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Can ‘good’ social mobility news be ‘bad’ and vice versa?

Measurement (and downward mobility) pitfalls

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Abstract: Limited attention has been paid to how well social mobility measures debated and used to study industrial countries perform in analysis of low-income settings. Following brief, selective reviews of the axiomatic and econometric literatures, three mobility concepts illustrate how properties that appear innocuous in industrial country analysis become problematic when downward mobility includes descents into destitution. For origin-independence measures—the most widely used in research on developing countries to date—axiomatic propriety and cognizance of co-residency-induced and other more well-known sources of estimation bias are not enough. This paper adopts the term 'perverse fluidity' from sociology to define the estimate bias attributable to intergenerational poverty descents. Using simple experiments and data from India, poverty descents generate perverse fluidity biases in intergenerational regression and correlation coefficients of up to 50 per cent, suggesting that seemingly 'good' mobility news may be 'bad' and that mobility comparisons are more precarious than acknowledged so far.

Key words: intergenerational mobility, measurement, developing countries, destitution, perverse fluidity bias

JEL classification: D3, I2, I3, J6

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1 Introduction

Findings from intergenerational mobility research are typically sensitive to whether income, educational, or occupational mobility is considered and to the concept or measure of mobility used (Fields 2008). Unlike poverty and inequality measurement, which has been subjected to extensive scholarly scrutiny (e.g. Atkinson 1970; Cowell 1980; Foster et al. 1984; Shorrocks and Foster 1987), the properties of and how adequately social mobility measures perform when applied to the study of developing country settings remain comparatively unchartered research terrain.

The questions this knowledge gap raises include whether developing country settings are sufficiently different to warrant (a) a rethink of the axiomatic and other properties a social mobility measure ought to possess, along with (b) a careful examination of whether the social mobility measures that have been used to study developing countries have properties or satisfy axioms that appear *essential*. Answering (a) and (b) requires clarity and, ideally, a cataloguing of the strengths and limitations of the measures of interest, which, in turn, can help improve research practice and the quality of policy advice. The purpose of this paper is to provide direction and make some progress on each of these fronts.

The paper begins by noting a similarity between the empirical and the axiomatic literatures on social mobility: the focus on estimation bias in the former and a set of mathematical properties in the latter, with much less attention to whether and how features of low-income settings may interfere with estimation or could inform deliberations about essential properties. This is followed by brief, selective and non-technical reviews of these two branches of the literature.

Fields (2008) distinguishes between two broad and alternative approaches to axiomization: the social welfare-based approach (e.g. Atkinson 1980; Chakravarty et al. 1985) and the descriptive approach (e.g. Fields and Ok 1996, 1999). The descriptive approach can be understood to involve, as Cowell (2016) puts it, the setting out and defending, on a priori grounds, a minimal set of properties a measure of social mobility ought to possess. As suggested in the following, the descriptive approach can also be useful for reflecting on other properties.

For a descriptive approach, (a) can now be answered, first, by assessing the completeness of the axioms that have been proposed and, then, by reflecting on and identifying other essential properties a measure of intergenerational mobility ought to possess. Unlike the literature to date, these reflections will be guided by examples from a nationally representative dataset from India. To answer (b), one option is to run through the gamut of social mobility measures. The more selective and pragmatic route taken here is informed, instead, by a measure's perceived relevance as captured by empirical applications using developing country datasets to date.

Following condensed and selective reviews of the econometric, the axiomatic, and the other literature addressing properties, Section 3 uses three of the six concepts of mobility considered by Fields (2008)—relative, share, and flux mobility—to illustrate how properties that appear innocuous when studying industrial countries may turn problematic in the analysis of developing country settings. Section 4 then asks whether a fourth concept of mobility, origin-independence (see Fields 2019), with measures that are the most widely used for researching developing countries, embodies similar frailties.[1] Confirming that they do, we follow Emran and Shilpi (2019) and discuss alternative and more robust mobility measures.

2 Econometric, axiomatic, and other approaches: a brief review

As discussed by Emran and Shilpi (2019), a large body of work in economics has been concerned with estimation and with the *econometric* challenges encountered in intergenerational income or earnings mobility research (Solon 1999; Black and Devereux 2011).[2] The intergenerational income elasticity (IGE) is the standard summary measure in studies and comparisons of intergenerational mobility in the United States, Western Europe, and other parts of the industrialized world. In its simplest form,

$$lny_2 = \beta_0 + \beta_1 lny_1 + u_i \tag{1}$$

where y_1 and y_2 represent parental and offspring earnings (typically for father–son pairs) and β_1 is the IGE. The sensitivity of IGE estimates to measurement errors in parental earnings or income and the attenuation bias this results in has been widely discussed (Solon 1999; Black and Devereux 2011; Emran and Shilpi 2019), with the main revision to past practice being to replace single with multiple and sequential earning observations to improve proxies for 'permanent income'.[3] Although data limitations, the prevalence of household-based agricultural production, informality, and other contextual features make income-based analysis of intergenerational mobility in low-income settings a much harder task, not enough effort has been devoted to discerning whether and how developing country ground realities may interfere with estimation.[4]

A similar argument extends to discussions of essential properties—addressed mainly in the axiomatic literature which, drawing on the literature on inequality, has focused on core mathematical properties of measures of (income) mobility, with limited attention to whether developing country contexts may affect and should inform deliberation efforts.

In his discussion of the Hart index, Shorrocks's (1993) starting point is the Galtonian model given by

$$lny_{t+1} = \alpha_t + \beta_t lny_t + \epsilon_{t+1} \tag{2}$$

[1] These origin-independence measures are known as variants of the Hart measure in the axiomatic literature (Shorrocks 1993) and as the intergenerational regression coefficient (IGRC) and the intergenerational correlation coefficient (IGC) (e.g. Emran et al. 2017; Emran and Shilpi 2019; Azam 2015) in the econometric literature.

[2] The econometric and axiomatic literatures have mainly focused on income mobility.

[3] To illustrate the demanding threshold this sets, consider Corak et al.'s (2014) comparison of Canada, the United States, and Sweden which is based on 30-year earnings data for Swedish and 5-year earnings data for Canadian fathers. Such data are simply not available for developing countries. Notice, also, that Chetty et al. (2014) found limited IGE estimate sensitivity to the number of years used to measure income.

[4] See Iversen et al. (2019) for a more detailed discussion. An important exception, discussed later, is Emran et al.'s (2017) analysis of the estimation bias resulting from samples restricted to co-resident parent–offspring pairs in developing country datasets.

It is evident that when t=1, and t_1 and t_2 denote Generation 1 and 2, β_t mirrors the IGE in Equation (1). In his forensic examination and comparison of the Hart index[5] with the Shorrocks and the Maasoumi–Zandvakili indices, Shorrocks (1993) focuses on income and the generically desirable properties of a social mobility index: the discussion of desired properties is informed by deliberations on inequality indices and includes, for example, universal domain, continuity (in incomes),[6] population, and time symmetry and normalization, but also clarity about the conditions under which an income or other structure A will have more mobility than an alternative structure B. The discussion also touches on an analogue of the Pigou–Dalton condition for mobility analysis.

Of the twelve axioms considered, the Hart measure embodies nine. This does not, as Shorrocks (1993) is careful to point out, imply an endorsement of the Hart measure since no effort was made to classify axioms as essential or to rank the axioms in order of importance. A key point is that the axiomatic properties of what Fields (2019) denotes as measures of origin-independence are well-known and seemingly adequate.

While Shorrocks (1978, 1993) and other contributions use a parsimonious approach, the remainder of this paper will borrow the simple and intuitive two-period framework proposed by Fields and Ok (1999) and Fields (2008) to highlight some of the systematic problems developing country contexts introduce to social mobility research. Their starting point is population distribution vectors $\mathbf{x}=(x_1, x_2, \ldots x_n)$ and $\mathbf{y}=(y_1, y_2, \ldots y_n)$ where the same units are followed over time and where Period 1 or, as interpreted here, Generation 1 units, are ordered from lowest to highest: while Fields and Ok (1999) focus on income, the variable of interest could also be occupational or educational attainment. A mobility measure that captures the transformation from Generation 1 to Generation 2 can then be generally represented by $m(x,y)$.

This framework can be used to make simple intergenerational mobility illustrations and to provide a first response to whether developing country contexts are sufficiently different.

3 Mobility concepts and properties: relative, share, and flux mobility

Here, relative,[7] share, and flux mobility are considered: inspired by Fields (2008), examples I–III are used and interpreted to represent intergenerational mobility profiles:

I: (1,2)–(1,2)

II: (1,2)–(2,4)

III: (2,4)–(4,8)

[5] A suitable index, according to Shorrocks (1993), should be defined on the [0,1] interval, with 0 capturing complete immobility and 1 perfect mobility. While this interval works well for inequality and on first sight may appear attractive, the presence of downward mobility makes the 0 to 1 interval less suitable for a mobility measure (index).

[6] There are obvious differences between income and earnings, which are continuous variables, and the categorical variables used in occupational mobility studies, for example.

[7] As Fields (2019) makes clear, relative mobility has a variety of possible interpretations and uses.

Adding a developing country contextual feature, suppose that 1.5 represents the poverty line. Following Fields (2008), weak relativity can be defined by $m(\lambda x, \lambda y)=m(x,y)$ for all $\lambda>0$. Further, and for share mobility, Generation 1 shares for Units 1 and 2, respectively, will be given by

$$s_{11} = \frac{x_1}{x_1 + x_2}$$

and

$$s_{21} = \frac{x_2}{x_1 + x_2}$$

Finally, flux mobility can be represented as the sum of the absolute values of changes (or fluctuations) from Generation 1 to Generation 2.

For weak relativity, III=II>I, with no difference between III and II, in spite of Unit 1's poverty escape in II. For share mobility (here $s_{11} \neq s_{21}$), I–III all represent zero mobility profiles. Notice that share mobility can occur without changes in ranks: weak relative mobility can also occur without a rank change and through a narrowing of the gap. For flux, which captures the sum of absolute changes, III>II>I, since 6>3>0.

For sharper insights, consider the following intergenerational mobility profiles:

IV: (2,4)–(2,4)

V: (2,4)–(1,2)

VI: (4,8)–(2,4)

Share mobility delivers a similar zero mobility verdict. For weak relative mobility, V and VI are identical in spite of Unit 1's poverty descent in V. There are three important insights. First, and when comparing IV–VI for a developing country setting, profile IV, with rigidity and complete immobility, is the most favourable, in spite of the weak relative and share verdicts and the higher flux in V and especially in VI.[8] Rigidity, if secured by resilience to adverse downward mobility, could result from the presence of an effective social security system.

Second, if poverty escapes and descents are perceived as major mobility achievements or setbacks, relative and share mobility concepts (and measures) null out and will fail to register that 50 per cent of the population escapes poverty in II and descends into poverty in V. Flux, in the manner interpreted here, does not distinguish between upward and downward movements and will thus be indifferent between 50 per cent of the population descending into poverty and 50 per cent of the population escaping poverty. Third, these examples touch on the direction of movement and the fact that some concepts and measures may be described as direction neutral: direction

[8] Fields (2008) and Genicot and Ray (2012) argue similarly: the former distinguishes between directional and non-directional movement while the latter underscore the lack of ethical considerations in the equivalent of a flux-based indicator of income mobility.

neutrality may work in some parts of the distribution but become problematic for descents into destitution.[9]

3.1 Direction neutrality and levels: the problem of destitution

To close in on the relevance of direction neutrality, consider the following profiles:

VII: (3,4)–(3,3)

VIII: (1,2)–(1,1)

where VII and VIII represent occupational mobility in an industrial and a developing country setting, respectively: as for income, 1 represents the lowest occupational category.

For weak relative and for share mobility, the offspring generation will be relatively better positioned than the parent generation for Pair 1 and relatively worse for Pair 2, in both VII and VIII. For flux mobility, VII and VIII are identical. It is also evident that weak relative and share mobility may register positive mobility when all mobility events are poverty descents.

In an industrial country setting, VII could represent a situation of genuine offspring autonomy where the observed downward mobility captures a desirable feature of mobility or fluidity in society.

Instead, if you compare VII and IX, where IX is represented by

IX: (3,4)–(3,5),

valuing offspring autonomy makes it harder to claim that IX represents an improvement over VII. For flux, VII and IX are identical. An implicit and unstated direction neutrality property supports reasoning and appears reasonable and possibly even important in an industrial country setting.

Returning to the absolute and directional changes in VII and VIII, and while directions and flux are identical, it is much harder to claim that the occupational descent in VIII represents individual autonomy in the manner it might in VII. These simple examples illustrate that while it may be desirable for a mobility measure to embody a direction neutrality property in an industrial country setting, mobility measures that embody variants of this property may perform less well in a low-income setting (VII).

As Torche (2014) remarks, social mobility research on Latin America and other low-income contexts has typically—and often uncritically—been based on the transfer of methodological templates used to study industrialized country settings.

To further progress and shift the focus from stylized examples to the properties of the measures most widely used in studies of intergenerational mobility in developing countries, the empirical literature will now be briefly reviewed.

[9] It is evident that the onset of destitution in the analysis of occupational or educational mobility is more fuzzy than the threshold in expenditure or income-based analysis using a poverty line.

4 Intergenerational mobility in the Global South: a condensed review of the empirical literature

While empirical research on social mobility covering developing countries has gained momentum, the increasingly exacting income and earnings data standards set by research covering industrial countries, have compelled most scholars working on developing country data to restrict their analysis to educational or occupational mobility.[10]

4.1 Origin-independence (persistence) measures of intergenerational mobility

The bulk of research on developing countries has opted for one of the two pragmatic and favoured variants of Equation (1), which are firstly:

$$Y_1 = \beta_0 + \beta_1 Y_0 + u_i \tag{3}$$

where β_1 is the intergenerational regression coefficient (IGRC) and Y_0 and Y_1 capture parental and offspring educational or occupational attainments measured in levels.[11] The second variant, the intergenerational correlation coefficient (IGC), is given by:

$$\rho = \beta_1 \left(\frac{\sigma_0}{\sigma_1}\right) \tag{4}$$

where σ_0 and σ_1 are the standard deviations of education or occupational attainments in the parent and the child generation, respectively. Equations (3) and (4) overlap in the unlikely case of identical attainment dispersions in parent and offspring generations. Note that a cross-sectional rise in educational inequality from one generation to the next will enhance the social mobility estimate while a more compressed distribution of educational attainments in the child generation will have the opposite effect.

The main attraction of Equations (3) and (4) for developing country settings is that information about intergenerational educational or occupational attainment can be discerned from easy to implement retrospective questions in nationally representative household surveys. This ensures fewer and less severe quality and methodological concerns than data on earnings (Blanden 2013; Emran et al. 2017; Torche 2019). It is thus no coincidence that studies of intergenerational mobility in Latin America have relied extensively on retrospective survey questions (Torche 2014: 625).

Hertz et al.'s (2007) comparative analysis of educational mobility uses data from forty-two countries, including seven countries in Latin America, four in Africa and ten in Asia. They find particularly strong educational persistence in Latin America where the seven highest IGC estimates are concentrated: highest among these—and bottom in mobility terms—is Peru (0.66).

Emran and Shilpi (2015) study educational mobility among cohorts of young women and men in India and find progressively lower IGC estimates over time for women in urban areas and for

[10] Exceptions include the wage convergence analysis in Hnatkovska et al. (2012) and the income analysis in Bevis and Barrett (2015).

[11] While most developing country research has used data on fathers and sons, some studies average parental educational attainments (Hertz et al. 2007) or report estimates for both daughters and sons (Emran and Shilpi 2015). It is customary in Equation (1) to add age controls for lifecycle variations in earnings (Solon 1999) and to estimate Equation (2) separately by birth cohort (e.g. Hertz et al. 2007; Azam and Bhatt 2015) in order to discern changes over time.

individuals at the lower and upper rungs of the caste hierarchy. Between 1993 and 2006, the IGC for urban women declined from 0.593 to 0.508, which is interpreted as higher mobility and therefore encouraging. For the United States, Torche (2013) notes that the intergenerational status association for white men has typically been in the 0.30–0.45 range: for black men, associations are weaker and estimates less precise.

With respect to econometric challenges and axiomatic and other properties, the emerging literature has been particularly concerned with the former and with truncation and the sample selection bias that creeps in when analysing data restricted to father–son pairs who are co-habiting at the time of the survey: sons who have left their parental household to live nearby or for more distant migration are typically neither included nor traced.

As Azam and Bhatt's (2015) analysis using the India Human Development Survey I (IHDS-I) suggests, this co-residence restriction cuts feasible father–son comparisons dramatically, in their case by two-thirds. Emran et al. (2017), using two richer than usual datasets from Bangladesh and India, are able to pin down the estimation biases resulting from intergenerational information being available only for co-resident parent–offspring pairs. While IGRC-based analysis using co-resident data substantially inflates mobility estimates, the IGC bias is much less pronounced.[12]

There is also the occasional caveat about how IGRC and IGC estimates should be interpreted (e.g. Hertz et al. 2007). A startling outlier in Hertz et al. (2007) is rural Ethiopia in 1994. Educational progress from a low base of 0.12 years of average parental schooling contributed to the country's top educational mobility ranking, as measured by the IGC, among the 42 countries in the sample: the 0.10 IGC value puts Ethiopia well ahead of 'high mobility' countries like Denmark (0.30) and Finland (0.33). Accordingly, and while a summary measure of social mobility can be immensely valuable (Blanden 2013), the measure also needs to deliver meaningful and consistent verdicts.

Another requirement must be that the circumstances under which the measure performs well and less well are clearly understood and ideally catalogued. The Ethiopia example points to the possibility that IGRC and IGC sensitivity and interpretational concerns may be more pronounced in low-income settings. Another challenge is the presence of ceiling effects (World Bank 2018).

Given the predominance of origin-independence (persistence) measures in the analyses of intergenerational mobility in developing countries to date, it is worth reiterating that the discussion of the axiomatic properties of the Hart measure in Shorrocks (1993) extends to the IGE: while IGC or IGRC are occupation- or education-based, there will be overlaps for these, too. What is missing from the literature and which is considered next is whether these most widely used measures of intergenerational mobility possess the type of frailties discussed in Section 3.

5 Beyond axiomatic deliberation: the properties of origin-independence (persistence) measures

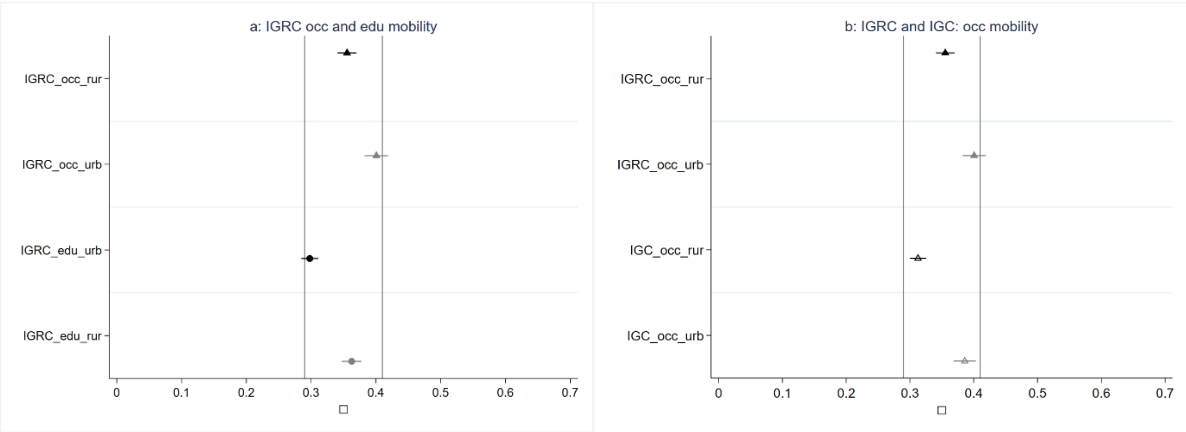
For the following examples, data on intergenerational occupational and educational mobility from the nationally representative India Human Development Survey II (IHDS-II, 2011–12) are used. The occupational mobility estimates are based on the six occupational categories in Iversen et al.

[12] For another example, focusing on estimate bias implications of the breakdown of the linearity assumption, see Cowell and Flachaire (2018).

(2017).[13] For the same father–son pairs, and to ensure comparability, six educational categories are introduced.[14]

Figures 1a and 1b report IGRC and IGC estimates for occupational and educational mobility for rural and urban India.

Figure 1: IGRC and IGC occupational and educational mobility estimates



Source: author's compilation based on the India Human Development Survey II (IHDS-II), 2011–12.

It is evident that the occupation and education mobility estimates are quite closely aligned, since coefficient values are all in the 0.29–0.4 range. In rural areas, the occupation and education IGRCs are effectively identical. Orthodoxly interpreted, these ordinary least square coefficient values are suggestive of high intergenerational mobility and resonate with recent empirical research (e.g. Jalan and Murgai 2008; Hnatkovska et al. 2012, 2013) where one message—for educational mobility—has been that India, compared with other countries, is doing better than expected (Jalan and Murgai 2008). The IGC occupational mobility estimates, included in Figure 1b, convey a similar verdict.[15]

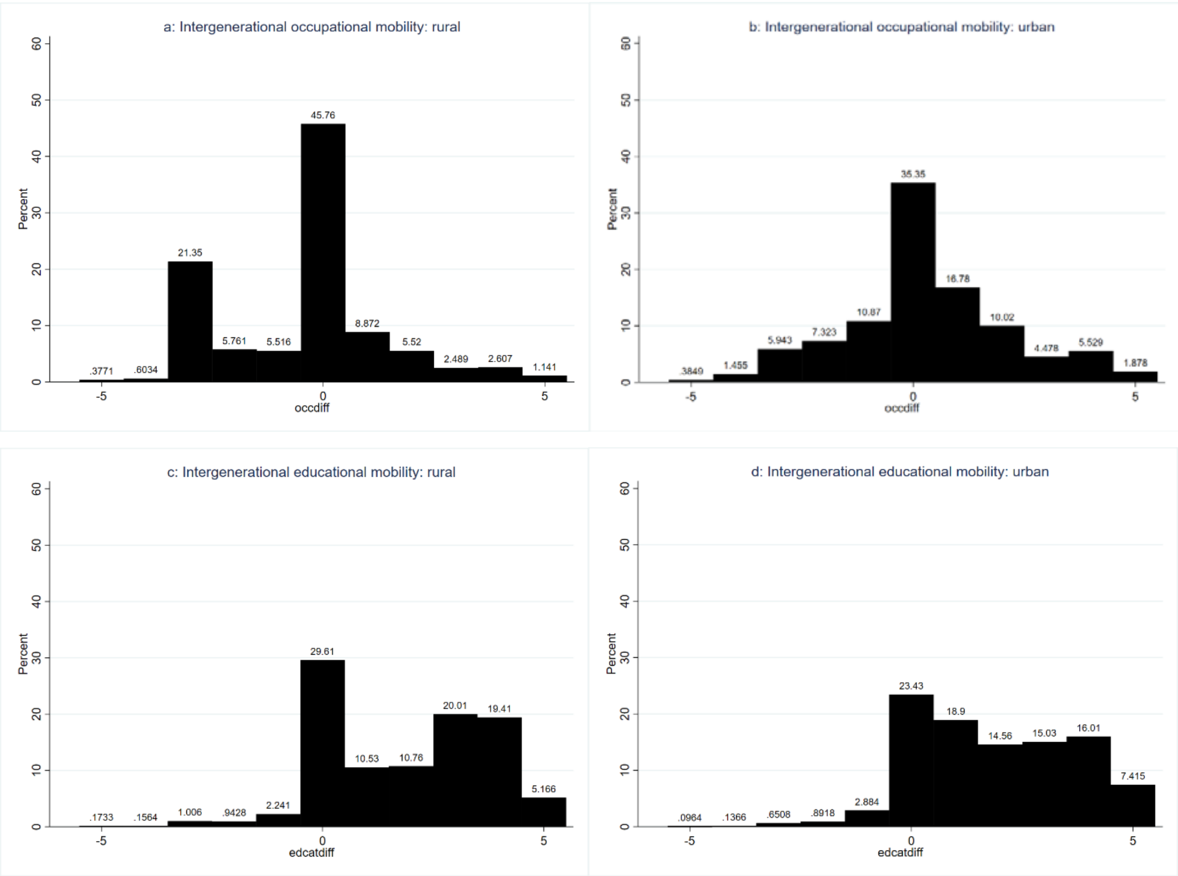
Turning, next, to the data, the *x*-axis variable in Figure 2 represents the difference between a son and father's occupational category for all father–son pairs: the histogram thus portrays the prevalence of absolute occupational persistence (the zero difference central bar) as well as the prevalence and order of magnitude of upward and downward mobility, separately for rural and urban areas for occupational and educational mobility.

[13] There are six occupational categories: (1) agricultural or other manual labourer, (2) lower status vocational occupations, (3) higher status vocational occupations, (4) farmers, (5) clerical and others, and (6) professionals.

[14] (1) no schooling, (2) 1–2 years of schooling, (3) 3–4 years of schooling, (4) 5–8 years of schooling (5) 9–12 years of schooling, and (6) above 12 years of schooling. Other categories may be preferable: this is just an example.

[15] The conclusion for educational mobility is similar.

Figure 2: Absolute difference in the occupational and educational attainments of father–son pairs, by rural and urban location



Source: author's compilation based on IHDS-II, 2011–12.

Starting with rural occupational mobility and absolute persistence, the central bar shows that 45.8 per cent of rural sons 'inherit' their father's occupational category. It is also evident that downward mobility afflicts 33.7 per cent of father–son pairs and strongly dominates upward mobility (the remaining 20.6 per cent of the sample): put differently, downward mobility accounts for about 62 per cent of all rural mobility events. In the urban sample, absolute persistence is lower, with 35.4 per cent of sons in the same occupational category as their father. In stark contrast to rural areas, upward mobility clearly dominates downward mobility: 38.7 per cent of urban sons are in a higher and 25.9 per cent of urban sons in a lower occupational category than their father. About 60 per cent of urban mobility events are thus ascents. In spite of these compelling contrasts, the IGRC and IGC coefficient values suggest either on par (IGRC) or greater mobility in rural India (IGC). For education, in Figures 2c and 2d, urban mobility is again higher with 23.4 per cent of sons in the same educational category as their father: the corresponding figure for rural areas is 29.6 per cent. For education, the image of progress—consistent with, for example, Maitra and Sharma (2009) and irrespective of whether rural or urban areas are examined—is unambiguous and overwhelming: in rural and urban areas, 93.6 and 93.8 per cent of all intergenerational educational mobility events are ascents. There are, however, few signs of these stark contrasts in the IGRC and IGC estimates.

Table 1 summarizes these observations, disaggregated by type of mobility and by rural and urban. The first two rows report the intergenerational mobility ranking using IGRC and IGC coefficient values: the subsequent rows provide a summary for different mobility indicators along with a ranking to indicate consistency, or lack thereof, in the rankings suggested by the IGRC, the IGC, and each individual indicator.

Table 1: Intergenerational occupational and educational mobility in India

	Rural		Urban	
	Education	Occupation	Education	Occupation
IGC	1	2	3	3
IGRC	2	3	1	4
Father–son pairs with mobility (% of *n*)	70.5 (2)	54.2 (4)	76.6 (1)	64.6 (3)
Father–son pairs with ascents (% of *n*)	65.9 (2)	20.6 (4)	71.9 (1)	38.7 (3)
Father–son pairs with descents (%)	4.5 (1)	33.6 (4)	4.7 (1)	26.0 (3)
Net mobility (ascents–descents)	61.4 (2)	–13.0 (4)	67.2 (1)	12.7 (3)
Average ascent	2.97 (1)	2.13 (3)	2.7 (2)	2.11 (3)
Average descent	–1.91 (2)	–2.54 (4)	–1.64 (1)	–1.97 (2)

Source: author's compilation based on the India Human Development Survey-II (IHDS-II), 2011–12.

Summarizing, Table 1 suggests (i) that educational mobility is unambiguously positive and associated with dramatically fewer setbacks than occupational mobility; and (ii) urban occupational mobility is more pronounced and associated with fewer setbacks than rural occupational mobility. Indeed, and whether total mobility, net mobility (downward mobility dominance captured by a negative sign), average ascents, or average descents are considered, the rankings across educational and occupational mobility consistently favour educational mobility.

Against this backdrop, educational mobility is captured seemingly well by the above measures, while the occupational mobility estimates are intriguing. The IGC, favoured for its robustness to co-residence truncation (Emran et al. 2017), is also vulnerable. The rural occupational mobility estimate is particularly problematic, suggesting more rural occupational mobility than urban occupational and educational mobility. To close in on the foundation of these inconsistencies, the discussion returns to mobility concepts and poverty descents.

An intriguing insight from Section 3 is that a mobility concept (or measure) may register a poverty descent as increased mobility. While fluidity is regularly interpreted as a quality of an open society—over some ranges of a distribution as in the directional neutrality discussion above—descents into destitution can be interpreted as a particularly repugnant variant of what sociologists call 'perverse fluidity' (e.g. Goldthorpe and Mills 2004) and which occurs if members of a marginalized group are less able than others to retain a high parental occupational achievement for their offspring.[16] Here, reference is made to the proposed variant of perverse fluidity as the 'destitution property' of a social mobility measure, which can be defined as follows:

> *The destitution property*: A son's (or daughter's) descent into poverty should not increase intergenerational mobility.

The starting point, in the following examples, is the initial value for the main measure of interest, given by $IGRC_0$ or IGC_0. In each example, a change in a son's occupational category is introduced and the IGRC or IGC response to this change reported. The bottom occupational category—agricultural and manual labourers—is used as proxy for a condition of poverty and destitution: a marginal descent from occupational category 2 to 1 should, if the destitution property is satisfied, not increase intergenerational mobility. The first examples, in Table 2, capture marginal descents into poverty from a low initial base: the IGRC and IGC response to a marginal poverty descent is a reduction in social mobility. This is not sufficient to rule out a violation of the destitution property and the possibility of a sizeable perverse fluidity bias.

[16] See Heath and Zwysen's (2018) discussion of Hout's (1984) work on African Americans with reference to children of immigrants in the European Union and Iversen et al.'s (2017) similar observations for Scheduled Castes in India.

Table 2: IGRC and IGC value responses to a marginal poverty descent

	Example 1
IGRC	*Marginal descent* $(x_1, 2)–(y_1, 2) \rightarrow$ $(x_1, 2)–(y_1, 1)$ 0.347756 ↑ 0.347866
IGC	$(x_1, 2)–(y_1, 2) \rightarrow$ $(x_1, 2)–(y_1, 1)$ 0.308115 ↑ 0.308184

Source: author's compilation based on IHDS-II, 2011–12.

What are the IGRC and IGC responses to a son experiencing a moderate (−3 occupational categories) or large (−5 occupational categories) descent into poverty?

For the Table 3 examples, both the IGRC and the IGC violate the destitution property: the longer the fall, the more pronounced the *positive* intergenerational mobility response for both measures. While a manual occupation may be rational and voluntary choice in a high-income environment, a long-distance poverty descent is hard to construe as plausibly voluntary. The destitution property is thus violated and both the IGRC and IGC have a frailty that can undermine the meaningfulness, accuracy, and comparability of social mobility estimates from developing country settings.

Table 3: IGRC and IGC value responses to moderate and large descents

	Example 2	Example 3
IGRC	*Moderate descent* $(x_1, 4)–(y_1, 4) \rightarrow$ $(x_1, 4)–(y_1, 1)$ 0.347756 ↓ 0.347407	*Large descent* $(x_1, 6)–(y_1, 6) \rightarrow$ $(x_1, 6)–(y_1, 1)$ 0.347756 ↓ 0.34604
IGC	$(x_1, 4)–(y_1, 4) \rightarrow$ $(x_1, 4)–(y_1, 1)$ 0.308115 ↓ 0.307801	$(x_1, 6)–(y_1, 6) \rightarrow$ $(x_1, 6)–(y_1, 1)$ 0.308115 ↓ 0.306724

Source: author's compilation based on IHDS-II, 2011–12.

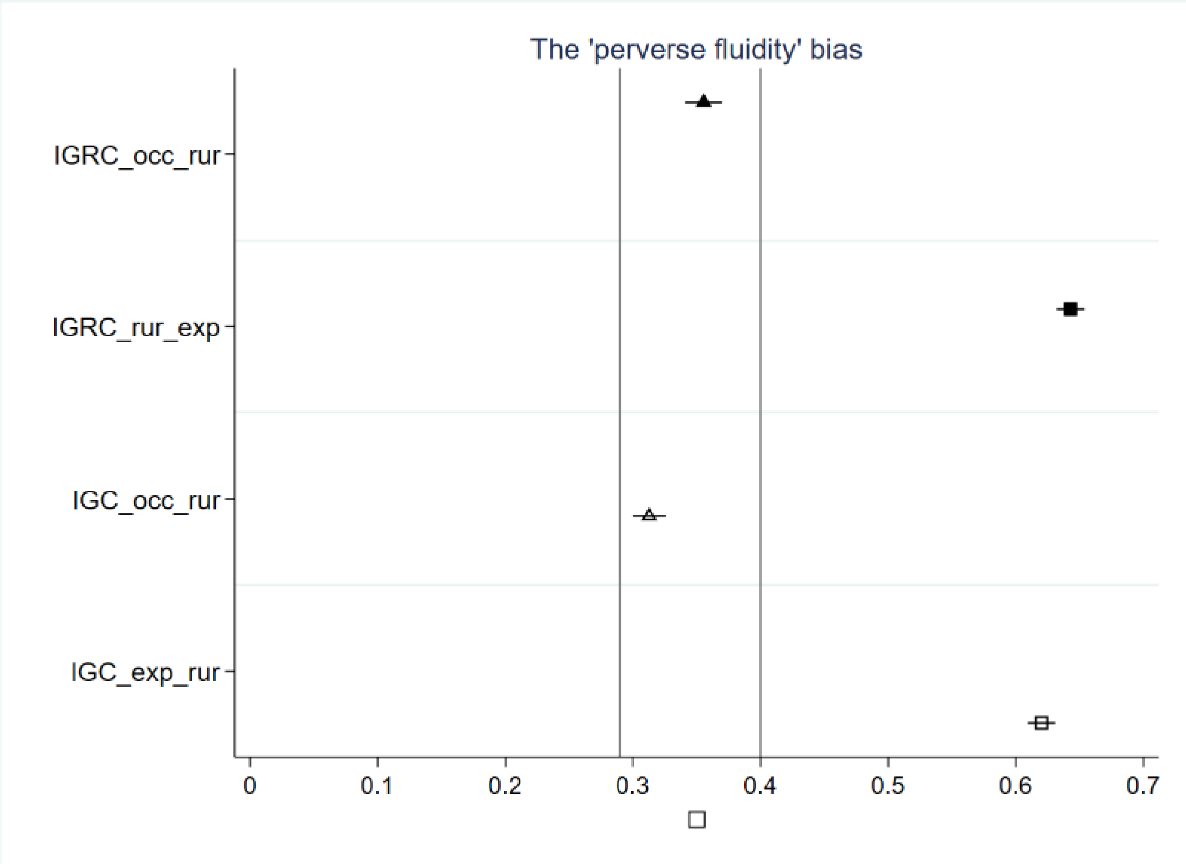
To make further progress, more clarity about the severity of this frailty is required. For a precise answer, a simple experiment is implemented. To estimate the perverse fluidity bias attributable to moderate poverty descents in the study dataset, a counterfactual is constructed with no poverty descents for the large subset of father–son pairs where the father is a farmer.

The results of this experiment are reported in Figure 3. Coefficients are organized pairwise with the original (e.g. IGRC_occ_rur) first followed by the experimental equivalent represented by IGRC_rur_exp. The horizontal distance shows the downward perverse fluidity bias attributable to moderate poverty descents. For rural areas, and irrespective of whether the IGRC or the IGC is considered, the perverse fluidity bias is non-trivial: the moderate poverty descents in the data reduce the IGRC coefficient from 0.64 to 0.36, that is, by an order of magnitude of 44 per cent, while the IGC coefficient value is reduced from 0.62 to 0.31 and thus by 50 per cent.[17]

[17] Using the equivalent of Emran et al.'s (2017) definition of bias, that is, [(*IGRC_rur_exp*–*IGRC_occ_rur*)×100)/*IGRC_occ_rur*], the IGRC bias is 77.8 per cent, while the IGC bias is 100 per cent.

While the IGC is less vulnerable to co-residence truncation (Emran et al. 2017), it is more sensitive to poverty descents than the IGRC here. Not surprisingly, the impacts on urban estimates (not reported) are negligible.

Figure 3: IGRC and IGC 'perverse fluidity' biases



Source: author's compilation based on IHDS-II, 2011–12.

Turning to directional neutrality, Example 1 (in Table 2) shows that poverty descents from a low base reduce mobility: although not shown here, a marginal ascent out of poverty increases mobility. For the main origin-independence measures, the directional neutrality concerns flagged in the discussions of relative, share, and flux mobility, do not, therefore, afflict marginal upward and downward mobility from a low, initial base.

Two counterparts to the destitution property—the weak and the strong poverty escape property—can be formulated as:

> *The weak poverty escape property*: A son's (or daughter's) poverty escape should not reduce intergenerational mobility.
>
> *The strong poverty escape property* embodies the weak, but adds that starting from the same base, a larger out-of-poverty ascent should generate a positive mobility effect at least as large as a marginal ascent.

As Example 4 in Table 4 shows, a large ascent exerts a stronger downward pull on the IGRC and IGC values than a marginal ascent (not shown here). In the middle of the distribution, directional neutrality kicks in, for both the IGRC and the IGC. The main concern, as the comparison in Table

4 makes clear, is a directional neutrality variant that differs from that afflicting mobilities in Section 3.

Table 4: IGRC and IGC responses to large ascents and descents

	Example 4	Example 3 repeated
	Large ascent	*Large descent*
IGRC	$(x_1, 1)$–$(y_1, 1) \rightarrow$ $(x_1, 1)$–$(y_1, 6)$	$(x_1, 6)$–$(y_1, 6) \rightarrow$ $(x_1, 6)$–$(y_1, 1)$
	0.347756 ↓ 0.346636	0.347756 ↓ 0.34604
IGC	$(x_1, 1)$–$(y_1, 1) \rightarrow$ $(x_1, 1)$–$(y_1, 6)$	$(x_1, 6)$–$(y_1, 6) \rightarrow$ $(x_1, 6)$–$(y_1, 1)$
	0.308115 ↓ 0.306993	0.308115 ↓ 0.306724

Source: author’s compilation based on IHDS-II, 2011–12.

The relevant frailty of both the IGRC and the IGC is their direction neutrality for large (or moderate) ascents and descents. While the strong poverty escape property is satisfied for both measures, large out-of-poverty ascents and poverty descents have proximately similar effects on mobility. In fact, a large poverty descent registers with a more positive effect on mobility than a large out-of-poverty ascent in the examples in this study. This can be summarized in the directional asymmetry property:

> *The directional asymmetry property*: Poverty escapes and mirror image poverty descents should not have comparable, positive effects on intergenerational mobility.

How damaging are these IGRC and IGC frailties in practice? In the Indian dataset, the impacts on urban occupational mobility and educational mobility estimates are negligible since few moderate and large descents prevent a serious perverse fluidity bias in estimation. In rural areas, in contrast, and as seen, the high prevalence of descents from farmer to agricultural labour occupational status results in sizeable IGRC and IGC perverse fluidity biases.

Further insights about the relevance of the perverse fluidity bias can be found in the descriptive statistics reported by Alesina et al.’s (2019) pathbreaking analysis of educational mobility in Africa. Alesina et al. (2019) define downward intergenerational educational mobility as the failure to complete primary education by offspring of literate parents. Such downward mobility may be interpreted as an educational parallel to the occupational poverty descents observed for rural India. For countries like Zambia, Kenya, and Malawi, the overall prevalence of downward educational mobility has been high, with Alesina et al. (2019) reporting downward mobility incidence of 26.6, 24.6, and 50 per cent, respectively. For some conflict-affected areas, the numbers are around 50 per cent (Rwanda, Sierra Leone); for others such as South Sudan, they are much higher (83 per cent).[18]

How significant is this in practice? The IHDS data can be used to illustrate the impacts of downward educational mobility parallels to the poverty descents observed in the occupational data. In this example and in contrast to above, we now use years of schooling for fathers and sons as dependent and independent variables. For the rural sample, the initial IGRC coefficient is about 0.45. Introducing moderate, intergenerational descents—from years 6 and 7 for fathers to zero for sons, for 3.3 per cent of the observations in the estimation sample—the IGRC coefficient drops

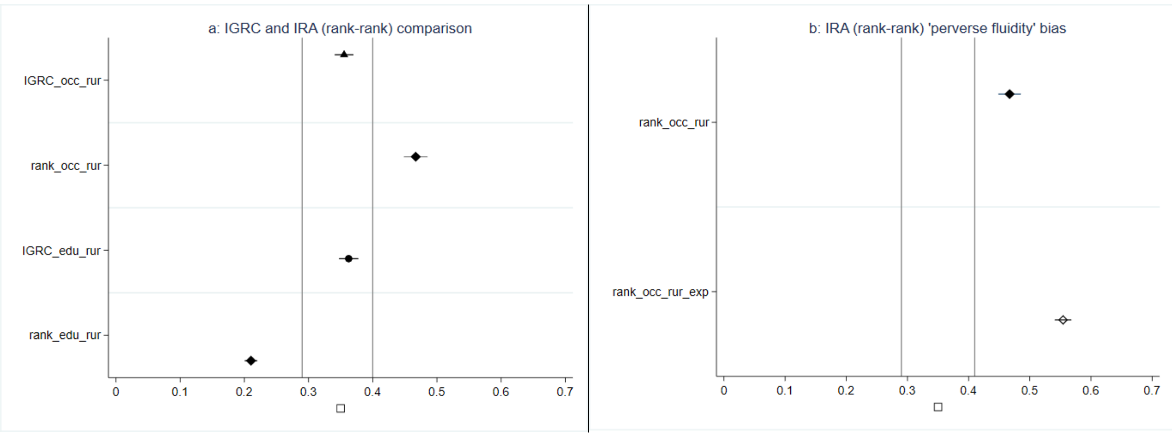
[18] These estimates cover the decades before 2000.

to 0.298 or by about 34 per cent [or 52 per cent using the Emran et al. (2019) method, see footnote 17], which provides strong, additional support to the above arguments.

5.1 An alternative

As Emran and Shilpi (2019) discuss in depth, the co-residence frailties of the IGRC and the IGC (e.g. Azam and Bhatt 2015; Emran et al. 2017) indicate the usefulness of supplementing analysis with alternatives, such as sibling correlations (Emran and Shilpi 2015). As the above analysis brings to the fore, regression-based measures have other frailties that become particularly pressing in developing country contexts. Drawing on Emran and Shilpi (2019), an important question is whether the rank–rank measures, introduced by Dahl and DeLeire (2008) and discussed and developed by Chetty et al. (2014), handle poverty descents more reassuringly. Using the present study's dataset, the overall performance of rank–rank measures is examined, first by comparing the intergenerational rank association (IRA) with IGRC rural occupational and educational mobility coefficient estimates and then by examining the IRA vulnerability to the presence of moderate poverty descents: for this, the IRA perverse fluidity bias is estimated.[19] The results are reported in Figures 4a and 4b.

Figure 4: Rank–rank comparisons



Source: author's compilation based on IHDS-II, 2011–12.

Unlike the IGRC and IGC, the IRA appears to capture the difference between and the essence of occupational and educational mobility patterns in an intuitive and 'consistent with the data' manner: educational mobility is high (0.21), while occupational mobility is moderate (0.46). For the IRA, the perverse fluidity bias is, also, as Figure 4b shows, much lower (0.55–0.46) and of an order of magnitude of about 15 per cent.[20]

6 Concluding remarks

With some important exceptions (e.g. Shorrocks 1993; Fields 2008; Cowell and Flachaire 2018), the literature addressing the axiomatic and other properties of social mobility measures remains underdeveloped. Drawing on the analysis of inequality, early work focused on the axiomatic

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[19] Following Dahl and DeLeire (2008), the parent and offspring variables are their percentiles in the distributions of parent and offspring occupational or educational attainments.

[20] The bias equivalent to Emran et al. (2017) is 19.6 per cent.

properties a social mobility measure ought to embody. Assessing the Hart measure, an origin-independence measure of social mobility, Shorrocks (1993) is agnostic about the importance and ranking of the axioms and properties that he considers. Crucially, the most widely used measures for studying developing country contexts to date, the IGRC and IGC, have much in common with the Hart measure with axiomatic properties that may therefore be considered known.

Echoing Torche (2014), a major motivation for this paper is the limited attention paid to how well or how inadequately social mobility measures that have been used and discussed mainly in relation to industrial countries perform in the analysis of low-income settings. Using Fields and Ok's (1996) simple conceptual framework and three of the six mobility concepts discussed by Fields (2008), the paper first illustrates how properties of relative, share, and flux mobility, seemingly unproblematic in the study of industrial country settings, become less innocuous in the presence of descents into destitution. The present study draws on these insights to scrutinize the properties of the IGRC and IGC and find that being home and dry axiomatically and cognizant of the implications of co-residency-induced and other well-known sources of estimation bias (Emran et al. 2017) does not mean that all is well.

Using occupational and educational mobility data from a nationally representative dataset for India, this study shows that while the IGRC and IGC occupational and educational mobility estimates in Figures 1a and 1b align closely, the mobility patterns (Figure 2 and Table 1) underpinning these estimates are strikingly different: for rural areas, and unambiguous educational progress and significant occupational setbacks notwithstanding, the IGRC and IGC occupational and educational mobility estimates are close to identical.

To explicate these apparent inconsistencies, this study focuses on the directional neutrality and destitution properties of social mobility measures. The former captures the notion of fluidity as a quality of an open society and echoes the idea that origin-independence may involve mobility in both directions. However, in contexts where poverty descents are commonplace, a directional neutrality property can be very damaging.

As the examples illustrate, the IGRC and IGC respond appropriately to marginal poverty escapes: both measures also possess the weak and strong poverty escape property. In contrast, and while moderate and large poverty descents capture origin-independence consistently, these descents also violate the deprivation property. For rural occupational mobility, perverse fluidity biases of 44 and 50 per cent in the IGRC and IGC coefficient estimates are attributable to moderate poverty descents.

This exceeds, for example, the co-residence biases reported in Emran et al. (2017). For the directional asymmetry property—which requires that *a poverty escape and a mirror image poverty descent do not generate comparable, positive intergenerational mobility responses*—satisfying the strong poverty escape property (large ascents generate a positive social mobility response) and the moderate descent violation of the deprivation property implies that the directional asymmetry property is violated for large upward and moderate and large downward mobility.

For inter-country and other comparisons, this is damaging: as the simple experiments above demonstrate, the IGRC and IGC coefficient estimates in the 0.6–0.7 range may represent mobility patterns preferable to estimates in the 0.3–0.4 range, since the former, in these experiments, entail favourable rigidity which could reflect, say, that an effective social security system prevents offspring from descending into poverty. At the same time, these IGRC and IGC frailties have a negligible impact on the estimates for urban occupational mobility and educational mobility in the Indian dataset. In the two latter cases, there are too few moderate and large descents in the dataset for a serious perverse fluidity bias to creep in and distort estimation. As the paper also shows, downward educational mobility patterns of a kind and order of magnitude that trigger perverse fluidity bias concerns have been commonplace in Africa (Alesina et al. 2019).

Finally, and drawing on Emran and Shilpi's (2019) discussion, this study examines whether rank–rank measures outperform the IGRC and IGC. To start with, and for both occupational and educational mobility (Figure 4a), the IRA appears to distinguish the contrasts in mobility patterns more intuitively and effectively than the IGRC and IGC. Also, for occupational mobility IRA is less vulnerable to the perverse fluidity bias than the other two measures.

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