Policy Research Working Paper 9898

The Interplay of Regional and Ethnic Inequalities in Malaysian Poverty Dynamics

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WORLD BANK GROUP
Poverty and Equity Global Practice
January 2022

Policy Research Working Paper 9898

Abstract

This study employs a synthetic panel approach based on nationally representative micro-level data to track poverty and income mobility in Malaysia in 2004–16. On aggregate, there were large reductions in chronic poverty and increases in persistent economic security, but those who remained poor in 2016 were increasingly likely to be poor in a structural sense. Further, the poverty and income dynamics differ notably across geographic dimensions. Such disparities are most striking when comparing affluent urban Peninsular Malaysia with poorer rural East Malaysia. Although there are important differences in welfare levels between the main ethnic groups in Malaysia, the mobility trends generally point in the same direction. While the findings show that there is still scope for poverty reduction through the reduction of interethnic inequalities, the study underscores the importance of taking regional inequalities into account to ensure a fairer distribution of socioeconomic opportunities for poor and vulnerable Malaysians. Hence, addressing chronic poverty is likely to require additional attention to less developed geographic areas, as a complement to the current policies that are largely ethnicity-based.

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The Interplay of Regional and Ethnic Inequalities in Malaysian Poverty Dynamics

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JEL codes: D31, D63, I32, O53
Keywords: Poverty dynamics, ethnic inequality, regional inequality, Malaysia, synthetic panels

Acknowledgments: The authors would like to thank Chris Elbers, Jomo Kwame Sundaram, Niaz Asadullah, Norman Loayza, Tobias Pfutze, Yu Cao, and other participants at the World Bank Workshop on Income Mobility in Malaysia (Kuala Lumpur, February 2020), the Kuala Lumpur World Bank Research Seminar (March 2021) and the Ninth ECINEQ Meeting (July 2021) for their helpful comments.

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1. Introduction

Past decades have seen Malaysia experience a long period of rapid economic growth. GDP per capita grew from about MYR 7,000 in 1970 to MYR 43,000 in 2018 in constant Malaysian ringgit (WDI 2020). This is a more than sixfold increase. For the period studied in this paper, 2004–2016, cumulative real GDP growth was about 77 percent, while real per capita incomes grew by around 46 percent (WDI 2020). Interestingly, and somewhat unusually compared to many other countries experiencing rapid economic growth, survey-based income inequality as measured by the Gini coefficient fell from about 0.46 in 2004 to 0.41 in 2016. These two forces have combined to all but eliminate extreme poverty at the international poverty line of USD 1.90 at 2011 PPPs. Malaysia introduced a new national poverty line in 2020, which is roughly USD 10 per person per day at 2011 PPPs. Based on this new official poverty line, the poverty headcount fell from 7.6 percent in 2016 to 5.6 percent in 2019 (DOSM, 2020).

While this reduction in the headline poverty rate is well-documented, not much is known about poverty dynamics in Malaysia – i.e., statistics that capture the movements in and out of poverty of individuals or households over time. Studies of this kind have been published for other countries in the region, such as Indonesia and Vietnam (Imai et al. (2011), Justino et al. (2008), Purwono et al. (2021), Suryahadi et al. (2003)). On Malaysia, there have been studies based on retrospective data that investigate socio-economic intergenerational mobility (Khalid 2018, Hamid et al. 2019). However, this study is the first to provide information on poverty dynamics in Malaysia based on official micro-level survey data.

One particular feature of Malaysia's development model concerns the preferential treatment of the Bumiputera ethnic groups, the population segment that was economically disadvantaged both before and after independence. For example, average consumption was and remains lower for Bumiputeras than for Chinese or Indian Malaysians, the other main ethnic groups.[1] Malaysia's New Economic Policy (NEP), introduced in 1971, had the twin objectives of reducing overall poverty and improving the economic position of the Bumiputeras. The NEP aimed to raise the participation of Bumiputeras in the formal education system, tertiary education and professional occupations, as well as expand their ownership of and control over capital (Lee, 2017). We will elaborate on this context in the next section.

[1] See Anand (1983) or Ikemoto (1985) for a detailed historical treatment, or Jomo and Hui (2014) for a more recent overview. The demonym *Malaysian* refers to all citizens of Malaysia, regardless of their ethnicity. The term *Malay* refers to the Malay ethnic group, the largest in the country. *Bumiputera* is an ethnic label that groups Malays with other indigenous groups (such as *Orang Asli* in Peninsular Malaysia and *Orang Asal* in the states Sabah and Sarawak). The Bumiputeras form the majority of Malaysia's population.

Such ethnic inequalities matter for poverty reduction policy and income mobility. Two recent studies examine the interaction between ethnic inequality and poverty in Malaysia based on analysis of tabulated nationally-representative survey data for the period 1970–2016 (Ravallion, 2020a, 2020b). An important insight emerging from this work is that between-group relative inequality decreased over this time period, as a result of Bumiputera households having higher income growth rates than the other ethnic groups. Inequality at the national level also declined. However, Ravallion (2020a, 2020b) observes that the growth differential was not sufficient to reduce absolute differences in income, so that ethnic income inequality in absolute terms is higher now than 50 years ago. The difference is relevant, given that popular perceptions of inequality may well track absolute rather than relative inequality measures.[2] Ravallion (2020a, 2020b) further indicates that only about 10 percent of absolute poverty reduction in Malaysia, and 17 percent of the decline in relative poverty, can be attributed to reduced inequality between ethnic groups over this time. Growth of overall mean income has thus played a much more important role in reducing poverty than the fall in relative inequality between ethnic groups. Nevertheless, Ravallion (2020b) does emphasize the role of reduced ethnic inequality and notes that reducing it further may still matter for reducing poverty as measured by his weakly relative poverty line. Our study will show, however, that Ravallion's conclusions should be viewed alongside findings about spatially differentiated poverty dynamics and inequality, between rural and urban areas, and between Peninsular and East Malaysia.

Conventional efforts to monitor poverty typically involve tracking measures such as the headcount ratio over time. Such studies provide insights into poverty trends at some aggregate level such as the country, community or sector, but are unable to shed light on the dynamics of poverty at the level of individuals or households. Yet, from both a theoretical and policy perspective, such micro-level poverty transitions are of considerable interest. If we observe chronic poverty, where individuals or households are stuck in poverty over extended periods of time, this would be consistent with theories of poverty traps related to, for example, lack of credit, geographic disadvantages, or discrimination against marginalized groups (Kraay and McKenzie 2014). Focused policies, such as expanding banking services, upgrading transport infrastructure, or introducing affirmative action measures might then be helpful in overcoming these structural barriers. If, on the other hand, people are seen to move in and out of poverty from one period to the next, then poverty is largely a transitory phenomenon that may be due, for example, to fluctuations in the business cycle or weather conditions that affect agricultural yields. In that case,

[2] See for example Ravallion (2016, Chapter 5) for a discussion.

measures to alleviate poverty might instead emphasize unemployment insurance or other components of a social safety net that aim to protect against falling into poverty. Thus, data on poverty dynamics at the micro-level can inform our understanding of the drivers of poverty and provide insights into the kind of anti-poverty policies that are needed.

Unfortunately, evidence about such poverty dynamics is scarce in developing countries; this also holds for Malaysia. In general, panel surveys that follow the same households over time are needed in order to make statements about whether poverty is chronic or transitory. Such surveys are typically complex and costly, and as a result they are rare and often involve relatively small sample sizes. In addition, attrition can be a problem as households drop out of the sample for a variety of reasons. To the extent that attrition is non-random, it has consequences for the validity of results. Still, it is notable that in Southeast Asia, both Indonesia and Vietnam conduct panel surveys on household income or expenditure.

A variety of approaches that aim to overcome the constraints posed by the lack of panel data have been explored in the literature. The idea is to draw inferences about poverty dynamics via analysis of far more widely available cross-sectional data. One line of research focuses on pseudo-panel methods, in which insights about poverty transitions are gleaned through scrutiny of cohort averages in cross-sectional surveys.[3] Another approach constructs synthetic panels from cross-sectional surveys through econometric models estimated on the basis of time-invariant household characteristics (Dang, Lanjouw, Luoto and McKenzie, 2014). The empirical analysis in this paper is based on the latter approach. While the method does not permit true panel analysis—in which the trajectories of individual households can be followed over time—it does yield upper- and lower-bound estimates of transitions into or out of poverty at an aggregate level.[4] An appealing feature of the method is that it also allows for delving deeper into the data to construct profiles of the groups who experience the various poverty transitions. We will focus specifically on the composition of the group of chronically poor, comparing the likelihood of chronic poverty along several dimensions, such as ethnicity and geography. The synthetic panel bounds approach has been validated against actual panel data for a range of countries and regions with good results (Dang et al. 2014, Cruces et al. 2015, Perez 2015). In this paper we focus on poverty dynamics in Malaysia as observed over intervals between adjacent survey rounds in the 2004-2016 period.

[3] See Deaton (1985) for the initial setup of the approach, and Bourguignon et al. (2004) for an application to poverty. Kraay and van der Weide (2019) explore the feasibility of drawing inferences about intragenerational mobility from aggregate macro data.

[4] We note that a different variant of the synthetic panel method produces point estimates, but applying it was not feasible in our case. We refer to Garces-Urzainqui et al. (2021) for further discussion of the two variants.

To construct our synthetic panel we use six rounds of cross-sectional data from the Household Income and Basic Amenities Survey (HIS) collected by the Department of Statistics Malaysia. The data are for the years 2004, 2007, 2009, 2012, 2014 and 2016. When Malaysia's national poverty line was updated in 2020, the value of the line was only recalculated for the 2016 and 2019 surveys, and not for the earlier surveys. Hence, we employ our own poverty line, which corresponds to the income level of the 40th percentile in the first year of our analysis, 2004. This line is then kept constant in real terms for the subsequent years. It is close to the new official poverty line. [5]

In addition, we study income mobility in a broader sense by drawing on the vulnerability analysis proposed by Dang and Lanjouw (2017). This allows us to define three income groups: the poor, the vulnerable (those non-poor who face a heightened risk of falling into poverty) and the economically secure. From these, upward mobility is defined as moving up one or two categories, downward mobility as moving down one or two groups. We note that this is a somewhat narrow definition of mobility that does not describe intergenerational mobility or mobility within the middle and higher reaches of the income distribution.

The main contribution of the present study is that it provides the first evidence on poverty and income dynamics in Malaysia based on official micro-level survey data. In comparison to synthetic panel studies carried out in other countries, our addition is that we are able to use six rounds of high-quality data, rather than only two or three. Moreover, each round has a large number of observations, which facilitates within- and between-group analyses. This means that we are able to present results on a variety of dimensions, with this paper focusing on chronic poverty, upward mobility and downward mobility, also taking into account differences between population groups.

We present three headline results. The first is that the likelihood of being chronically poor in Malaysia has decreased considerably over the 2004–2016 period. Nevertheless, as aggregate poverty in Malaysia has fallen, our evidence suggests that the remaining poor are increasingly likely to be poor in a structural sense – our second main finding. Third, after digging further into the structural nature of poverty, we observe that Malaysians in rural areas and in East Malaysia in particular experience a higher risk of chronic poverty. As a result, addressing chronic poverty might require more focus on less-developed geographic areas, and less emphasis on existing ethnicity-based affirmative action policies.

[5] Ravallion (2020b) proposes a weakly relative poverty line that would be around USD 12 or MYR 20 per person per day in 2016 prices when converted at PPP exchange rates. The line we use is around USD 10 (PPP) or MYR 17 per person per day. We chose the 40th percentile because this is in line with the policy concept of the bottom 40% of the income distribution that is used widely in Malaysia.

The paper continues with a further sketch of the Malaysian poverty reduction and affirmative action policy context in Section 2. Section 3 outlines our methodology, discussing the synthetic panel method and our approach to the analysis of vulnerability. Section 4 describes the data. We then turn to a discussion of population-level results in Section 5, focusing on chronic poverty and upward and downward mobility. Section 6 analyzes these transition categories by subgroup, contrasting results along ethnic and geographic dimensions. We conclude with a discussion of the policy implications of our results in Section 7.

2. Context

Malaysia saw remarkable progress in poverty reduction, with the poverty headcount rate declining from 49.3 percent in 1970 to 5.6 percent in 2019. Furthermore, the rapid decline in poverty is observed across ethnic groups, across regions, and between urban and rural areas.[6] The country's success against poverty is often attributed to the effectiveness and timeliness of the NEP (1971–1990) and successive plans. Nonetheless, official statistics demonstrate that the rate of poverty reduction has varied within specific population subgroups, including within the Bumiputera group. Table 1 shows sizeable differences when we compare Bumiputeras living in Peninsular Malaysia with those in East Malaysia, as well as between urban and rural Bumiputeras.[7] How can we relate these two observations?

The NEP was designed to take a two-pronged strategy, firstly focusing on "reducing and eventually eradicating poverty among all Malaysians, irrespective of race" and secondly on "restructuring Malaysian society to correct the economic imbalance among racial groups and reduce and eventually eradicate the identification of race with economic function" (Economic Planning Unit, 2004, p. 2). Achieving these dual goals may lead to conflicting demands, for example, as it concerns non-Bumiputera poor and vulnerable households. Notably, the NEP's second prong pushes policy makers to make a distinction between ethnic groups, which led to pro-Bumiputera affirmative action policies and programs being instilled within society—across various public institutions, including universities, banks and other financial institutions, and state-owned enterprises. Commenting on these policies, Lee (2017) argues that the efforts to uplift

[6] See Economic Planning Unit (2017) for an overview from the Malaysian government's perspective.

[7] Malaysia is a federal country, with its constituent states spread over two geographically separate areas: Peninsular Malaysia on the Asian mainland and East Malaysia on the island of Borneo. Another contextual factor is that the Bumiputera group consists of Malays and other indigenous groups. The latter mostly reside in the states of Sabah and Sarawak in East Malaysia, but also include the Orang Asli in rural areas of Peninsular Malaysia.

Bumiputeras' well-being have taken place mainly in the public realm, through preferential hiring for public sector employment, preferential admissions and exclusive institutions in public education and special public procurement demands, leaving the private sector largely untouched. To some extent, Lee argues, this has led to a public sector dominated by the Bumiputera group and a private sector that is non-Bumiputera dominated. Although the NEP ran until 1990, affirmative action policies have continued to the present.

Beyond the NEP's preferential treatment of Bumiputeras in general, separate policies have been designed to strengthen poverty eradication efforts, specifically for people living in East Malaysia and in rural areas of Peninsular Malaysia. These policies would typically cover basic infrastructure development, skills and training programs, as well as land development and ownership particularly for the non-Malay Bumiputera groups in Sabah and Sarawak, and indigenous Orang Asli groups in rural areas of the Peninsula. These measures are usually found within the five-year Malaysia Plans, apart from state-specific development plans.[8] It is difficult to quantify the impact of these more focused policies, also relative to the effects of the affirmative action policies. Nevertheless, it is clear that large differences in poverty rates prevail: using our poverty line, the headcount rate in 2016 was 7.2 percent in Peninsular Malaysia, but 26.1 percent in East Malaysia (see Table 1).

Observing the poverty situation in Malaysia today, the NEP's two prongs may no longer reinforce, but rather contradict each other. Several Malaysian leaders and scholars have pointed out what they consider flaws in Malaysia's affirmative action policies, mainly stemming from the NEP's second prong (Zainuddin, 2019; Lee, 2021; Thillainathan and Cheong, 2016). They argue that the NEP and its successors have shaped institutional discrimination—beyond ethnicity—in Malaysia, by favorizing individuals from middle- and higher-income groups. For example, it is said that the affirmative action policies create loopholes for wealthier Bumiputeras to take advantage of programs such as education scholarships and investment schemes (Zainuddin, 2019). Despite implementing both pro-Bumiputera and pro-rural policies to eradicate poverty, Malaysia has not been as successful in delivering its intended outcomes in lagging states like Sabah and Sarawak, which notably have large non-Malay Bumiputera populations. Although there is more attention for geographically-based policies, the latest Malaysia Plan, 12MP, remains largely focused on ethnicity-based policies.

[8] The state-specific development plans are often designed and implemented as extensions of the national five-year Malaysia Plans, representing a joint initiative between the state and federal governments. For example, the Sabah Economic Development and Investment Authority (SEDIA) serves as a main driver to implement the Sabah Development Corridor (SDC), which was first established in the Ninth Malaysia Plan, to accelerate economic growth and address persistent socioeconomic inequalities within the state.

The preceding discussion is based on a static, cross-sectional view of poverty. As noted, Malaysia does not collect panel survey data on household income or consumption, so there is limited knowledge of poverty and income dynamics at the micro-level. However, some studies have investigated socio-economic intergenerational mobility based on retrospective data (Khalid 2018, Hamid et al. 2019). Khalid (2018) finds that the majority of younger-generation Malaysians (birth cohort 1975–1985) have higher educational attainment and better occupational skills than the previous generation (the cohort born between 1945–1960). Income mobility patterns across generations are mixed, but mobility was found to be highest for children born to parents in the lowest income quintile. This is consistent with the image of reductions in poverty and inequality in official Malaysian statistics. For example, Khalid (2018) finds that children born in the poorest households will in general not be poor as adults, suggesting that long-run chronic poverty is uncommon. However, he also observes that upward intergenerational mobility was less likely in rural areas than in urban ones. Despite positive findings about past mobility, Khalid argues that such patterns are unlikely to be repeated for children born in the 1990s and later, e.g., due to changes in Malaysia's education policy. This connects with the criticisms discussed above that preferential policies favor those who are already richer than the average Malaysian.

Table 1 Descriptive statistics on income and poverty per Household Income Survey (HIS) round (selected years)

	2004			2009			2016		
Mean income (2016 MYR)	974			1,103			1,690		
Median income (2016 MYR)	654			750			1,256		
Poverty headcount ratio	0.400			0.338			0.105		
N	36,483			43,026			78,297		
Poverty headcount (age 25–55)	0.409			0.340			0.107		
N (age 25–55)	25,893			30,774			54,993		
Poverty figures subgroups	Pop. share	Pov. ratio	Pov. share	Pop. share	Pov. ratio	Pov. share	Pop. share	Pov. ratio	Pov. share
Bumiputera	0.663	0.491	0.814	0.685	0.405	0.821	0.681	0.131	0.853
Chinese Malaysian	0.248	0.177	0.110	0.233	0.149	0.103	0.218	0.024	0.050
Indian Malaysian	0.084	0.334	0.070	0.077	0.305	0.070	0.088	0.073	0.061
Other Malaysian	0.005	0.525	0.006	0.004	0.429	0.005	0.013	0.286	0.036
Urban	0.639	0.284	0.454	0.663	0.237	0.466	0.774	0.071	0.527
Rural	0.361	0.606	0.546	0.337	0.536	0.534	0.226	0.219	0.473
Peninsular Malaysia	0.807	0.353	0.713	0.810	0.288	0.692	0.828	0.072	0.572
East Malaysia*	0.193	0.596	0.287	0.190	0.547	0.308	0.172	0.261	0.428
East Coast**	0.151	0.563	0.213	0.155	0.465	0.213	0.142	0.159	0.216
Other Peninsular	0.656	0.305	0.500	0.655	0.247	0.478	0.686	0.054	0.356
Head is a man	0.897	0.401	0.898	0.886	0.336	0.881	0.867	0.103	0.852
Head is a woman	0.103	0.393	0.102	0.114	0.353	0.119	0.133	0.117	0.148
Urban Peninsular	0.541	0.259	0.350	0.561	0.208	0.345	0.668	0.053	0.340
Rural Peninsular	0.267	0.545	0.363	0.249	0.470	0.347	0.160	0.151	0.231
Urban East Malaysia	0.099	0.422	0.104	0.103	0.396	0.121	0.106	0.185	0.187
Rural East Malaysia	0.094	0.779	0.183	0.088	0.722	0.188	0.066	0.383	0.242
Urban Bumiputera	0.355	0.359	0.319	0.391	0.287	0.332	0.480	0.089	0.407
Rural Bumiputera	0.308	0.643	0.495	0.294	0.562	0.489	0.202	0.232	0.445
Peninsular Bumiputera	0.512	0.432	0.553	0.531	0.345	0.543	0.550	0.092	0.480
Peninsular non-Bumiputera	0.295	0.217	0.160	0.278	0.181	0.149	0.278	0.034	0.091
East MY Bumiputera	0.151	0.692	0.261	0.154	0.612	0.279	0.131	0.298	0.372
East MY non-Bumiputera	0.042	0.247	0.026	0.037	0.272	0.030	0.041	0.143	0.056

* Labuan, Sabah and Sarawak; ** Kelantan, Pahang and Terengganu. Source: Authors' calculations based on DOSM data. Note: All figures are aggregated from household-level data using sampling and population weights. Mean and median income are in terms of gross monthly household income per capita in 2016 Malaysian ringgit. The poverty line is defined as the 40th percentile of household income per capita in 2004, i.e., MYR 527 per month in 2016 prices. The poverty figures by subgroup give, per survey round: how large the group is as a proportion of the overall population (first column), the headcount ratio within the subgroup (second column), and what share of the total number of poor this represents (third column).

3. Methodology

3.1. Poverty dynamics

This section summarizes the approach outlined in Dang et al. (2014). Our aim is to estimate joint and conditional probabilities of poverty dynamics. For example, we wish to know the likelihood that an individual is poor in survey round 1 and non-poor in round 2, a joint probability which we can write as follows, denoting per capita income by y_i and the poverty line by z:

$$P\ (y_{i1} \leq z_1\ and\ y_{i2} > z_2).$$

Alongside evidence on joint probabilities, we are also interested in conditional probabilities. For instance, we might wish to estimate the likelihood of moving out of poverty, conditional on being poor initially. Such a conditional probability can be written as

$$P\ (y_{i2} > z_2 \mid y_{i1} \leq z_1\ ) = \frac{P\ (y_{i1} \leq z_1\ and\ y_{i2} > z_2\ )}{P\ (y_{i1} \leq z_1\ )}$$

and can be computed straightforwardly from the joint probabilities, as the right-hand side of the equation shows. In the absence of panel data, we do not observe incomes in round 1 and round 2 for the same unit i and would normally not be able to estimate these quantities. However, the method we describe below draws on cross-sectional data and yields both upper and lower bounds for each of the four possible outcomes of the dynamic process, in both conditional and unconditional terms.

We model the logarithm of per capita income in each round as a linear function of time-invariant household characteristics and an individual error term. Schematically:

$$y_{i1} = \beta_1' x_{i1} + \varepsilon_{i1}$$

and

$$y_{i2} = \beta_2' x_{i2} + \varepsilon_{i2}.$$

The basic idea of the method is to use time-invariant household characteristics x_i to predict household per capita income for the year in which the actual observation is lacking. These characteristics will be

unchanged across the two rounds. Mostly, they will be characteristics of the household head, such as the year of birth, educational attainment, ethnicity or religion and birth district. In addition, if the survey includes retrospective questions, these could be used, e.g., if the household owned a car or television at the time of the previous survey.

As we have data for each year, we estimate the coefficient vector β on these time-invariant explanatory variables. In practice we predict the round 1 income for households in the round 2 survey by applying the coefficient vector resulting from the round 1 regression (β_1) to the characteristics of households in round 2 (x_{i2}). This prediction looks as follows for the observations i of round 2:

$$\hat{y}_{i1} = \widehat{\beta_1'} x_{i2} + \hat{\varepsilon}_{i1}.$$

We turn first to the assumptions underlying this approach and will then discuss how estimates for the error term are obtained.

The method for estimating bounds on poverty transition quantities is predicated on two important assumptions. First, we need to assume that the underlying population from which the data are sampled is the same in both survey rounds. This implies that the method cannot be applied in cases where there are large shocks to the population, for example, if there were massive migration into or out of the country. More precisely, we want to ensure that the income model coefficients that we estimate in round 1 are good predictors for what the round 1 income of the households surveyed in round 2 would have been. Hence, to ensure stability of the reference population, we only include households whose heads are between 25 and 55 years in survey round 1.[9]

Second, we need to make assumptions about the relationship between the error terms ε_{i1} and ε_{i2}. Specifically, we assume that these are, on average, positively correlated over time. In the presence of household fixed effects and persistence of shocks, this does not seem to be an unreasonable assumption. Where panel data are available, the correlation coefficient ρ can be estimated directly, and indeed Dang et al. (2014) report values between 0.39 and 0.66 for the six countries they investigate.[10] We do not make further assumptions about the shape of the distribution of the error terms; in that sense, these estimates are non-parametric.

[9] This age range is chosen so that formation of new households and dissolution of existing households should be at a minimum. Moreover, it ensures that in round 1 heads will generally have obtained their maximum level of education.

[10] Dang et al. estimate a value of 0.50 for Indonesia (1997-2000) and values of 0.58 – 0.66 for Vietnam (all pairs of 2004, 2006 and 2008) (Dang et al. 2014, p. 120).

The upper- and lower- bound estimates for mobility derive from two extreme cases of the assumed relationship between the error terms. It is important to note that upper bounds of mobility correspond to the lower bound of immobility, i.e., remaining poor or remaining non-poor, and vice versa. Throughout the paper, upper-bound estimate and lower-bound estimate refer to upper and lower bounds of mobility.

At one extreme, we consider the case of $\rho = 0$, which corresponds to the upper-bound mobility estimate. In this scenario, the errors are uncorrelated and mobility, given household characteristics, will be at a maximum, both out of poverty and into it. Because we assume that errors in fact are positively correlated, on average the upper bound will be strictly larger than actual mobility. Predicted upper-bound round 1 income for household i surveyed in round 2 will be:

$$\hat{y}_{i1}^{2U} = \widehat{\beta_1'} x_{i2} + \widetilde{\hat{\varepsilon}_{i1}},$$

where $\widetilde{\hat{\varepsilon}_{i1}}$ is a residual randomly drawn from the actual distribution of residuals resulting from estimating the income model on the round 1 data. Based on the predictions thus obtained, we can estimate the probability of each poverty transition for each observation. Aggregating these quantities at the population level, we obtain the country-level poverty dynamics.[11] Due to the random nature of this process, these steps are repeated R times, with R = 100 in this application, and averaged to obtain a robust estimate of the upper bound of mobility.

At the other extreme, our lower-bound estimates assume a perfect positive correlation between the errors: $\rho = 1$. In this case, average mobility will be at its minimum. For the estimation, this means we simply take the estimated round 2 residual, scale it by γ, and add it to the fitted round 1 income:[12]

$$\hat{y}_{i1}^{2L} = \widehat{\beta_1'} x_{i2} + \gamma \hat{\varepsilon}_{i2}.$$

Analogous to the upper-bound scenario, but without the repetition, we obtain the lower-bound population-level poverty dynamics estimates.[13] Conditional probabilities are subsequently computed

[11] In our analysis the regressions are at the household level taking log per capita household income as the dependent variable. Transition probabilities for each household are population-weighted when we aggregate, so that the country-level figures represent population proportions.

[12] We use a scaling factor $\gamma = \hat{\sigma}_{\varepsilon 1} / \hat{\sigma}_{\varepsilon 2}$ to adjust for the difference in error variance between the two rounds ($\hat{\sigma}_{\varepsilon}$ is the standard error of the residuals).

[13] Repetition is not necessary in this case because adding the scaled round 2 residual for the same unit is not a stochastic process.

from the population- or subgroup-level joint probability estimates.

3.2. Vulnerability

Our analysis of vulnerability and income mobility is based on the definition of a vulnerability line as introduced by Dang and Lanjouw (2017). Below, we summarize this approach and explain how it ties in with the synthetic panel method. Our goal is to estimate 3x3 transition matrices for the income categories poor, vulnerable and economically secure.[14] This study focuses on the lower part of the income distribution, which is reflected in our choice of income categories. We note that once an individual reaches the secure category, there is no further scope for mobility in our setup. That also implies we are not analyzing the likelihood of social mobility in a broader sense, or intergenerational mobility – two relevant topics in the Malaysian context.

We start by defining the category 'vulnerable' as those non-poor in period 1 who face a certain probability P^V or higher of falling into poverty in period 2. This conditional probability can be denoted as:

$$P\left(y_{i2} \leq z_2 \mid z_1 < y_{i1} \leq v_1\right) = \frac{P\left(y_{i2} \leq z_2 \; and \; z_1 < y_{i1} \leq v_1\right)}{P\left(z_1 < y_{i1} \leq v_1\right)},$$

where v_1 stands for the vulnerability line. The latter is derived empirically after setting the vulnerability index P^V, the maximum probability to fall into poverty that we are willing to accept for a household to be considered economically secure. For example, we might set the index at a value of 20 percent. This approach contrasts with other approaches in the sense that the vulnerability line is not set arbitrarily, for example at 1.5 times the poverty line, but derived empirically from the vulnerability index. In practice, this requires a recursive algorithm that goes over the synthetic panel data to arrive at the vulnerability line that yields the desired vulnerability index.[15] We acknowledge that setting the vulnerability index is still an arbitrary decision, but it is based on a transparent weighing of risks. We argue that anchoring the definition of vulnerability in this way evokes the insecurity that is inherent to vulnerability.

We mostly present results for poverty and vulnerability dynamics in figures that do not indicate the level of precision of estimates. The main reason for this is that the results already consist of bounds

[14] There are no generally agreed upon names for these categories. In some applications, the non-poor who are not considered vulnerable have been labeled 'middle class'. We opt for the more neutral 'economically secure'. One reason is that some of these households will be quite rich, so that middle class would be a misnomer for them.
[15] See Rongen (2021) for a manual that describes the procedure in detail.

that incorporate uncertainty about the errors in our income model. The bounds are highly likely to contain the true value of the probability estimates, as was confirmed in other settings by Dang et al. (2014) and Hérault and Jenkins (2019). In addition, sample sizes for each round are large, so that the standard errors of our estimators are generally small.

4. Data

Our study analyzes six rounds of cross-sectional data from the Household Income and Basic Amenities Survey (HIS) collected by the Department of Statistics Malaysia. The data are for the years 2004, 2007, 2009, 2012, 2014 and 2016; we consider the five pairs of adjacent survey rounds.[16] One requirement for analyzing welfare changes over time is that the measure of welfare, income in our case, is measured in a consistent and comparable manner. The Malaysian data are of high quality and satisfy this requirement. In addition, the sample sizes of the surveys are large, ranging from 36,000 to over 80,000 household-level observations per survey year (see Table 1).

At the start of our analysis, the official Malaysian poverty line was very low; poverty was virtually non-existent by those standards.[17] Given that this line had not been updated in real terms since 1977, it was not an appealing yardstick for the purpose of our analysis. Present-day discussions about poverty and mobility in Malaysia often refer to the living standards of the bottom 40 percent of the income distribution. Accordingly, we have chosen to employ a poverty line corresponding to the income level of the 40th percentile in the first year of our analysis, 2004. This line is then kept constant in real terms for the subsequent years. Hence, it is initially set as a relative line, but is treated as absolute poverty line thereafter. In 2016 prices, the line stands at MYR 527 per capita per month. This is roughly equivalent to MYR 17 per day, or USD 10.5 when converted at 2016 PPP exchange rates. Table 1 gives an overview of the resulting poverty headcount rate for each of the six survey years, both for the whole country and for subgroups. These aggregate numbers are estimated by applying the household sampling and population weights contained in the dataset. We use the same weights to estimate aggregate transition probabilities.

The dependent variable in our analysis is the natural log of monthly household pre-tax income per capita, which is evaluated against our poverty line to determine the poverty status of a household.

[16] Surveys may extend into the subsequent year. When we refer to 'round 1', this indicates the first round of any pair, not necessarily the 2004 survey (and similarly for 'round 2').
[17] As noted earlier, a new official poverty line was adopted in 2020, which is roughly USD 10 per person per day at 2011 PPPs and close in value to ours.

We did not use post-tax income because few Malaysians are subject to personal income tax; it is thus unlikely to affect poverty or vulnerability status.

Income data have been adjusted for spatial price differences. We constructed a spatial price index that reflects prices of basic goods, services and housing at the state level, separately for rural and urban areas within the state (see Table A 1 in the Appendix). The index was derived from the household-specific poverty lines that the Department of Statistics Malaysia calculates for each survey year, which depend on the location and demographic composition of the surveyed household.[18]

As explanatory variables in our income model, the method requires we only use variables that are time-invariant. We use three such categories. First, we employ dummy variables for the birth cohort of the household head, using five-year bins. The first bin starts in 1949 (those 55 in 2004) and the last bin starts in 1984.[19] Second, we use six dummy variables for the highest level of education enjoyed by the household head. Those with primary education or less form the base category. Third, we use dummy variables for the ethnicity of the household head. The four categories are Bumiputera, Chinese, Indian and Other; Bumiputera is set as the base category.

In addition, we use two location dummies that, strictly speaking, are not time-invariant. These are one dummy for urban or rural location and another for being located in either Peninsular Malaysia or East Malaysia. This restricts the interpretation of results to households that did not migrate from one such classification to another.[20] We opted for this approach because omitting these dummies led to biases in predicted income based on urban or rural location, which would have led us to overestimate downward mobility for rural households. Table A 2 in the Appendix provides the regression results of our income models for each survey year, based on the subsample of households with heads in the age range of 25–55.

The synthetic panel method requires checks on the stability of the sample, as a means of assessing the assumption of a stable underlying population. We observe some differences in the distribution of explanatory variables between survey rounds, notably in the means of education variables. This seems to be driven by the age of household heads, with the mean age of heads in later rounds being lower

[18] We are aware that the index is thus based on expenditure patterns at the very low end of the income distribution. However, this is the best we could do in the absence of spatially disaggregated consumer price data.

[19] The first two bins are taken as base categories, since the first bin alone does not always contain a sufficient number of observations.

[20] With the caveat that classification of a location as urban or rural may change over time, the cross-sectional data show that the proportion of the population that is living in rural areas is steadily decreasing: from an estimated 36 percent in 2004, it declined to an estimated 23 percent in 2016. Similarly, mean estimated household size decreased from 4.5 in 2004 to 4.0 in 2016.

(remember that we use the same age cohort in estimating the synthetic panel, so that mean birthyear should remain the same if the composition of households does not change). A possible explanation is that there are more deaths among the older part of the sample. We also investigated the sensitivity of round 1 coefficients to the age cohort on which the model is estimated. Fortunately, our estimators of the coefficients are not much affected by the specification of the age cohort. This implies that the round 1 predictions for round 2 households are robust to the difference in population characteristics.

We use a vulnerability line to study income mobility in more detail. The line is set based on the synthetic panel for the first interval in the dataset (2004–2007) and kept constant afterwards. It is derived from a vulnerability index of 0.4, implying that all non-poor household in 2004 that face a probability of 0.4 or more of falling into poverty in 2007 are considered vulnerable.[21] In our data, this conditional probability is attained at an income level of MYR 703 per capita per month (about MYR 23 per day, or USD 14 at 2016 PPP levels) at the upper bound of mobility. This means that in any round all households with per capita income between MYR 527 and MYR 703 are considered vulnerable. Households with incomes above MYR 703 are labeled economically secure.

5. Population-level results

This section presents findings from applying the synthetic panel methodology to Malaysia's official household survey data. In interpreting these results, it is important to recall that, although the poverty line is defined in relative terms in 2004, it is kept constant in real terms after that. That means we do not adjust it for greater general affluence in Malaysian society over time. This also holds for the vulnerability line. Moreover, all comparisons are based on households of heads aged 25–55 in round 1 and adjusted accordingly for round 2.[22] We analyze joint probabilities and conditional probabilities, both of which are relevant quantities. The first give a clear image of how mobile society as whole is, and allow us to draw conclusions on, for example, what percentage of Malaysians was poor both in 2007 and 2009. The latter enable us to zoom in on a specific group and ask, for instance, given that an individual was poor

[21] The values that the researcher may select for this index are limited empirically by the poverty line and the average conditional probability of all non-poor to fall into poverty. In the upper bound scenario, this range for the index was approximately 0.27 to 0.41. This means that, on average, no non-poor household faces a probability of more than 41 percent to fall into poverty, and all non-poor households face a probability of at least 27 percent to do so.

[22] For example, the estimates for the year pair 2014 – 2016 are based on a sample of households with heads of ages between 25 – 55 years in 2014 and between 27 – 57 years in 2016.

in 2007, what was their probability of remaining in poverty? Although these concepts are closely linked, both merit detailed treatment.

5.1. Poverty transitions

Figure 1 shows the evolution of the joint probabilities of all four poverty transition categories over consecutive survey rounds. The Appendix contains the corresponding transition matrices. The upper-left graph gives the bounds on the probability of being in poverty in both survey rounds, which is how we define chronic poverty. This joint probability may also be interpreted as the share of the population that is in chronic poverty. First, we can observe that this share decreases, from somewhere between 18–36 percent for 2004–2007 to a number in the range of 3–11 percent for the 2014–2016 interval. Conversely, the upper-right graph shows that the probability of not being poor in both rounds increases from 48–60 percent to 81–86 percent respectively. These are impressive positive developments consistent with the general picture of the Malaysian economy in this period, i.e., of fast growth that was broadly shared. Nevertheless, we can also observe that the decrease in the fraction of the population that is chronically poor has slowed recently compared to the 2007–2014 period.

Regarding movements into and out of poverty, we observe that bounds have narrowed over time, but also that the share of the population escaping poverty has likely become smaller as part of the total: the range goes from 3–16 percent in 2004–2007 to 3–9 percent for the most recent survey-pair (lower-left graph in Figure 1). This is perhaps not surprising given that the headcount poverty rate has steadily declined: there are fewer and fewer people who could potentially escape poverty. At the same time, when it comes to downward mobility, the impression is that this has also become less likely over time (lower-right graph).[23] These findings are consistent with the general picture of steadily declining poverty in Malaysia over the reference period. Controlling for initial poverty status can offer additional nuance to these observations, and we turn next to an examination of such conditional probabilities.

[23] The lower-bound estimate for the probability of moving into poverty is even (very close to) zero. For interpretation of this extreme result, remember that we assume perfect correlation of errors between rounds for the lower-bound estimate, i.e., minimum mobility, and that we project income backwards. Consequently, in the absence of major changes in the coefficients on the household time-invariant regressors, it is to be expected that a household that is poor in round 2 is unlikely to have been non-poor in round 1. Since we add the scaled round 2 residual to fitted round 1 income, we also project backwards any idiosyncratic shock that may have happened in round 2. Hence, the result is no surprise. For the opposite probability of poverty exit, the same mechanism holds, but the lower bound does not approach zero due to generally increasing incomes.

Figure 1 Population shares of the four poverty transition categories

Figure 2 (see Table A 4 in the Appendix for the corresponding transition tables). It is notable that some of the bounds are much wider here than for the joint probabilities. Starting with the conditional probability of chronic poverty, we observe a mostly decreasing trend over the 2004–2014 subperiod: an individual who was poor in 2012 had a chance somewhere between 28 and 67 percent of still being in poverty in 2014, compared to a probability in the range of 53–91 percent for 2004–2007.[24] However, the decreasing trend is no longer obvious after 2014, as the bounds for the 2014–2016 year pair widen to the range 24 to 78 percent. We cannot conclude with much certainty what is happening here, but at the very least we observe that there is a slower decrease in the conditional probability of staying poor. We cannot exclude the possibility that chances of remaining in poverty have increased. Obviously, the conditional probability of escaping poverty behaves as the mirror image of the above. Hence, we

[24] Note that we can also interpret this conditional probability as the share of chronic poverty in overall poverty.

observe some evidence that it has recently become more difficult to escape poverty, after about ten years of generally increasing chances. Looking at this from a different angle, we observe that the estimated ranges for these 2014–2016 conditional probabilities are largely the same: 24–78 percent for staying in poverty, and 23–77 percent for escaping poverty.

We can hypothesize about two explanations. On the one hand, it may be a ceiling effect in the sense that as more and more people escape poverty, the characteristics of those remaining in poverty are such that it is harder for them to earn a living above the poverty line. This could mean that there is a group of people who face chronic poverty and may not be able to escape from it without additional policy measures. On the other hand, there may be macro-level effects that decrease the average probability of escaping poverty, such as reduced growth. This would then indicate that for the economy as a whole, it is becoming harder to lift those remaining in poverty out of it. This may similarly prompt increased state efforts to combat remaining poverty.

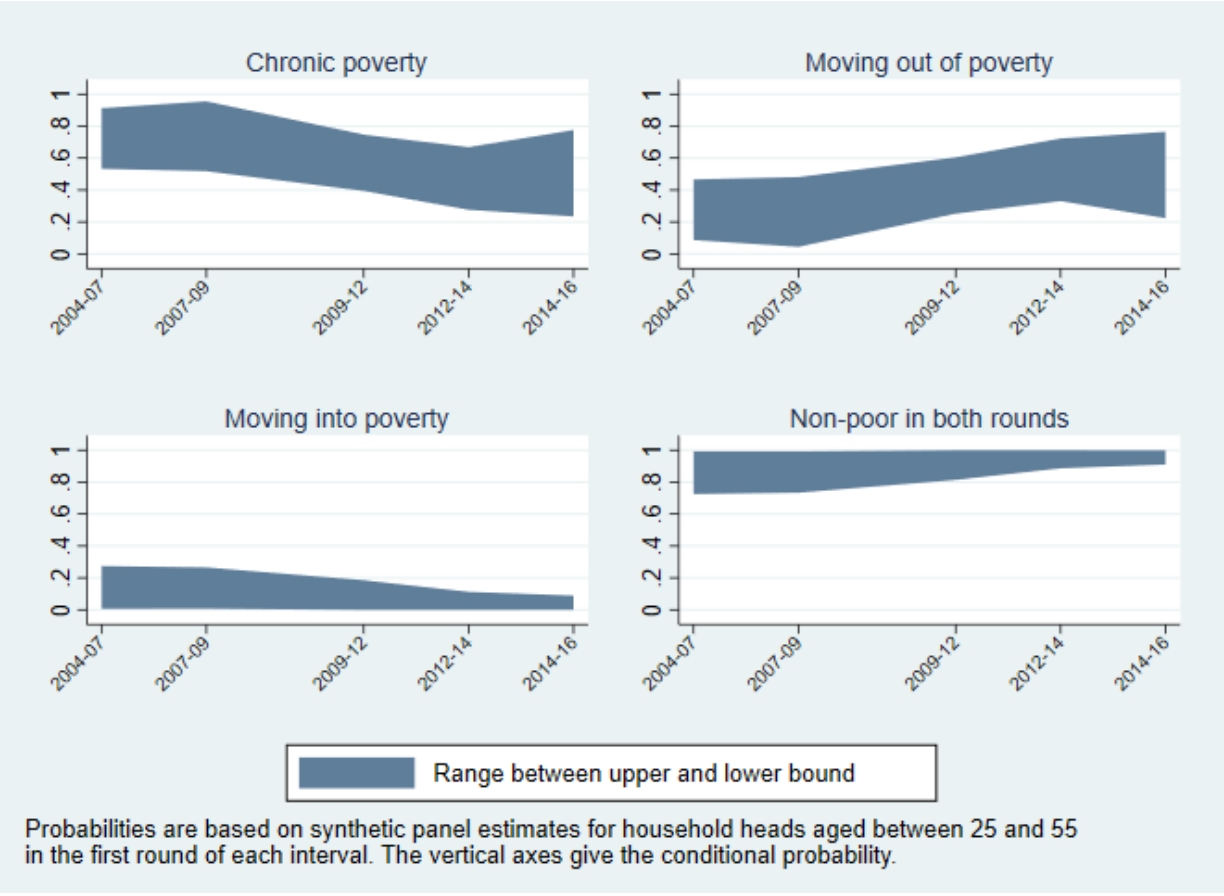

Figure 2 Conditional probabilities poverty transitions

Turning to the mean conditional probabilities faced by non-poor individuals, it seems clear that the likelihood of falling into poverty has decreased considerably. As before, this is equivalent to an increasing conditional probability of staying out of poverty. The latter moves up from somewhere in the range of 73–99 percent for 2004–2007 to a chance between 91–100 percent in 2014–2016.[25] This is a very encouraging development for the non-poor. When we consider the development all four probabilities together, there is some indication that Malaysian society is becoming less mobile when it comes to poverty. The next sections deepen our investigation of income mobility by adding the category of vulnerability and analyzing along broader definitions of upward and downward mobility.

5.2. A first glance at vulnerability

Figure 3 gives the relative size of three groups we may distinguish in the Malaysian income distribution over the period 2004–2016, based on cross-sectional estimates: the poor with low incomes, the vulnerable with somewhat higher incomes, but still facing a significant chance of falling into poverty, and the economically secure with higher incomes and a low probability of becoming poor. We employ poverty and vulnerability lines as defined in the preceding sections. This analysis allows us to study whether people who escape poverty are in a position to increase their incomes further, or if they remain in an economically vulnerable position in which chances of falling back into poverty are elevated. From that perspective, it stands out that the share of people who are in an economically secure position has increased considerably, from approximately 46 percent in 2004 to about 80 percent of the population in 2016. At the same time, the share of the vulnerable has only marginally decreased, from about 13 percent to 10 percent. This would be consistent with an image of the income distribution as a whole shifting to the right, with an increasing number of people moving past the twin goal posts of the poverty and vulnerability lines as Malaysian society becomes richer. We note, however, that this classification does not provide further details about the top of the distribution.

[25] See footnote 23 above about extreme results.

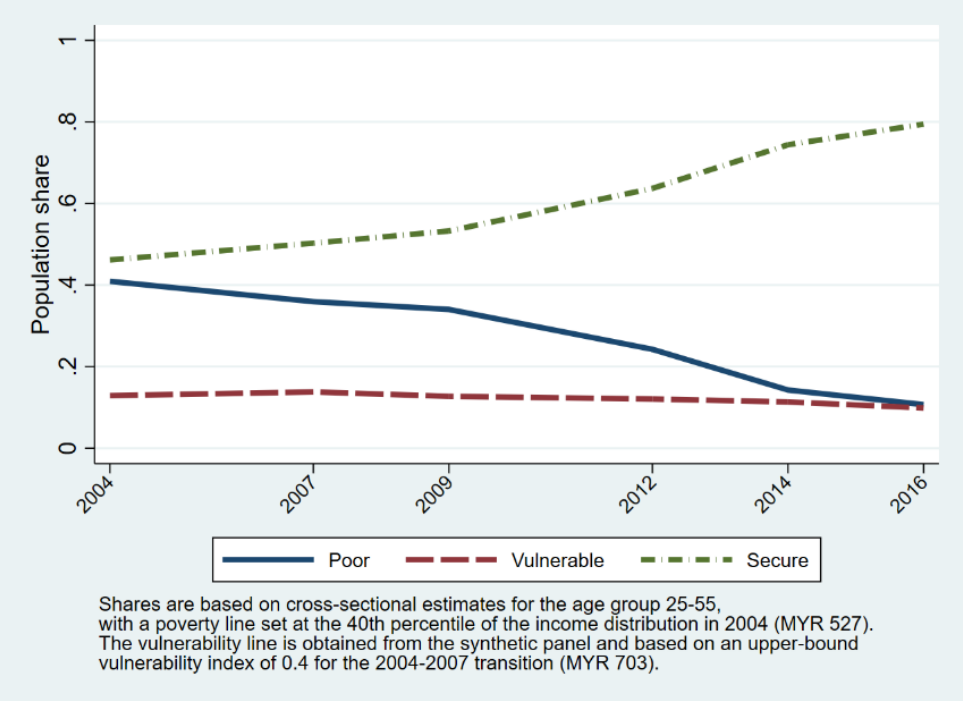

Figure 3 Size of cross-section income groups, 2004–2016

5.3. Income mobility

The division of the income distribution into poor, vulnerable and secure individuals allows for the estimation of a 3x3 transition matrix based on our synthetic panel, which portrays a richer image of income mobility. Table 2 contains two such matrices for the 2014–2016 transition, one for the upper-bound mobility estimates and one for the lower-bound ones. One contrast, by construction, is that the mass in the diagonal cells, which are the immobile categories, is much smaller in the upper-bound case than in the lower bound one. The reverse is happening for the non-diagonal cells. Nevertheless, adding the estimates together, the row totals do not differ much between the lower and upper bound estimates, which is a good sign for the stability of the estimates.[26]

[26] The column totals are equal for both estimates because we take the actual round 2 observations and project income backwards to round 1, which is where the unknowns come in.

Table 2 Transition matrix (3x3) 2014–2016

Upper bound mobility estimates

	Poor 2016	Vulnerable 2016	Secure 2016	Total
Poor 2014	0.024	0.018	0.078	0.119
Vulnerable 2014	0.016	0.014	0.072	0.102
Secure 2014	0.066	0.065	0.648	0.779
Total	0.106	0.097	0.798	

Lower bound mobility estimates

	Poor 2016	Vulnerable 2016	Secure 2016	Total
Poor 2014	0.105	0.030	0.000	0.135
Vulnerable 2014	0.001	0.065	0.045	0.111
Secure 2014	0.000	0.001	0.752	0.754
Total	0.106	0.097	0.798	

Note: Estimated based on the synthetic panel, using a poverty line of MYR 527 and a vulnerability line of MYR 701. N = 56917. Cells give the fraction of the population that is in each transition categories.

We investigate upward and downward mobility by aggregating some of the nine categories. Upward mobility is defined as moving up one category or more, downward mobility as moving down one category or more. In addition, we will also present the share of those secure in both rounds, as this limits the scope for upward mobility. Figure 4 displays the development of the population shares of these groups over time the 2004–2016 period.[27] As we have seen, the secure group has grown steadily, especially since 2009. Persistent security increased from bounds of 32 - 47 percent at the start to a range of 65–75 percent at the end of the study period. In addition, we can observe that downward mobility is likely to have decreased over our timeframe, from between 1 – 25 percent of the population in 2004–2007 to the range of 0 - 15 percent in 2014–2016. Upward mobility seems to have peaked in the 2009–2012 and 2012–2014 intervals with about 20 percent of the population being upward mobile in each of these. In the most recent period, however, we cannot be sure that upward mobility is still larger than downward mobility. Obviously, the larger the share of the population that is secure, the less scope for upward mobility there is.

[27] Note that the upper bound for the secure group goes with the lower bounds of the upward and downward mobile (minimum mobility scenario), and the other way around (maximum mobility scenario). The poor-poor and vulnerable-vulnerable transitions are omitted from this figure, so the totals for each scenario do not sum to one.

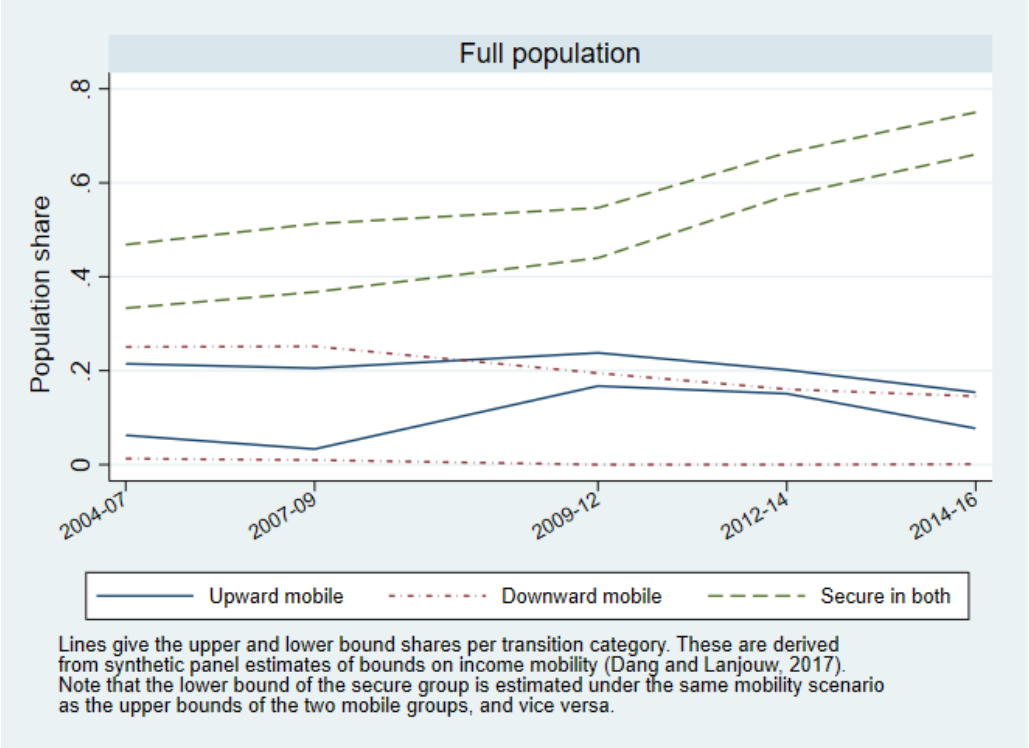

Figure 4 Income mobility 2004–2016

At the aggregate level, we have observed a broad and meaningful trend towards less chronic poverty and more economic security. Many Malaysians seem to have durably escaped poverty over the 2004–2016 period. Unfortunately, the Covid-19 pandemic may have reversed some of these advances. We will contrast the headline characteristics of the chronic poverty and poverty exit categories in the next subsection. By extension, there are some indications of the existence of specific groups that have had difficulties escaping from poverty already prior to the pandemic. We will study these subgroups in more detail in Section 6.

5.4. Basic profile of poverty exit and chronic poverty groups

Figure 5 shows how prevalent various characteristics are among both the chronic poverty and poverty exit groups in the 2014–2016 interval; the population mean of these characteristics in 2016 functions as a reference value.[28] Given that the upper bound estimates are based on a number of draws,

[28] These are the means estimated based on the sample with a restricted age range of household heads; they are not based on the full population.

each household has a certain probability to end up in one of these transition categories. Hence, we have estimated the means for these groups by weighting observations with this probability. The setup of this figure enables us to differentiate between these groups and to sketch their profiles based on a direct comparison for each attribute. To start with a characteristic that does not differ much between the two groups, we can observe that whether the household head is a woman or a man does not matter much for the household's chances of escaping poverty. By contrast, poor households with heads who have completed at most primary education are more likely to remain poor than to escape poverty: an estimated 27–41 percent of the chronically poor has at most primary education, while this range is 21–23 percent for the poverty exit group. This situation is reversed when the head's highest completed education level is upper secondary school. Such households form a larger fraction of the poverty exit group (45–47 percent) than of the chronic poverty group (26–42 percent), indicating that they have better chances to escape poverty.[29] There are few poor households that hold some type of college degree, so this is not a helpful characteristic in profiling the two groups.

Moving to the ethnicity variables, we observe that the Bumiputeras form the large majority of both the chronic poverty and poverty exit groups, reflecting their overrepresentation among the poor. However, they form an even larger part of the chronically poor group (86–91 percent) than of the poverty exit group (80–82 percent), while the opposite holds for the relative shares of Chinese and Indian Malaysians. This could indicate that poor Bumiputeras are further below the poverty line than poor Chinese and Indian Malaysians.

When we consider the geographic distribution of the poor and related probabilities to escape poverty, we observe that differences between the chronic poverty and poverty exit groups are largest in this dimension. Rural households are less likely to escape poverty than urban ones: they make up 47–63 percent of the chronically poor households, but only 38–40 percent of those exiting poverty. The reverse holds for households located in Peninsular Malaysia. They form 43–59 percent of chronically poor households, but 73–82 percent of households that escape poverty.

[29] Better in the sense both that the probability to escape is higher than the probability to remain in poverty, and that they form a larger fraction of the poverty exit group than those with at most primary education.

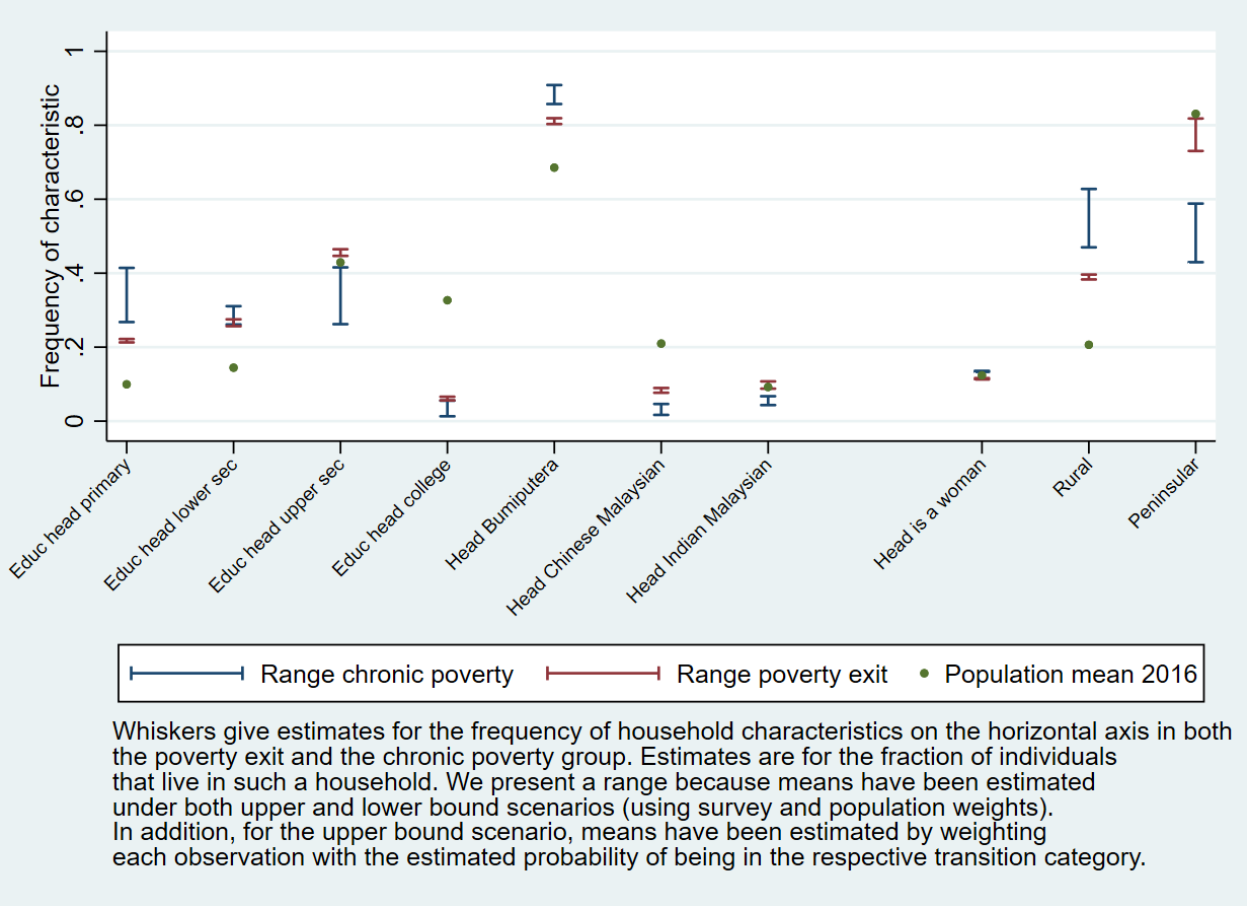

Figure 5 Comparison of characteristics poverty exit against chronic poverty group, 2014–2016

6. Subgroup results: Ethnic and regional inequalities

Malaysia's population-level dynamics show largely positive developments in the sense that chronic poverty is drastically reduced and that many reach a situation of economic security. Nevertheless, aggregate patterns may hide different subgroup trends. Knowing which groups are less or more likely to escape poverty, for example, is useful to inform anti-poverty policy. In this section, our angle is to compare, across groups, the fraction of each subgroup that is in a particular transition category. We investigate such differences first with respect to chronic poverty, and then as regards upward and downward mobility, and persistent security.

In the Malaysian context, the differences between ethnic groups are of special interest. As described earlier, starting in 1970, the Malaysian government has implemented affirmative action policies to improve the economic position of the Bumiputera ethnic groups, which were disadvantaged and make

up the majority of the population. To a large extent, these policies are still in place and we might expect to see their effects also over the time frame of this study. Hence, we compare probabilities for Bumiputeras, Chinese Malaysians and Indian Malaysians. In addition, we disaggregate along several geographic dimensions: rural against urban areas, and Peninsular Malaysia (the part of Malaysia on the Asia mainland) compared to East Malaysia (the part on the island of Borneo). To sketch an image of the magnitude of the headline differences, Figure 6 and Figure 7 below provide an overview of the shares of chronic poverty and mobility for various groups, indicating that there is ample variation between the subgroups.[30] In addition to the subgroups outlined above, these figures also provide information on further regional differences within Peninsular Malaysia by contrasting the East Coast states to the rest of the peninsula, and on gender differences by comparing households headed by women against those headed by men.[31] Since the latter differences are small, however, we will not focus on these in the remainder of the section. Moreover, because the difference between the East Coast and Other Peninsular States largely reflects the urban-rural disparity, we will not consider this specific regional subdivision further. Finally, in the subsequent analysis we will also combine dimensions to investigate geographic differences within the Bumiputera group.

[30] Note that the confidence intervals in the figures are constructed using standard errors that take into account the sampling error, but not the uncertainty of the estimated model parameters.

[31] This subdivision splits Peninsular Malaysia into the - more rural - East Coast (the states of Kelantan, Pahang, Terengganu) and the – more urban - remainder of the peninsula.

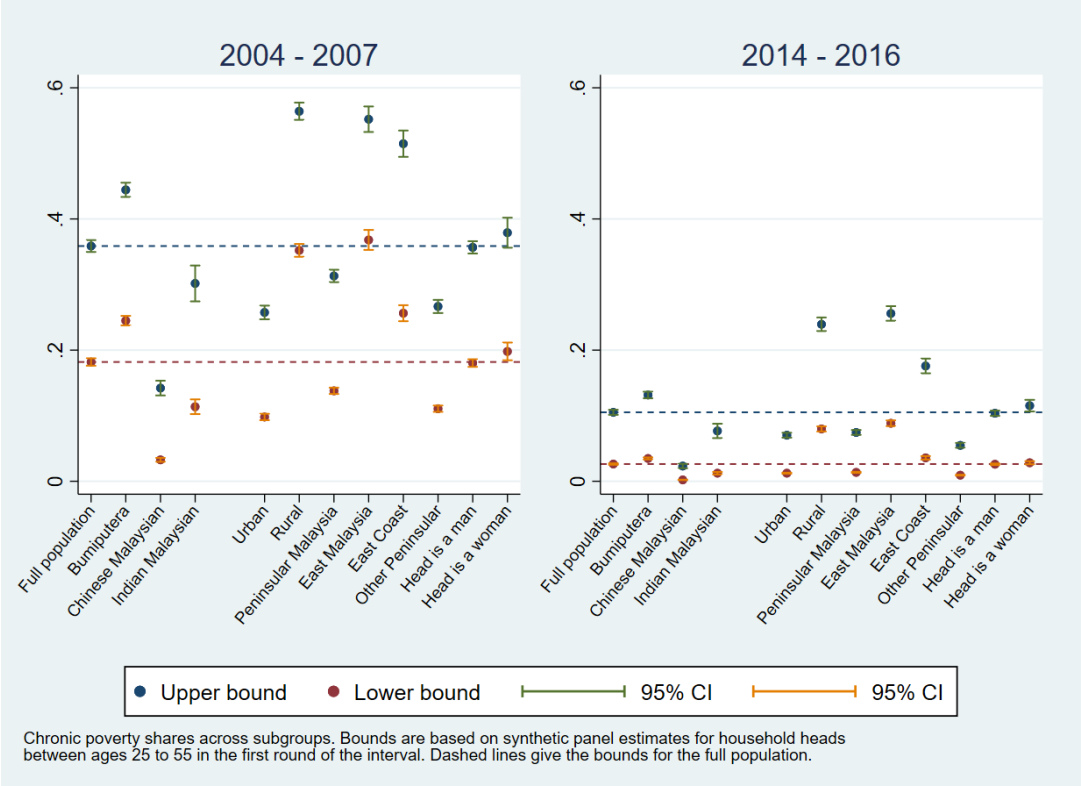

Figure 6 Chronic poverty headcount rates across subgroups.

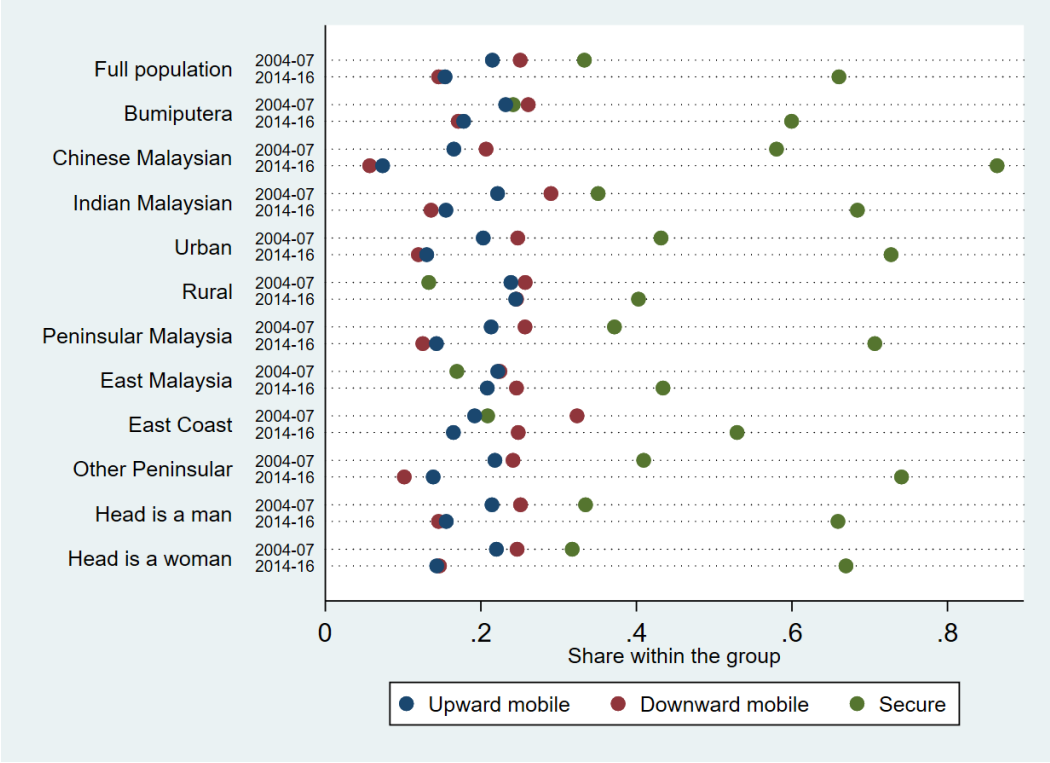

Figure 7 Income mobility across subgroups (upper bound)

6.1. Chronic poverty

We analyze the presence of chronic poverty across a number of different subgroups. Figure 8 below shows developments in chronic poverty across the three main ethnic groups in Malaysia. Clearly, there is more chronic poverty among the Bumiputeras than among Chinese Malaysians. However, the absolute difference has decreased over time, from somewhere in the range of 21–30 percent to a figure in the range of 3–11 percent. The difference between Bumiputeras and Indian Malaysians is less pronounced and has also become smaller over time. The ranges overlap: in the 2014–2016 interval, they are 1–8 percent for Indian Malaysians and 3–13 percent for Bumiputeras.

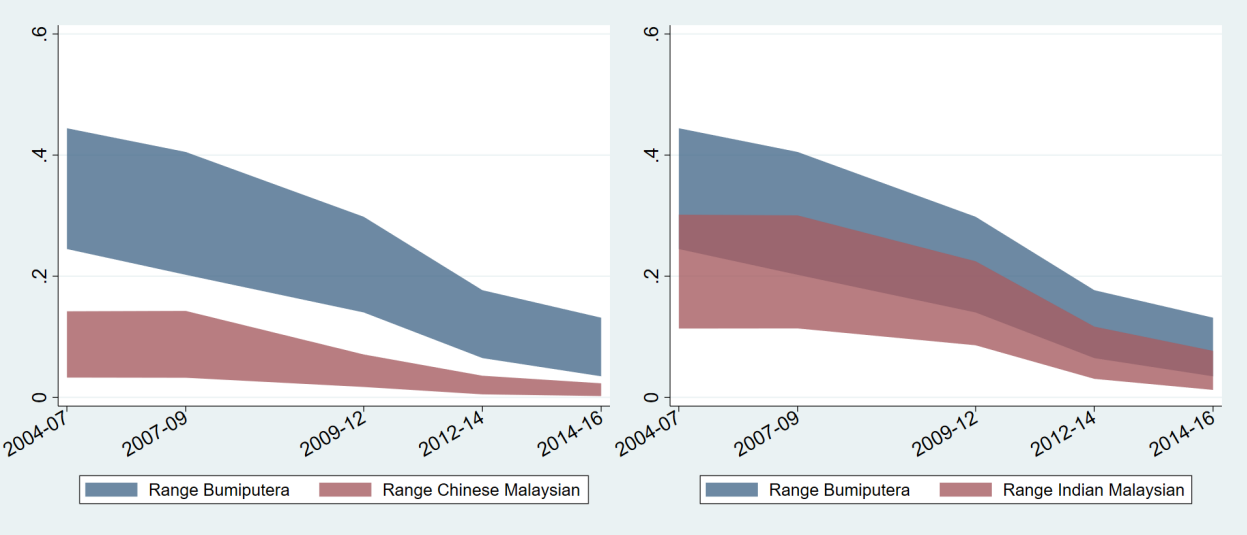

Figure 8 Chronic poverty across ethnic groups. The vertical axis indicates the fraction of the subgroup in chronic poverty.

The graphs in Figure 9 below show developments in chronic poverty across two regional dimensions. These contrast households situated in urban and rural areas, and those living in Peninsular Malaysia and East Malaysia. In addition, we consider a combination of the above. In short, we observe significant differences in the sense that bounds do not overlap between the areas: proportionally, there is much more chronic poverty in rural areas and in East Malaysia compared to urban areas and Peninsular Malaysia. Moreover, bounds for the former areas do not seem to narrow over time, which may indicate that the income of many households lies close to the poverty line; in our scenario of maximum mobility, they escape poverty, but in case of minimum mobility, they do not. Strikingly, if we combine the two spatial dimensions, the largest gap in chronic poverty rates of any comparison can be observed when contrasting urban areas in Peninsular Malaysia with rural ones in East Malaysia. In the 2014–2016 interval,

between 16 and 39 percent of the population in rural East Malaysia was chronically poor, while this range was only 1 to 5 percent for the urban population in Peninsular Malaysia.

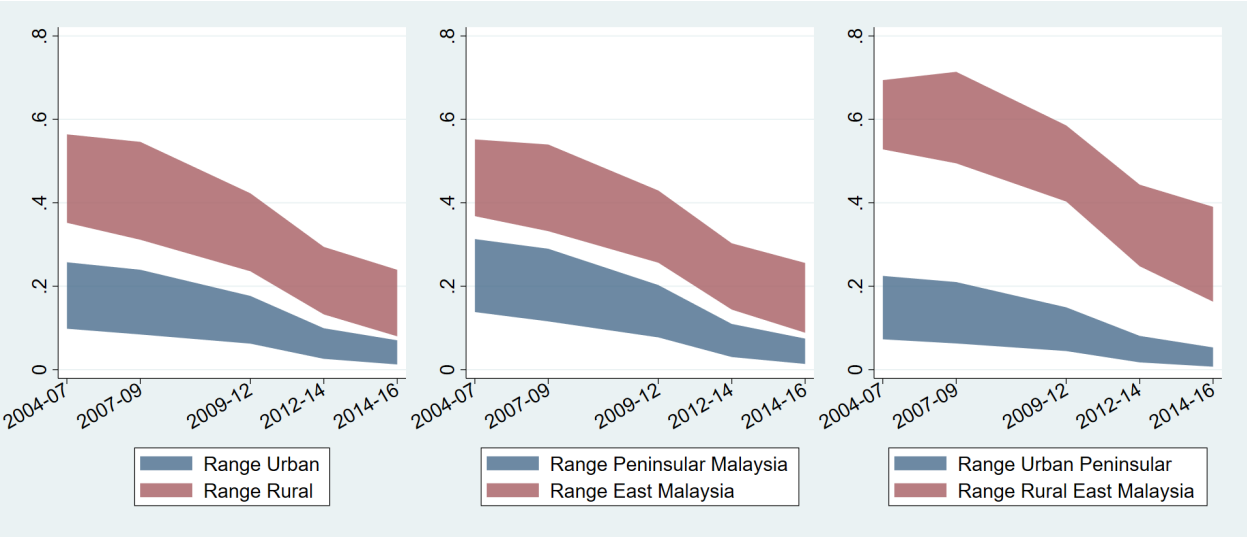

Figure 9 Chronic poverty shares across geographic dimensions. The vertical axis indicates the fraction of the subgroup in chronic poverty.

Given that the observed regional differences are larger than the ethnic ones, it is of interest to explore how these dimensions interact. Figure 10 below deepens the previous discussion by looking at regional differences within the Bumiputera group. The impression is that the regional differences dominate: the urban-rural and Peninsular Malaysia-East Malaysia disparities seem to be repeated within the Bumiputera group. It is notable, for example, that there is a distinct difference in the presence of chronic poverty between Bumiputeras in Peninsular Malaysia and those in East Malaysia.

Taken together, these findings suggest, as indeed Ravallion (2020a, b) finds, that there is some scope for further reducing poverty by reducing ethnic inequalities. At the same time, however, our results clearly indicate that bigger gains in reducing the likelihood of chronic poverty are to be found by also incorporating spatial characteristics in poverty reduction policies.

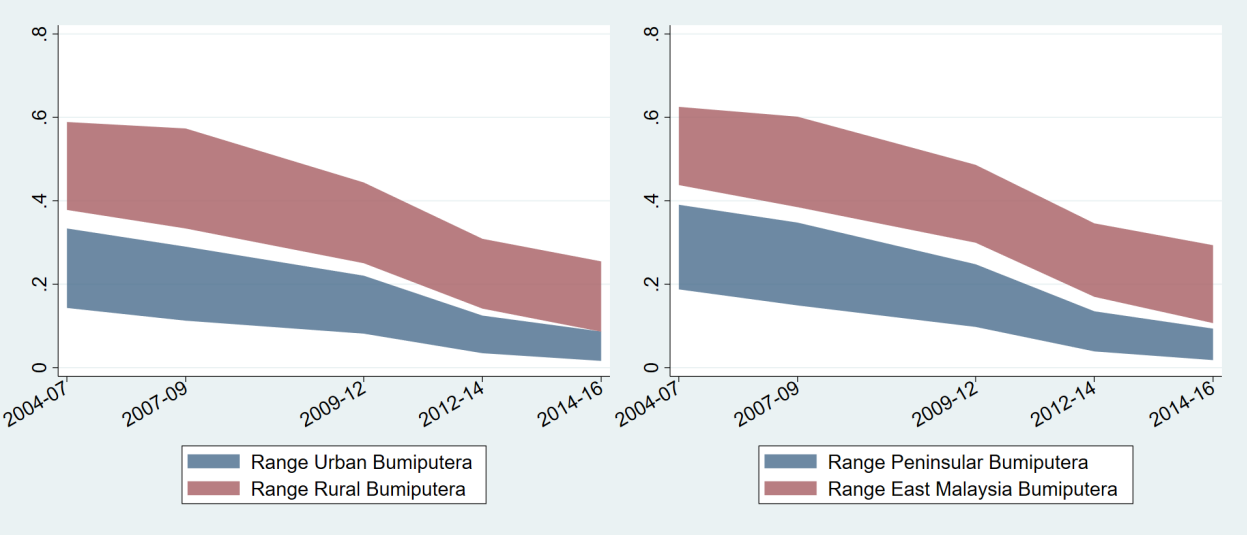

Figure 10 Chronic poverty shares within the Bumiputera group. The vertical axis indicates the fraction of the subgroup in chronic poverty.

6.2. Income mobility

We continue the analysis of dynamics across subgroups by considering income mobility, in the form of the somewhat broader categories of downward mobility, upward mobility and economic security. These categories are absolute in the sense that they depend on fixed poverty and vulnerability lines. This stands in contrast to relative mobility analysis based on, for example, income quintiles. The implication is that in our set-up it is theoretically possible for one group to catch up with another, e.g., by achieving the same level of economic security within the group. In percentile-based analysis, the gain of one subgroup necessarily implies some downward mobility for another subgroup.

Starting again with the ethnic dimension, we observe important differences in levels of mobility, although overall trends go in the same direction. Persistent economic security is highest among Chinese Malaysians, increasing from a range of 58–71 percent to 86–90 percent of the subgroup. This fraction is somewhat lower for Indian Malaysians (increasing from 35–51 percent to 68–77 percent) and Bumiputeras (rising from 24–38 percent to 60–70 percent). Over the study timeframe, Bumiputeras experienced the largest absolute increase in economic security. Yet, in 2014–2016 they were on average at about the level where Chinese Malaysians were in 2004–2007. In addition, we observe decreasing shares of downward mobility among all three groups. Nevertheless, also upward mobility seems to have decreased in recent periods. This comes as no surprise, because a large share of Chinese Malaysians are already in the secure category.

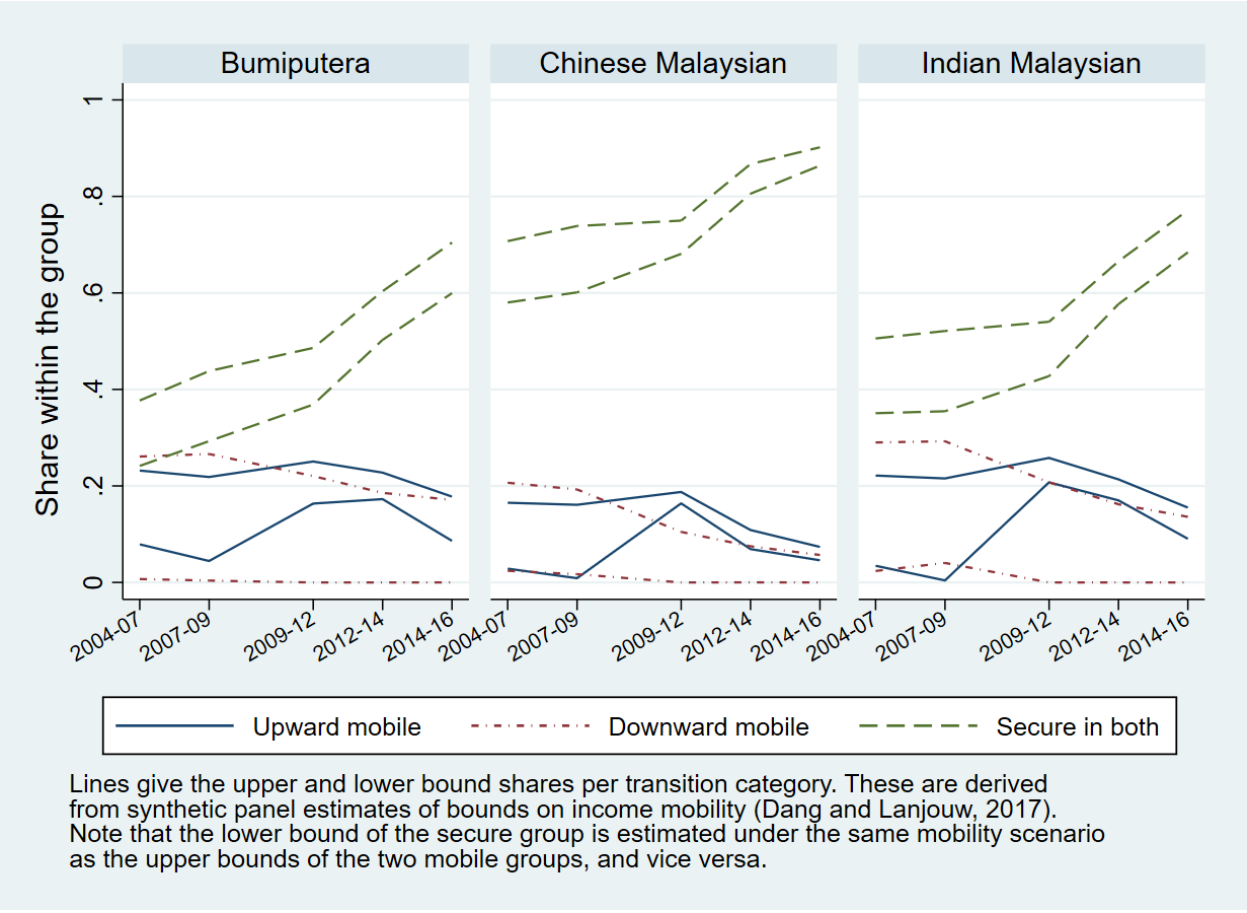

Figure 11 Income mobility across ethnic groups, 2004–2016

Most of the regional patterns of chronic poverty are repeated in reverse fashion when we consider persistent economic security in Figure 12. Economic security is much higher in urban areas, rising from a range of 43–58 percent in 2004–2007 to 73–80 percent in 2014–2016. Over the same period, the range moves from 13–25 percent to 40–58 percent in rural areas.[32] Again, we observe an even larger gap between urban Peninsular Malaysia and rural East Malaysia – the fraction of the population in economic security in both 2014 and 2016 was in the range of 76–83 percent in the former area, but only 24–39 percent in the latter. Furthermore, it is noticeable that downward mobility seems to have decreased in urban areas and in Peninsular Malaysia, while we do not observe much change in this respect in rural areas and in East Malaysia. In fact, downward mobility seems to have increased in rural areas in East

[32] We omit the graph comparing mobility in Peninsular Malaysia to East Malaysia, as trends are largely similar to the urban-rural comparison.

Malaysia. It is not encouraging that upward mobility seems to have decreased recently in rural areas and in East Malaysia, as levels of economic security were already comparatively low here.

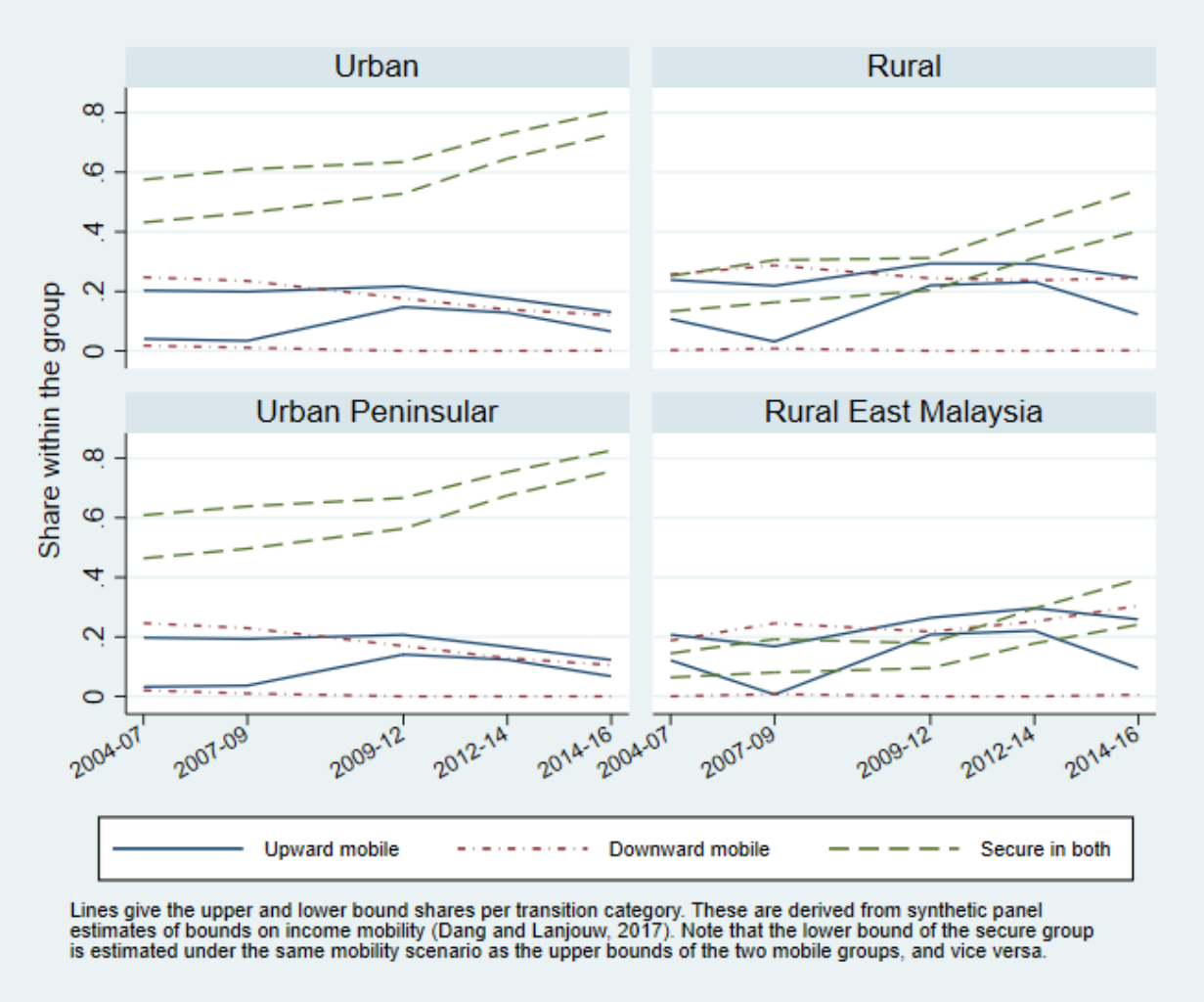

Figure 12 Income mobility across regional dimensions, 2004–2016

Figure 13 below extends the analysis above by looking at regional differences within the Bumiputera group. Overall, regional differences seem to be repeated within the Bumiputera group, as we saw for chronic poverty too.

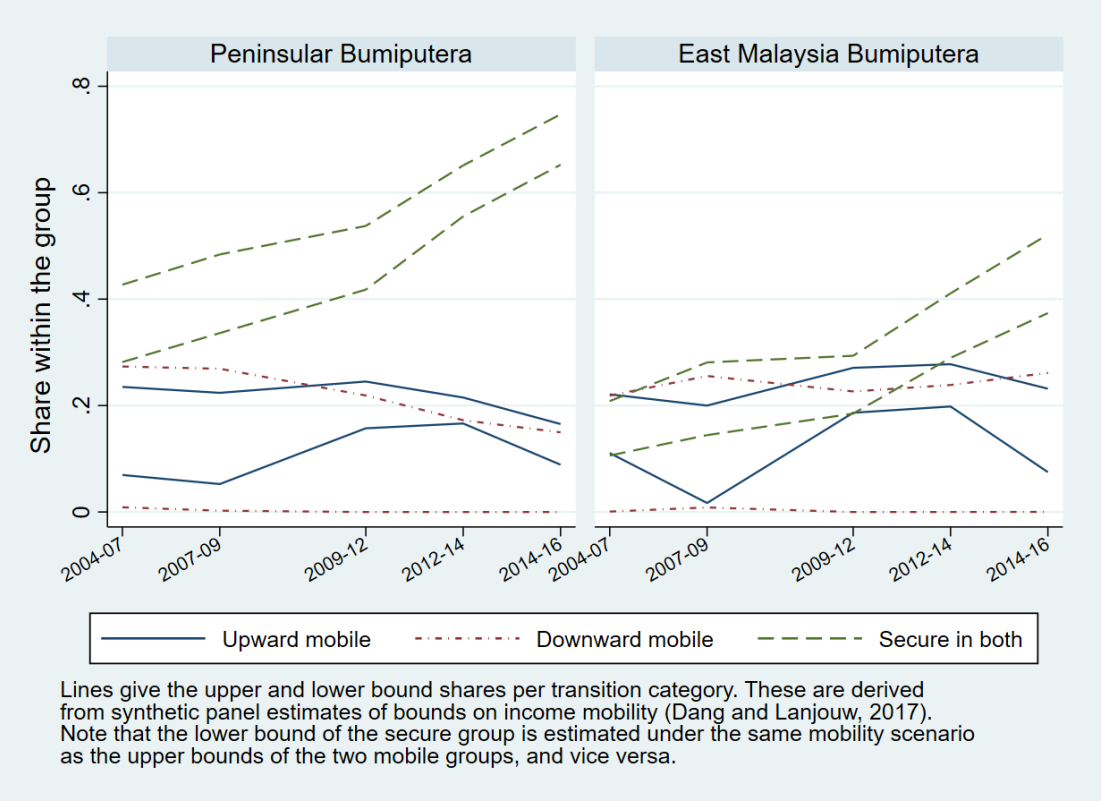

Figure 13 Income mobility within the Bumiputera group, 2004–2016

7. Conclusion

This study provides evidence on poverty and income dynamics in Malaysia in the first two decades of the twenty-first century. We have employed a synthetic panel approach to estimate upper and lower bounds on poverty and vulnerability transitions between consecutive survey rounds in the 2004 to 2016 period. Our results indicate that the likelihood of being chronically poor decreased considerably, especially during the 2009–2014 interval. For those already living above the poverty line, the probability of staying out of poverty has increased significantly.

Yet, the pace of poverty reduction has slowed recently, and the likelihood of escape from poverty seems to have decreased compared to previous years. We cannot rule out the possibility that the likelihood of remaining poor was higher for poor individuals in 2014 than for those in poverty in 2012. At

the same time, our impression is that downward mobility has somewhat decreased: individuals not in poverty are less likely to fall below the poverty line.

Part of our analysis focused on the probabilities faced by different subgroups in Malaysian society. We have clear indication that there are subgroups who face a higher risk of chronic poverty than others, despite absolute improvements within all groups. Our results show that both the rural population and those living in East Malaysia still have a considerably higher average chance of being chronically poor than the urban population and those in Peninsular Malaysia. The highest incidence of chronic poverty is found in rural East Malaysia. In parallel, we observe higher incidence of chronic poverty among the Bumiputeras compared to Chinese and Indian Malaysians. However, these ethnic differences are smaller in absolute terms than the spatial differences.

In sum, despite improvements for all groups, we do not observe those living in rural areas or in East Malaysia catching up, for example, in terms of the probability to exit poverty. In East Malaysia, it is not just that a larger part of the population is in chronic poverty, but also that a larger share of all poor is chronically poor and has fewer opportunities to escape poverty over time. These differences in poverty and income mobility raise concerns about Malaysia's capacity to create equal opportunities. It seems that the NEP's twin objectives of poverty reduction and correcting ethnic imbalances in the economy have proved less successful for these geographically defined subgroups.

A number of additional research avenues are of interest. First, the robustness of our methodology and the assumptions made in this analysis can be tested further, for example by investigating whether the results hold up if a different poverty line or vulnerability line is employed. Moreover, simulations could provide information on the sampling distribution of our bound estimates, so that we have more clarity on their precision. Second, a potential extension to our analysis is to dive deeper into the chronic nature of poverty by creating a synthetic panel for three rounds. For example, we could investigate the cross-sectional surveys of 2012, 2014, 2016, which would give estimates for the proportion of poor people over a longer or shorter time interval.

Naturally, our analysis would benefit from the inclusion of more recent data, specifically the latest available HIS 2019 and upcoming HIS 2022 survey data. This would enable the investigation of both the effects of the Covid-19 pandemic and longer-term trends in poverty and income mobility. This would be useful for future policies, including the implementation of the recently released Twelfth Malaysia Plan for 2021–25 and the preparation of the Thirteenth Malaysia Plan that will cover 2026–2030. As in many other countries, the pandemic has had a severe impact on the lives and livelihoods of Malaysians. It is very likely that some of the progress in poverty reduction has been reversed, and that the likelihood of poverty exit

has decreased. Combining synthetic panel analysis with simulations of shocks, such as the Covid-19 crisis, may help to understand the impacts of such shocks on poverty and inequality.

In short, when it comes to ensuring a fairer distribution of socioeconomic opportunities for poor and vulnerable Malaysians, our study demonstrates that it is indispensable to take regional inequalities into account. At the same time, our study affirms that there is still some scope for poverty reduction through the reduction of ethnic inequalities. Hence, looking ahead, addressing chronic poverty is likely to require additional attention to less developed geographic areas, as a complement to the current policies that are largely ethnicity-based.

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Appendix

Table A 1 Spatial price index

State-stratum combination	Survey year					
	2004	2007	2009	2012	2014	2016
Johor Urban	0.987	0.983	0.978	0.982	0.994	0.996
Johor Rural	0.898	0.909	0.904	0.892	0.886	0.881
Kedah Urban	0.948	0.942	0.941	0.952	0.947	0.952
Kedah Rural	0.883	0.889	0.884	0.887	0.877	0.861
Kelantan Urban	0.858	0.875	0.855	0.867	0.88	0.886
Kelantan Rural	0.794	0.803	0.8	0.794	0.793	0.78
Melaka Urban	0.985	0.977	0.984	0.982	0.985	0.987
Melaka Rural	0.906	0.914	0.894	0.884	0.9	0.884
N. Sembilan Urban	0.949	0.962	0.943	0.952	0.948	0.953
N. Sembilan Rural	0.944	0.964	0.964	0.948	0.924	0.918
Pahang Urban	0.976	0.975	0.971	0.977	0.982	0.985
Pahang Rural	0.904	0.922	0.915	0.919	0.893	0.882
P. Pinang Urban	1.042	1.037	1.042	1.041	1.045	1.05
P. Pinang Rural	0.977	0.973	0.977	0.959	0.947	0.944
Perak Urban	0.924	0.942	0.937	0.944	0.938	0.944
Perak Rural	0.874	0.898	0.888	0.867	0.881	0.851
Perlis Urban	0.926	0.919	0.909	0.929	0.921	0.92
Perlis Rural	0.862	0.872	0.885	0.868	0.864	0.849
Selangor Urban	1.055	1.049	1.038	1.049	1.042	1.049
Selangor Rural	0.94	0.941	0.935	0.931	0.921	0.907
Terengganu Urban	0.922	0.915	0.919	0.946	0.935	0.946
Terengganu Rural	0.919	0.914	0.913	0.899	0.916	0.905
Sabah Urban	1.14	1.135	1.151	1.13	1.105	1.076
Sabah Rural	1.113	1.074	1.154	1.136	1.096	1.049
Sarawak Urban	1.081	1.081	1.09	1.076	1.077	1.073
Sarawak Rural	1.049	1.044	1.055	1.019	1.01	0.981
WP. KL Urban	1.221	1.204	1.192	1.196	1.19	1.204
WP. Labuan Urban	1.14	1.134	1.161	1.081	1.098	1.081
WP. Labuan Rural	1.113	1.068	1.184	1.114	1.102	1.062
WP Putrajaya Urban		1.161	1.162	1.133	1.098	1.108

Source: Authors' calculations based on DOSM household-specific poverty lines.
Note that the Federal Territory of Putrajaya was not yet included as a separate area in 2004. Putrajaya and Kuala Lumpur do not have rural districts

Table A 2 OLS regression output income model – Dependent variable: log of spatially-adjusted monthly household income per capita

	2004	2007	2009	2012	2014	2016
Dummy: lower secondary	0.210	0.135	0.176	0.123	0.117	0.106
	(0.015)***	(0.014)***	(0.014)***	(0.015)***	(0.011)***	(0.012)***
Dummy: upper secondary	0.521	0.437	0.506	0.432	0.361	0.339
	(0.015)***	(0.014)***	(0.014)***	(0.014)***	(0.010)***	(0.011)***
Dummy: vocational	0.763	0.636	0.726	0.666	0.553	0.517
	(0.030)***	(0.031)***	(0.028)***	(0.027)***	(0.018)***	(0.020)***
Dummy: university (dipl)	1.076	1.034	1.061	0.971	0.781	0.752
	(0.024)***	(0.022)***	(0.021)***	(0.019)***	(0.012)***	(0.014)***
Dummy: advanced university degree	1.456	1.378	1.479	1.369	1.221	1.137
	(0.025)***	(0.022)***	(0.021)***	(0.018)***	(0.014)***	(0.015)***
Dummy: ethnicity is Chinese	0.576	0.490	0.424	0.478	0.402	0.407
	(0.014)***	(0.013)***	(0.013)***	(0.012)***	(0.008)***	(0.009)***
Dummy: ethnicity is Indian	0.213	0.141	0.057	0.095	0.087	0.090
	(0.021)***	(0.019)***	(0.018)***	(0.018)***	(0.012)***	(0.012)***
Dummy: ethnicity is Other	0.173	0.083	0.096	0.129	0.129	-0.024
	(0.067)**	(0.089)	(0.074)	(0.060)**	(0.058)**	(0.027)
Dummy: rural	-0.288	-0.245	-0.259	-0.229	-0.200	-0.185
	(0.013)***	(0.012)***	(0.012)***	(0.012)***	(0.009)***	(0.009)***
Dummy: Peninsular	0.311	0.252	0.284	0.231	0.207	0.263
	(0.015)***	(0.015)***	(0.015)***	(0.014)***	(0.009)***	(0.009)***
Birth cohort starting 1959	-0.249	-0.176	-0.201	-0.110	0.185	0.256
	(0.014)***	(0.014)***	(0.015)***	(0.019)***	(0.027)***	(0.016)***
Birth cohort starting 1964	-0.268	-0.274	-0.324	-0.281	0.010	0.121
	(0.015)***	(0.015)***	(0.015)***	(0.020)***	(0.026)	(0.015)***
Birth cohort starting 1969	-0.184	-0.215	-0.286	-0.345	-0.067	0.015
	(0.016)***	(0.016)***	(0.016)***	(0.020)***	(0.026)**	(0.015)
Birth cohort starting 1974	0.007	-0.093	-0.220	-0.307	-0.045	-0.016
	(0.020)	(0.017)***	(0.017)***	(0.021)***	(0.026)*	(0.015)
Birth cohort starting 1979	0.069	-0.014	-0.101	-0.197	0.005	0.005
	(0.044)	(0.021)	(0.019)***	(0.021)***	(0.026)	(0.015)
Birth cohort starting 1984			-0.134	-0.168	0.032	0.041
			(0.046)***	(0.024)***	(0.027)	(0.015)***
_cons	5.910	6.079	6.104	6.371	6.337	6.353
	(0.020)***	(0.019)***	(0.021)***	(0.023)***	(0.028)***	(0.019)***
R^2	0.441	0.415	0.431	0.422	0.393	0.383
N	25,893	26,497	30,774	30,763	59,373	54,993

* $p<0.1$; ** $p<0.05$; *** $p<0.0$

Source: Authors' estimations based on DOSM data. Note: Parameters have been estimated using household-level survey data and incorporate sampling and population weights. The robust standard errors take the sampling design into account. Estimates are for households with heads in the age bracket 25-55.

Table A 3 Transition tables by survey-pair - Joint probabilities

Bound estimates 2004 - 2007 (Full population)

	Lower Bound	Upper Bound
Poor, poor	0.359	0.182
Poor, non-poor	0.034	0.159
Non-poor, poor	0.004	0.181
Non-poor, non-poor	0.603	0.478
N	27,174	27,174

Bound estimates 2007 - 2009 (Full population)

	Lower Bound	Upper Bound
Poor, poor	0.337	0.157
Poor, non-poor	0.016	0.146
Non-poor, poor	0.005	0.185
Non-poor, non-poor	0.642	0.512
N	31,405	31,405

Bound estimates 2009 - 2012 (Full population)

	Lower Bound	Upper Bound
Poor, poor	0.244	0.110
Poor, non-poor	0.082	0.168
Non-poor, poor	0.000	0.134
Non-poor, non-poor	0.674	0.588
N	31,965	31,965

Bound estimates 2012 - 2014 (Full population)

	Lower Bound	Upper Bound
Poor, poor	0.142	0.049
Poor, non-poor	0.070	0.129
Non-poor, poor	0.000	0.093
Non-poor, non-poor	0.788	0.729
N	61,113	61,113

Bound estimates 2014 - 2016 (Full population)

	Lower Bound	Upper Bound
Poor, poor	0.105	0.026
Poor, non-poor	0.030	0.085
Non-poor, poor	0.001	0.080
Non-poor, non-poor	0.864	0.809
N	56,917	56,917

Source: authors' calculations based on DOSM data. Transitions were estimated using a poverty line of the 40th percentile of the income distribution in year 2004 (MYR 527 per capita per month in 2016 prices). Rows give the fraction of population (in households whose heads are in the selected age range) that is in each of the four categories. For example, 'Poor, poor' indicates the fraction that was poor in year 1 and poor in year 2.

Table A 4 Transition tables by survey-pair - Conditional probabilities

Bound estimates 2004 - 2007 (Full population)

	Lower Bound	Upper Bound
Poor to poor	0.913	0.533
Poor to non-poor	0.087	0.467
Non-poor to poor	0.007	0.274
Non-poor to non-poor	0.993	0.726
N	27,174	27,174

Bound estimates 2007 - 2009 (Full population)

	Lower Bound	Upper Bound
Poor to poor	0.956	0.518
Poor to non-poor	0.044	0.482
Non-poor to poor	0.007	0.266
Non-poor to non-poor	0.993	0.734
N	31,405	31,405

Bound estimates 2009 - 2012 (Full population)

	Lower Bound	Upper Bound
Poor to poor	0.748	0.395
Poor to non-poor	0.252	0.605
Non-poor to poor	0.000	0.186
Non-poor to non-poor	1.000	0.814
N	31,965	31,965

Bound estimates 2012 - 2014 (Full population)

	Lower Bound	Upper Bound
Poor to poor	0.669	0.276
Poor to non-poor	0.331	0.724
Non-poor to poor	0.000	0.113
Non-poor to non-poor	1.000	0.887
N	61,113	61,113

Bound estimates 2014 - 2016 (Full population)

	Lower Bound	Upper Bound
Poor to poor	0.776	0.235
Poor to non-poor	0.224	0.765
Non-poor to poor	0.001	0.090
Non-poor to non-poor	0.999	0.910
N	56,917	56,917

Source: authors' calculations based on DOSM data. Transitions were estimated using a poverty line of the 40th percentile of the income distribution in year 2004 (MYR 527 per capita per month in 2016 prices). Rows give the conditional probability of each of the four states. For example, 'Poor to poor' indicates the probability of being poor in year 2, given that the individual was also poor in year 1.