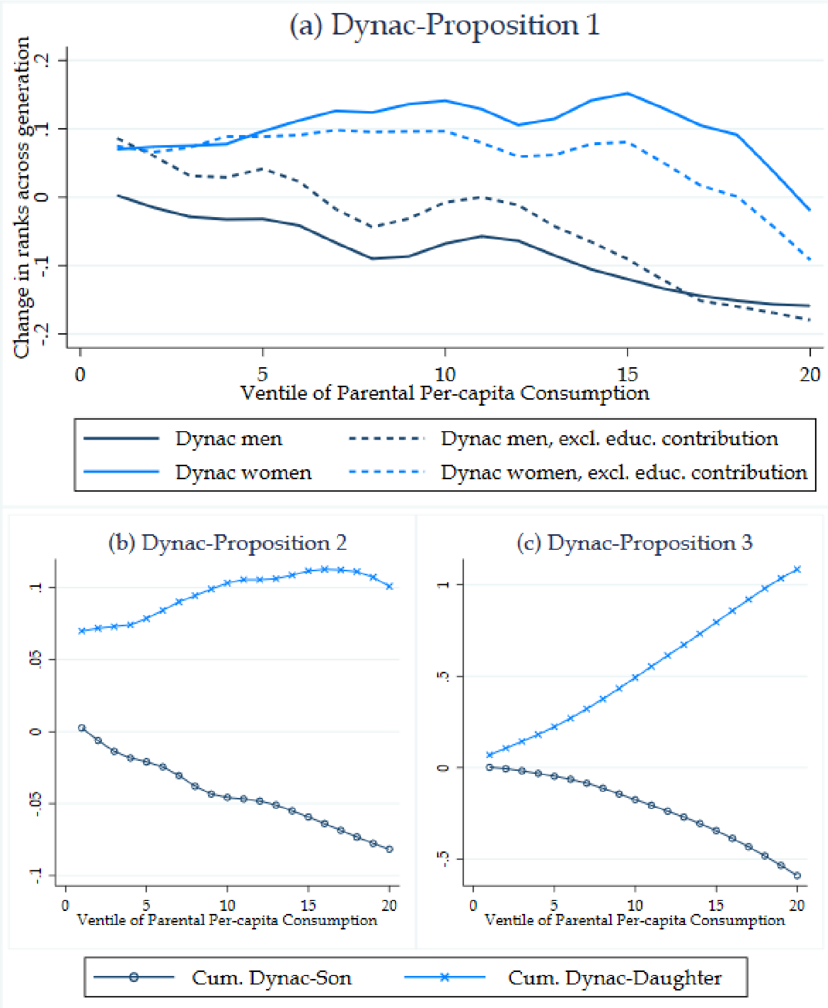
**Gender Heterogeneity.** We observe substantial heterogeneity between men and women in Figure 3. Mobility is positive for all women and negative for all men, leading to an unequivocal dominance of women's mobility patterns over men's. Counterfactual patterns show that this gender gap would be smaller without the education mobility at the advantage of women. The mobility pattern is broadly regressive for women, except at the top, and mildly progressive for men. Counterfactual results show that earnings mobility would be more neutral for women, and progressivity more pronounced for men, had there not been regressive education mobility. These results translate in monetary terms our findings regarding educational mobility, and possibly the underlying role of structural changes and education reforms.

Figure 3: Relative Mobility of Potential Earnings (DynaCs, Baseline)




Source: authors' elaboration based on IFLS 1 and IFLS 5. Notes: intergenerational relative mobility, DynaC, is calculated as the change in achievement (outcome ranks) across generations. It is computed at the dynasty level, identified by parents' per-capita expenditure, and comparing daughters to mothers and boys to fathers (like-for-like). For exposition, DynaCs are averaged by ventile of per-capita expenditure and smoothed using kernel-weighted local polynomial regression. In graph (a), dash lines correspond to a counterfactual where children's potential earnings are predicted while using parents' education level to neutralize the role of education mobility.

Figure 4: Relative Mobility of Potential Earnings (DynaCs, by Gender)




Source: authors' elaboration based on IFLS 1 and IFLS 5. Notes: intergenerational relative mobility, DynaC, is calculated as the change in achievement (outcome ranks) across generations. It is computed at the dynasty level, identified by parents' per-capita expenditure, and comparing daughters to mothers and boys to fathers (like-for-like). For exposition, DynaCs are averaged by ventile of per-capita expenditure and smoothed using kernel-weighted local polynomial regression. In graph (a), dash lines correspond to a counterfactual where children's potential earnings are predicted while using parents' education level to neutralize the role of education mobility.

### 5.3 Robustness and Extensions

We end with a set of sensitivity checks and complementary results focusing on mobility measured with weighted achievements.

**Smoothing.** In our empirical implementation, dynasties are defined over quantile intervals of the parental distribution of $z$ (e.g., ventiles) rather than at the strict individual level. This aggregation is necessary to produce a smooth and interpretable DynaC, as individual-level curves can be highly volatile due to idiosyncratic variation.[15] In addition, we smooth the DynaC curves using kernel-weighted local polynomial regressions (LPOLY). We depart from this setting with a few sensitivity checks. In Figure 5, we focus on educational mobility, but results for potential earnings are qualitatively similar. We first vary the number of aggregation bins—using centiles (panel b) instead of ventiles (baseline, panel a)—and find nearly identical shapes. We then display the unsmoothed DynaC (panel c), which is more volatile but preserves the same overall pattern across most of the living-standard distribution. Finally, we compare alternative smoothing techniques (panel d), notably locally weighted regressions (LOWESS), which yield very similar qualitative results.

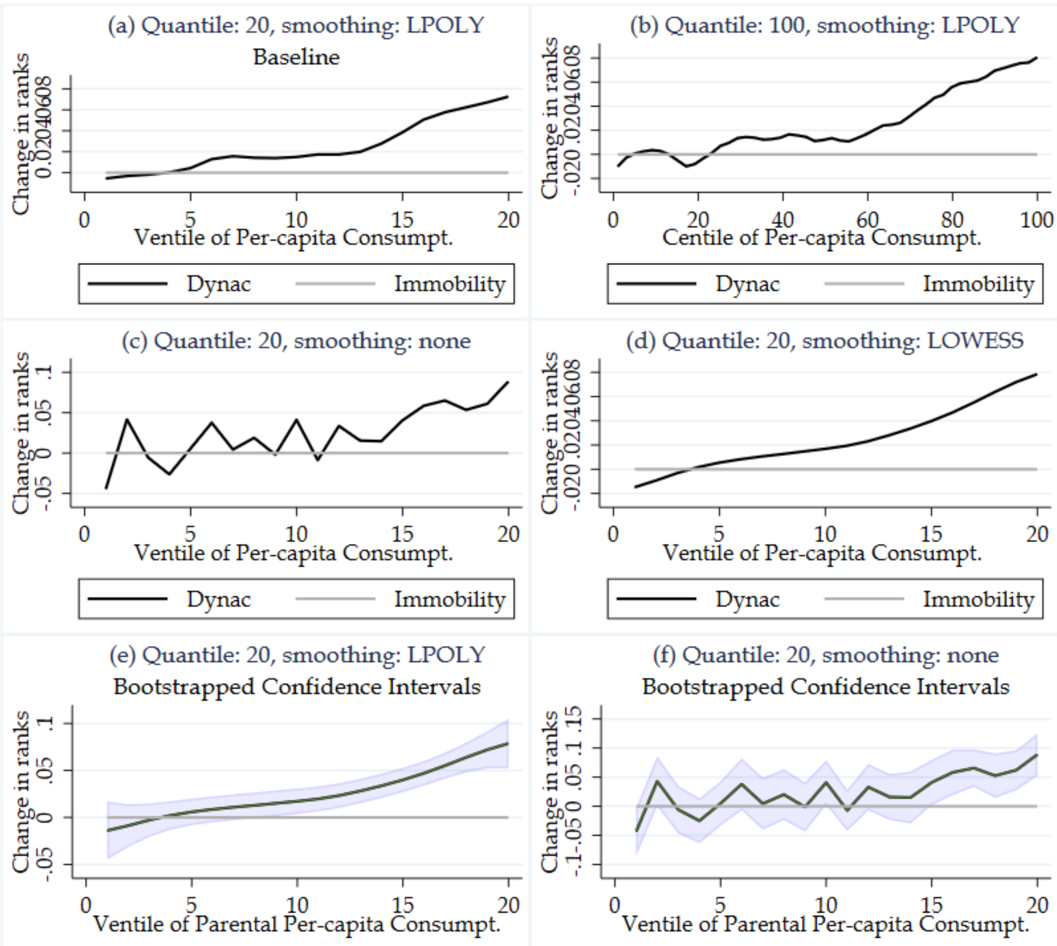
**Statistical Inference.** To assess the sampling uncertainty surrounding our mobility estimates, we compute confidence intervals for the DynaC using a nonparametric bootstrap with 500 replications. Panels (e) and (f) of Figure 5 report the resulting 95% confidence bands for education mobility, respectively for the smoothed specification (LPOLY) and the unsmoothed version. In both cases, shaded areas represent the confidence intervals around the baseline DynaC. The bands remain narrow over most of the distribution and confirm the main conclusions regarding the regressive pattern of relative education mobility.

**Weighted DynaC.** Weighted DynaC curves rely on the achievement definitions in equation 3 and make it possible to account for structural changes in the marginal distributions across generations, since the weights reflect the rank improvement over time. To illustrate, Figure A8 plots weighted DynaCs for potential earnings mobility, both overall and by gender. We focus here on differences in patterns relative to the unweighted case, since mobility levels are not directly comparable across the two approaches. Overall, the profiles are broadly similar to those in Figure 3, but some notable differences emerge. For example, among boys from the poorest dynasties, the unweighted DynaC shows negative mobility—indicating a loss in relative earning capacity—whereas the weighted DynaC be-

[15] Accordingly, the empirical DynaC represents the expected change in achievement for dynasties within each quantile bin, rather than an exact one-to-one mapping between individual parent–child pairs. This aggregation preserves the ordinal structure of the DynaC—dynasties remain ranked by parental status—but implies that welfare and dominance interpretations apply to the average mobility experience within each group. As noted by Berman and Bourguignon (2023), such aggregation facilitates interpretation by abstracting from micro-level noise that has limited social relevance.

comes positive, reflecting that inequality has fallen above them. Such divergences illustrate how weighted mobility becomes more informative in settings where reductions in inequality matter normatively, especially under social welfare criteria that place greater weight on lower-ranked dynasties.

Figure 5: Relative Education Mobility: Sensitivity Analysis




Source: authors' elaboration based on IFLS 1 and IFLS 5. Notes: intergenerational relative mobility, DynaC, is calculated as the change in achievement (outcome ranks) across generations. It is computed at the dynasty level, identified by parents' per-capita expenditure, and comparing daughters to mothers and boys to fathers (like-for-like). In this sensitivity analysis, DynaCs are averaged either by ventile or centile of per-capita expenditure; smoothing is based on kernel-weighted local polynomial regression (LPOLY) or locally weighted regression (LOWESS).

# 6 Conclusion

We suggest a simple measure of relative intergenerational mobility based on changes in ranks across generations. The approach is flexible, in the sense that it can accommodate any type of outcomes–discrete or continuous–used to assess each generation's achievement while providing dominance results across population subgroups (e.g., gender or ethnic groups). Higher-order dominance results are suggested, as well as a weighting scheme that allows us to depart from basic reranking measures and to account for structural changes in the parents' and offsprings' distributions.

We suggest one of the rare estimation of intergenerational mobility for a developing country, exploiting Indonesian longitudinal data that are both long and characterized by a low attrition rate. Thus, we can match parents (observed in 1993) and children (observed twenty years later) to derive both absolute and relative intergenerational mobility patterns for different types of outcome, focusing on educational attainment and potential earnings. For both outcomes, relative mobility patterns were markedly to the advantage of women. In absolute terms, a large part of the population was lifted out of illiteracy, possibly due to the large-scale education reforms implemented in Indonesia. However, using per-capita consumption as a measure of welfare (or status) to identify dynasties, we show that relative educational mobility was regressive: dynasties that have progressed the most in terms of educational attainment were those of low-educated but rich parents. These patterns also tend to seriously limit the degree of progressivity observed for the relative mobility in earnings prospects.

The theoretical and empirical results proposed in this paper are encouraging and open new avenues of research. From a theoretical perspective, several extensions are possible. They include the assessment of intergenerational mobility across more than two generations, an adaptation of the model to allow for a multidimensional evaluation of mobility, and a more challenging contribution with a full characterization of mobility measures based on weighted achievements. From an empirical perspective, the mobility scheme proposed in this paper could be applied to other countries for which long panels exist, mainly rich countries. Cross-country comparisons would be of particular interest, for instance to characterize how the relative mobility of poor dynasties (in terms of education, earnings or health) varies across countries and to identify the policies that may have contributed to the most salient patterns of relative mobility.

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# Appendix A: Additional results

## A.1: Descriptive Information and Statistics

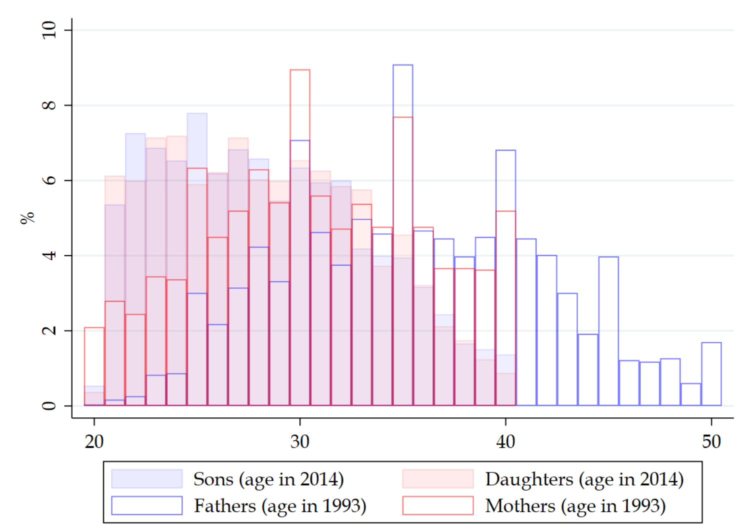
**Education Reforms.** A series of programs have been implemented in Indonesia since the 1970s and have certainly contributed to boost enrollment rates and increase access to education. In 1973, the Indonesian government launched the "Sekolah Dasar INPRES" program, a large-scale school construction program, whose effectiveness on primary school enrollment has been well documented in many studies.[16] Education enrollment expansion continued through the 1990s and the early 2000s, i.e. the years of the Asian economic 'miracle' marked by remarkable progress in poverty reduction and economic growth (Bolt et al., 2018, Timmer, 2018). By the early 2000s, Indonesia achieved nearly universal net primary enrollment rate while junior high school enrollment rates had reached about 60% compared to 17% in 1975 (Granado et al., 2007). In 2005, the government launched the 'One Roof School Program' aimed to facilitate transitions from primary to secondary school by building junior high schools on the same site as a primary schools, especially in remote areas (ILO, 2011). Efforts to increase access to education, especially among the most disadvantaged children have also been made since the late 1990s through the launch of a series of scholarship programs.[17]

[16]See *inter alia* Duflo (2001), Duflo (2004), Akresh et al. (2019), Mazumder et al. (2019), Ashraf et al. (2020). Between 1973-1974 and 1978-1979, the number of primary schools in the country more than doubled, leading to a remarkable increase in enrollment rates among children aged 7 to 12, i.e. from 69% in 1973 to 83% by 1978. In our selection, the parents have been hardly affected by this reform when they were themselves children but all their children were in the right age group to fully benefit from the reforms. Indeed, those who could benefit from the early phase of INPRES schoold were those aged 5 or below by 1974, which represents less than 3% (12%) of the fathers (mothers) in our sample. In contrast, all the children in our selection where born after 1974 and hence have been at primary school age at the time of the second phase of INPRES school construction.

[17]This includes the 1998 'School Grants Program', which was effective in preventing schools drop-outs especially among primary school-aged children from poor rural families (Sparrow, 2004). Another program was implemented in 2001-2005, the 'Compensation for Fuel Subsidy Decreased Program', to help children from poor families through scholarships (Bantuan Khusus Murid, BKM) which covered both primary and secondary education.

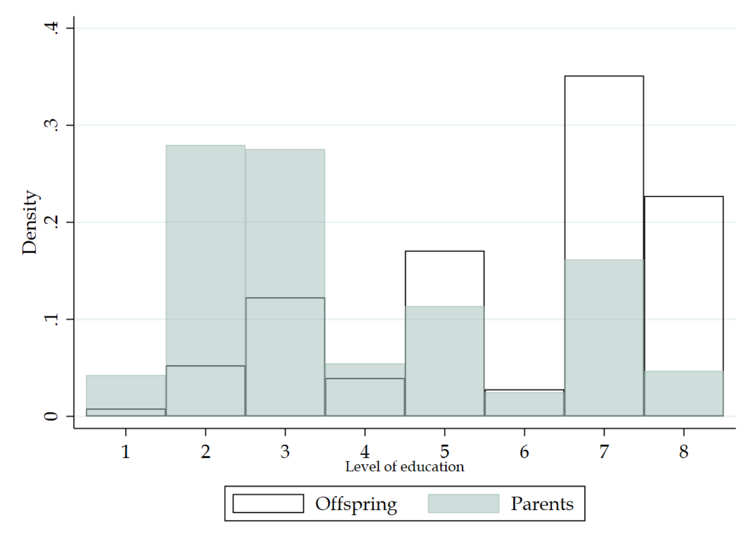
**Age, Education and Earnings: Descriptive Statistics.** Descriptive statistics are reported in Table A1. The age distribution by cohort and gender is reported in Figure A1. Daughters and sons are observed aged 29 on average, which is lower but close to their mother's age (32) and father's age (37). Figure A1 shows a broad overlap between generations. However, there are mechanical differences explained by the matching of generations at specific points in time (1993 and 2014) and by demographic specificities (e.g. the fact that men are older than their spouses). This justifies the strategy followed in earnings predictions to neutralize the role of age (see below). The distribution of educational levels is presented in Figure A2. The education distribution by cohort and gender is shown in Figure A3.

Figure A1: Age Distribution by Cohort and Gender



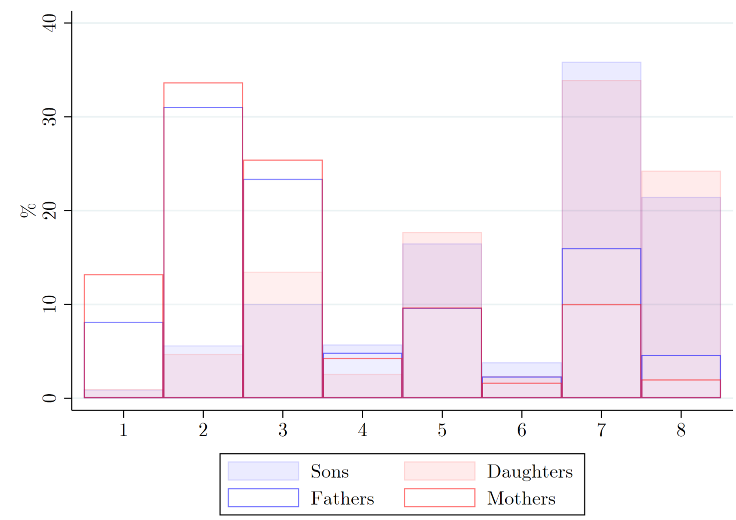

Source: Authors' elaboration based on IFLS 1 and IFLS 5 data. Sample size: 4,955 for offsprings, 2,558 for fathers and 2,492 for mothers.

Figure A2: Distribution of Educational Levels




Source: authors' elaboration based on IFLS 1 and IFLS 5. Note: Educational level correspondence: 1 No Education, 2 Incomplete Primary School, 3 Completed Primary School, 4 Incomplete Junior High School, 5 Completed Junior High School, 6 Incomplete Senior High School, 7 Completed Senior High School, 8 University. Source: authors' elaboration based on IFLS 1 and IFLS 5.

Figure A3: Education Distribution by Cohort and Gender




Note: Educational level correspondence: 1 No Education, 2 Uncompleted Primary School, 3 Completed Primary School, 4 Uncompleted Junior High School, 5 Completed Junior High School, 6 Uncompleted Senior High School, 7 Completed Senior High School, 8 University. Source: Authors' elaboration based on IFLS 1 and IFLS 5 data. Sample size: 4,955 for offsprings, 2,558 for fathers and 2,492 for mothers.

Table A1: Summary statistics

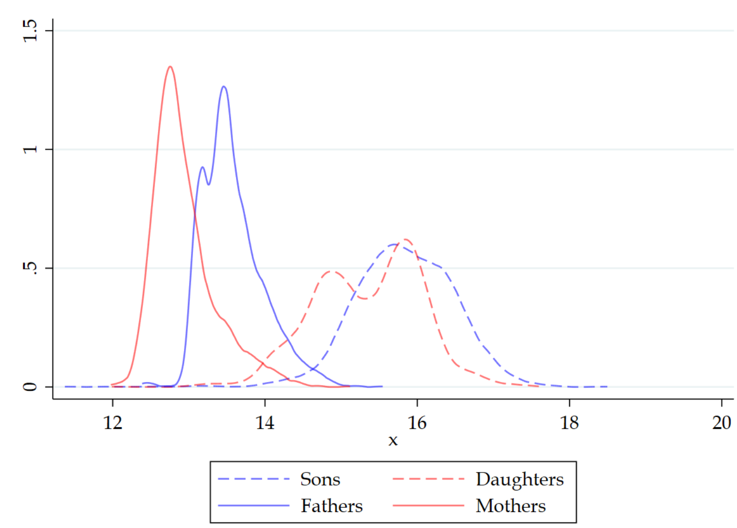
| Variable | Mean | Std. Dev. | Min. | Max. | N |
|---|---|---|---|---|---|
| **Children** | | | | | |
| Female | 0.5 | 0.5 | 0 | 1 | 4224 |
| Rural | 0.4 | 0.5 | 0 | 1 | 4224 |
| Daughter's age | 28.4 | 4.9 | 20 | 40 | 2164 |
| Son's age | 28.4 | 5.0 | 20 | 40 | 2060 |
| Daughter's Level of education | 5.9 | 1.9 | 1 | 8 | 2164 |
| Son's Level of education | 5.9 | 1.9 | 1 | 8 | 2060 |
| Daughter's log predicted annual earnings | 15.3 | 0.7 | 12.6 | 17.4 | 2164 |
| Son's log predicted annual earnings | 15.8 | 0.7 | 5.2 | 18.1 | 2060 |
| Log annual PCE | 15.8 | 0.6 | 14.0 | 18.9 | 4224 |
| **Parents** | | | | | |
| Mother's age | 31.5 | 5.1 | 20 | 40 | 4220 |
| Father's age | 36.5 | 6.0 | 20 | 50 | 4223 |
| Mother's level of education | 3.0 | 1.8 | 1 | 8 | 4224 |
| Father's level of education | 3.6 | 2.1 | 1 | 8 | 4224 |
| Mother's log predicted annual earnings | 12.9 | 0.4 | 12.1 | 14.7 | 3836 |
| Father's log predicted annual earnings | 13.6 | 0.4 | 12.5 | 15.2 | 3885 |
| Log annual PCE | 14.8 | 0.6 | 12.1 | 18.3 | 4224 |

Source: Authors' elaboration based on IFLS 1 and IFLS 5 data.

PCE: per capita expenditure (IDR, real, base: 2002).

**Earnings Regressions and Imputations.** We first run four separate earnings estimations, namely for mothers, fathers, sons and daughters, using a standard Heckman approach. These regressions account for a first-step selection equation using a relatively standard instrument, namely the total resource of other family members. Berman and Bourguignon (2023) show that averaging incomes over several years helps attenuate measurement error. In the same spirit, our procedure attempts to mitigate measurement error, first by using predicted rather than observed earnings, and by using average earnings over the ±2 years surrounding key years (1994 for parents and 2013 for children). Estimation results are reported in Table A2. They essentially show the (monotonic) effect of education classes in the main equation (earning potentials) as well as the significant role of the instrument (and its expected negative sign) in the participation equation. Then, using the four sets of estimations and individual characteristics at the time of observation (except age), we predict potential earnings for all. To compare the potential earnings of sons and fathers (daughters and mothers) at about the same age, we predict 2014 earnings for sons (daughters) using the age that their father (mother) had in 1993. Without this adjustment, earnings mobility would partly reflect the fact that parents are observed at older ages and hence at higher earnings levels (a differential that might vary along the cross-sectional distribution). Predicted earnings distributions are presented in Figure A4.

Figure A4: Potential Earnings Distribution by Cohort and Gender




Source: Authors' elaboration based on IFLS 1 and IFLS 5 data. Sample size: 4,955 for offsprings, 2,558 for fathers and 2,492 for mothers.

Table A2: Heckman Regressions

| | Daughter | Son | Mother | Father |
|---|---|---|---|---|
| **Earnings** | | | | |
| Age | 0.00864 | 0.0146** | 0.00362 | 0.00553 |
| | (0.00686) | (0.00625) | (0.00593) | (0.0106) |
| Education: Primary School | 0.153 | 0.0221 | 0.0410 | 0.0980 |
| | (0.141) | (0.110) | (0.0735) | (0.191) |
| Education: Junior High School | 0.248* | 0.325*** | 0.334*** | 0.422 |
| | (0.135) | (0.102) | (0.116) | (0.270) |
| Education: Senior High School | 0.675*** | 0.642*** | 0.504*** | 0.569** |
| | (0.123) | (0.0870) | (0.105) | (0.229) |
| Education: University | 0.756*** | 0.993*** | 0.712*** | 0.861** |
| | (0.123) | (0.0989) | (0.194) | (0.388) |
| Rural | -0.266*** | -0.0237 | -0.219*** | -0.301* |
| | (0.0727) | (0.0658) | (0.0643) | (0.164) |
| Married | 0.0111 | 0.257*** | 0.369*** | 0.209 |
| | (0.0793) | (0.0670) | (0.133) | (0.820) |
| **Selection** | | | | |
| Real PCE | -1.58e-06*** | -1.37e-06*** | -8.29e-07*** | -4.19e-07*** |
| | (5.31e-08) | (4.88e-08) | (8.73e-08) | (1.35e-07) |
| Mills ratio | -0.930 | -1.401 | -0.839 | -3.602 |
| t stat | -24.13 | -32.08 | -5.56 | -1.42 |
| Observations | 3,485 | 3,339 | 2,451 | 2,558 |
| R-squared | 0.212 | 0.181 | 0.177 | 0.188 |
| Ethnicity Fixed Effects | YES | YES | YES | YES |
| Province Fixed Effects | YES | YES | YES | YES |

Note: Standard errors in parentheses. $*p < 0.1$, $**p < 0.05$, $***p < 0.01$

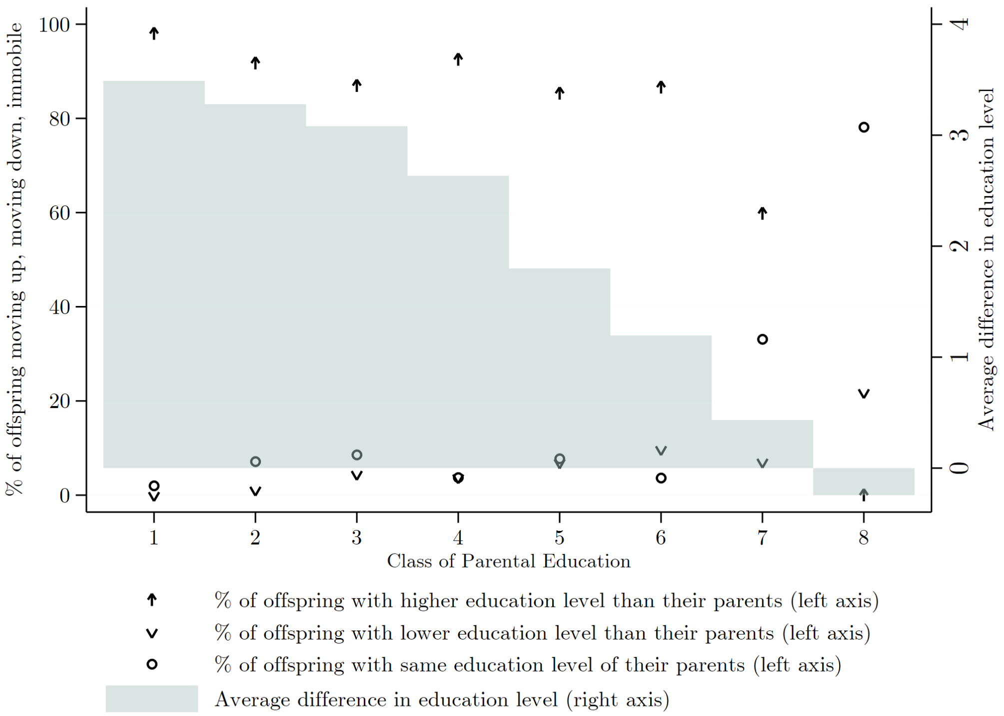
## A.2: Intergenerational Mobility in Education

**Changes in Education Levels.** In Figure A2 above, we have presented the distribution of education levels for the two generations. The most striking feature is the dramatic decline in illiteracy among the second generation. About one-third of parents in our dynastic sample had no education or did not complete primary school, whereas almost none of their children are illiterate, and fewer than 5 percent failed to complete primary school. The share of individuals completing junior high school has nearly doubled, while a majority of the younger generation now hold a senior high school diploma or have pursued university studies.

**Educational Mobility by Education Classes.** We next examine who benefited from the large educational improvements. Figure A5 depicts absolute educational mobility when dynasties are identified by parental education levels. The left axis shows the shares of upward, downward, and immobility. Upward mobility dominates among children of parents with less than a high school degree, while mobility declines sharply at the top—around 80% of university-educated parents also have university-educated children. The right axis shows the average education gap between generations, with larger gains among dynasties of low-educated parents and a declining profile thereafter. Similar results are obtained with education DynaCs depicted across parents' education classes (Figure A6), rather than across living standards as in the main text. We observe a declining pattern with 'positive' mobility only for dynasties of parents in the lowest education categories, i.e. classes 1 ('no education') and 2 ('incomplete primary school'). Results are broadly similar for sons and daughters. It tells us that dynasties where parents were at the lowest education levels have progressed faster than others.

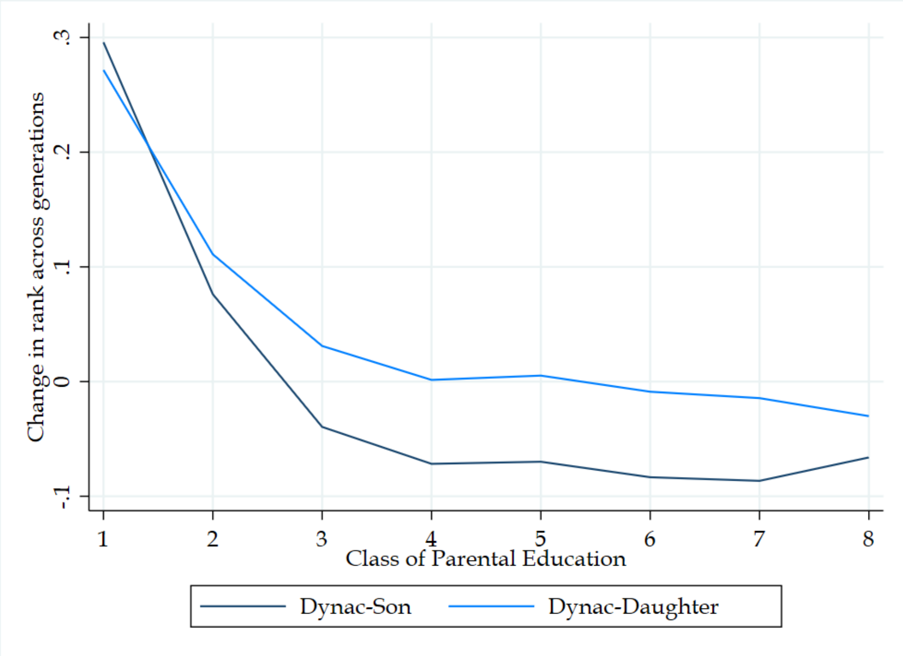
**Educational Mobility by Living Standards.** A different pattern emerges when dynasties are identified by percentiles of per-capita consumption (Figure A7). Low education (no or incomplete primary) is found across all living standards (purple curve), though more concentrated at the bottom. Importantly, illiteracy drops at every level, but more sharply at higher percentiles (green curve): at the top, a 20–30% illiteracy rate among parents vanishes completely, while at the bottom, where rates were around 50–60%, illiteracy persists partly into the next generation. These results support DynaC analyses of education mobility relative to consumption levels, as presented in Figure 1 (a) the main text.

Figure A5: Absolute Educational Mobility by Education Class



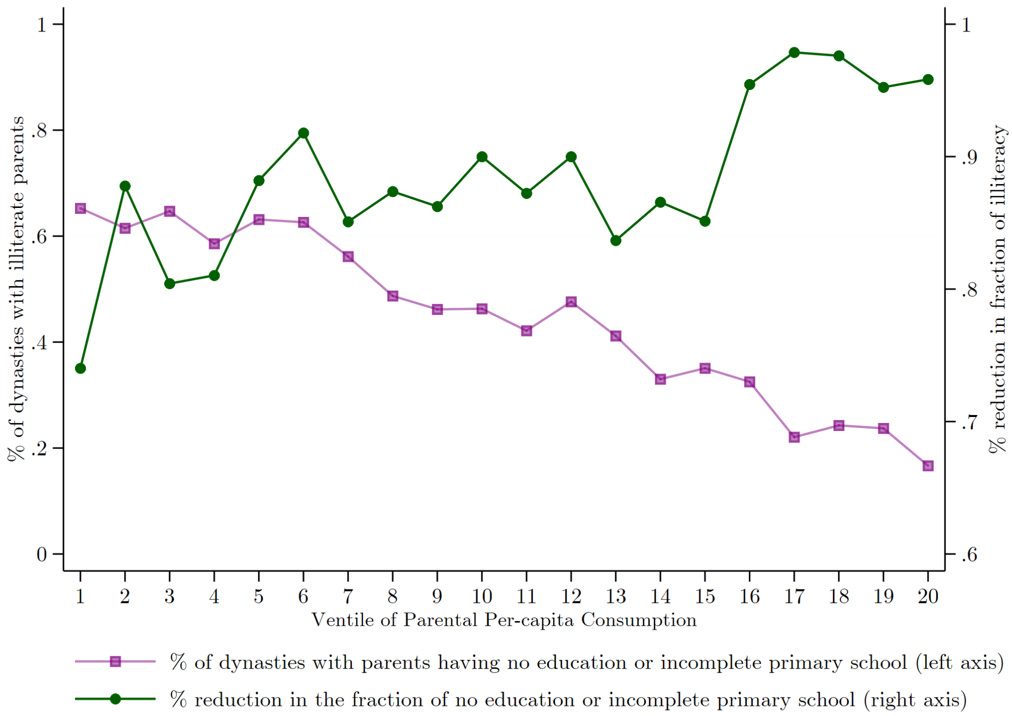

Source: authors' elaboration based on IFLS 1 and IFLS 5. Note: Educational level correspondence: 1 No Education, 2 Incomplete Primary School, 3 Completed Primary School, 4 Incomplete Junior High School, 5 Completed Junior High School, 6 Incomplete Senior High School, 7 Completed Senior High School, 8 University. Source: authors' elaboration based on IFLS 1 and IFLS 5.

Figure A6: Relative Education Mobility (DynaC by Parent Education Levels)




Source: authors' elaboration based on IFLS 1 and IFLS 5. Notes: intergenerational relative mobility, DynaC, is calculated as the change in achievement (outcome ranks) across generations. It is computed at the dynasty level, identified here by parents' education classes, and comparing daughters to mothers and boys to fathers (like-for-like). Educational level correspondence: 1 No Education, 2 Incomplete Primary School, 3 Completed Primary School, 4 Incomplete Junior High School, 5 Completed Junior High School, 6 Incomplete Senior High School, 7 Completed Senior High School, 8 University.

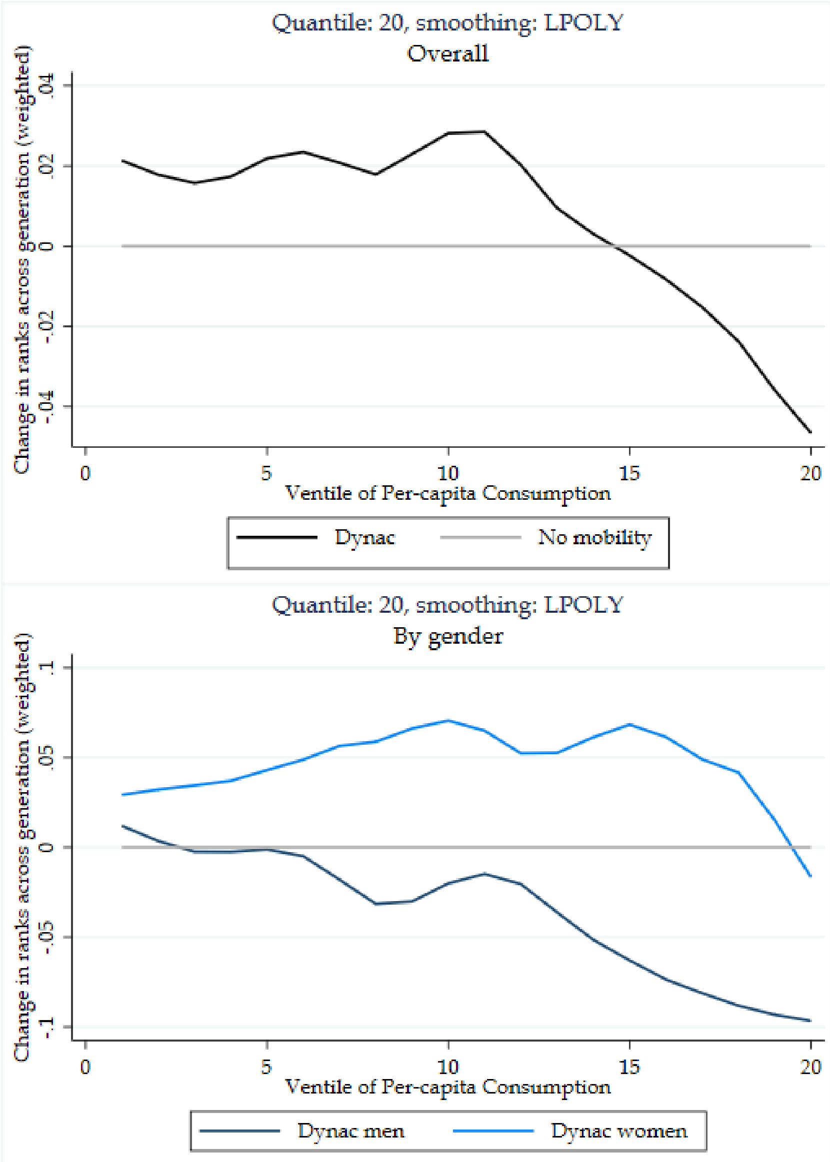
Figure A7: Absolute Educational Mobility by Per-Capita Consumption Percentile




Note: Parental achievement refers here to the rank of the best education level between the father and the mother. Source: authors' elaboration based on IFLS 1 and IFLS 5.

## A.3: Intergenerational Mobility with Weighted Achievements

Figure A8: Relative Mobility of Potential Earnings, **Weighted** DynaC




Source: authors' elaboration based on IFLS 1 and IFLS 5. Notes: intergenerational relative mobility, DynaC, is calculated as the change in weighted achievement across generations. It is computed at the dynasty level, identified by parents' per-capita expenditure, and comparing daughters to mothers and boys to fathers (like-for-like). Achievements are outcome ranks per generation and weights are rank progression across generation. For exposition, DynaCs are averaged by ventile of per-capita expenditure and smoothed using kernel-weighted local polynomial regression.

# Appendix B: Proofs of propositions 1-3

**Proof of Proposition 1.** We seek sufficient and necessary conditions such that:

$$\Delta W = \int_0^1 w(p_t)(d_\omega(p_t)dp_t - d_\pi(p_t)dp_t) \geq 0, for\ all\ W \in P^* \tag{11}$$

Let $\delta(p_t) = d_\omega(p_t) - d_\pi(p_t)$ so equation 11 is rewritten as:

$$\Delta W = \int_0^1 w(p_t)\delta(p_t)dp_t \geq 0 \tag{12}$$

For the sufficiency condition, note that $w(p_t) \geq 0$ for all $p_t \in [0,1]$, so that $\delta(p_t) \geq 0$ for all $p_t \in [0,1]$ implies that $\int_0^1 w(p_t)\delta(p_t)dp_t \geq 0$. For the necessary condition, let $\Delta W \geq 0$, but assume that $\delta(p_t) < 0$ for some $p_t \in [0,1]$. Following Lemma 1 in Chambaz and Maurin (1998), there exists a set of values $z(p) \in V^+$ and $\rho(p) \in V^+$ such that $\int_0^1 z(p)\delta(p_t)dp_t \leq 0$. Define $z(p) = w(p_t)$, since $z(p) \in V^+$ (hence $z(p) > 0$ for all $p$), substituting in equation 12 gives $\Delta W \leq 0$, which is a contradiction.

**Proof of Proposition 2.** We look for sufficient and necessary conditions such that:

$$\Delta W = \int_0^1 w(p_t)d(p_t)dp_t \geq 0, for\ all\ W \in P^* \tag{13}$$

for which $\frac{\delta w(p_t)}{\delta p_t} \leq 0$ for all $p_t \in [0,1]$. For the sufficiency part, we integrate equation 13 by parts:

$$w(p_t = 1)\int_0^1 \delta(p_t)dp_t - \int_0^1 w'(p_t)\int_0^{p_t} \delta(q_t)dq_t dp_t \tag{14}$$

Since $w(p_t = 1) \geq 0$ for all $p_t \in [0,1]$, $\int_0^{p_t} \delta(q_t)dq_t \geq 0$ for all $p_t \in [0,1]$ implies $w(p_t = 1)\int_0^1 \delta(p_t)dp_t \geq 0$. Furthermore, since $w'(p_t) \leq 0$ for all $p_t \in [0,1]$, we have $\int_0^1 w'(p_t)\int_0^{p_t} \delta(q_t)dq_t \leq 0$. Thus, $\Delta W \geq 0$. For the necessity part let $\Delta W \geq 0$, but assume that $\int_0^{p_t} \delta(q_t)dq_t < 0$ for some $p_t \in [a,b] \subset [0,1]$. Rewrite equation 14 as follows:

$$w(p_t = 1)\int_0^1 \delta(p_t)dp_t + \int_0^1 -w'(p_t)\int_0^{p_t} \delta(q_t)dq_t dp_t \tag{15}$$

Denote $-w'(p_t) = \alpha(p)$. By Lemma 2 in Chambaz and Maurin (1998), $\int_0^1 \alpha(p)\int_0^{p_t} \delta(q_t)dq_t \leq 0$ for all $\alpha(p) \in V^+$ and $p_t \in [a,b] \subset [0,1]$. Suppose $\int_0^{p_t} \delta(q_t)dq_t \searrow 0$ for all $p_t \in [0,1] \setminus [a,b]$, the second term of equation 15 becomes negative. Then it is always possible to find combinations of $w(p_t)$ and $\delta(p_t)$ such that:

$$\left| w_(p_t = 1) \int_0^1 \delta(p_t) dp_t \right| < \left| \int_0^1 -w'(p_t) \int_0^{p_t} \delta(q_t) dq_t dp_t \right| \tag{16}$$

which results in $\Delta W < 0$, a contradiction.

**Proof of Proposition 3.** We seek sufficient and necessary conditions for:

$$\Delta W = \int_0^1 w(p_t)\delta(p_t)dp_t \geq 0 \tag{17}$$

$\forall\ W \in P^*$ for which $\frac{\delta w(p_t)}{\delta p_t} \leq 0$ and $\frac{\delta^2 w(p_t)}{\delta p_t^2} \geq 0$ for all $p_t \in [0,1]$. For sufficiency, consider equation 14 and use the following notation $\Psi(p_t) = \int_0^{p_t} \delta(q_t)dq_t$. Integrating by parts the second component:

$$w(1)\Psi(1) - w'(1) \int_0^1 \Psi(p_t)dt + \int_0^1 w''(p_t) \int_0^{p_t} \Psi(q_t)dq_t dp_t \tag{18}$$

Since $w''(p_t) \geq 0 \forall p_t \in [0,1]$, $\int_0^{p_t} \Psi(q_t)dq_t \geq 0$ for all $p_t \in [0,1]$ implies $\int_0^1 w''(p_t) \int_0^{p_t} \Psi(q_t)dq_t dp_t \geq 0$; since $w(1)' \leq 0$, it also implies that $-w(1)' \int_0^1 \Psi(p_t)dp_t \geq 0$; last, given that $w(1) \geq 0$, $w(1)\Psi(1) \geq 0$. Thus, $\int_0^{p_t} \Psi(q_t)dq_t \geq 0$ for all $p_t \in [0,1]$ is sufficient for $\Delta W \geq 0$. For the necessity part, let $\Delta W \geq 0$, but assume that $\int_0^{p_t} \Psi(q_t)dq_t < 0$ for some $p_t \in [\alpha, \beta] \subset [0,1]$. $\int_0^1 w(p_t)'' \int_0^{p_t} \Psi(q_t)dq_t dp_t \leq 0$ for all $w(p_t)'' \in V^+$ and $p_t \in [\alpha, \beta]$. Assuming that $\int_0^{p_t} \Psi(p_t) \searrow 0$ for all $p_t \in [0,1] \setminus [a,b]$, then $-w'(1)\Psi(1) + \int_0^1 w''(p_t) \int_0^{p_t} \Psi(q_t)dq_t dp_t \leq 0$. Now, it is always possible to find a combination of $w(1)$ and $\Psi(1)$ such that $|w(1)\Psi(1)| < \left| -w'(1) \int_0^1 \Psi(p_t)dp_t + \int_0^1 w''(p_t) \int_0^{p_t} \Psi(q_t)dq_t dp_t \right|$, which would result in $\Delta W < 0$, a contradiction.

# Appendix C: Proposition 3'

**Proposition 3'.** *Given two mobility processes* $D_{\pi}^{(t,t+1)}$ *and* $D_{\omega}^{(t,t+1)}$, $D_{\pi}^{(t,t+1)}$ *is preferred to* $D_{\omega}^{(t,t+1)}$ $\forall\ W \in P^*$ *for which* $\frac{\delta w(p_t)}{\delta p_t} \leq 0$ *for all* $p_t \in [0,1]$, $\frac{\delta^2 w(p_t)}{\delta p_t^2} \geq 0$ *for all* $p_t \in [0,\bar{p}]$, $\frac{\delta^2 w(p_t)}{\delta p_t^2} \leq 0$ *for all* $p_t \in [\bar{p},1]$ *if and only if*

$$(i) \int_0^{p_t} \int_0^{q_t} d_{\pi}(s_t) ds_t dq_t \geq \int_0^{p_t} \int_0^{q_t} d_{\omega}(s_t) ds_t dq_t, \forall q_t \in [0,1]\ \forall p_t \in [0,\bar{p}] \tag{19}$$

$$(ii) \int_{p_t}^{1} \int_0^{q_t} d_{\pi}(s_t) ds_t dq_t \geq \int_{p_t}^{1} \int_0^{q_t} d_{\omega}(s_t) ds_t dq_t, \forall q_t \in [0,1]\ \forall p_t \in [\bar{p},1]. \tag{20}$$

This is an alternative to Proposition 3. It suggests a test based on third-order upward (downward) DynaC dominance for all dynasties ranked lower (higher) or equal to $\bar{p}$. It finds its justification in the presence of a social planner that wants to preserve the mobility of the poorest among the poor while, at the same time, avoiding that the distances among the richest dynasties growth further apart (see Aaberge (2009) for a discussion on the application of this principle in standard inequality measurement).

**Proof of Proposition 3'.** We seek sufficient and necessary conditions for:

$$\Delta W = \int_0^1 w(p_t)\delta(p_t) dp_t \geq 0 \tag{21}$$

$\forall\ W \in P^*$ for which $\frac{\delta w(p_t)}{\delta p_t} \leq 0$ for all $p_t \in [0,1]$, $\frac{\delta^2 w(p_t)}{\delta p_t^2} \geq 0$ for all $p_t \in [0,\bar{p}]$, $\frac{\delta^2 w(p_t)}{\delta p_t^2} \leq 0$ for all $p_t \in [\bar{p},1]$.

For a given $\bar{p_t}$, rewrite equation 21 as follows:

$$\Delta W = \int_0^{\bar{p_t}} w(p_t)\delta(p_t) dp_t + \int_{\bar{p_t}}^1 w(s_t)\delta(s_t) ds_t \geq 0 \tag{22}$$

For sufficiency, use the notations $\Psi(p_t) = \int_0^{p_t} \delta(q_t) dq_t$, $\Psi(\bar{p_t}) = \int_0^{\bar{p_t}} \delta(p_t) dp_t$ and $\Theta(s) = \int_{\bar{p_t}}^{s_t} \delta(r_t) dr_t$ and $\Theta(1) = \int_{\bar{p_t}}^{1} \delta(r_t) dr_t$. We integrate equation 22 by parts twice to have:

$$w(\bar{p_t})\Psi(\bar{p_t}) - w'(\bar{p_t}) \int_0^{\bar{p_t}} \Psi(p_t) dt + \int_0^{\bar{p_t}} w''(p_t) \int_0^{p_t} \Psi(q_t) dq_t dp_t \tag{23}$$

$$w(1)\Theta(1) - w'(1) \int_{\bar{p_t}}^{1} \Theta(s_t) dt + \int_{\bar{p_t}}^{1} w''(s_t) \int_{\bar{p_t}}^{r_t} \Theta(r_t) dr_t ds_t$$

The last component of the above equation can be rewritten as follows:

$$\int_{\bar{p}_t}^{1} w''(s_t)\left[\int_{\bar{p}_t}^{1}\Theta(r_t) - \int_{s_t}^{1}\Theta(r_t)\right] dr_t ds_t = \int_{\bar{p}_t}^{1} w''(s_t)\int_{\bar{p}_t}^{1}\Theta(r_t)dr_t ds_t - \int_{\bar{p}_t}^{1} w''(s_t)\int_{s_t}^{1}\Theta(r_t)dr_t ds_t.$$

Noting that $\int_{\bar{p}_t}^{1} w''(p_t)dp_t = w'(1) - w'(\bar{p}_t)$, for $w'(1) = 0$ we have:

$$-w'(\bar{p}_t)\int_{\bar{p}_t}^{1}\Theta(r_t)dr_t - \int_{\bar{p}_t}^{1} w''(s_t)\int_{s_t}^{1}\Theta(r_t)dr_t ds_t.$$

$\Delta W$ can now be rewritten as follows:

$$w(\bar{p}_t)\Psi(\bar{p}_t) - w'(\bar{p}_t)\int_{0}^{\bar{p}_t}\Psi(p_t)dt + \int_{0}^{\bar{p}_t} w''(p_t)\int_{0}^{p_t}\Psi(q_t)dq_t dp_t \tag{24}$$

$$w(1)\Theta(1) - \int_{\bar{p}_t}^{1} w''(s_t)\int_{s_t}^{1}\Theta(r_t)dr_t ds_t$$

Since $w''(s_t) \leq 0$ for all $s_t \in [\bar{p}_t, 1]$, $\int_{s_t}^{1}\Theta(r_t)dr_t \geq 0$ for all $s_t \in [\bar{p}_t, 1]$ implies $-\int_{\bar{p}_t}^{1} w''(s_t)\int_{s_t}^{1}\Theta(r_t)dr_t \geq 0$. Hence, $\int_{s_t}^{1}\int_{\bar{p}_t}^{s_t}\delta(r_t)dr_t ds_t \geq 0$ for all $s \in [\bar{p}_t, 1]$ is sufficient for the sum of the last two component of equation 23 to be positive. The sufficiency for the positivity of the first three terms has been proved in Proposition 3, for this proposition just assume that $p_t \in [0, \bar{p}_t]$. Putting together the arguments: $\int_{0}^{p_t}\int_{0}^{q_t}\delta(x_t)dx_t dq_t \geq 0$ for all $p_t \in [0, \bar{p}_t]$ and $\int_{s_t}^{1}\int_{\bar{p}_t}^{s_t}\delta(r_t)dr_t ds_t \geq 0$ for all $s \in [\bar{p}_t, 1]$ imply $\Delta W \geq 0$. For the necessity part, let $\Delta W \geq 0$, but assume that $\int_{s_t}^{1}\Theta(r_t)dr_t < 0$ for some $s_t \in [\alpha, \beta] \subset [\bar{p}_t, 1]$. $\int_{\bar{p}_t}^{1} w(p_t)''\int_{s_t}^{1}\Theta(r_t)dr_t ds_t \leq 0$ for all $w(p_t)'' \in V^+$ and $p_t \in [\alpha, \beta]$. Assuming that $\int_{s_t}^{1}\Theta(r_t)dr_t \searrow 0$ for all $s_t \in [\bar{p}_t, 1] \setminus [a, b]$, then $\int_{0}^{1} w''(p_t)\int_{0}^{p_t}\Theta(q_t)dq_t dp_t \leq 0$. Now, it is always possible to find a combination of $w(1)$ and $\Theta(1)$ such that $|w(1)\Theta(1)| < \left|\int_{0}^{1} w''(p_t)\int_{0}^{p_t}\Psi(q_t)dq_t dp_t\right|$. Putting together these results with those obtained for proposition 3 (letting them holding for all $p \in [0, \bar{p}]$) would result into $\Delta W < 0$, a contradiction.

# Appendix D: Proposition 4

We introduce an additional dominance result that reflects strong preferences for mobility among the 'worst-off' in an absolute sense.

**Proposition 4.** *Given two mobility processes $D_\pi$ and $D_\omega$, $D_\pi$ is socially preferred to $D_\omega$ $\forall\, W \in P^*$ for which $w(p_t) = w(q_t) > 0\ \forall p_t, q_t \in [0, \bar{p}]$ and $w(p_t) = 0\ \forall p_t \in [\bar{p}, 1]$ if and only if:*

$$\int_0^{\bar{p}_t} d_\pi(q_t)dq_t \geq \int_0^{\bar{p}_t} d_\omega(q_t)dq_t. \tag{25}$$

By selecting a threshold equal to $\bar{p}$ implies that we focus only on dynasties corresponding to households of the lower $\bar{p}$ percent of the first-generation distribution. Alternative thresholds can be selected to focus on different groups of dynasties. If the threshold is equal to 1, the proposition reduces to the comparison of mean mobilities. When $\bar{p} = 0.5$, it is reminiscent of a recent approach introduced by Asher et al. (2018) to estimate intergenerational educational mobility with coarse data, which is typically the case of developing countries. The test corresponding to this proposition can be interpreted as a 'priority' criterion, i.e. it reflects the preferences of a social planner who endorses a 'mobility priority for the worst off'. This echoes back to the *maximin* criterion *à la* Rawls: mobility is valuable if and only if poor dynasties experience an improvement, independently of how the rest of the population performs.

**Proof of Proposition 4.** We want to find sufficient and necessary conditions for:

$$\Delta W = \int_0^1 w(p_t)\delta(p_t)dp_t \geq 0 \tag{26}$$

$\forall\, W \in P^*$ for which $w(p_t) = w(q_t) > 0\ \forall p_t, q_t \in [0, \bar{p}]$ and $w(p_t) = 0\ \forall p_t \in [\bar{p}, 1]$.
For a given $\bar{p}_t$, since $w(p_t) = w(q_t) > 0$ for all $p_t, q_t \in [0, \bar{p}]$ and $w(p_t) = 0$ for all $p_t \in [\bar{p}_t, 1]$, rewrite Equation 26 as follows:

$$\Delta W = w \int_0^{\bar{p}_t} \delta(p_t)dp_t \geq 0 \tag{27}$$

Given $w > 0$, $\int_0^{\bar{p}_t} \delta(p_t)dp_t \geq 0$ is necessary and sufficient for $\Delta W \geq 0$.

**Results based on Proposition 4.** We provide additional analyses of educational relative mobility based on the dominance conditions defined in Proposition 4. Results are reported in Table D1. We suggest four different thresholds $\bar{p_t}$, corresponding to ventiles 1, 3, 5 and 10 of the per-capita expenditure dynasties. In line with graphical results, we observe that the mobility profiles of daughters are significantly better than those of sons at all these cutoffs, and especially at the higher ones, in the like-for-like matching (panel A). Using the mean education achievement of the parents as a common reference point, we observe the same reversal as on the graphs when all the weight is put on lower segments of the dynastic distribution. In the presence of social preferences over mobility profiles *à la* Rawls, one can judge the mobility of men to be superior to that of women (Panel B). With utilitarian social preferences, however, one would probably judge the mobility of women as superior to that of men.

Table D1: Education Mobility: Dominance Results of Proposition 4

| **Panel A: Baseline (like-for-like)** | Sons | Daughters | T-Stat |
|---|---|---|---|
| Threshold: $\bar{p} = 1$ | -0.009 | -0.001 | -28.315 |
| Threshold: $\bar{p} = 3$ | -0.010 | 0.009 | -33.950 |
| Threshold: $\bar{p} = 5$ | -0.015 | 0.009 | -37.968 |
| Threshold: $\bar{p} = 10$ | -0.034 | 0.047 | -59.000 |
| **Panel B: Same Reference Point (mean educ.)** | Sons | Daughters | T-Stat |
| Threshold: $\bar{p} = 1$ | -0.001 | -0.006 | 28.742 |
| Threshold: $\bar{p} = 3$ | 0.005 | -0.004 | 27.653 |
| Threshold: $\bar{p} = 5$ | 0.005 | -0.012 | 36.820 |
| Threshold: $\bar{p} = 10$ | 0.013 | 0.006 | 11.462 |

Note: T-test of statistical significance obtained through 300 bootstrap replications.
Same Reference Point refers to father's and mother's average education level.
Source: Authors' elaboration based on IFLS 1 and IFLS 5 data.