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IZA DP No. 17407

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Kelly J. Liu
University of Basel

Alois Stutzer
University of Basel and IZA

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ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

The Role of Social Mobility Experience in Zero-Sum Beliefs

In today's world where growth and capital accumulation are the norm, many people still adhere to zero-sum thinking, the belief that gains for one party can only come at the expense of another party. The perception of economic exchange as zero-sum can lead to excessive competition and uncooperative behavior. We investigate social mobility as a driver of zero-sum beliefs by leveraging worldwide survey data and recently published data on intergenerational educational mobility. We find that a higher probability of experienced downward mobility in an individual's cohort and education group is associated with increased zero-sum beliefs. Consistent with gender-specific status concerns, experienced downward mobility only strengthens zero-sum beliefs for men.

JEL Classification: D83, Z13

Keywords: zero-sum, social mobility, intergenerational mobility, belief formation, gender norms

Corresponding author:
Alois Stutzer
University of Basel
Faculty of Business and Economics
Peter Merian-Weg 6
4002 Basel
Switzerland

E-mail: alois.stutzer@unibas.ch

1 Introduction

The portrayal of economic exchange as being positive sum in Adam Smith's "Wealth of Nations" has not convinced everybody. Many people seem to see the economic realm as primarily zero-sum – where one party's gain or success signifies an equivalent loss or failure for another party (e.g., Chinoy et al., 2023; Roberts and Davidai, 2022; Różycka-Tran et al., 2015). These zero-sum beliefs promote a mindset that emphasizes competitive rather than cooperative outcomes (e.g., Chernyak-Hai and Davidai, 2022; Kakkar and Sivanathan, 2022; Sirola and Pitesa, 2017). Accordingly – whether appropriate or not – people might be more susceptible to a political rhetoric that refers to the notion of a fixed pie. Such a perspective is, for example, frequently invoked in debates around immigration, international trade, and structural change. If no added value or surplus is expected through exchange, agreeing on openness or reforms is correspondingly more challenging and may put social cohesion at risk.

Taking as given that beliefs about the nature of exchange being zero- or positive-sum matter for people's decisions (for a general account of beliefs, see Molnar and Loewenstein, 2022), we ask where these beliefs come from. Specifically, we study the prominent idea that people tend to form zero-sum beliefs when their experiences are such that they feel threatened and perceive the world as one with limited resources (Harinck et al., 2000; Roberts and Davidai, 2022). People are especially prone to such beliefs when the threat holds personal consequences or involves high stakes. In modern societies, these experienced threats might relate as much to status as to actual material conditions (e.g., Erikson and Goldthorpe, 1992). In order to capture them, we focus on experienced social mobility. Moving down socio-economically is likely perceived as a threat to one's social standing and fosters the sense of scarce resources in an environment where not everyone is able to get their deserved share, increasing the belief in a zero-sum world. In contrast, moving upward is not threat-enhancing and may even counteract zero-sum thinking by bringing to mind that growth is possible.

In our analysis, we consider absolute social mobility in terms of educational attainment of children vis-à-vis their parents. In this regard, in many places around the world people's experience in the twentieth century was characterized by educational upward mobility (see, e.g., Breen and Müller, 2020). However, people in recent generations have more often also experienced a stagnation or even a downward mobility in their educational position relative to their parents, an experience that will likely affect even more people in the future when there is less growth in demand for high (formal) educational qualification. For our analysis, we can rely on recently published data of the World Bank on intergenerational educational mobility to calculate a new measure for the experienced social mobility within an individual's peer group, referring to people with the same level of education born in the same decade.

This allows us to capture people's learning from experience when they adopt a more egotropic view and draw conclusions about the world from their own experience or that of their peer group. The same data also allows us to compile a measure of observed social mobility at the aggregate level, capturing a possible sociotropic perspective in people's formation of beliefs. Using this, we can go beyond the scope of the so far limited empirical evidence provided by Chinoy et al. (2023), who survey a subsample of US residents and find a negative association between economic upward mobility and zero-sum thinking.

Furthermore, in the empirical study we consider that social mobility substantially differs between women and men across countries and over time. This is important because up- and downward mobility might also differently affect women's and men's formation of beliefs. In fact, under traditional gender norms, men's status is much more closely tied to educational attainment than it is for women. Accordingly, downward mobility is also expected to be a bigger threat for men than for women. Our data allows us to test this differential prediction.

We find that a higher probability of experienced downward mobility in an individual's cohort and educational group is associated with increased zero-sum beliefs. In contrast, a higher probability of experienced upward mobility is not systematically linked with zero-sum beliefs when the alternative is achieving the same educational level as one's parents. Furthermore, the results suggest that people do not seem to incorporate concerns about the overall mobility in society but focus on the mobility experience in their cohort and educational group. Finally, consistent with gender-specific status concerns, experienced downward mobility only strengthens zero-sum beliefs for men.

The remainder of this paper is organized as follows. In Section 2, we provide a brief account of the literature to which we contribute. Section 3 describes the theoretical foundations and derives the subsequent hypotheses. The empirical strategy is discussed in Section 4. Results are presented in Section 5 and discussed in Section 6.

2 A Brief Account of Zero-Sum Beliefs

2.1 The emergence of zero-sum beliefs

Evolutionary psychology proposes that zero-sum beliefs originally emerged as an evolutionarily dominant strategy in ancestral small-scale human societies whose sparse surrounding more closely resembled a true zero-sum environment (Boyer and Petersen, 2018; Foster, 1965). The image of the limited good would enhance monitoring of resource distribution within the group and possibly increase defense mechanisms against outside aggressors, thus benefiting the whole group. Moreover, individuals who were more concerned about others gaining at their expense were likely to be more attentive to who won and who lost, making sure they

did not receive less than others, resulting in an evolutionarily advantageous position within the resource-limited environment (for a recent review, see Davidai and Tepper, 2023). From this perspective, zero-sum beliefs can be viewed as artifacts of an evolutionarily dominant strategy that may still prevail today, even though the specific environment may not be truly zero-sum.[1]

However, this evolutionary approach can only account for the prevalence of zero-sum beliefs in general, but not the observed heterogeneity among people revealing this kind of thinking in certain situations. Accounting for the evolutionary emergence, empirical research was concluded into a framework where zero-sum beliefs are adopted as a cognitive default in situations under (perceived) threat and (perceived) resource scarcity. Thus, even in modernized societies where growth and capital accumulation is possible and in fact reality, similar forces that enhance (perception of) threat or resource scarcity are likely to elicit default zero-sum beliefs in people, and heterogeneity in the experience of these forces may explain variation in such beliefs in the population.

Against this background, zero-sum beliefs are studied within two more or less separate concepts. On the one hand, the general zero-sum belief represents the belief about how social, economic and ecological interactions play out, i.e., an overall idea of "how the world works". Various studies have shown that people adopt this generalized view that one party can only gain at the expense of others when there are desired scarce resources to be distributed across different settings (e.g., Roczniewska and Wojciszke, 2021; Różycka-Tran et al., 2015). Indeed, people tend towards this general cognitive view even when the situation is not zero-sum, exhibiting the so-called "fixed-pie bias" (Bazerman and Neale, 1993; Bazerman et al., 1985; Meegan, 2010). On the other hand, domain-specific zero-sum beliefs are operationalized as the belief about the rules that govern interactions within a specific system. Research focusing on these context-specific zero-sum beliefs has revealed that zero-sum beliefs need not be an overarching view of how the world works, but can emerge differently within disparate contexts such as international trade (Roberts and Davidai, 2022), immigration (Louis et al., 2013), educational grades (Meegan, 2010), relations regarding ethnicity (Smithson et al., 2015), race (Norton and Sommers, 2011), gender (Kuchynka et al., 2018; Ruthig et al., 2017; Sicard and Martinot, 2018), as well as social status (Andrews-Fearon and Davidai, 2023) and romantic relationships (Burleigh et al., 2017; Cunningham et al., 2022). It remains a largely open question whether and how these two concepts of zero-sum beliefs are related and possibly

[1] However, the subsequently derived hypothesis that people stemming from a more egalitarian ancestor population still hold stronger zero-sum beliefs in the present than do their counterparts from a non-egalitarian ancestry does not find empirical support (Sarti and Pelosi, 2023). Similarly, experimental evidence reveals that the perception of exchange as a win for one party and loss for the other does not increase when the exchange more closely mirrors ancestral environments (Johnson et al., 2022).

interact with each other within a person. Arguably, the exposure to (perceived) threat and/or limited resources can foster both general and domain-specific zero-sum beliefs.

2.2 Threat and limited resources as fuels for zero-sum beliefs

The feeling of threat is likely to arise in situations where own interests are at risk, making people more prone to zero-sum beliefs when the stakes are personal and/or high (Harinck et al., 2000; Roberts and Davidai, 2022). In fact, numerous studies have shown that people belonging to high-status groups (e.g., white Americans, men, residents) often perceive their status under threat and feel that low-status groups (racial minorities, women, immigrants) are gaining at their expense (e.g., Esses et al., 2001; Kuchynka et al., 2018; Wilkins and Kaiser, 2014; Wilkins et al., 2015). Moreover, this mechanism can explain differences in findings on the association between political ideology and zero-sum beliefs. Whereas belief in a zero-sum world has been associated with people identifying as conservatives (Wilkins et al., 2015), recent findings by Davidai and Ongis (2019) show that both conservatives and liberals adopt zero-sum views depending on the issue at hand. This is no contradiction when considering that conservatives feel more threatened when the status quo is at risk, while liberals feel threatened when their ability to instigate change is challenged.

Unfavorable economic conditions such as low GDP that increase the sense of resource scarcity have been linked to enhanced zero-sum beliefs (Różycka-Tran et al., 2015). Interestingly, real scarcity does not need to be present, simply perceiving resources as limited can foster zero-sum beliefs (Meegan, 2010). Accordingly, misperceptions, such as the "lump of labour" fallacy, or feelings of relative deprivation that stem from upward social comparisons are likely to stimulate these beliefs (Esses et al., 1998; Ongis and Davidai, 2022). In contrast, experiences of economic growth or coming from an upwardly mobile family in terms of relative income might ameliorate the formation of zero-sum beliefs (Chinoy et al., 2023). Furthermore, research indicates that zero-sum beliefs can be attenuated when people are more knowledgeable or are prompted to think about the issue at hand in a broader or more long-term framework, i.e., zero-sum beliefs can be overridden by deliberation (Bhattacharjee et al., 2017; Caplan, 2001; Johnson et al., 2022).

2.3 Consequences of zero-sum beliefs

Zero-sum beliefs have been linked to adverse effects at both the personal and the societal level. Intrapersonally, these beliefs have been associated with more negative affect and lower life satisfaction (Różycka-Tran et al., 2021). Those who hold zero-sum beliefs often see society as unjust and distrust societal institutions (Andrews-Fearon et al., 2021; Różycka-Tran et al.,

2015). In interpersonal interactions, strong zero-sum beliefs can increase the risk of overlooking opportunities for mutually beneficial cooperation (Davidai et al., 2022), reduce willingness to help others in the workplace (Chernyak-Hai and Davidai, 2022; Kakkar and Sivanathan, 2022; Sirola and Pitesa, 2017), and even promote aggression and domination in status-related scenarios (Andrews-Fearon and Davidai, 2023).

These adverse effects extend to intergroup relations and potentially create division along various dimensions of society. For example, viewing race relations as zero-sum significantly contributes to the denial of racism among white Americans, which then leads them to withhold support for equality-enhancing actions (Eibach and Keegan, 2006; Wellman et al., 2016). Endorsing especially domain-specific zero-sum beliefs can lead to the marginalization of minority groups and also result in lower support for gender-equity policies (Kuchynka et al., 2018) or increased demand for anti-immigration policies (Davidai and Ongis, 2019). Yet, considering society in general, evidence indicates that zero-sum views are correlated with concern about inequality (Davidai and Ongis, 2019) and support for redistribution in terms of wealth (Chinoy et al., 2023; Schaube and Strang, 2023).

On a broader scale, countries with prevalent zero-sum beliefs tend to allocate more resources to military spending, permit fewer civil liberties, and demonstrate weaker commitment to democratic institutions (Różycka-Tran et al., 2015, 2019). It is therefore important to consider not only personal but also aggregate societal consequences of zero-sum beliefs, especially since it has also been shown that holding such beliefs about national conflicts is associated with reduced willingness to compromise (Maoz and McCauley, 2005).

2.4 Social mobility and beliefs

The literature on social mobility and the shaping of beliefs has largely concentrated on its impact on beliefs about inequality or an "unjust world" and related political attitudes such as preference for redistribution. For example, Mijs et al. (2022) leverage survey data to show that subjectively experienced upward mobility is associated with a stronger belief in a meritocratic system, where individual abilities and efforts are rewarded. Relatedly, the theoretical literature posits that through a form of attribution bias, often coined as self-serving bias, upwardly moving individuals may ascribe their success more to their own skills and effort, whereas downward moving individuals tend to blame external economic and institutional conditions for their socio-economic descent, thus leading to heterogeneous effects on demand for redistribution. In line with this, there is ample evidence suggesting that (perceived) upward

mobility decreases support for redistribution, while downward mobility increases demand for redistribution (Alesina and La Ferrara, 2005; Guillaud, 2013; Soclife and Schmidt, 2011).[2]

It has also been acknowledged in this literature that the extent to which people are aware of their own mobility experience plays a crucial role in the formation of beliefs. Indeed, it may not be the objective social mobility but the subjective mobility experience that shapes individuals' view of the world.[3] Moreover, Day and Fiske (2017) show through experimental manipulation that overall social mobility framed as being low reduces people's belief in a meritocratic world, which leads to reduced defense of the overarching system. While the framing did have an influence on people's personal perceived social mobility, the personal dimension alone could not explain the effect, pointing to a role for *aggregate* social mobility in the formation of beliefs.

The existing literature studies the connection between social mobility and political attitudes such as demand for redistribution by referring to the channel of perceived fairness/inequality and the resulting desire to insure against risks. The present project opens up for consideration an alternative mechanism that emphasizes the impact of social mobility on people's zero-sum beliefs about the world which then potentially shape political attitudes.

3 Theoretical Foundation and Hypotheses

3.1 Intergenerational mobility and the formation of zero-sum beliefs

Intergenerational mobility can be a boon in material terms if it is upward, but a threat if it is downward. Importantly, intergenerational mobility also carries status consequences, as parents are an important reference point when individuals assess their own situation (Cohen, 1987; Kurer and Van Staalduinen, 2022). People who find themselves with a lower social status compared to their parents may feel "betrayed by the system" and perceive others as a threat to their own position along various dimensions such as material welfare, educational attainment, occupational prestige or social standing. Moving downward could foster the perception that resources are limited and others are gaining at one's own expense, which results in stronger zero-sum beliefs (Davidai and Tepper, 2023). Symmetrically, we would expect up-movers to have less pronounced zero-sum beliefs. People doing better than their

[2] However, there are also conflicting findings provided by Clark and D'Angelo (2013) and Jaime-Castillo and Marqués-Perales (2019), who do not observe a consistent correlation between social mobility and preference for redistribution.

[3] Assessing the exact relationship between these two is hindered by the fact that concurring information on both objective and subjective mobility is often not available in the data. While some studies suggest that actual and perceived social mobility are generally well-correlated (e.g., Gugushvili, 2019; Soclife and Schmidt, 2011), other datasets reveal quite high proportions of respondents misperceiving their own mobility (e.g., Weber, 2023).

parents probably do not feel as threatened regarding their position in society and may even conclude from their ascent that growth is possible and resources are not limited, leading to a weaker zero-sum view of the world.

When it comes to the formation of beliefs about the determinants of one's own achievements, there is potentially another important mechanism, the self-serving bias (see, e.g, Deffains et al., 2016). It refers to people's tendency to ascribe their success to internal factors such as their own abilities and effort, but to blame external factors for their failures. This bias attenuates any effect on zero-sum beliefs for upward mobility but reinforces any positive effect for downward mobility. The present analysis, however, does not allow identification of this bias. Note also that it remains unclear what the starting point is for an individual's zero-sum beliefs. Children may grow up engaging in competitive behaviors such as fighting for the biggest piece of the (literal) birthday cake or attention from parents, but are later taught through the educational system about the opportunities in a positive-sum world. Alternatively, parents may actively instill in their children beliefs centered on the merits of cooperative behavior from an early age. Indeed, various scenarios are conceivable. Our proposed framework, however, focuses on potential changes in zero-sum beliefs, allowing us to formulate hypotheses irrespective of the specific genesis of these beliefs.

3.2 Gender differences

The expansion of female educational attainment in the past few decades has led to vastly increasing absolute mobility for women around the world, with girls in the later cohorts experiencing higher upward mobility than boys in high-income economies and a rapidly closing gap in developing economies (Narayan et al., 2018). Thus, in light of the differential development of educational mobility between males and females, it is firstly important to take into account potential heterogeneity in experienced intergenerational mobility regarding gender. Secondly, as we try to capture an objective assessment of the mobility that a child experiences, we also have to choose a reference standard. Gender role identification theories and the principles of social learning advocate a framework wherein individuals are posited to emulate the behavior and aspirations of their same-gender parent (e.g., Wood and Eagly, 2012). Moreover, cultural norms across a multitude of societies uphold and propagate distinct expectations for males and females, leading to an environment in which cross-gender comparisons may not readily occur (Eagly and Wood, 1999). Accordingly, we start from the premise that daughters are more likely to compare themselves with their mother than with their father, while sons focus on comparing their own social standing with what their father achieved. Therefore, a daughter that achieves a higher socio-economic standing than her mother although not surpassing her father is likely to still see herself as experiencing upward

mobility. The same experiences of intergenerational mobility, however, are not expected to matter equally for women and men. Under traditional gender norms, women's status is less strongly related to educational achievements than that of men. Therefore, educational downward or upward mobility is also expected to affect women's zero-sum beliefs less.

3.3 Egotropic and sociotropic concerns

When people form beliefs and learn from experience, these experiences likely go beyond the self. Regarding social mobility, it is not (only) the individual experience but also the perception of how people "like me" move up and down, or even people overall, that affects zero-sum beliefs. First of all, people may see their own experience as a noisy proxy for the "true" underlying mobility and thus regard the mobility experienced by the majority of society as more informative for learning about the "true functioning of the world". Secondly, social identity theory suggests that individuals identify with larger groups (e.g., social class, ethnicity, nationality) such that they form their beliefs by the perceived experience of these groups (Tajfel and Turner, 1979). In fact, the literature in social psychology and specifically that on the formation of political attitudes and beliefs emphasizes the interplay between egotropic factors, which refer to individual-level considerations, and sociotropic factors, which pertain to society at large. For example, Kinder and Kiewiet (1981) demonstrated early on that besides individuals' own economic well-being, sociotropic concerns such as the nation's economic condition may partly shape voters' political attitudes and behavior in elections.

We focus on experienced social mobility within an individual's peer group, referring to people of the same gender with the same level of education and born in the same decade. This captures people's learning from experience when they adopt a more egotropic view and draw conclusions about the world from their own experience or that of their peer group. As a complement, we consider observed social mobility at the aggregate level capturing a possible sociotropic perspective in people's formation of beliefs.

3.4 Hypotheses

Based on these considerations, we formulate three hypotheses:

H1: A higher probability of experiencing downward mobility in a cohort and education group is associated with increased zero-sum beliefs, whereas a higher probability of experiencing upward mobility is associated with reduced zero-sum beliefs.

H2: A higher probability of downward mobility in society overall is associated with increased zero-sum beliefs, whereas a higher probability of upward mobility in society is associated with reduced zero-sum beliefs.

H3: A higher probability of experiencing downward (upward) mobility in a cohort and education group is associated with increased (reduced) zero-sum beliefs for men but less so for women.

4 Data and Empirical Strategy

4.1 Zero-sum beliefs

The measure for zero-sum beliefs of individuals relies on a question included in four waves of the World Values Survey (WVS), a large-scale research project that examines people's values and beliefs around the world (Haerpfer et al., 2022). Specifically, in waves 2, 3, 5 and 6 of the WVS, surveyed in the years 1990-2014, respondents were asked to place their own view on an integer scale from 1 to 10, where 1 is total agreement with the statement "People can only get rich at the expense of others" and 10 is total agreement with the statement "Wealth can grow so there's enough for everyone".[4] The respondent's answer was taken as a measure of their propensity to believe that the world is zero-sum, with 1 being the most zero-sum. Figure 1 shows the weighted distribution of answers in each wave.

While most of the answers lie around the middle of the scale, there is visible bunching at the two extremes, with a considerable share of people exhibiting strong zero-sum beliefs. The resulting dataset includes data from 68 countries worldwide, i.e., 27 high income economies, 38 middle income economies and 3 low income economies, with a total of 106,270 observations. To mitigate the concern that young people may not yet have completed their education, only respondents aged 25 and above are included.[5]

The WVS data does not include direct measures to infer individual experienced mobility. However, it can be linked to another worldwide dataset on aggregated mobility measures. The following subsections introduce the dataset and show how it can be used to approximate an individual's experienced mobility of his or her cohort in the country.

[4] The zero-sum variable was encoded as E041 in the Integrated Values Survey (IVS), which is a composition of all the waves of the two surveys World Values Survey (WVS) and European Values Study (EVS). E041 was elicited in WVS waves 2, 3, 5, 6 and EVS wave 2; however, due to missing recordings of education in EVS wave 2, only the four WVS waves could ultimately be included in our analysis.

[5] Several mismatches in the original data were manually corrected. These concerned chronological inconsistencies regarding year of birth, age and survey year. Upon inquiry at the WVS secretariat, survey year seemed to be most likely the erroneous variable. Thus, survey year was corrected where possible for a few country-wave combinations in order to dispose of most of these inconsistencies. The details are documented in the Appendix.

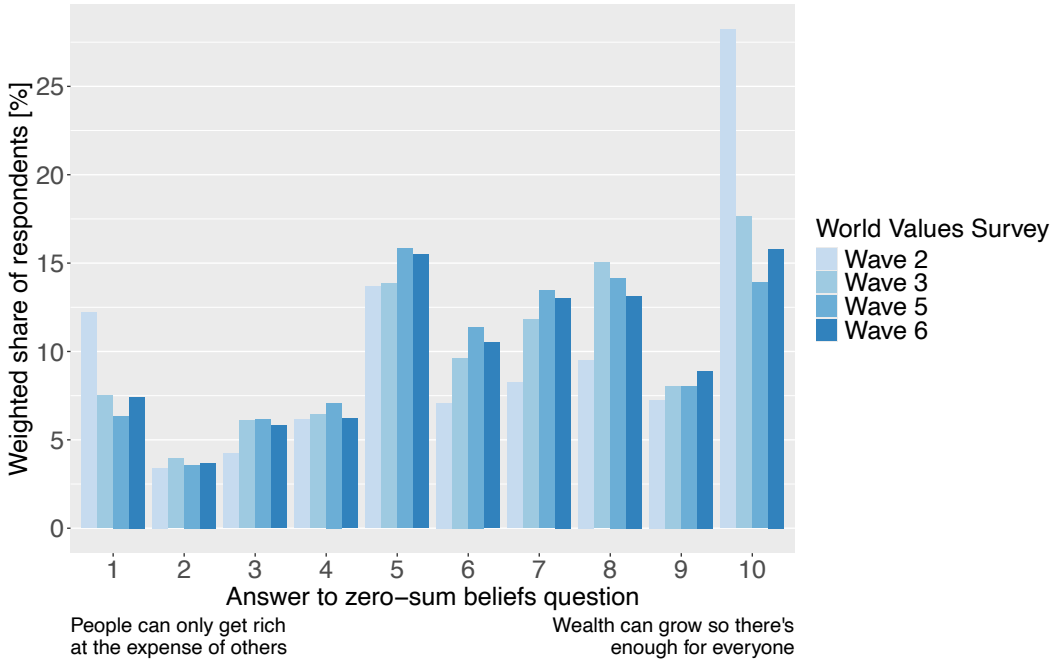

Figure 1 — Zero-sum beliefs from four waves of the WVS. Distribution of answers to the zero-sum beliefs question in the World Values Survey (WVS) waves 2, 3, 5 and 6. 1 corresponds to total agreement with "People can only get rich at the expense of others" and 10 to total agreement with "Wealth can grow so there's enough for everyone". Answers are weighted to be nationally representative and equalizing sample size to 1,000 per country-wave (weighting variables S017 and S018, applied to all following analyses).

4.2 Intergenerational educational mobility as measure for social mobility

Social mobility has been conceptualized as both intra- and intergenerational mobility. Intra-generational mobility seeks to capture fluctuations in socio-economic standing throughout a person's lifetime. Intergenerational mobility on the other hand focuses on the changes in social and economic status between different generations within families, measuring the extent to which upbringing and family background matter in determining children's outcomes. As the former requires long-term panels that are often not available, the literature tends to focus on intergenerational mobility. The latter can be assessed by exploiting cross-sectional data and does not rely on costly individual-level longitudinal designs. In the present analysis, we also focus on intergenerational mobility as a measure of absolute social mobility. Comprehensive data on intergenerational mobility from around the world has only become available in 2023 through the "Global Database of Intergenerational Mobility" (GDIM) published by the World Bank (2023). This dataset gathers measures of educational mobility between parent and child generations. The focus on education rather than other common dimensions of status such as

income for measuring mobility relies on two main advantages of education: Firstly, data on education is more widely available. Secondly, unlike income, the level of education does not change once acquired, i.e., it is unlikely that lifecycle bias is introduced when the measure is elicited at a point in time (when it can be assumed that education is completed).

Education can arguably be regarded as the foundation for a measure of intergenerational mobility as it is an important aspect of human progress. Moreover, its importance is highlighted by the fact that it is also a strong predictor for lifetime earnings (Narayan et al., 2018). However, its limitations include the fact that educational data does not capture distortions in the labor market, such as to what extent good job opportunities are contingent on parental connections. In the GDIM, *quality* of education is also not considered, which could potentially reduce the reliability of the outcome variable as an indicator of the skills that determine a person's lifetime earnings (Narayan et al., 2018).

Furthermore, as van der Weide et al. (2024) highlight, using education as a mobility indicator poses methodological challenges, because educational outcomes are measured on a coarser scale than income, typically exhibit bunching and are bounded below and above. This means that there is a "flooring effect" in the lowest educational categories, which typically applies to low-income countries, where it is quite common that parents have no formal education at all. On the other hand, a "ceiling effect" in the highest educational categories is more likely to affect high-income countries, where especially in younger cohorts a substantial share of the population completes tertiary education. The ceiling effect is probably less of a concern, however, since the share of people achieving the highest education level remains a minority even in the richest countries. Overall, middle income countries should be least affected by these methodological drawbacks.

4.3 Intergenerational educational mobility from the GDIM

The "Global Database of Intergenerational Mobility" (GDIM) is made available by the World Bank (2023).[6] It is a rich dataset on intergenerational mobility in 153 countries, covering about 97% of the world population. The database includes detailed information on educational intergenerational mobility for 10-year cohorts from 1940 up to 1980, thus effectively covering people born in the years 1940-1989. The data originates from retrospective surveys that record educational levels of both respondents and their parents. The majority of the included surveys were conducted after 2010. This ensures that most respondents of the 1980s cohort have reached an age at which it can be assumed that they have completed their education. In countries where retrospective data is not available (39 out of 153), the database relies

[6] The database is explained in van der Weide et al. (2024) and accessible via `https://www.worldbank.org/en/topic/poverty/brief/what-is-the-global-database-on-intergenerational-mobility-gdim`.

on high-quality household surveys where respondents co-reside with their parents. However, since the decision to co-reside with one's parents may not be random, these observations may be subject to the so-called co-residency bias. Accordingly, we will not include co-resident data in our analyses, and, following recommendations by the authors, we will also exclude the 1940s cohort because of higher uncertainty in earlier data.

The GDIM harmonized education categories across the included surveys to correspond to five categories of highest completed education based on the International Standard Classification of Education (ISCED). The five GDIM levels thus are: 1 = less than primary (ISCED0), 2 = primary (ISCED 1), 3 = lower secondary (ISCED 2), 4 = upper secondary or post-secondary non-tertiary (ISCED 3-4) and 5 = tertiary (ISCED 5-8). Furthermore, the GDIM differentiates mobility measures for gender-specific parent-child pairings. In each intergenerational pairing, the parental anchor can either be father (*dad*), mother (*mom*), the maximum of the two (*max*) or the average of the two (*avg*). And the child can either refer to son (*son*), daughter (*daughter*) or the average of all children (*all*). In total, for each mobility measure, 12 possible pairings of parent and child are available. Based on this data, the GDIM offers aggregate measures that capture absolute upward mobility, such as the *CAT*, i.e., the probability of surpassing one's parents' education level.[7]

To test our hypotheses, we do not solely rely on the GDIM aggregate measures, however, but additionally construct our own more fine-grained mobility measures.[8]

4.4 Individual's mobility experience in their cohort and educational group

To approximate individual's mobility experience, we calculate for a respondent with a given educational level the probability that they moved down from higher educational levels and/or the probability that they moved up from lower educational levels. We do this for gender-specific pairings, i.e., *dad-son* pairing for males and *mom-daughter* pairings for females. The

[7] Conceivably, the probability of moving upward could vary greatly with educational level and across different income-level countries. For example, a high *CAT* in a high-income country is probably due to many people moving from the middle to the upper educational categories, while a high *CAT* in a low-income country would be more likely due to many people moving from the lower to the middle educational categories.

[8] These measures also markedly differ from the conventional mobility measures such as the widely used correlation coefficient *COR*. With the *COR*, it is unclear what exactly "low" or "high" intergenerational mobility means. The *COR* measures the linear correlation between children's and parents' outcomes (in educational intergenerational mobility, usually based on years of schooling), so it is a measure for intergenerational persistence, and *1-COR* is usually adopted as a measure of intergenerational mobility. However, when *1-COR* is low (i.e., *COR* is high), we do not know the nature of this high persistence, i.e., if it is caused by the majority of the children's generation staying in the same category as their parents or, rather, the majority of the children's generation actually moving up. In an extreme case, the entire children's generation achieves exactly one category higher educational attainment than their parents, creating a perfect positive linear correlation, which suggests low mobility in terms of relative educational mobility even though all of them experienced upward mobility in their absolute standing vis-à-vis their parents.

resulting measure can be interpreted as the education-level-specific likelihood of downward mobility or upward mobility, respectively, experienced by people of a given gender in a given cohort and country.

This probability can be calculated using Bayes' rule based on three types of information from the GDIM. First, the dataset provides a transition matrix with information on the distribution of children's educational level conditional on their parents' educational level. For example, the variable *tm12* denotes the share of children with the GDIM educational level 2 conditional on parents having GDIM educational level 1. Second, there is information on the distribution of parents' educational level in the population, so the transition matrix can be weighted by the relative share of parents with the corresponding educational level (here, level 1). And third, the dataset also provides the distribution of children's educational level in the population, so the weighted transition matrix can be divided by the relative share of children with the corresponding educational level (here, level 2). In this example, this would result in the relative share of people with educational level 2 whose parents had educational level 1, thus representing the relative share of "up-movers" in educational level 2. This can be computed for up-movers for all categories higher than 1 (lowest possible educational level, i.e., no up-movers) and for "down-movers" for all categories lower than 5 (highest educational level, i.e., no down-movers).

One caveat is that the educational data from the WVS used in this analysis apply a broader categorization of education with only three levels, where "lower" corresponds to GDIM levels 1-3, "middle" corresponds to GDIM level 4 and "upper" corresponds to GDIM level 5.[9] Consequently, to get the up-movers for WVS educational level "middle" ("upper"), all up-moving people in GDIM level 4 (5) with parents in GDIM levels 1-3 have to be aggregated, whereas for downward mobility, there is no distinction between moving down to GDIM level 1, 2 or 3. This three-level categorization means that we are bound to four different mobility values per cohort: downward mobility in educational level "lower" (*mobilityDOWN1*) and downward mobility in educational level "middle" (*mobilityDOWN2*), upward mobility in educational level "middle" (*mobilityUP2*) and upward mobility in educational level "upper" (*mobilityUP3*). The following formulas show how each of these measures is calculated from the information provided in the GDIM:

[9] There is a variable X025 in the WVS that captures educational levels on a more granular level (9 categories). However, the corresponding levels in the questionnaire cannot readily be translated into the ISCED 0-8 categorization and thus effectively cannot be mapped to the GDIM categorization, which is why the recoded education variable with three education levels (variable X025R) is considered in the analysis.

$$
\begin{aligned}
\textit{mobilityDOWN1} &= P(\text{down} \mid \text{child} \in \text{GDIM levels } \{1,2,3\})^{10} \\
\textit{mobilityDOWN2} &= P(\text{down} \mid \text{child} = \text{GDIM level } 4) \\
\textit{mobilityUP2} &= P(\text{up} \mid \text{child} = \text{GDIM level } 4) \\
\textit{mobilityUP3} &= P(\text{up} \mid \text{child} = \text{GDIM level } 5)
\end{aligned}
$$

where

$$
P(up \mid child = x) = \frac{\sum_{i=1}^{x-1} P(child = x \mid parent = i) P(parent = i)}{P(child = x)}
$$

$$
P(down \mid child = x) = \frac{\sum_{i=x+1}^{5} P(child = x \mid parent = i) P(parent = i)}{P(child = x)}
$$

For the regression analyses, the individuals' probability of downward mobility into the highest educational level and the upward mobility into the lowest educational level are set to zero.

4.5 Societal mobility

The *CAT* measure mentioned previously is an appropriate approximation for societal upward mobility. In the GDIM it is defined as the probability of surpassing one's parents' educational level conditional on parents not having tertiary education. Excluding parents with the highest educational level mitigates the ceiling effect. As the measure intends to capture the perceived mobility in society overall, a gender-invariant pairing is chosen, focusing on the pairing *max-all*, which compares the educational attainment of all children with the maximum of the parents. To have similar abbreviations, we will henceforth call this measure *mobilityUPsoc*.

However, there is no direct information in the GDIM on absolute downward mobility in society. *1-CAT* incorporates both the probability of staying at the same educational level as parents and the probability of ending up in a lower level than parents. Again, with the transition matrix we are able to construct the corresponding measure for downward

[10] This simplified representation is shown for intuition. The mathematically correct formula:
$\textit{mobilityDOWN1} = \frac{\sum_{j=1}^{3} \sum_{i=4}^{5} P(child=j|parent=i) P(parent=i)}{\sum_{k=1}^{3} P(child=k)}$

mobility: we simply sum up all shares of children with a lower educational level than their parents weighted by the corresponding share of parents in each educational level and put it into relation with the share of parents in educational levels above the lowest. The resulting *mobilityDOWNsoc* is thus the probability of ending up in a lower educational category than one's parents conditional on parents not having the lowest educational level. The corresponding formula is:

$$mobilityDOWNsoc \quad = \frac{\sum_{i=2}^{5} \sum_{j=1}^{4} P(child = i - j \mid parent = i) P(parent = i)}{\sum_{i=2}^{5} P(parent = i)}$$

4.6 Descriptive statistics

Table 1 presents summary statistics of the variables of interest in the dataset considered. *ZSB* are zero-sum beliefs normalized to lie between 0 and 1, increasing in zero-sum beliefs. *mobilityDOWN* is the education-level-specific probability of experienced downward mobility in the sample, where respondents with the highest education level ("upper") are assigned probability = 0. *mobilityUP* is the education-level-specific probability of experienced upward mobility, where respondents with the lowest education level ("lower") are assigned probability = 0. *mobilityDOWN1* and *mobilityDOWN2* denote the probability of experienced downward mobility conditional on being in education level 1 and education level 2, respectively. *mobilityUP2* and *mobilityUP3* denote the probability of experienced upward mobility conditional on being in education level 2 and education level 3, respectively.

The summary statistics show that, on average, the individual probability of experienced downward mobility (mean = 4.2%) is by a magnitude smaller than the probability of experienced upward mobility (mean = 56%). Similarly, at the societal level, downward mobility is lower than upward mobility. The sample is gender-wise reasonably balanced. Zero-sum beliefs are slightly more prevalent among men than women. Furthermore, the mobility measures show that downward mobility in individuals' cohort and education group is on average higher for men than for women, while the corresponding upward mobility is lower for men compared to women. As expected, the majority of people belong to the "middle" educational category. In the WVS, the variable income denotes the decile of the national distribution that an individual's household falls in, whereby for this analysis deciles 1 to 3 are grouped into income level "low", deciles 4 to 6 are grouped into income level "middle", and deciles 7 to 10 are grouped into income level "high".

The constructed measures reveal great heterogeneity in the development of downward and upward mobility across countries. In all, 55 out of 68 countries in the sample saw an

Table 1 — Summary statistics of main variables of interest

		Overall		Mean by gender	
Variable	N	Mean	St. Dev.	Female	Male
ZSB	106,270	0.405	0.302	0.398	0.414
Individual mobility					
mobilityDOWN	106,270	0.042	0.071	0.034	0.051
mobilityUP	106,270	0.564	0.346	0.570	0.557
mobilityDOWN1	21,657	0.042	0.094	0.115	0.135
mobilityDOWN2	56,638	0.063	0.069	0.050	0.072
mobilityUP2	56,638	0.687	0.240	0.737	0.683
mobilityUP3	27,975	0.749	0.155	0.825	0.747
Societal mobility					
mobilityDOWNsoc	106,270	0.158	0.110	-	-
mobilityUPsoc	106,270	0.588	0.168	-	-
Age	106,270	39.087	9.578	39.096	39.077
Gender					
Female	55,334 (52.1%)				
Male	50,936 (47.9%)				
Education					
1 = lower	21,657 (20.4%)				
2 = middle	56,638 (53.3%)				
3 = upper	27,975 (26.3%)				
Income					
low	33,268 (31.3%)				
middle	47,971 (45.1%)				
high	25,031 (23.6%)				

Data sources: World Values Survey (Haerpfer et al., 2022) and own calculations based on the GDIM from the World Bank (2023).

increase in individual downward mobility for both genders across the whole period of the four cohorts considered, while only about a third (24 countries) saw an increase in individual upward mobility in both genders over the same period. The statistics also show vastly different patterns for females and males. Regarding societal mobility, 26 out of 66 countries saw an overall increase in upward societal mobility, greatly but not completely overlapping with the 25 countries that saw an overall decrease in downward societal mobility in the same time. Detailed plots for each country can be found in the Appendix.

In sum, the two mobility measures differ not only by construction, but also capture different variation. While *mobilityDOWNsoc* is a measure of overall absolute downward mobility in the population and is the same for all respondents in a given cohort and country, *mobilityDOWN* is differentiated by gender and education level, so that it is the same for all respondents of the same gender in a given educational category as well as cohort and country. It is generally the case that when overall societal downward mobility is high, the education-level-specific downward mobility is more likely to also be high. Due to the differentiation of the latter, the two measures need not correlate perfectly, however. Indeed, the Pearson's correlation coefficient is only $\rho = 0.04$ for the two downward mobility measures and $\rho = 0.31$ for the two upward mobility measures, indicating that multicollinearity in the regression analyses will not be much of an issue. Additionally, the correlation between *mobilityDOWN* and *mobilityUP* within a respondent is low with ρ = -0.27. Though there is moderate linear correlation between *mobilityDOWNsoc* and *mobilityUPsoc* of ρ = -0.69, we show in additional regressions in the Appendix that excluding either of the two yields very similar results.

4.7 Econometric specification and control strategy

For the main analysis, we use multiple linear regressions to study the statistical relationship between downward and upward mobility and the dependent variable zero-sum beliefs. The latter lies between 0 and 1 and is increasing in zero-sum beliefs. To test *H1*, we estimate the following equation:

$$ZSB_{i,c,t} = \alpha + \beta_1 mobilityDOWN_{k,c} + \beta_2 mobilityUP_{k,c} + \mathrm{X}_{i,c,t}\mathcal{T} + \gamma_c + \delta_t + \epsilon_{i,c,t} \qquad (1)$$

where i denotes an individual, c a country, t a survey year, and k a cohort in the GDIM. *mobilityDOWN* is the probability of experienced downward mobility for an individual in a given country, cohort and educational level and of a given gender. Analogously, *mobilityUP* is the probability of experienced upward mobility for an individual in a given country, cohort

and educational level and of a given gender. X is a set of individual-level demographic controls such as gender, age, age squared, education level and relative income level. The main specifications include country fixed effects (γ_c) and survey-year fixed effects (δ_t) to account for time-invariant country heterogeneity and general changes in zero-sum beliefs over time. Standard errors are clustered at the country-cohort-gender-education level. This design allows us to exploit variation in mobility within-country across cohorts of peer groups and between-country within the same cohort of peer groups. Note that as is usually the case with estimations including age, period and cohort, the linear relationship of *age = period - cohort* does not allow distinguishing between general cohort and age effects (e.g., Bell, 2020; Fosse and Winship, 2019). *H1* predicts a positive coefficient for *mobilityDOWN* and a negative coefficient for *mobilityUP*.

To test hypothesis *H2*, we re-estimate equation (1), where for *mobilityDOWN* and *mobilityUP* we substitute *mobilityDOWNsoc* and *mobilityUPsoc*, respectively, which denote the societal downward and upward mobility for an individual in a given country and cohort. Standard errors are clustered at the country-cohort level. Then, to jointly test the hypotheses, we estimate the following equation with combined explanatory variables, where all aforementioned technical descriptions apply:

$$\begin{aligned} ZSB_{i,c,t} = \alpha + \beta_1 mobilityDOWN_{k,c} + \beta_2 mobilityUP_{k,c} \\ + \beta_3 mobilityDOWNsoc_{k,c} + \beta_4 mobilityUPsoc_{k,c} + \mathrm{X}_{i,c,t}\mathcal{T} + \gamma_c + \delta_t + \epsilon_{i,c,t} \end{aligned} \quad (2)$$

If the mobility perceived in society overall does not meaningfully influence the shaping of zero-sum beliefs, we expect a null effect for *mobilityDOWNsoc* as well as *mobilityUPsoc* in both specifications. If, however, societal mobility does play a systematic role in belief formation, the theoretical foundation would predict a positive coefficient for *mobilityDOWNsoc* and a negative coefficient for *mobilityUPsoc* on zero-sum beliefs. Note that by including the measures for societal mobility in the regression together with the individual mobility measures, we also control for a potential systematic correlation between societal and individual mobility that could drive results when *H1* and *H2* are tested. To test for gender differences according to *H3*, we estimate equations (1) and (2) separately for females and males. We expect the same signs for the coefficients as for *H1* and *H2*, but smaller in magnitude for females than for males.

5 Results

The two panels in Figure 2 visualize the variation of zero-sum beliefs in downward and upward mobility, respectively, across countries over cohorts. Zero-sum belief variation is depicted as the weighted average residual per country-cohort after accounting for time-invariant differences between countries and plotted against the corresponding weighted average of individually experienced downward (upward) mobility. While the left panel suggests that zero-sum beliefs increase with downward mobility, the right panel indicates a slightly negative association for zero-sum beliefs and upward mobility. These first descriptive observations are thus in line with the main hypothesis *H1*.

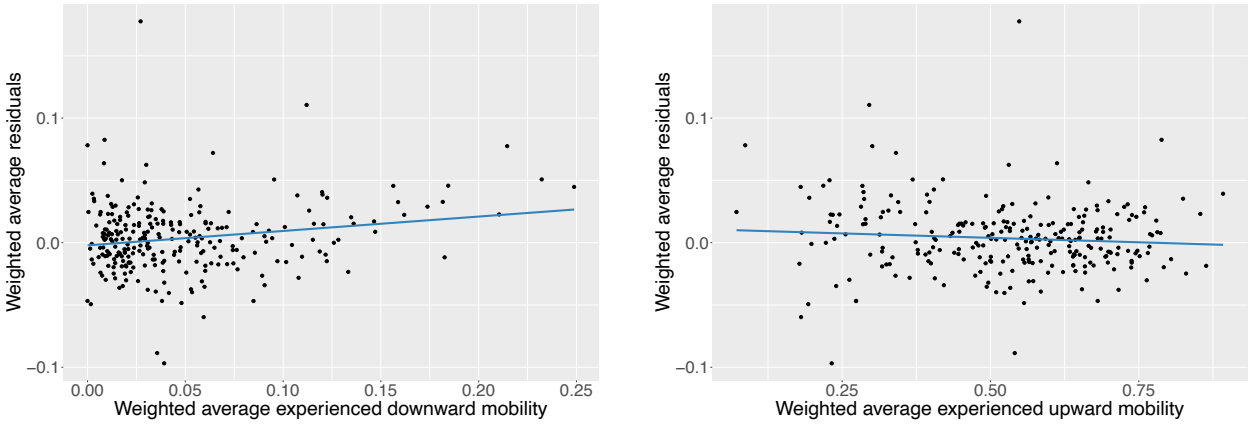

Figure 2 — Experienced mobility and zero-sum beliefs. Left panel: weighted average residuals of zero-sum beliefs net of country fixed effects in relation to weighted average experienced downward mobility for each country-cohort combination, calculated as mean of all respondents' education-level-specific downward mobility. Right panel: weighted average residuals of zero-sum beliefs net of country fixed effects in relation to weighted average experienced upward mobility for each country-cohort combination, calculated as the mean of all respondents' education-level-specific upward mobility.

5.1 Main results

Table 2 presents in columns (1)-(3) results from regression analyses for testing *H1*, *H2*, and *H1* and *H2* jointly, respectively. Column (1) indicates a statistically significant positive partial correlation between individual experienced downward mobility and zero-sum beliefs, and a non-significant slightly negative correlation for individually experienced upward mobility. In contrast, column (2) suggests that there is no systematic relationship between overall societal downward or upward mobility and individuals' zero-sum beliefs. These results persist when the different mobility measures are taken jointly into account in column (3), i.e., individually

experienced downward mobility has a statistically significant effect in that it is related to stronger zero-sum beliefs. The measured relationship is sizeable. For a ten percentage point higher probability of experienced downward mobility, individuals are, on average, 0.52 percentage points more likely to report that they totally agree with the statement "People can only get rich at the expense of others" rather than that they totally agree with the statement "Wealth can grow so there's enough for everyone".

The results furthermore confirm previous findings that women, on average, exhibit less zero-sum thinking than men, and that lower income (reference category: "high") is associated with more pronounced zero-sum beliefs. For an income in the category "low" (1st to 3rd decile in the national distribution) rather than in the category "high" (7th to 10th decile), people are, on average, 4.2 percentage points more likely to totally agree with the zero-sum perspective than to totally agree with the idea that "wealth can grow so there's enough for everyone". No such systematic relationship is observed for lower versus upper education in columns (1) and (3). This is in contrast to previous evidence that documented weaker zero-sum beliefs for more educated people (see, e.g., Carvalho et al., 2023), similar to column (2) when only societal mobility is controlled for. Our finding emerges when individual educational mobility is taken into account. Virtually no association between the educational level attained and zero-sum beliefs about wealth accumulation remains. We interpret this finding to suggest that it is not limited education per se, but rather the experience of not achieving as much as one's parents that drives the zero-sum view of the world.

In columns (4) and (5), we split the sample into female and male individuals to test *H3*, which postulates gender differences in the effect of mobility experience. The estimated coefficients reveal that the males are driving the correlation. While there is a significant positive relationship between individual downward mobility and zero-sum beliefs held by men, women show essentially no such relationship. This gender difference is statistically significant, as shown in the regression with an interaction term in the Appendix. Furthermore, material scarcity in terms of low income is particularly associated with more pronounced zero-sum beliefs for men and slightly less so for women.

Overall, the results support *H3*, suggesting that when experiencing downward mobility, primarily men translate this into increased zero-sum beliefs, while the formation of women's beliefs seems not to be systematically affected. Regarding the size of the effect, a male individual who experiences downward mobility (with probability 1) is predicted to express stronger zero-sum beliefs (i.e., a score of 1 rather than 10 on the original scale) with about a 7.0 percentage points higher probability compared to a situation with no such experience.

Henceforth, the gender-distinct equation (2) underlying columns (4) and (5) will be our main specification.[11]

5.2 Related beliefs

We consider a general belief that the world is zero-sum to be a rather fundamental aspect of an individual's mindset that might well form other (or lower-order) beliefs and (political) attitudes. Accordingly, we have not considered other beliefs as control variables in our main specification (in order to exclude a "bad controls" problem). However, we are still interested in understanding the sensitivity of the observed relationships to the inclusion of related beliefs. Table 3 shows the results. We observe that zero-sum beliefs are positively associated with the belief that success is determined by luck and connections rather than hard work, that competition is harmful rather than good as well as with the notion that incomes should be made more equal. Moreover, people with stronger zero-sum beliefs tend to feel that they have less control and freedom of choice over how their life turns out. When we control for these related beliefs, we find that the results of the main specification are very similar. Details on the survey questions are provided in the Appendix.

5.3 Gender attitudes

In hypothesis *H3*, we propose traditional gender norms as a driver of differential effects of experienced educational mobility on the formation of zero-sum beliefs in women and men. While the evidence reported in Table 2 is consistent with *H3*, attitudes towards women's and men's roles in society are not directly considered. In Table 4, we provide additional results that consider gender attitudes. Based on a further sample split, we test directly whether the relationship between experienced individual mobility and zero-sum beliefs is stronger for men who hold more traditional gender attitudes.

We rely on three survey items in the WVS that cover enough of our sample to be meaningfully considered for the analysis. These questions ask for agreement or disagreement with the statements "A university education is more important for a boy than for a girl." (asked in WVS waves 3, 5 and 6, with possible responses "agree strongly","agree","disagree" or "strongly disagree"), "When jobs are scarce, men should have more right to a job than women." (asked in WVS waves 2, 3, 5 and 6, with possible responses "agree", "disagree" or "neither") and "On the whole, men make better political leaders than women do." (asked in WVS waves

[11] In regard to recent findings of a negative relationship between early life experience of economic growth and zero-sum beliefs (Chinoy et al., 2023), we control for the average annual growth rate of GDP per capita during the first 20 years of an individual's life, i.e., for individuals in a given country and born in a given year. The above mentioned main results persist and are reported in the Appendix.

Table 2 — Intergenerational educational mobility and zero-sum beliefs

	Dependent variable: zero-sum beliefs				
	(1)	(2)	(3)	(4) female	(5) male
mobilityDOWN	0.052***		0.052***	−0.011	0.070**
	(0.019)		(0.020)	(0.031)	(0.028)
mobilityUP	−0.013		−0.014	−0.016	0.002
	(0.011)		(0.011)	(0.017)	(0.017)
mobilityDOWNsoc		0.010	0.005	0.001	0.021
		(0.048)	(0.048)	(0.064)	(0.052)
mobilityUPsoc		−0.007	0.005	−0.005	0.005
		(0.025)	(0.026)	(0.036)	(0.029)
income = low	0.042***	0.042***	0.042***	0.035***	0.050***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)
income = middle	0.030***	0.030***	0.030***	0.026***	0.035***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
gender = female	−0.012***	−0.014***	−0.012***		
	(0.002)	(0.002)	(0.002)		
education = middle	0.007	−0.004	0.008	0.009	−0.002
	(0.009)	(0.004)	(0.009)	(0.015)	(0.014)
education = upper	0.002	−0.014***	0.003	0.005	−0.011
	(0.011)	(0.005)	(0.011)	(0.018)	(0.016)
age	−0.002*	−0.002	−0.002	−0.001	−0.004*
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
age squared/100	0.002	0.002	0.002	0.001	0.004
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
country FE	X	X	X	X	X
survey-year FE	X	X	X	X	X
Observations	106,270	106,270	106,270	55,334	50,936
Adjusted R^2	0.069	0.069	0.069	0.067	0.072

*p<0.1; **p<0.05; ***p<0.01

Notes: The table reports OLS estimates. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples. Standard errors are clustered by country-cohort (except for column (1), where standard errors are clustered by country-cohort-gender-education-level). The omitted category for income is "high" and for education "lower".

3, 5 and 6, respond with "agree strongly","agree","disagree" or "strongly disagree"). We code agreement with either of the three statements as "traditional" and everything else as "progressive".

Table 3 — Intergenerational educational mobility and zero-sum beliefs: controlling for related beliefs

	Dependent variable: zero-sum beliefs							
	female	male	female	male	female	male	female	male
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mobilityDOWN	−0.016	0.064**	−0.015	0.073***	−0.009	0.063**	−0.011	0.064**
	(0.032)	(0.026)	(0.032)	(0.026)	(0.032)	(0.026)	(0.032)	(0.026)
mobilityUP	−0.011	0.004	−0.012	0.006	−0.018	−0.002	−0.015	0.0005
	(0.017)	(0.016)	(0.017)	(0.016)	(0.017)	(0.016)	(0.017)	(0.016)
mobilityDOWNsoc	0.012	0.018	0.008	0.005	0.023	0.028	−0.018	0.041
	(0.068)	(0.064)	(0.068)	(0.064)	(0.067)	(0.062)	(0.065)	(0.064)
mobilityUPsoc	−0.007	0.0001	−0.006	−0.005	0.003	0.016	−0.026	0.005
	(0.035)	(0.036)	(0.035)	(0.037)	(0.033)	(0.036)	(0.034)	(0.037)
success is luck	0.111***	0.118***						
	(0.008)	(0.008)						
competition is harmful			0.072***	0.067***				
			(0.008)	(0.008)				
incomes more equal					0.096***	0.109***		
					(0.007)	(0.007)		
no control							0.116***	0.108***
							(0.008)	(0.009)
individual controls	X	X	X	X	X	X	X	X
country FE	X	X	X	X	X	X	X	X
survey-year FE	X	X	X	X	X	X	X	X
Observations	54,924	50,585	54,431	50,413	54,552	50,378	54,078	49,832
Adjusted R^2	0.080	0.085	0.072	0.075	0.077	0.084	0.077	0.080

*p<0.1; **p<0.05; ***p<0.01

Notes: The table reports OLS estimates. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples. Standard errors are clustered by country-cohort. Individual controls include income level, educational level, age and age squared. "success is luck" = success is determined by luck and connections rather than hard work, "incomes more equal" = incomes should be made more equal, "no control" = feeling of no control and freedom of choice over one's life.

In line with hypothesis *H3*, we find that the effect heterogeneity between women and men is likely moderated by more or less traditional gender attitudes. The correlation between mobility experience and zero-sum beliefs is higher (and statistically significant) for traditional

men compared to progressive men and there is a statistically significant difference in the predicted effect between females and males only for people with traditional views.

Table 4 — Gender attitudes as a moderator of mobility experience and zero-sum beliefs

	Dependent variable: zero-sum beliefs			
	traditional		progressive	
	female	male	female	male
mobilityDOWN	0.028	0.083**	−0.028	0.016
	(0.043)	(0.042)	(0.046)	(0.040)
mobilityUP	−0.022	0.018	−0.007	−0.031
	(0.027)	(0.023)	(0.023)	(0.031)
mobilityDOWNsoc	0.001	−0.016	−0.064	0.003
	(0.076)	(0.055)	(0.081)	(0.081)
mobilityUPsoc	−0.016	−0.016	−0.009	0.005
	(0.042)	(0.032)	(0.049)	(0.052)
individual controls	X	X	X	X
country FE	X	X	X	X
survey-year FE	X	X	X	X
Observations	29,342	32,555	22,326	15,299
Adjusted R^2	0.071	0.070	0.077	0.090

*p<0.1; **p<0.05; ***p<0.01

Notes: The table reports OLS estimates. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples. Standard errors are clustered by country-cohort. Individual controls include income level, educational level, age and age squared. Individuals are considered "traditional" if they indicate agreement with either of three gender attitudes questions, and "progressive" otherwise.

5.4 Imputed mobility

In our main analysis, experienced social mobility is imputed based on our own calculations relying on data from the GDIM. To check the robustness of our main results with regard to this data restriction, we perform a second imputation exercise. The latest waves of the WVS (wave 7) and the EVS (wave 5), while not asking the zero-sum question, include information on educational attainment of the respondent as well as their parents. This allows us to determine individual intergenerational educational mobility experience and impute mobility probabilities for each cell of the combinations of country, cohort, gender and educational level as before. While the latest survey waves do not overlap completely as to country and

cohorts covered with those considered in our sample, we are still able to match 1,322 out of 1,487 individual mobility measures from the GDIM dataset with the complementary mobility measures.

Table 5 shows the results of this robustness check. The main regression coefficients remain rather similar when the alternatively imputed individual mobility measures are used. We still consider the GDIM dataset the more reliable source for constructing mobility measures as the number of observations per particular cell is generally higher in the GDIM mobility dataset than in that of the joint WVS and EVS. However, with our fully self-compiled complementary mobility measures, we are able to adapt more granular cohort divisions. In Table 5 on the right, we show that the main findings persist when using 5-year cohorts instead of the original 10-year cohorts. The correlation between individual downward mobility and zero-sum beliefs for men is slightly less strong, but stays positive and statistically significant. We also show in the Appendix that the main estimates of interest are robust to using either mobility dataset by visualizing estimate sensitivity as a function of increasing replacement of GDIM mobility measures with our complementary mobility measures.

5.5 Further robustness checks

5.5.1 Socio-economic maturity and exlusion of immigrants

Mobility research suggests that people reach "maturity" in their socio-economic status at around their mid-30s (Gugushvili, 2019). Thus, a further robustness check restricts the sample to people aged 35 years and above, increasing the likelihood that respondents' educational attainment has translated into their ultimate social positioning. For this subsample, the estimated correlation between individual downward mobility and zero-sum beliefs is expected to be stronger. Another robustness check excludes all individuals that are (most likely) immigrants.[12] First of all, if people are immigrants, we obviously cannot infer that they experienced the social mobility opportunities of the peer group in the country they now live in. Secondly, immigrants potentially have a rather different (typically more positive) perception of their social mobility if they migrate from a less developed country to an affluent one, even if their objective educational attainment does not surpass that of their parents. Lastly, research has associated immigrant flows into the US with advancement in aggregate socio-economic conditions (Sequeira et al., 2020). Thus, if immigrants were able to enhance their living standard without making other people worse off, they may engage systematically less in zero-sum thinking. Excluding these observations is thus expected to similarly lead to a more pronounced statistical relationship. Table 6 shows the results for both robustness

[12] In the Appendix, we explain the exclusion process in detail.

Table 5 — Intergenerational educational mobility and zero-sum beliefs: Alternatively imputed mobility measure

	Dependent variable: zero-sum beliefs							
	10-year cohorts				5-year cohorts			
	female	female	male	male	female	female	male	male
mobilityDOWN	−0.006		0.068**		−0.012		0.067**	
	(0.031)		(0.029)		(0.031)		(0.030)	
mobilityUP	−0.013		−0.005		−0.010		−0.005	
	(0.018)		(0.017)		(0.018)		(0.017)	
mobilityDOWN imputed		0.021		0.068**		0.009		0.056**
		(0.029)		(0.027)		(0.021)		(0.022)
mobilityUP imputed		−0.017		0.007		−0.016		−0.002
		(0.014)		(0.014)		(0.013)		(0.012)
mobilityDOWNsoc	0.059	0.052	0.048	0.058	0.057	0.052	0.045	0.054
	(0.065)	(0.064)	(0.056)	(0.056)	(0.065)	(0.065)	(0.057)	(0.057)
mobilityUPsoc	0.025	0.027	0.014	0.012	0.025	0.027	0.013	0.013
	(0.037)	(0.038)	(0.032)	(0.032)	(0.038)	(0.038)	(0.032)	(0.033)
individual controls	X	X	X	X	X	X	X	X
country FE	X	X	X	X	X	X	X	X
survey-year FE	X	X	X	X	X	X	X	X
Observations	46,340	46,340	41,853	41,853	46,080	46,080	41,597	41,597
Adjusted R^2	0.069	0.069	0.074	0.074	0.070	0.070	0.074	0.074

*p<0.1; **p<0.05; ***p<0.01

Notes: The table reports OLS estimates. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples. Standard errors are clustered by country-cohort. Individual controls include income level, educational level, age and age squared. Mobility measures underlying mobilityDOWN imputed and mobilityUP imputed are imputed values from the WVS wave 7 and EVS wave 5. All other mobility measures come from the GDIM dataset.

checks. As expected, the correlation between individual downward mobility and zero-sum beliefs for men is stronger in both specifications.

5.5.2 Leave-one-country-out analysis

To check whether any one country is heavily impacting our results, we carry out leave-one-country-out regressions of the main specification split by gender. Figure 3 shows the estimated coefficient of individual downward mobility with 95% confidence intervals for females (left)

Table 6 — Intergenerational educational mobility and zero-sum beliefs: subsamples age ≥ 35 and excluding immigrants

	Dependent variable: zero-sum beliefs			
	age ≥ 35		exclude immigrants	
	female	male	female	male
mobilityDOWN	−0.033	0.082**	0.004	0.078**
	(0.046)	(0.034)	(0.035)	(0.033)
mobilityUP	−0.030	−0.001	−0.012	−0.001
	(0.023)	(0.020)	(0.020)	(0.018)
mobilityDOWNsoc	−0.022	−0.047	0.016	0.014
	(0.089)	(0.086)	(0.068)	(0.055)
mobilityUPsoc	0.016	−0.030	−0.0005	0.008
	(0.047)	(0.042)	(0.038)	(0.031)
individual controls	X	X	X	X
country FE	X	X	X	X
survey-year FE	X	X	X	X
Observations	34,841	31,813	46,010	42,629
Adjusted R^2	0.073	0.077	0.068	0.071

*p<0.1; **p<0.05; ***p<0.01

Notes: The table reports OLS estimates. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples. Standard errors are clustered by country-cohort. Individual controls include income level, educational level, age and age squared.

and males (right) when leaving out the country specified on the right hand side. Except for Germany, no single country has a substantial impact on the results. Germany is indeed an interesting case, since the post World War II cohorts experienced high social fluidity (i.e., also high downward mobility) but at the same time saw high economic growth and general advancement. As a consequence, these German cohorts may exhibit less of a zero-sum view of the world despite many people experiencing downward mobility. Consistent with this reasoning, when observations from Germany are excluded from the analysis, the suggested increasing effect of downward mobility on zero-sum beliefs for men is even slightly more pronounced, while for women, the effect tends toward the opposite direction, although it is not statistically significant. Overall, we conclude that the results are robust and excluding

the influential country Germany would only strengthen our interpretation of the regression results.

5.5.3 Multi-level mixed effects model and ordered logistic regression

To account for the hierarchical structure of our data, we additionally estimate our main specifications with a multi-level mixed effects model using maximum likelihood fitting, where individuals are nested in country-(survey-)year clusters, which in turn are nested in country clusters. Technically, this allows country-year intercepts to be random draws from each country intercept distribution, i.e., this model accounts for both within-country and between-country variability as well as within-year and between-year variability in our independent variables. As reported in Table 7, the results are very similar to the linear regressions using OLS. We again find a statistically significant positive correlation of individual downward mobility and zero-sum beliefs for men.

Further, to allow for an ordinal rather than cardinal interpretation of the dependent variable, we estimate an ordered logistic regression. Table 8 shows the odds ratios with the corresponding 95%-confidence intervals obtained using Hessian optimization. The odds ratio of 1.57 for individual downward mobility for males indicates that with a unit increase in mobilityDOWN, the odds of zero-sum beliefs being in a higher category (stronger zero-sum beliefs) increase by a factor of 1.57, the statistical significance is shown by the confidence interval not including 1. I.e., for men who experience downward educational mobility vis-à-vis their parents, the odds of expressing stronger zero-sum beliefs about wealth accumulation is 1.57 times higher than for men who do not experience such downward mobility. Similarly to the results from the multiple linear regressions, the other mobility odds ratios do not report statistical significance.

6 Discussion and Conclusion

In this paper, we investigate the role of social mobility experience in forming beliefs that wealth accumulation follows a zero-sum logic. The results suggest that the experience of descent in terms of educational intergenerational mobility is associated with increased zero-sum beliefs. This is consistent with theories that emphasize economic threats as a factor driving zero-sum beliefs. Moreover, we observe that the associations differ markedly between women and men, with only men reporting stronger beliefs in zero-sum when exposed to downward mobility. This is consistent with traditional gender norms largely mitigating any status anxiety related to educational downward mobility for women. We do not find a symmetric correlation for upward mobility. A possible explanation is attribution bias, or self-serving bias, according

Table 7 — Intergenerational educational mobility and zero-sum beliefs: Estimations based on a multi-level mixed effects model

	Dependent variable: zero-sum beliefs	
	female	male
mobilityDOWN	−0.026	0.070**
	(0.029)	(0.026)
mobilityUP	−0.019	−0.011
	(0.013)	(0.014)
mobilityDOWNsoc	−0.003	−0.008
	(0.043)	(0.045)
mobilityUPsoc	0.013	0.018
	(0.025)	(0.026)
individual controls	X	X
AIC	25,495	25,106
BIC	25,620	25,230
Log Likelihood	-12,733	-12,539
Num. obs.	55,334	50,936
Num. groups: year:country	134	134
Num. groups: country	68	68
Var: year:country (Intercept)	0.004	0.004
Var: country (Intercept)	0.003	0.004
Var: Residual	0.052	0.057

*p<0.1; **p<0.05; ***p<0.01

Notes: Estimates from the multi-level mixed effects model using maximum likelihood. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples. Individuals are nested in country-year clusters, which in turn are nested in country clusters. Individual controls include income level, educational level, age and age squared.

to which people have a tendency to ascribe personal success to internal factors and blame external factors for their failures. Any such tendency would attenuate the proposed decreasing effect of upward mobility on zero-sum beliefs.

While the data on zero-sum beliefs in this analysis relies on a survey question pertaining to the particular domain of wealth accumulation, evidence from Carvalho et al. (2023) suggests that it can be seen as part of a generalized zero-sum view of the world. The authors use a closely worded question, among others, pertaining to domains such as income, power and happiness in order to compose a zero-sum index, and find in a principal component analysis

Table 8 — Intergenerational educational mobility and zero-sum beliefs: Estimations based on an ordered logistic regression

	Dependent variable: zero-sum beliefs			
	female		male	
	odds ratio	95%-CI	odds ratio	95%-CI
mobilityDOWN	0.97	[0.63, 1.49]	1.57	[1.09, 2.25]
mobilityUP	0.89	[0.73, 1.09]	1.02	[0.83, 1.25]
mobilityDOWNsoc	0.96	[0.48, 1.93]	1.08	[0.55, 2.12]
mobilityUPsoc	0.96	[0.65, 1.41]	1.07	[0.73, 1.57]
income = low	1.21	[1.14, 1.27]	1.32	[1.25, 1.39]
income = middle	1.17	[1.11, 1.23]	1.24	[1.18, 1.30]
education = middle	1.08	[0.91, 1.29]	0.99	[0.84, 1.17]
education = upper	1.07	[0.87, 1.32]	0.96	[0.79, 1.15]
age	1.00	[0.98, 1.01]	0.98	[0.96, 1.00]
age squared/100	1.00	[0.99, 1.03]	1.02	[1.00, 1.04]

Notes: Odds ratios estimated with ordered logistic regression using maximum likelihood with 95%-confidence intervals obtained through Hessian optimization. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples.

that the different domains load similarly on the first component, indicating that their index captures a general zero-sum belief. We also show that the zero-sum beliefs we consider in our analysis capture an aspect of individuals' world view that goes beyond related core beliefs about the determinants of success, the harmfulness of competition, how incomes should be distributed or an external locus of control.

Robustness checks include restricting the sample to people aged 35 and above, as mobility research suggests people reach 'maturity' in socio-economic status around their mid-30s (Gugushvili, 2019) as well as excluding immigrants, for whom we have less certainty in their experienced mobility probabilities. Further, we complement the multiple linear regressions with a multi-level mixed effects model that accounts for the nested structure of the data, as well as an ordered logistic model, both of which confirm the results from the main regressions.

By linking social mobility to zero-sum thinking, we complement the focus of Chinoy et al. (2023) on 'historical forces' such as ancestral economic mobility or enslavement, by centering on medium-term experiences of educational mobility relative to the parental generation.

Ideally, future research could further put these findings in perspective by examining how more immediate changes in socioeconomic status shape core economic beliefs. This would enable a deeper understanding of the malleability of zero-sum beliefs in response to *different* experiences over a person's life. Advancing our knowledge of fundamental beliefs like the one in a zero-sum world is crucial for illuminating the economic trinity, i.e. the interplay of preferences, beliefs, and constraints in shaping individuals' behavior and well-being.

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Appendix

Error corrections in the World Values Survey (WVS)

Inconsistencies regarding year of birth, age and survey year were found in a total of 18,834 observations in the original dataset (all waves of the World Values Survey and European Values Study), of which however only a few country-wave combinations were relevant for the analysis. In the relevant cases, survey year was corrected such that year of *birth + age = survey year* for the majority of the country-wave sample (note that *year of birth + age + 1 = survey year* can be chronologically consistent and was considered in the screening). This led to the following corrections for a total of 5,470 observations:

- Albania, WVS wave 3: survey year 1996 instead of 1998
- Croatia, WVS wave 3: survey year 1998 instead of 1996
- Maldives, WVS wave 7: survey year 2022 instead of 2021
- Montenegro, WVS wave 3: survey year 1998 instead of 1996
- Nicaragua, WVS wave 7: survey year 2019 instead of 2020
- North Macedonia, WVS wave 3: survey year 1995 instead of 1998
- Poland, WVS wave 2: survey year 1990 instead of 1989
- Sweden, WVS wave 3: survey year 1997 instead of 1996

Related beliefs - survey questions

Respondents in the WVS waves 2,3,5 and 6 were asked to place their views on a scale from 1 to 10 for the following four statements:

- 1 = In the long run, hard work usually brings a better life.
  10 = Hard work doesn't generally bring success - it's more a matter of luck and connections.
- 1 = Competition is good. It stimulates people to work hard and develop new ideas.
  10 = Competition is harmful. It brings out the worst in people.
- 1 = Incomes should be made more equal.
  10 = We need larger income differences as incentives for individual effort.
- Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please indicate how much freedom of choice and control you feel you have over the way your

life turns out:
1 = No choice at all.
10 = A great deal of choice.

For regression analyses, the latter two scales are reversed and all four scales normalized to lie between 0 and 1.

Robustness checks - exclude immigrants

The exclusion process for immigrants follows a restrictive paradigm where only those with high probability of not being immigrants are retained in the sample. For the four WVS waves considered in the analyses, the rules were as follows:

- WVS wave 2 and 3: "Were you born in this country?" If yes, classified as not immigrant. If no, classified as immigrant.
- WVS wave 5: "Are your mother or father immigrants to this country or not?" If both no, classified as not immigrant, else classified as immigrant.
- WVS wave 6: "Were you born in this country or are you an immigrant?" If answered with "I am an immigrant to this country", classified as immigrant, else classified as not immigrant.

Controlling for economic growth

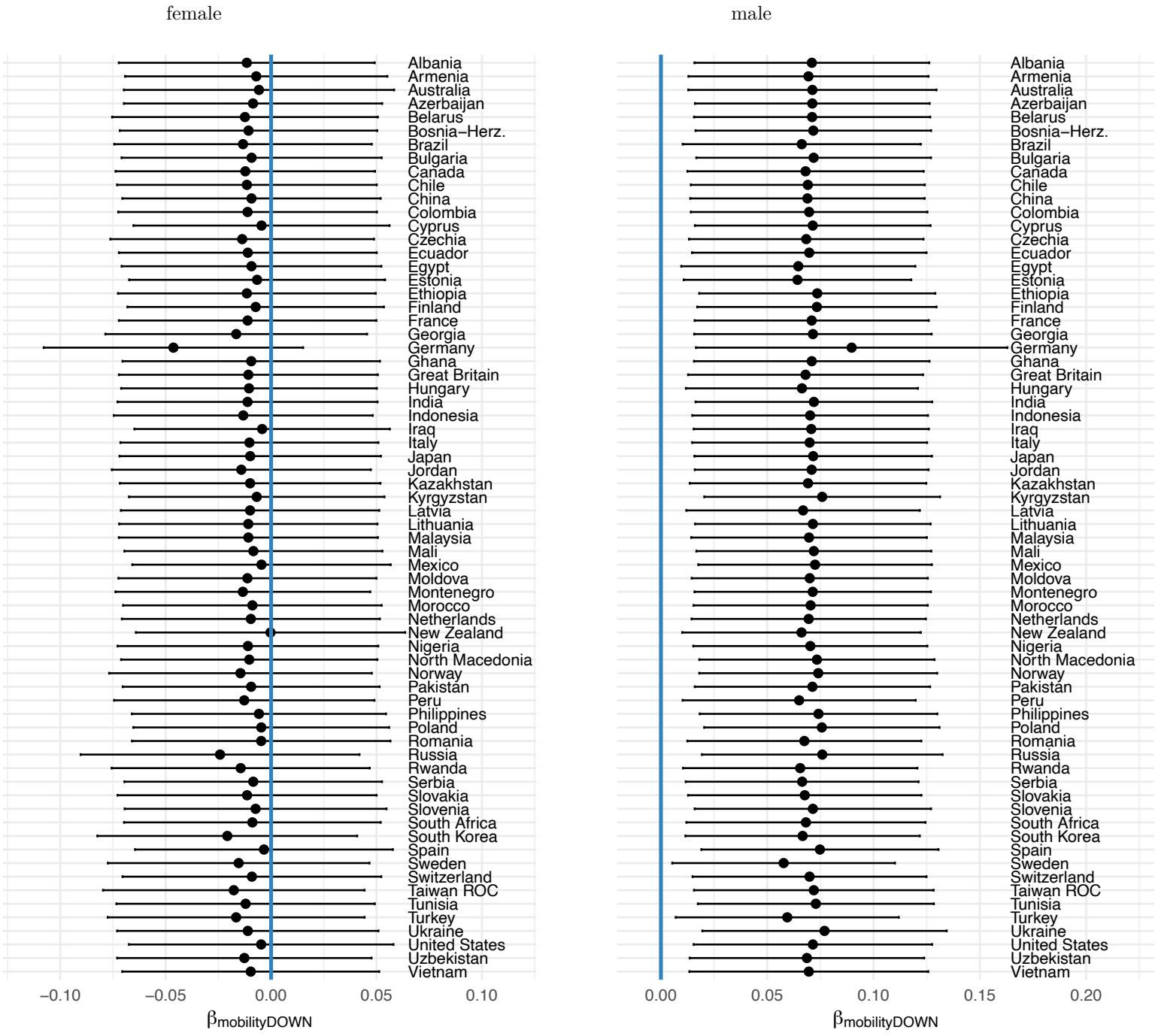


Figure 3 — Leave-one-country-out analysis. Estimates with 95%-confidence intervals for individual downward mobility when leaving the country specified on the right hand side out of the analysis. Left: female. Right: male. The blue line accentuates the zero point. Regressions follow the main specification (2) described in the section "Econometric specification and control strategy". Confidence intervals rely on clustered standard errors. "Bosnia-Herz." = Bosnia and Herzegovina.

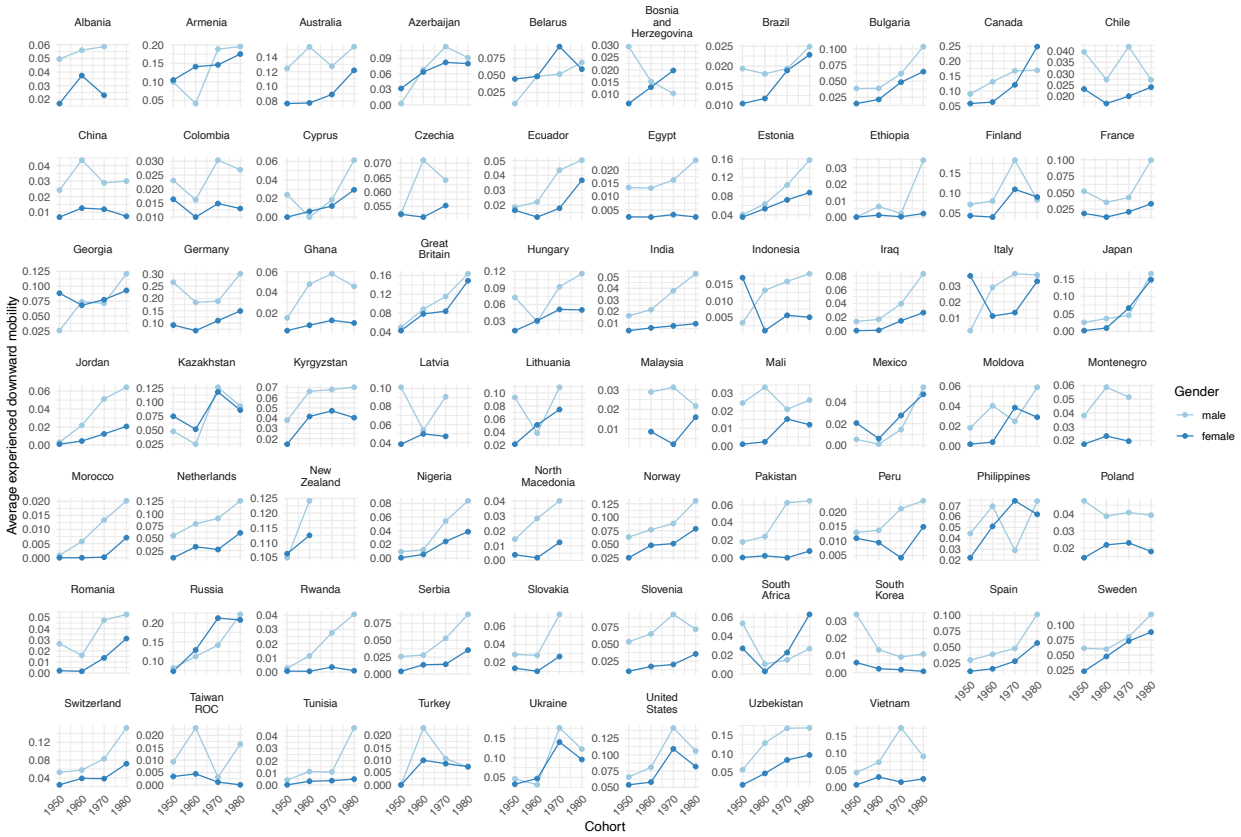
Table A1 — Intergenerational educational mobility and zero-sum beliefs - controlling for experienced economic growth

	Dependent variable: zero-sum beliefs				
	(1)	(2)	(3)	(4) female	(5) male
mobilityDOWN	0.053**		0.054**	−0.012	0.071**
	(0.021)		(0.021)	(0.034)	(0.030)
mobilityUP	−0.008		−0.010	−0.006	−0.001
	(0.012)		(0.012)	(0.019)	(0.018)
mobilityDOWNsoc		0.029	0.026	0.022	0.044
		(0.054)	(0.054)	(0.068)	(0.061)
mobilityUPsoc		0.013	0.022	0.001	0.035
		(0.029)	(0.029)	(0.041)	(0.036)
economic growth first 20 yrs	0.002*	0.002	0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
income = low	0.038***	0.038***	0.038***	0.031***	0.047***
	(0.004)	(0.005)	(0.005)	(0.006)	(0.007)
income = middle	0.028***	0.028***	0.028***	0.026***	0.031***
	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)
gender = female	−0.013***	−0.015***	−0.013***		
	(0.003)	(0.003)	(0.003)		
education = middle	0.002	−0.005	0.005	0.001	−0.001
	(0.011)	(0.004)	(0.010)	(0.016)	(0.015)
education = upper	−0.004	−0.016***	−0.002	−0.006	−0.009
	(0.012)	(0.005)	(0.012)	(0.019)	(0.018)
age	−0.001	−0.001	−0.001	0.001	−0.004*
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
age squared/100	0.001	0.001	0.001	−0.002	0.004
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
country FE	X	X	X	X	X
survey-year FE	X	X	X	X	X
Observations	88,843	88,843	88,843	45,722	43,121
Adjusted R^2	0.072	0.072	0.072	0.070	0.076

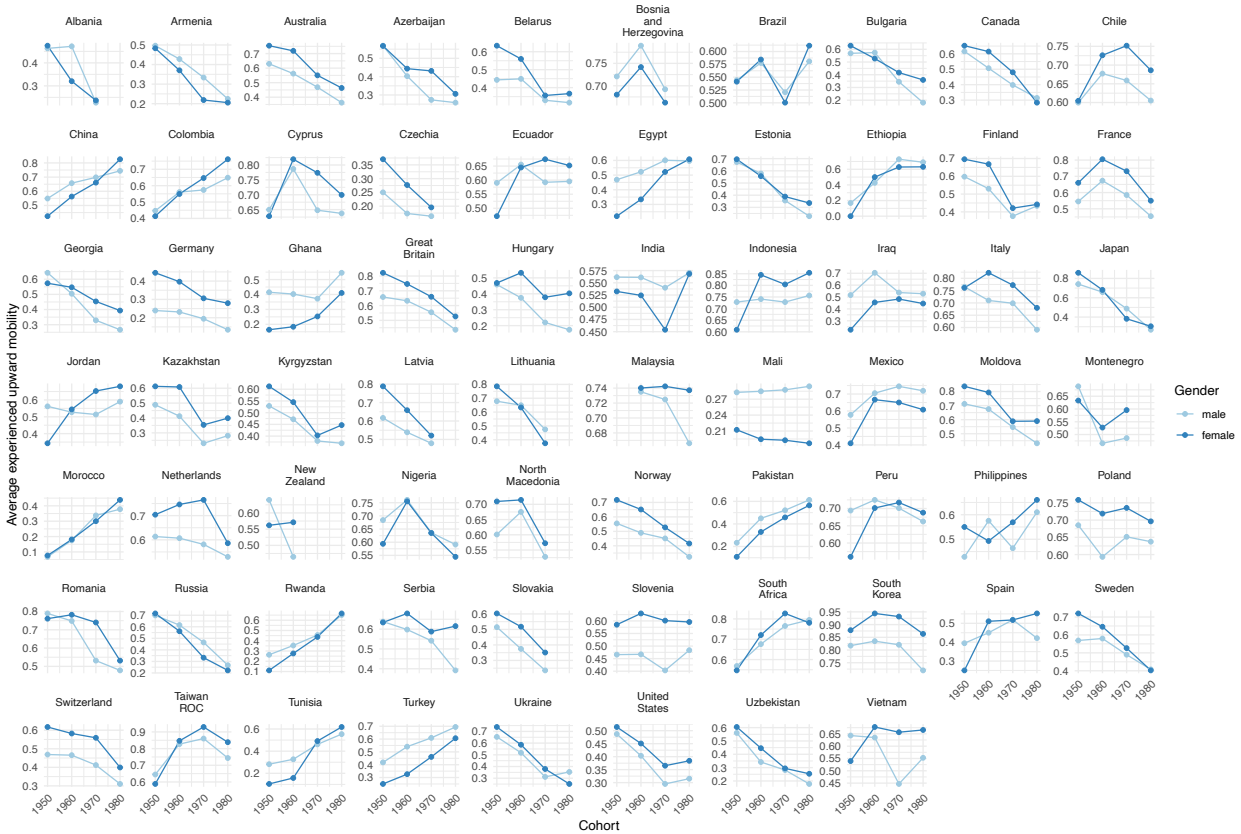
*p<0.1; **p<0.05; ***p<0.01

Notes: The table reports OLS estimates. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples. Standard errors are clustered by country-cohort (except for column (1), where standard errors are clustered by country-cohort-gender-education-level). The omitted category for income is "high" and for education "lower". The variable "economic growth first 20 yrs" represents the average annual growth rate of real GDP per capita during the first 20 years of an individual in the country of residence.

Figure A1 — Probability of individual experienced mobility

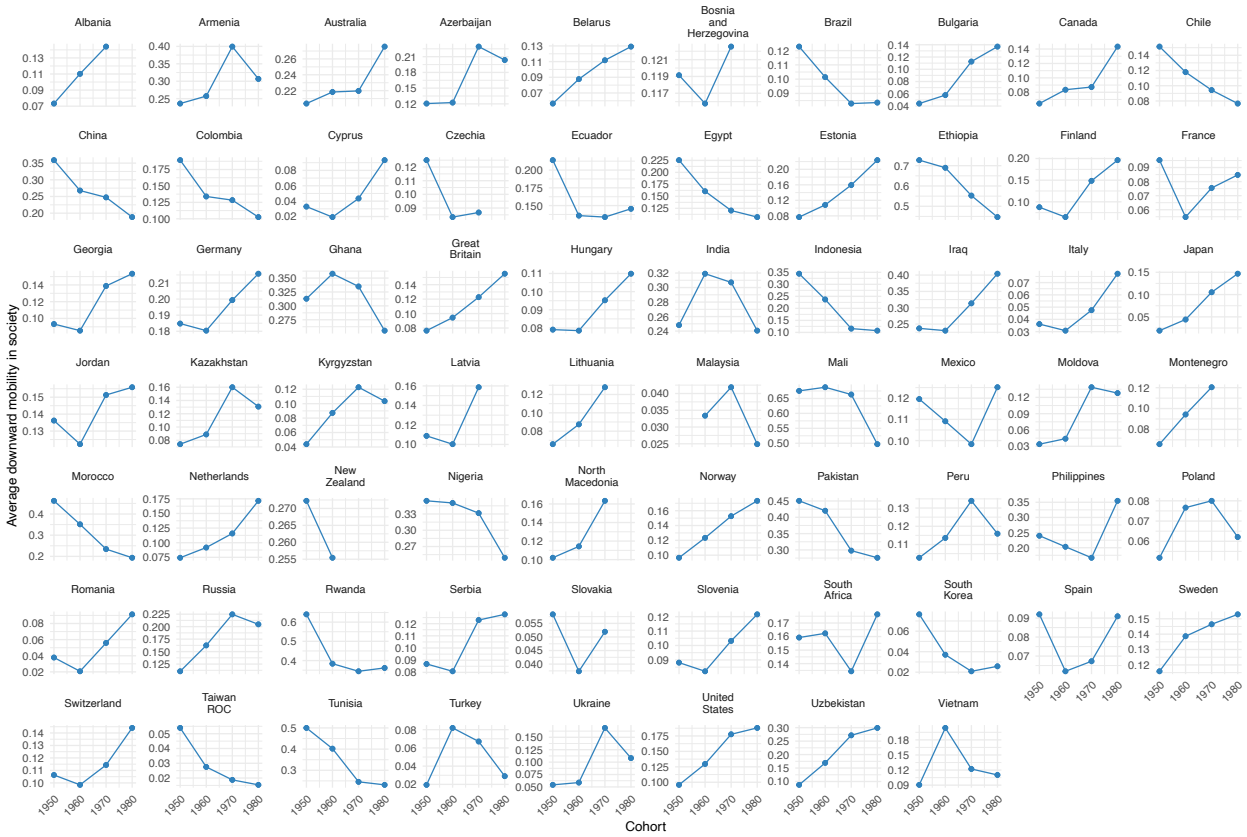


(a) Individual downward mobility across cohorts in each country

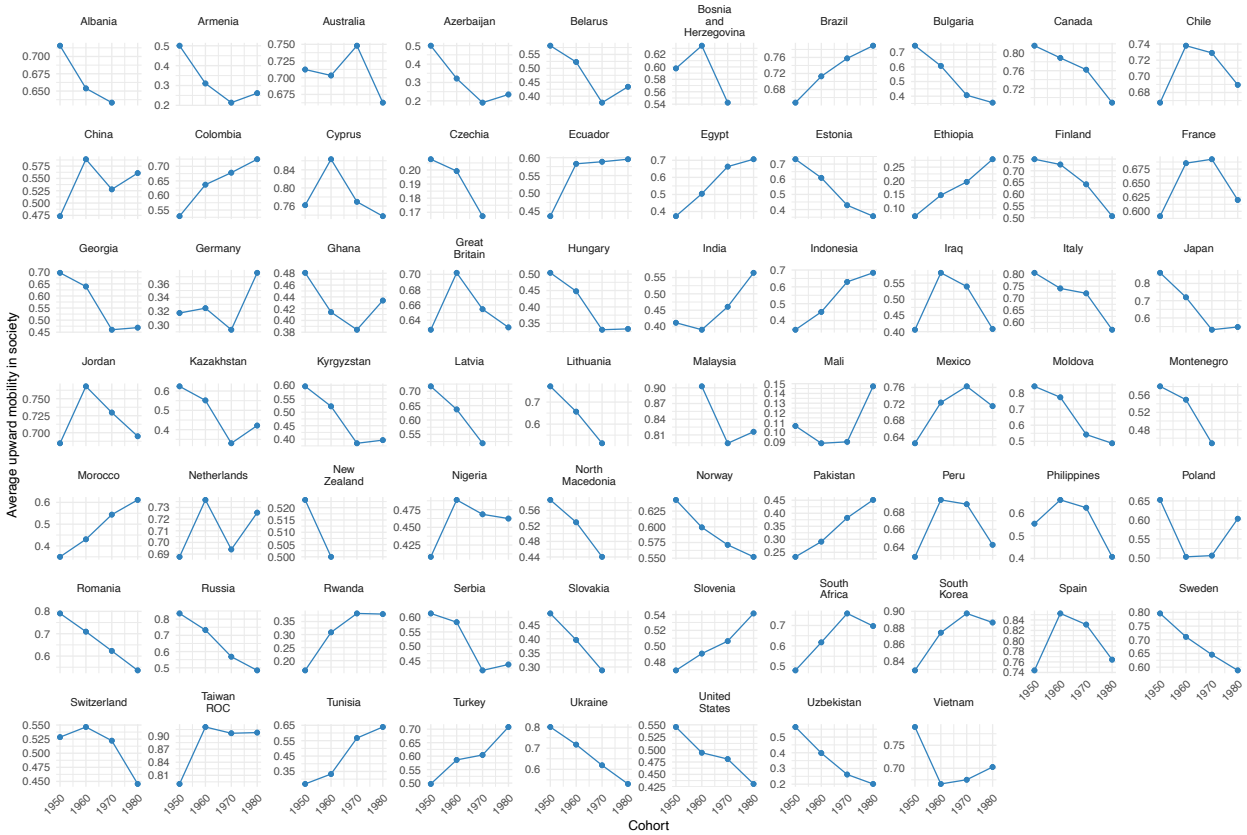


(b) Individual upward mobility across cohorts in each country

Figure A2 — Societal mobility



(a) Societal downward mobility across cohorts in each country



(b) Societal upward mobility across cohorts in each country

Table A2 — Main regression results with gender interaction term

	Dependent variable: zero-sum beliefs	
	(1)	(2)
mobilityDOWN	0.099***	0.100***
	(0.023)	(0.024)
mobilityUP	−0.016	−0.018
	(0.011)	(0.011)
mobilityDOWNsoc		0.007
		(0.048)
mobilityUPsoc		0.006
		(0.025)
gender = female	−0.012***	−0.012***
	(0.002)	(0.002)
mobilityDOWN:gender = female	−0.131***	−0.131***
	(0.030)	(0.032)
individual controls	X	X
country FE	X	X
survey-year FE	X	X
Observations	106,270	106,270
Adjusted R^2	0.069	0.069

*p<0.1; **p<0.05; ***p<0.01

Notes: The table reports OLS estimates. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples. Standard errors are clustered by country-cohort. Individual controls include income level, educational level, age and age squared.

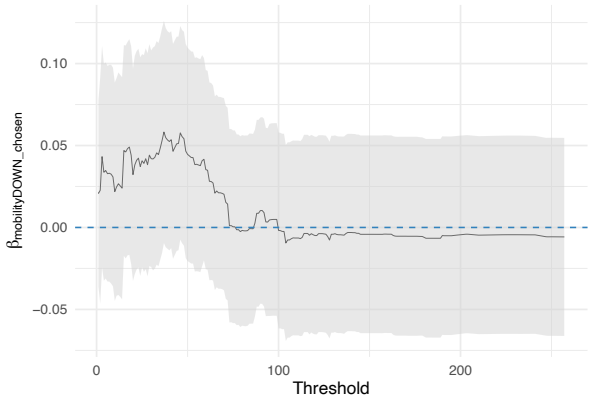
Table A3 — Main regression results testing mobility measures separately

	Dependent variable: zero-sum beliefs					
	(1)	(2)	(3)	(4)	(5)	(6)
mobilityDOWN	0.053***				0.052***	0.053***
	(0.019)				(0.019)	(0.020)
mobilityUP		−0.014			−0.013	−0.014
		(0.011)			(0.011)	(0.011)
mobilityDOWNsoc			0.019		−0.001	
			(0.031)		(0.033)	
mobilityUPsoc				−0.010		0.003
				(0.017)		(0.018)
individual controls	X	X	X	X	X	X
country FE	X	X	X	X	X	X
survey-year FE	X	X	X	X	X	X
Observations	106,270	106,270	106,270	106,270	106,270	106,270
Adjusted R^2	0.069	0.069	0.069	0.069	0.069	0.069

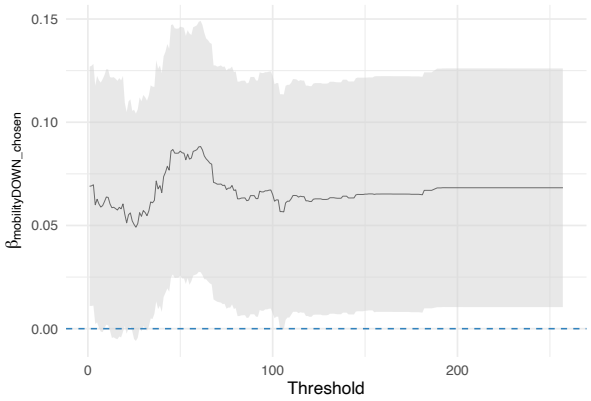
*p<0.1; **p<0.05; ***p<0.01

Notes: The table reports OLS estimates. Observations are on the individual level and weighted to be nationally representative and equalizing country-wave samples. Standard errors are clustered by country-cohort. Individual controls include gender, income level, educational level, age and age squared.

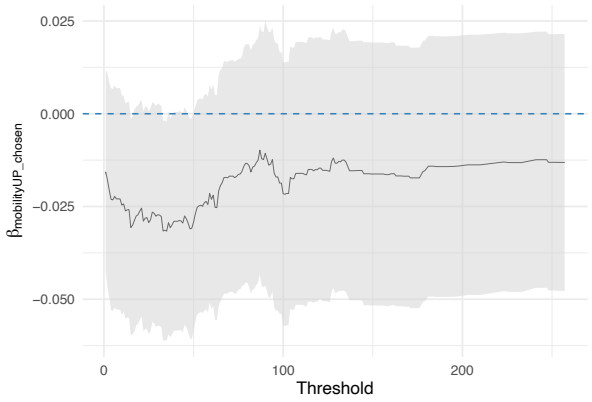
Imputed mobility - Estimate sensitivity



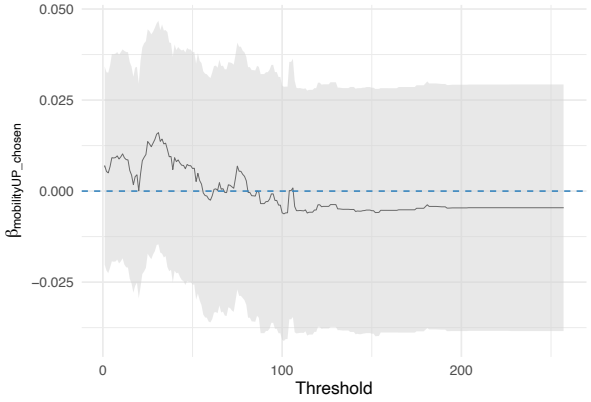
female, individual downward mobility



male, individual downward mobility



female, individual upward mobility



male, individual upward mobility

Figure A3 — Estimate sensitivity with alternatively imputed mobility data. Estimate sensitivity of downward (top) and upward (bottom) mobility on zero-sum beliefs, for female (left) and male (right) respondents. Each figure shows how the OLS estimate (black solid line) and 95%-confidence intervals (grey area) vary depending on the composition of mobility measure underlying the regression analysis. The x-axis denotes the threshold of observations per cell, above which the alternatively imputed mobility measures from WVS 7 and EVS 5 are chosen rather than the GDIM mobility measures, i.e., the left starting point is where only the alternatively imputed mobility is used, and the right ending point is where only GDIM mobility is used. The blue dashed line accentuates the zero point.