Changing Beliefs in Meritocracy and Preference for Redistribution in China

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Abstract

When a society is in equilibrium, social choice for redistribution reflects the majority opinion on the trade-off between equity and efficiency. This is no longer true in a changing society where individuals may experience multiple ways of living. The aim of this paper is to empirically explain endogenous preferences for redistribution together with the causes of poverty, using Chinese individual data. Two worlds coexist in China. On one side, the rural population adheres to the conservative view of the image of limited good (Foster 1965) where redistribution is not possible without affecting the fate of others. On the other side, the urban world has benefited from economic growth, accompanied by the rise of meritocracy and the desire for redistributing the fruits of economic growth. In between, we have the floating population of rural migrants with different motives in their decision to join the meritocratic urban world. Using a simultaneous ordered probit model and the data provided by the 2006 CGSS, we found that the length of migration duration and the exposure to discrimination due to the Hukou status are the main drivers of changes in the mechanism of preference formation for redistribution. These insights may help to understand the adherence to meritocratic beliefs as well as how to implement social welfare policies. It provides a new look on Chinese economic growth.

Keywords: Hukou and migrant workers, preference for redistribution, inequality perceptions, meritocracy, image of limited good.
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1 Introduction

Bowles (1998) introduces his article on endogenous preferences with the following words:

> *Markets and other economic institutions do more than allocate goods and services: they also influence the evolution of values, tastes, and personalities. Economists have long assumed otherwise; the axiom of exogenous preferences is as old as liberal political philosophy itself.*

As a matter of fact, most of the articles that have influenced the writing of the present paper do consider preferences (here preferences for redistribution) as exogenous. Benabou and Tirole (2006) introduce the possibility of different equilibrium in different countries, depending on the configuration of personal beliefs about redistribution, Piketty (1995) explains the formation of personal beliefs about redistribution by dynasties and family transmission. Alesina and Angeletos (2005) were among the first to consider explicitly the impact of tax policies on preferences and on the desire for redistribution. However, the fundamental parameters of their model, the aversion for unfairness and the preference for immediate consumption are still exogenous.

Tax systems usually evolve smoothly over time, so the changes in preferences are hard to figure out empirically. The main objective of the present paper is to exploit the Chinese context with its extremely strong policy changes and the availability of a magnificent data base (the 2006 Chinese General Social Survey) to illustrate how preferences for redistribution and the causes of poverty are changing between communities (the traditional opposition between the rural and the urban worlds) when there is a floating rural population that migrates into towns, either temporarily or on a longer term basis.

The *first* main assumption that we shall introduce is the strong divide of the Chinese society between rural and urban groups, a divide which is amplified by the *Hukou* system, especially designed to control population movements (see Song 2014 for a general description). We next assume (*second* main assumption) that the rural world is mainly influenced by traditional values, adhering easily to the *Image of Limited Good* developed in Foster (1965), where goods are intrinsically in a limited quantity (such as agricultural land). Redistribution in this world is not possible without threatening the position of others as exemplified by the huge policy of redistribution and equalisation operated in China just after 1949. On the contrary, the urban world has experienced most of the benefit of the economic growth, following the economic reforms promoted by Deng Xiaoping who emphasised the role

of *meritocracy* and the reward of individual talents (see e.g. Zhang 2015 for the domain of public administration). So our main *third* assumption is that urban people are shaped by meritocratic values. In between those two worlds, we have the case of internal migrants between rural and urban zones that represented 17% of the total population in 2010 (Liang et al. 2014). We assume (*fourth* assumption) that the decision to migrate and the conditions under which migrations are operated constitute the main transmission mechanism for changing values about the desire for redistribution and the role of luck and circumstances in explaining poverty.

The decision for migrating might have several causes. Rural migrants might want to escape from their surroundings either because they might be intrinsically more ambitious, more hard working (two key meritocratic values, Hedegaard 2019) or simply because of exogenous causes such as floods and climatic events that have destroyed their way of living (Pei 2017). However, when they arrive in towns, migrants are exposed to discriminations due to the *Hukou* system (Zhang and Wu 2017). Our *fifth* assumption is that, as changing opinion takes time, the length of exposition to discrimination is an essential element in explaining cultural transmission. This leads us to distinguish between seasonal and long term migrants.

To summarise, the research question of this paper is to explain endogenous opinion formation with respect to preference for redistribution and the causes of poverty from an empirical point of view, using Chinese data. To reach that goal, we need an adequate econometric model which is going to be a simultaneous ordered probit model for explaining jointly the *desire for redistribution*, and the two opinion variables *poor as misgoverning* and *poor as laziness*. As the decision to migrate is assumed to interact with opinion formation, we complete these three equations by a multinomial model to explain the decision to migrate, either on a seasonal or on a long term prospect. Considering endogenous preferences together with distinct motives for migrating will allow us to solve an apparent paradox found in the literature according to which migrants have the same values as rural people (Han 2012, Whyte and Maocan 2009, Whyte 2010*a*).

The 2006 CGSS survey provides an invaluable source of information to serve our goal. First of all, this survey is representative of most of the Chinese population, covering 28 provinces (out of 32), thus giving a neat picture of the rural - urban contrast at that time. It provides information on the *Hukou* status and thus helps to identify both categories of migrants. Finally and most of all, we have on one side a set of questions on *redistribution* and *causes of poverty* and on the other side twelve questions on the *keys variables to success* which include the traditional definition of *meritocracy* (merit = intelligence + hard work) together with anti-meritocratic variables (e.g. luck

or family background) defining the key to success, including some variables with a typical Chinese flavour such as political performance. Finally, this survey contains useful information to build a discrimination index concerning migrant workers.

The paper is organised as follows. In section 2, we recall both literatures on *meritocracy* and on the *Image of Limited Good* with their relation to the desire for redistribution. Section 3 introduces the 2006 version of the CGSS, with details on how to distinguish between seasonal and long term migrants. We analyse stylised facts concerning both redistributive variables and meritocratic variables. In section 4, we introduce our main econometric model with solutions for an efficient inference method (simulated MLE). Section 5 discusses valid instruments and present our empirical results. Section 6 concludes. Technical econometric details are given in an appendix.

2 Redistribution and economic theory

Redistribution means taking money in the form of taxes from one group to redistribute it to another group. It relies on the decreasing utility of money, but also on a social agreement (Benabou 2000*b*). In the present paper, we have chosen to explore the relation between the desire for redistribution and the form of social contract and social norms that are represented by the belief (or not) in meritocracy. We first present main theories and then explore how they could fit in the Chinese case.

2.1 Classical explanations

Meltzer and Richard (1981) predicted that, in an advanced society, preference for redistribution depends upon the position in the income distribution. An individual is beneficiary of redistribution if her income is below the mean, but will pay more taxes if her income is above the mean. The POUM effect of Benabou and Ok (2001) (prospect of upward mobility) incorporates future expectations to this simple model, meaning that those who expect to have an income above the mean in the future will be against redistribution by fear of being taxed on their future income, even if today they are below the mean.

What can be the basis for a prospect of upward mobility and more precisely on which kind of belief system do individuals rely to form their expectations about social mobility? Piketty (1995) develops a model of social mobility where the beliefs depends both on individual efforts and on their family historical experience. Because it is very costly to determine empirically the exact extend of possible social mobility, individuals have to rely on

their own subjective beliefs and on those of their family background. So in the long term, some family dynasties believe that predetermined factors are essential to determine individual achievement, while other family dynasties believe that effort is the key factor to success. We are thus back to the distinction made in meritocratic theory between individual merit (intelligence, effort, ambition) and outside structural factors (family background, social network, luck). In this context, beliefs are exogenous and do not change under the influence of external shocks.

Alesina and Angeletos (2005) relate the desire of redistribution to moral values and to the fight against discrimination. In their model, income has two sources: effort and ability on one side and luck (as a random noise) on the other side. The fundamental quantity in this model is the signal-to-noise ratio corresponding to the ratio between the part of income due to effort and that due to luck. This ratio serves as a measure of unfairness. The government chooses a rate of taxation-redistribution so as to maximise the utility of the median voter which is a function of consumption, effort and aversion for social unfairness. However, the taxation rate chosen by the government directly impacts the quantity of effort that individuals are ready to provide, influencing in its turn the proportion between income due to effort and income due to luck. This creates the possibility of multiple equilibria. But the two key parameters which are the degree of aversion for inequality and the degree of impatience are exogenous.

2.2 The meritocratic paradigm in economics

If effort and merit are the key notions for explaining the demand for redistribution, we have to shed more light on what are exactly merit and effort. A political system is said to be meritocratic if individuals are rewarded according to their ability and talent and not on account of their social or family background. The concept has been popularised by the British sociologist Michael Young in his satirical book *The Rise of Meritocracy* (Young 1958) where he defines *merit as intelligence plus effort*. But the merit-based society he describes turns out to be a nightmare, exacerbating fundamental inequality among individuals.

Despite its initial negative connotation, meritocracy is nowadays taken to be the basis of social justice by most politicians, as they associate it to *equality of opportunity* (Romer 2000, Kim and Choi 2017). Sen (2000) notes that the notion of merit should depend essentially on what we think a good society is. Meritocracy can be a rewarding system that provides incentives to reward actions that generate good consequences (rewarding thus actions and not individuals). If the notion of a good society includes the absence

of inequality, the rewarding system should take that into account (with for instance positive discrimination for some running examinations, or limiting the payments made to top executives).

Benabou (2000*a*) (and his related papers) is one of the rare modern references presenting a positive view of meritocracy. He builds a dynamic optimisation model that relates meritocracy to social mobility, income inequality and economic efficiency. In his model, personal income depends on the rewards of both the intrinsic qualities of an individual (meritocratic values a_i) and on her social background (anti-meritocratic values b_i). So that individual income y_i deviates from the average income $\bar{y}$ by:

$$y_i = \bar{y} + \lambda a_i + \mu b_i,$$

with $\mathrm{E}(a_i) = \mathrm{E}(b_i) = 0$. The degree of equality of opportunity M^{opp} is a function of the importance given to a_i relative to b_i to explain the departure of y_i from the average income $\bar{y}$. Meritocracy leads directly to inequality of outcomes simply because y_i departs from $\bar{y}$. This departure can be softened by taxation and redistribution. If τ is the taxation rate, and if the product of taxation is equally redistributed, the net individual income $\hat{y}_i$ is given by:

$$\hat{y}_i = \underbrace{(1 - \tau\bar{y}) + \lambda(1-\tau)a_i + \mu(1-\tau)b_i}_{taxation} + \underbrace{\tau\bar{y}.}_{reditribution}$$

Inequality of outcomes M^{out} is measured by $\lambda(1-\tau)$. Aristocracy is obtained for $M^{opp} \to 0$ and mediocracy when $M^{out} \to 0$. A meritocratic society has to choose a balance between M^{opp} and M^{out}. To illustrate this choice, Sen (2000) quotes the example of positive discrimination to favour the access of lower casts to education. And Benabou (2000*a*), later in his article in a dynamic section, details a particular form of redistribution which favours educational investment of poor families when there are imperfect financial markets. Redistribution generates long term growth (a larger pie) thanks to human capital accumulation, induces social mobility and reduces income inequality.[1] As a conclusion, the model of Benabou (2000*a*) implies that the political belief in meritocracy, properly balanced, insures economic growth and reduces inequality by virtue of redistribution. But political will and good governance are necessary to obtain a favourable equilibrium between M^{out} and M^{opp}.

[1] In this dynamic model, $M^{opp}_{\infty} = 1 - (\alpha + \beta\lambda(1-\tau))^2$ where α monitors the inheritance of human capital from the parents and β is the elasticity of education expenditure for human capital accumulation. M^{opp}_{∞} represents an exact measure of social mobility.

2.3 The Image of Limited Good

Meritocracy means first an increase of the size of the pie (Benabou 2000*a*) and second more efficiency, illustrated for instance by the mechanisms of promotion for civil servants as described in Zhang (2015). However, meritocracy has little chances of functioning in a peasant society like the rural regions of China. Foster (1965) gave a theoretical content to this view with his *Image of Limited Good*. Every society shares a common cognitive orientation that defines the unwritten rules of the game, the social norms that rationalise the behaviour of the group members. Peasants view their environment as one in which all the goods they would like to get (agricultural land in particular) are in a finite and limited quantity. And there is no way to increase that available quantity. This means that if one manages to improve her position, this can happen only at the expense of others, threatening the equilibrium of the entire community. There is no relation between effort and work on one side and the increase of personal wealth on the other side. To quote Foster (1965), *one works to eat, but not to create wealth.* We have thus a community or a group with well defined boundaries where the social norms are strongly implemented and where there is no room for either meritocracy (i.e. personal improvement) or redistribution (that would be made at the expense of others).

2.4 The *Hukou* system and the limits of meritocracy in China

Meritocracy has a long history in China as it dates back to the Han dynasty for recruiting civil servants. But modern China adopted meritocracy only very recently, starting with the economic reforms of Deng Xiaoping (Zhang 2015). In fact, meritocratic values enter in contradiction with ancient rural systems of values on one side (like the *Image of Limited Good* by Foster 1965), and on the other side with the need of political performance (or fidelity to the Party, Zhang 2015). Both can be viewed as anti-meritocratic values. On top of this, we should remember the impact of the very large experience of redistribution that China has known after 1949 and the system of class labels which was abolished only in 1987 (Chen et al. 2016). In the language of Benabou (2000*a*), the equalisation period consisted in suppressing totaly inequality of outcome with $M^{out} \to 0$.

With the economic reforms, another balance between M^{out} and M^{opp} was looked for. However, this balance was not the same for urban residents and for migrants because of the *Hukou* system. Chan and Zhang (1999) describe the *Hukou* system as a "larger economic and political system" designed to

control life and aspirations. It started in 1951 in cities and was extended to rural areas in 1955. Its main consequence was to block rural-urban migration when the latter started to cause congestion problems in cities after 1960. However, with the economic reforms at the end of the seventies, rural-urban migration developed a lot as additional labour forces were needed in the new economic regions of the East coast. That floating population was discriminated against on the labour market and also for accessing social services (Li 2008).[2] We can thus assume that the *Hukou* system had a large influence on the cognitive orientation of migrants in their appraisal of the balance between M^{out} and M^{opp} and that this effect was increasing with the length of migration.

2.5 Cognitive transitions through the lens of cultural theory

Important migration movements in China coincide with rural regions experiencing strong climate hazards (Gray et al. 2020, Wang et al. 2020). However, motivations for the decision to migrate have changed over time. Agriculture as a livelihood has declined, following the economic reforms, and economic growth in the cities has opened new opportunities. We can distinguish between seasonal migrants, looking for outside money to finance a special event, and longer term migrants, being more adventurous or ambitious, who can be fascinated by city life and the possibility to increase their wealth with effort and hard work (meritocratic values).[3]

Thus, we are confronted to the delicate question of a changing cognitive orientation and how it has operated in the mind of both categories of migrants. In other words, what are the transitions steps between the *Image of Limited Good* and the possibility of meritocracy among seasonal and long term migrants. We shall assume that this transition affects differently these two groups, in terms of the strength of the attachment to the rural group and in terms of values shared by this group. We find an answer with the cultural theory of Douglas (1996, 2007), which has also been used by Zhang (2015) to study meritocracy and its deviations in Chinese public administration.

Following the presentation made in Zhang (2015), the cultural theory is an attempt to account for the distribution of values along two dimensions: *Group* (community and its boundaries) and *Grid* (regulation, social norms)

[2]Li (2008) based his conclusions on the *Chinese Household Income Project* data set (CHIP) of 2008 and on the *Rural Migration Survey* of 2004.

[3]Gray et al. (2020) found that *temporary migration is most common for young male adults, unmarried, educated, living in rural areas, not heads of household*, while young females are more concerned by permanent migration.

to characterise four basic patterns of social relations. The *Group* dimension measures the strength of the group boundaries while the *Grid* dimension measures the strength of the ties within a group. We can assume that the group and grid dimensions are very strong for the rural stayers if they stick to the *Image of Limited Good*. On the contrary, both dimensions are low for the urban people if their adhere to the individualistic values of *meritocracy* and competition. Seasonal and long term migrants have to abandon one dimension, either group or grid, depending on their desired proximity with either their origin for seasonal migrants or their destination for long term migrants. We shall develop these aspects in section 3.3 when analysing statistically the adherence of each social group to meritocratic values, using the data available in the Chinese General Social Survey.

3 Stylised facts from the Chinese General Social Survey

The *Chinese General Social Survey* (CGSS) is a repeated cross-section survey designed to collect individual opinions, social values and judgements about the quality of life in China mainland for individuals over 18, starting in 2003 on an annual or a bi-annual basis. The last released wave was collected in 2017. The CGSS is a sub-project of the *International Social Survey Programme* (ISSP). Following the same structure as the famous US *General Social Survey* (GSS), the CGSS provides multi-dimensional information on both socio-economic characteristics and attitudes and values about social issues. However, only the 2006 wave includes a module containing questions about the perceived causes of poverty which makes it comparable to the *Social Inequality Programme* of the ISSP. But it also contains specific questions about *the key to success* which are directly related to *meritocratic* values. Finally, two questions concern perceived wages versus fair wages for migrant workers. In this wave, 28 provinces are included, with Beijing, Shanghai, and some of the other most developed direct-controlled municipalities. The four provinces of Hainan, Ningxia, Qinghai and Tibet are missing. This makes a total of 10,151 observations with weights.[4]

[4]An English version of the questionnaire is available online. However, the original Chinese questionnaire provides a more accurate information, as its translation in English is not very accurate. And it is the Chinese version of course that was used for the survey.

3.1 Identifying rural migrants in the CGSS

The *Hukou* system provides to each individual an official status corresponding to her geographical origin and permanent residence. Liang et al. (2014) identify the floating population (using census information) as corresponding to one of two criteria: either being for more than six months in a location different different from the place of birth indicated in their *Hukou*, or having been more than six months away from their place of birth. Of course, this floating population is larger than the rural-urban migrant population that we focuss on, as it also includes movers between towns. It represented 17% of the total population in 2010.

People with an official rural status represented 62% of the sample while true urban residents were only 36% in 2006, using weights.[5] Among those having an initial rural status, only a very small proportion of less than 2% have managed to obtain an urban status in the previous 10 years. Changing status implies that their property right on their land is lost.

A direct question is asked in the survey wether individuals are migrant workers or not. 1,364 have answered yes, corresponding to 15% of our sample using weights. In this group, 1,142 had the rural *Hukou* status (90% of the migrants). We have now to distinguish between seasonal and long term migrants in this group. When a person is identified as a migrant, a question is asked about her origin. Those who answered that they had a countryside origin are 512 in number (26% of the migrants, 3.9% of the whole CGSS sample). But only 451 have the official rural status out of the previous 521. We decided to identify this group to the long term migrants, its complement being the seasonal migrants, all having the rural *Hukou*.

We can justify this choice according to the answers given to a couple of complementary questions. A first and direct subsidiary question is asked to the migrants: *Do you want to give up the urban life and return to hometown?* We decompose in Table 1 the answers to this question according to our predefined two categories of migrants. Roughly 50% of the seasonal migrants plan to return home within one or two years, while this percentage drops down to 23% for long term migrants. 45% of long term migrants said they will never return while this percentage drops to 2% for seasonal migrants. This dichotomy between seasonal and long term migrants is confirmed by a second question: *Have you bought or do you plan to buy any house/apartments.* 17% of long stay migrants were in this case while this percentage drops to 2% for seasonal migrants. Finally, the accumulated income (*Since your arrival to*

[5]We should note here the importance of weights in this survey, essential to cope with the under-sampling of the rural population. Without weights, the proportions of rural status drops down from 62% to 49%.

Table 1: Intentions for returning home among migrants

	This year	1 or 2	3 to 5	more than 5	No plan	Never	Refuse to answer
Seasonal	0.280	0.212	0.054	0.092	0.013	0.019	0.329
Long term	0.124	0.109	0.048	0.116	0.129	0.317	0.157

Are you a migrant worker or businessman: qd14a. What type of place is your hometown: qd14c. Long term migrants are those for which qd14a=1 and qd14c=1. Do you want to give up the urban life and return to hometown: qd14i.

this place how much have you earned in total) of long term migrants is on average 18,152 CNY against just 8,607 CNY for the other group.[6]

Equipped with this distinction, we can now analyse the income distribution of the Chinese population and its subgroups in Table 2. The income variable of the CGSS regroups all sources of individual income received in the year 2005.[7] For the whole sample, there is a strong asymmetry in the

Table 2: China individual income decomposition by groups in 2006

	Total	Rural stayers	Migrant seasonal	Migrant long term	Urban
Mean income	8,290	4,665	6,840	12,917	13,143
Gini	0.543	0.532	0.475	0.590	0.441
Pop share	1.000	0.492	0.107	0.037	0.364

Yearly income is $qd35a$, zero and NA excluded. Weights used. Urban is defined as *Hukou* status $qa03a \geq 2$. Long term migrants are the non-local coming from a village $qd14c = 1$, rural stayers are those with a rural *Hukou* $qa03a = 1$ and are not migrants. Migrant-seasonal is the complement of migrant long term.

income distribution reflected by the large discrepancy between the median income (5,000 CNY) and the much larger mean income (8,290 CNY). The Gini coefficient in the whole sample is very large, 0.543, in accordance with accepted figures (see e.g. Chen et al. 2019).

[6]Variable *qd14h*, have you bought an apartment: 1 already purchased, 2 planned to purchase, 3 no intention to purchase. Variable *qd14g*, since your arrival to this place how much have you earned in total. Among the most important factor determining self-identity as urban residents, Wang and Fan (2012) found the accumulation of a sufficient capital and owning an apartment in the city of migration.

[7]Variable *qd35a* represents annual total personal income (not household income) including wages, bonuses, subsidies, allowances, insurance, interest, rent, business income, profits. There are 805 missing observations. Among the 9,283 valid observations, there are 1,066 observations reported as being zero for 2006, 71% of them being females but only 2% migrants.

Table 2 illustrates the huge difference between the income of rural and urban people.[8] The rural group has the lowest mean income, but one of the highest Gini, all good economic reasons for motivating migration. Seasonal migrants manage to improve their situation with a 50% increase of their mean income and a large reduction in income inequality. Long term migrants are even more successful as their mean income is roughly multiplied by 3, however at the cost of the largest income inequality of the whole sample. Finally, the urban group has the largest mean income coupled with the lowest inequality. Note also that the income of the urban residents includes subsidies and allowances which are not available to migrants. So for reaching a same level of income, long term migrants have to provide higher efforts and to work more hours (Wang and Fan 2012).

3.2 Desire for redistribution

Three variables are concerned by the desire for redistribution and the perception of poverty in the CGSS. They are phrased as follows in the Chinese questionnaire:

1. *One should tax the rich to help the poor,*
2. *People are poor because of misgovernment,*
3. *People are poor because of laziness.*

These opinions are reported on a four-level Likert scale, tracing the agreement to a given statement (1 for totally disagree to 4 for totally agree with no neutral position).[9] 80% are in favour of redistribution, 78% think that the origin of poverty is misgoverning while only 32% because individuals are lazy.

One variable concerns beliefs about future financial situation: *In your opinion, how will the economic status of your family change in the next three years?* (3 for worse, 2 almost the same, 1 better). This variable allows us to investigate the possibility of a POUM effect. On average, 58% expect a better financial situation in the coming future. An ordered probit regression of the redistribution variable against the dummy variable of an expected better financial situation results in a negative coefficient of -0.057, significant at the 1% level, giving some flesh to the POUM hypothesis for China.

[8] And the very poor agricultural provinces of Hainan, Ninxia, Qinghai and Tibet are not contained in the survey.

[9] A fifth option is given and corresponds to *refused to answer for this set of questions*. We transformed it to NA (missing value). These variables are respectively qe4714, qe4708 and qe4706.

We then test group decomposition differences, using a Wilcoxon test. The null is equality. The alternative can be two-sided, or one-sided. We report the p-values of the two-sided test in Table 3 and indicate the direction of the most plausible one-sided alternative when the null of equality is rejected. We should underline that these are marginal comparison, which means that they are not conditional on observed covariates. They also assume that the population decomposition is exogenously given. All these assumptions will be relaxed with our full econometric model of section 4.

Table 3: Testing group differences for preference for redistribution

	Rur-MigSea	Rur-MigLg	Rur-Urb	MigSea-MigLg	MigSea-Urb	MigLg-Urb
Pref redist	0.161 =	0.031 <	0.255 =	0.006 <	0.022 <	0.170 =
Poor gov	0.264 =	0.889 =	0.013 <	0.375 =	0.011 <	0.398 =
Poor lazy	0.524 =	0.026 >	0.003 >	0.027 >	0.022 >	0.496 =
Better Fin	0.000 <	0.046 <	0.000 >	0.027 >	0.000 >	0.000 >

Reported p-values are for the two-sided alternative when followed by =. Reported p-values are one-sided otherwise. In this case, the direction is indicated aside by $<$ or $>$.

Seasonal migrants are not different from the rural stayers for the three redistribution variables. However, they have higher financial expectations, being coherent with the results of Table 2. They anticipate higher earnings from migration.

Long term migrants start to differentiate themselves from rural stayers. They desire more redistribution and think less that poverty is due to laziness. Perhaps because of this, they have less financial expectations than seasonal migrants. Long term migrants are not different from the urban group as far as the redistributive variables are concerned. However, they have greater financial expectations.

The usual rural-urban contrast is found only for the causes of poverty. Both groups have an equal desire for redistribution, but rural people think that poverty is more due to laziness while urban people think that it is more due to misgoverning.

3.3 A cultural grid for meritocratic values

The CGSS contains twelve questions related to meritocracy. The general question is *What is your opinion concerning the key to success* and the answers are on a scale from 1 to 6, with 1 Crucial, 2 Very important, 3 Fairly important, 4 Not very important, 5 Not important at all and 6 Don't know (or refused to answer).[10] We have selected three items to summarise belief

[10]The value 6 is not easy to interpret. For the better finance question, the no change answer has an important frequency (40% for urban). For the twelve meritocratic questions,

in meritocracy. They are: intelligence, ambition and hard working, corresponding to the definition of meritocracy in the literature.[11]

Castillo et al. (2021) underline the importance of confronting meritocratic values to structural factors (or circumstances, or anti-meritocratic values). We find the same concern in the model of Benabou (2000*a*). We have selected three items: *coming from a rich family*, *having a social network* and *knowing people with power*.[12]

In the case of China, we could add specific anti-meritocratic values: *place of birth* which is related to the impact of the Hukou registration, *political performance* which was a key variable in Zhang (2015) and *fate and destiny*, a typical aspect of Confucianism.[13]

Table 4: Meritocratic values among groups

	Rur-MigSea	Rur-MigLg	Rur-Urb	MigSea-MigLg	MigSea-Urb	MigLg-Urb
Intelligence	0.225 =	0.004 <	0.000<	0.001 <	0.000 <	0.291 =
Ambition	0.573 =	0.000 <	0.000<	0.005 <	0.000 <	0.285 =
Hard work	0.709 =	0.000 <	0.000<	0.006 <	0.000 <	(—) <

Reported p-values are for the two-sided alternative when followed by =. Reported p-values are one-sided otherwise. In this case, the direction is indicated aside by < or >.

Table 5: The importance of anti-meritocratic values

	Rur-MigSea	Rur-MigLg	Rur-Urb	MigSea-MigLg	MigSea-Urb	MigLg-Urb
Rich family	0.541 =	0.003 <	0.801 =	0.032 <	0.651 =	0.005 >
Social network	0.968 =	0.000 <	0.000 <	0.000 <	0.000 <	0.561 =
Know personage	0.312 =	0.000 <	0.000 <	0.000 <	0.000 <	0.036 <

Reported p-values are for the two-sided alternative when followed by =. Reported p-values are one-sided otherwise. In this case, the direction is indicated aside by < or >.

With Table 4, we have the major result that rural stayers and urban residents have totaly different views concerning meritocracy, confirming our

individuals answer 6 for around 1% or less. So this cannot be assumed to be a medium answer, but more in line with the redistribution questions where the last value corresponded to people refusing to answer. Consequently we shall consider these occurrences as missing values. We shall invert the scale for calculations to be coherent with the previous questions by taking 6-item, giving: 5 Crucial, 4 Very important, 3 Fairly important, 2 Not very important, 1 Not important at all. So there are more positive possibilities, than negative ones.

[11]The variables names in the CGSS are *qe*0108 intelligence, *qe*0109 ambition, and *qe*0110 hard working.

[12]The variables names in the CGSS are *qe*0101 coming from a rich family, *qe*0111 good social network, and *qe*0112 knowing an important personage.

[13]The variables names in the CGSS are *qe*0107 place of birth, *qe*0113 political performance, and *qe*0114 fate and destiny.

Table 6: The specificity of Chinese anti-meritocratic values

	Rur-MigSea	Rur-MigLg	Rur-Urb	MigSea-MigLg	MigSea-Urb	MigLg-Urb
Place of birth	0.326 =	0.000 <	0.002 <	0.000 <	0.007 <	0.011 >
Political perf	0.420 =	0.001 <	0.000 <	0.001 <	0.000 <	0.624 =
Fate destiny	0.005 >	0.000 <	0.000 <	0.000 <	0.000 <	0.040 >

Reported p-values are for the two-sided alternative when followed by =. Reported p-values are one-sided otherwise. In this case, the direction is indicated aside by < or >.

assumption that meritocracy views concern urban people while rural stayers are opposed to it. However, it is difficult to say more, without using the finer grid of interpretation that we have introduced in section 2.5. For each group, we first recall its main theoretical properties as detailed in Douglas (2007) and Zhang (2015) (reported in italic below) and then we explain how well each theoretical group corresponds to one of our population groups, given the results of the Wilcoxon tests reported in Tables 4 to 6. These will be our stylised facts.

1. *Strong group with strong grid*: Zhang (2015) gives to it the name of ***hierarchical collectivism***. *The hierarchy is based on gender, age or other birth characteristics. The social norms are compelling.*

   We attach **rural individuals** to this group where the cognitive orientation of the *Image of Limited Good* exerts a very strong social pressure on individuals, first for being recognised as a member of the group and second for applying its social norms. Their rural *Hukou* status is part of their social identity as it recognises their right to own a land.

   Wilcoxon tests show that rural individuals believe much less in meritocratic values than both the urban people and long term migrants, and also less the same for anti-meritocratic values. So, they seem to be much less interested in any form of key to success, when compared to the urban people and long term migrants. Compared to seasonal migrants, which were found to be their closest group concerning redistributive values (Table 3), they believe more in the importance of fate and destiny (Table 6). This is an indication in favour of the adherence of this group to the *Image of Limited Good*.

2. *Low group and strong grid*: named as ***apathetic fatalism*** by Zhang (2015). *This group has no group membership to sustain individuals, who are in a cultural isolation. Public policy pays no attention to them and to their voice.*

   We assume that **seasonal migrants** belong to that group. With their rural origin and rural *Hukou* status, they are temporarily isolated in

urban cities. They aspire to return to their original place of birth. This is the type of migrants identified by Pei (2017). Those migrants are very much attached to their land, and to their values, as finely described in Pearl Buck novel, the Good Earth.

Seasonal migrants have the particularity of leaving temporally their rural place of birth, and then returning to it regularly, which explains their proximity with the rural group as shown by the Wilcoxon tests (Tables 4 and 5). But at the same time, these tests also show their lower attachment to traditional rural values. They share with the rural group their lower interest in meritocratic values (compared to long term migrants and the urban group, Table 4). They are also less sensitive to the importance of the anti-meritocratic values, compared to urban or long term migrants. But they differ from the rural people by the lower importance they give to fate and destiny (Table 6), which means that they believe that their destiny can be changed and improved, motivating them for starting a migration process.

3. *Low group and low grid*: this group is called ***competitive individualism*** by Zhang (2015). *Individual effort is rewarded on a meritocratic basis. In principle, this group would share egalitarian views, but in fact competition for wealth and power implies the failure of egalitarian ideals.*

   We assume that **urban people** adhere to this group which has experienced most of the economic growth, especially in the coastal regions (Piketty et al. 2019). Urban people can move between towns to take advantage of economic opportunities, but we do not count them as migrants because they have a urban *Hukou* status.

   The urban group is the perfect illustration of the importance of individual values that are detailed by the key to success variables. When compared to rural and seasonal migrants, they believe more in meritocratic values (intelligence, ambition and hard work, Table 4). Their opinion related to anti-meritocratic values are more diverse, especially when compared to migrants. Compared to the rural group, they are more sensitive to the importance of social network, to the fact of knowing a powerful person and to their individual political performance.

4. *Strong group and low grid*: named as ***egalitarian sectarism*** by Zhang (2015). For Douglas (2007) this group was for long not well-understood. *It has a strong boundary, but lacks of internal control. Personal relations being unregulated, freedom and equality would be exalted in this group.* It our context, this would correspond to **long term**

migrants. They form a strongly identified group because they have kept a rural *Hukou* status in an urban environment. But their social ties are weak, due to their lack of access to public services (schools, hospitals) which impedes their social life. If they accept the possibility to change their *Hukou* status (according to the recent changes in the regulation), they would accept the risk of loosing their right to own a land and of departing from the cognitive orientation of their original community.

Long term migrants share the meritocratic values of intelligence and ambition with the urban group, but not the meritocratic value of hard work. This can be seen with the Wilcoxon tests of Table 4, even if the test is not very powerful as long term migrants have never answered that effort was crucial (but just very important), at the difference of the other groups. As their efforts were not duely rewarded, they were upset by discrimination that they experienced on the labour market and in the access to public services. As a group, they are quite different from both seasonal migrants and rural stayers. If they are similar to urban on two meritocratic values (intelligence and ambition), they are more sensitive to the fact of coming from a rich family, but they could make no use of knowing a powerful person at the opposite of urban people (Table 5). They have experienced the importance of being born in the right place and of fate and destiny more than urban people (Table 6). They suffer from a lack of equality of opportunity due to the *Hukou* system. As a consequence, they ask more redistribution than seasonal migrants.

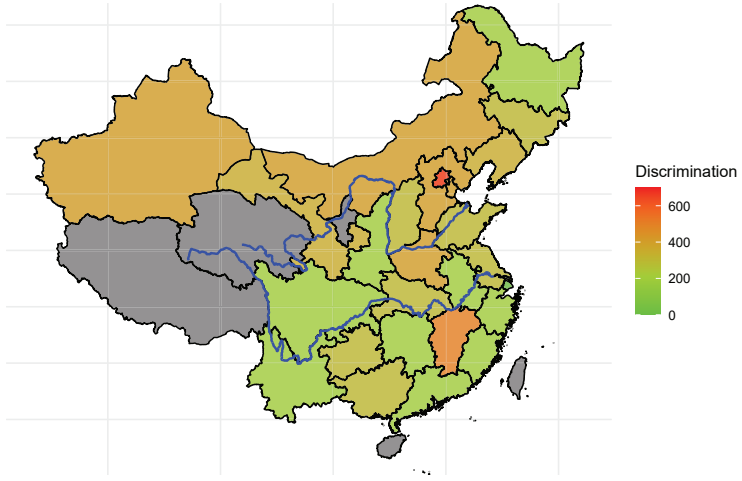
We have thus managed to identify four different groups in the Chinese population that have strong differences in term of meritocratic values. We assume that discrimination and the length of exposure to discrimination are the main causes for changing opinions. We propose in the next section a structural econometric model to explain how these groups contribute differently for explaining the desire of redistribution and the causes of poverty when interactions are allowed for. With this model, we shall be able to measure the impact of discrimination for changing opinion formation.

3.4 Discrimination

In Alesina and Angeletos (2005), the desire for redistribution is shaped by the degree of aversion to unfairness or what is felt as discrimination. They assume that an adequate measure is provided by the distance between fair income and actual income. In the CGSS, we have a question about fair

and actual income for peasant-workers (as migrant workers are called in the CGSS).[14] We have computed discrimination as the difference between these two quantities, trimming negative values. Then, we have computed the median value for each province, taking into account only the answers given by migrants.

The choropleth map of Figure 1 helps to visualise the geographical distribution of discrimination. Beijing and Tianjing are the regions with maximum discrimination while Shanghai has the lowest value. These are the two extreme cases. The difficulty of having *Hukou* of Beijing is 10 times harder than having that of Shanghai. Shanghai is a highly inclusive city. Most habitants are actually immigrants, and they call themselves "new Shanghai people". The map also indicates that the coastal regions are also seen as presenting



Regions in gray are those with no available data in the CGSS. The nine dotted lines are discarded from the map for displaying reasons.

Figure 1: Discrimination index for migrants

less discrimination. At the time of the survey, these were the main destination for migration and were also the regions that were the most beneficial of economic growth.

[14] These are questions qe0402 and qe0302. *To your knowledge (based on books, newspaper, and interactions with others, and so on), what is the actual income of people with the following occupations? Please estimate* (qe0302 for peasant-worker). *Do you think how much monthly income for the following occupations is justified?* (qe0402 for peasant-worker).

4 A Multivariate Ordered Probit Model with Endogeneity

We want to explain jointly three opinion variables (*Pref-redist*, *Poor-misgov* and *Poor-lazy*) by mean of a multivariate ordered probit model using explanatory variables in order to be able to test our five key hypothesis. Among the explanatory variables, the decision of *being-a-migrant*, either seasonal or long term, is likely related to the underlying psychological traits explaining the previous three opinion variables. We have thus an econometric model which is formed by a multivariate ordered probit, completed by a multinomial model for the decision to migrate with two items, seasonal or long term migration, rural stayers being the base line. Identification of the migration equations is achieved by introducing instrumental variables. A complementary identification strategy can be based on heteroskedasticity, an option that has the merit of improving statistical efficiency.

4.1 A Structural Ordered Probit Model

A first group of three equations explains the utility level y^*_{im} of individual i when answering in a joint manner each of the three opinion questions with $m = 1, 2, 3$. A second system of two equations explains the utility d^*_{ij} of individual i when she decides to migrate if rural, either on a seasonal or on a long term basis. So we have the following structural system:

$$y^*_{im} = X_i'\beta_m + d_{ij}\lambda_{mj} + \epsilon_{im}, \qquad m = 1, 2, 3, \quad i = 1, n, \tag{1}$$

$$d^*_{ij} = X_i'\alpha_j + Z_i'\gamma_j + e_{ij}, \qquad j = 1, 2, \quad i = 1, n, \tag{2}$$

where X_i is a matrix of explanatory variables, Z_i a set of instruments excluded from X_i and d_{ij} the observed migration decision made by rural individuals. In this structural model, we consider the multinomial choices of migration status as endogeneous which are modelled by a multinomial probit model where the status rural stayer is the reference group. For identification reasons, we constrained the parameters for the reference group to be 0 and $\mathrm{Var}(\epsilon_{im}) = 1$, $\mathrm{Var}(e_{ij}) = 1$. Thus we have $\Pr(d_{ij} = j) = \Pr(d_{ij} > 0, d_{ij'} < 0), \forall j' \neq j$. The error term is composed of ϵ_{im} and e_{ij}, with joint distribution a 5×5 multivariate normal density with zero mean and correlation matrix Σ:

$$\Sigma = \begin{pmatrix} 1 & * & * & * & * \\ \rho_{21} & 1 & * & * & * \\ \rho_{31} & \rho_{32} & 1 & * & * \\ \rho_{41} & \rho_{42} & \rho_{43} & 1 & * \\ \rho_{51} & \rho_{52} & \rho_{53} & \rho_{54} & 1 \end{pmatrix}. \tag{3}$$

This system is completed by a set of observation rules. Corresponding to the utility level y^*_{im}, we observe K levels y_{im} of a Likert scale, while for the utility level d^*_{ij} we observe the multinomial choice variable d_{ij}. This leads to the system:

$$y_{im} = k \, \mathbb{1}(\tau_{m,k-1} < X_i'\beta_m + d_{ij}\lambda_m + \epsilon_{im} < \tau_{m,k}), \tag{4}$$

$$d_{ij} = j \, \mathbb{1}(X_i'\alpha_j + Z_i'\gamma_j + e_{ij} > 0; X_i'\alpha_{j'} + Z_i'\gamma_{j'} + e_{ij'} < 0), \tag{5}$$

with $k = 1, ..., K$ and $j = 1, 2; j' \neq j$. In this writing, $\mathbb{1}(\cdot)$ is the indicator function equal to 1 when the condition is true and 0 otherwise. This observation rule introduces $(K-1) \times M$ parameters $\tau_{m,k}$ which are unobserved bounds common to all individuals. This writing is quite general if we suppose that $\tau_{m,0} = -\infty$ and $\tau_{m,K} = +\infty$. For our dataset, $K = 4$, the number of levels in each opinion question.

Because the variance-covariance matrix Σ is not diagonal, we have to consider the joint probability of five events, e.g., $(y_{i1} = j, y_{i2} = k, y_{i3} = l, d_{ij} = 1, 2)$ for each individual i for writing down the likelihood function. This probability is defined by a five dimensional integral:

$$\Pr[y_{i1} = j, y_{i2} = k, y_{i3} = l, d_{ij} = 1, 2] = \int_{\tau_{1,j-1}-\hat{y}^*_1}^{\tau_{1,j}-\hat{y}^*_1} \int_{\tau_{2,k-1}-\hat{y}^*_2}^{\tau_{2,k}-\hat{y}^*_2} \int_{\tau_{3,l-1}-\hat{y}^*_3}^{\tau_{3,l}-\hat{y}^*_3} \int_{-\infty}^{0-d^*_1} \int_{-\infty}^{0-d^*_2} \phi_5(\epsilon_1, \epsilon_2, \epsilon_3, e_1, e_2, \rho) \, \mathrm{d}\epsilon_{i1} \mathrm{d}\epsilon_{i2} \mathrm{d}\epsilon_{i3} \mathrm{d}e_{i1} \mathrm{d}e_{i2}, \tag{6}$$

where $\hat{y}^*_1, \hat{y}^*_2$ and $\hat{y}^*_3$ are the linear predictors $X'_{im}\hat{\beta}_m$ $(m = 1, 2, 3)$ and d^*_{ij} refers to the two linear predictors for the multinomial probit equation, ϕ_5 is the PDF of a five-variate normal distribution, ρ representing the vector of all correlation parameters. Under an IID assumption, the log-likelihood ℓ of the entire sample is:

$$\ell = \sum_{i=1}^{N} \sum_{j=1}^{K} \sum_{k=1}^{K} \sum_{l=1}^{K} \sum_{d_1, d_2} \log \Pr[y_{i1} = j, y_{i2} = k, y_{i3} = l, d_{ij} = 1, 2]. \tag{7}$$

As computing the probability of a basic event requires the evaluation of a five-dimensional integral, we have to rely on simulated maximum likelihood. Following Geweke et al. (1994), the GHK simulator seems to be the best choice for this class of models.[15] As the GHK algorithm may fail if positivity

[15] Cappellari and Jenkins (2003) have proposed an implementation of the GHK simulator for evaluating the likelihood function of a multivariate probit model. Here we generalise their approach to the case of ordered probit models, but we also treat specifically the question of the positivity of the variance-covariance matrix of the error terms in appendix C, as positivity can be a serious problem for larger models. The algorithm may fail if positivity constraints are not imposed on the variance-covariance matrix.

constraints are not imposed on the variance-covariance matrix, we detail in Appendix C how to impose directly those constraints on the decomposition $\Sigma = AA'$.

4.2 Identification strategies

The model is identified if the dimension of Z_i is at least one and if $(X_i, Z_i) \perp (\epsilon_{im}, \nu_i)$, where $\perp$ denotes statistical independence. Valid instruments are hard to find for explaining the decision to migrate while still being orthogonal to all three opinion variables.[16] Consequently, when Z_i is not available (and thus the exclusion restriction cannot be met), we should identify the endogenous treatment effect by another strategy. One way of obtaining identification is to control for the heteroscedasticity of the error terms and to develop a feasible control, different for each equation (see e.g. Farré et al. 2013 for the linear model). For our ordered probit model, we choose a fairly general form of heteroscedasticity with:

$$\sigma_{im} = \exp(W_i \delta_m),$$

where W_i is a set of observed variables explaining residual dispersion and δ stands for a vector of unknown parameters. Thus the marginal probability function of event k becomes:

$$\Pr(Y_{im} = k) = \Phi\left(\frac{\tau_{m,k} - X_i'\beta_m}{\exp(W_i\delta_m)}\right) - \Phi\left(\frac{\tau_{m,k-1} - X_i'\beta_m}{\exp(W_i\delta_m)}\right).$$

Another advantage of using error heteroscedasticity identification is to improve efficiency for probit and ordered probit models in presence of heteroscedasticity (Litchfield et al. 2012).

5 Changing preferences for redistribution in China

We have already obtained a certain number of results concerning opinion differences between seasonal and long term migrants. With a full model, we

[16] There is controversy in the literature concerning the exclusion restrictions in a limited dependent variable model with discrete endogenous variables. On one side, Wilde (2000) argue that the exclusion restrictions are not required because the model is automatically identified due to its nonlinearity. On the other side, Chesher and Smolinski (2012), Meango and Mourifie (2014) among others, pointed out that the exclusion restrictions are indeed essential to identify properly the model.

can answer more questions, in particular concerning the decision to migrate. We first list our main testable assumptions, then detail our search for valid instruments, before discussing the results of our full model.

5.1 Testable assumptions

We have identified and made the portrait of four different groups, according to their attitude to meritocratic values. The traditional literature did not manage to measure differences of attitudes between rural and migrant groups (Han 2012, Whyte and Maocan 2009, Whyte 2010*a*). We have given some explanations about this fact. We have now to test these explanations by means of inference results in our large simultaneous ordered probit model. We have regrouped these assumptions in five testable items that we have informally listed in the introduction and that we now recall:

> *Assumption 1* : Seasonal and long term migrants have different motives in their decision to migrate.
>
> *Assumption 2* : Seasonal and long term migrants have different attitudes about the desire for redistribution and the sense of effort.
>
> *Assumption 3* : Seasonal migrants have different opinion from rural people and long term migrants have different opinion from urban people
>
> *Assumption 4* : A key variable to explain difference of attitude between seasonal and long term migrants is the time of exposure to discrimination.
>
> *Assumption 5* : The long term exposure to discrimination reinforces the group values of long term migrants as opposed to urban residents, even if the former want to adopt an urban style.

In order to test these assumptions, we have estimated our full model. We shall present separately the results of the two migration equations and of the three opinion equations. But before that, we have to discuss the search for valid instruments in relation to the literature.

5.2 In search of valid instruments

We have to find valid instruments which explains the decision of migration while having no influence on opinion variables. We have outlined two types of variables: family size with *birth order* on one side and climatic *flood* variables

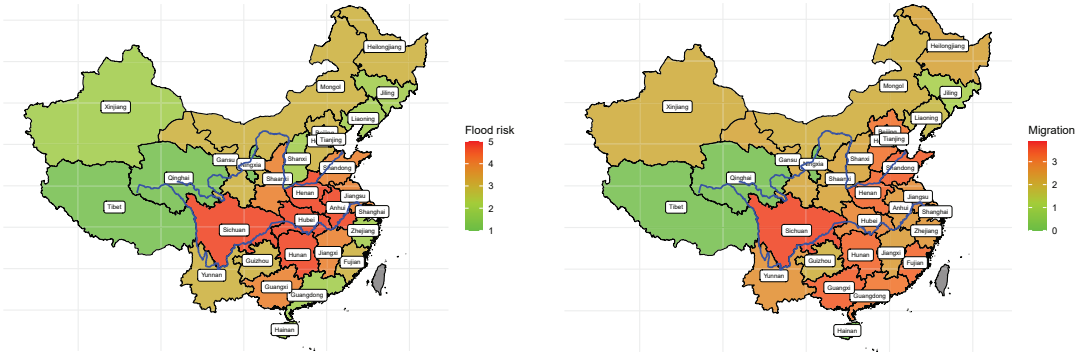
on the other side, providing information at the individual level and at the provincial level.

Being eldest among siblings has a particular meaning in the literature, but mainly for educational attainment (see e.g. Conley and Glauber 2006, Booth and Kee 2009). This is even true for China (Chen 2020), the main explanation being resource dilution. For migration, the meaning of this variable might be different. One can suppose that the eldest among siblings has finished her education and so can enter the labour market in order to provide a complementary income to her family. In a rural context, looking for a job means going to towns and thus migrating. The importance of being eldest among siblings is confirmed in Bratti et al. (2020) for migration decisions.

The geography of China provides a second type of instruments. China is subject to huge climate variations and extreme events, such a floods. Two main rivers play a major role in the history and geography of China: The Yangtze River in the south and the Yellow River in the north. On one side, these two river systems represent fertile soil, ideal for irrigation, homing a huge agricultural population. On the other side, they are the cause of major flood events, occurring almost every year, with major disasters in 1931, 1935, 1954, 1975, 1998, 2016 for the recent history. These major flood disasters had a huge impact on population mobility within China (Zhang and Zhang 2019). Victims who lost their lands, shelters, or even foodstuffs, turn to see a way to survive in neighbourhood regions, or eventually decide to move into cities (Xiao 2018).We assume that the provincial level of *Flood severity* can serve to predict the decision to migrate for rural residents.[17] Using the *Flood severity* indices provided by Liao et al. (2013), the choropleth map displayed in the left panel of Figure 2 shows that the flood most impacted provinces over the years 2000-2010 were Sichuan, Henan, Hubei, Hunan and Anhui. The choropleth map of the right panel of the same figure shows that these provinces also correspond to higher migration density.

However, if *Flood severity* does motivate migrations, its regularity and its long term impact can also shape opinions about the desire for redistribution and the causes of poverty. Not including this variable in the opinion equations could create a problem of omitted variables which means that in this case *Flood severity* would not be a valid instrument (see e.g. Greene 2011, Chap. 8). To correct for this bias, we could include extra variables related to water availability to control for the part of opinion variation explained by the long term effects of *Flood severity*. We have chosen two measures at

[17] As a matter of fact, Tian and Lemos (2017), using a field survey in the Poyang Lake region found that households that experienced flood more frequently in the past generally have a greater proportion of non-farm income obtained by seasonal migration.



The nine dotted lines are discarded from the map for displaying reasons.

Figure 2: Flood risk and migrations in China

the provincial level which are averages over the last four decades: i) average annual *Rainfall level* (in millimeters per square meter) and ii) average total amount of *Water resources* (in cube meters per square kilometer). The *Rainfall level* is certainly an important factor that causes flood. However, along the two big rivers, lower reaches are less impacted by flood than the middle reaches while having a higher *Rainfall level*. So this variable is not exactly correlated with flood risk. We have thus the necessary ingredients for finding a valid instrument.

5.3 Flood and migration decisions

Equipped with these two instrumental variables and modelling heteroskedasticty for the three opinion equations, we estimated our full model.[18] We first present in Table 7 the two migration equations extracted from the full model in order to test *Assumption 1* (*Seasonal and long term migrant have different motives in their decision to migrate*).

The two instruments have an opposed impact on seasonal and long term migration decisions with coefficients -0.014 and 0.194^{***} for eldest among siblings, -1.430^{***} and 0.184^{***} for flood severity. This difference is confirmed by a Wald test.[19] The Wald statistics of equality is 8.17 for *Being eldest*

[18] Heteroscedasticity is only applied to the three main equations, with five explanatory variables: age, believer, laoda, water and rev. The estimated parameters are given in Table 11 of Appendix D.

[19] The test statistic for testing the equality of two coefficients is:

$$W = (\hat{\beta}_1 - \hat{\beta}_2)^2 / (\text{Var}(\hat{\beta}_1) + \text{Var}(\hat{\beta}_2) - 2\text{Cov}(\hat{\beta}_1, \hat{\beta}_2))$$

Table 7: Different motivations for rural migration

	Seasonal Migrants	Long term Migrants
Intercept	-1.210^{***} (0.119)	-1.800^{***} (0.077)
Birth 60-79	0.329^{***} (0.098)	0.438^{***} (0.092)
Birth post 80	0.888^{***} (0.095)	0.724^{***} (0.105)
Female	-0.317^{***} (0.045)	-0.122^{**} (0.039)
Party	$-0.106^{\cdot}$ (0.055)	0.038 (0.047)
Rainfall level	-0.028 (0.052)	-0.240^{***} (0.034)
Water resources	0.005^{***} (0.000)	0.001^{***} (0.000)
Eldest	-0.014 (0.049)	0.194^{***} (0.028)
Flood severity	-1.430^{***} (0.074)	0.184^{***} (0.041)
Correlations for error terms		
Seasonal Migrant	1.000 (−)	
Longterm Migrant	-0.824^{***} (0.027)	1.000 (−)
N	4,733	4,733

Results from the multinomial probit part of the full model. Rural stayers are the baseline. The urban observations are excluded.

among siblings and 326.03 for *Flood*, both much larger than the 5% critical value. We can thus validate our *Assumption 1*. Seasonal and long term migrants do represent two distinct populations with different motives in their decision.

Being eldest among siblings is significant mainly for long term migration. Eldest siblings share the raising responsibility for their younger siblings, contributing to finance their education. Another explanation has to be found for seasonal migration.

Accidental flood induces traffic difficulties for seasonal mobility (strong negative coefficient, -1.430^{***}). But as it also causes shelter and production means destruction, it motivates individuals to seek for longer-term migration (positive coefficient, 0.184^{***}).

Females are less likely to migrate, especially for seasonal migration (Wald test statistics of 8.12). This difference can be explained by marriage which is a long term decision as underlined for instance in Gray et al. (2020). The cohort effects indicate that among the rural population, younger individuals

Under the null hypothesis that the coefficients are equal, the Wald test statistic follows a chi-squared distribution with 1 degree of freedom. The critical value at 5% is 3.841.

(younger cohorts) are more likely to migrate. But the cohort impact is the same on the two types of migration (Wald test statistics of 0.89 and 2.17).

5.4 Adequation with previous results for opinion formation

Table 8 confirms some of the usual results found in the literature concerning the desire for redistribution and the sense of effort; this is a kind of validation test.

Incomes appears in a non-linear way with very significant coefficients. When income increases, the desire for redistribution decreases as well as imputing poverty to circumstances. There is a non-linear effect of income in the Poor-lazy equation: the effect decreases till 22,000 yuans per year and then increases. The impact of income can also adopt indirect channels. Upward mobility has a negative impact on the desire for redistribution. If one manages to improve her financial situation, she probably does not want to share with others, a corroboration of the slight POUM effect found in section 3.2.[20] Better financial expectations leads to think that other people are poor because of laziness (0.162^{***}). But this effect is counterbalanced in the case of upward mobility (-0.113^{***} for father/son and -0.061^{***} for mother/daughter), presumably on the ground that my parents were not poorer than me because they were lazy.

The number of years of education does not seem to play a role, the effect being taken by income variables. Party members are of course less inclined to think that poverty comes from misgoverning (-0.089^{**}) while females think less that laziness is the main cause of poverty (-0.083^{**}).

5.5 The rural-urban opposition

We have two distinct and opposed worlds which are determined by the *Hukou* status. The stylised facts of section 3.3 have shown that the rural stayers could mostly adhere to the *Image of Limited Good* while the urban residents were more inclined to adopt *meritocratic values*. These results come from the analysis of the 12 questions related to meritocracy. However, with a marginal analysis of the redistributive questions as given in Table 3, we did not managed to find an opposition between urban and rural people in term of the desire for redistribution. We should remember that the theoretical model of Benabou (2000*a*) associates the desire for redistribution to meritocracy

[20]The upward mobility variables are built using an EGP scale which is corrected for China in a procedure explained in Appendix A.

Table 8: Preference for redistribution and poverty perception without the discrimination variable

	Redist	Poor-misgov	Poor-lazy
Birth 60-79	0.052	0.063$^{\cdot}$	−0.101**
	(0.038)	(0.036)	(0.038)
Birth post 80	0.082$^{\cdot}$	0.046	−0.096*
	(0.043)	(0.039)	(0.042)
Female	0.052	0.007	−0.083**
	(0.031)	(0.029)	(0.030)
Party	−0.022	−0.089**	−0.059$^{\cdot}$
	(0.035)	(0.031)	(0.033)
Believer	−0.045	−0.065*	−0.053
	(0.040)	(0.032)	(0.037)
Year Edu.	−0.006	−0.008$^{\cdot}$	0.001
	(0.005)	(0.004)	(0.004)
ln income	0.077***	0.045***	−0.020
	(0.019)	(0.008)	(0.017)
ln income squared	−0.007***	−0.004***	0.001***
	(0.001)	(0.000)	(0.001)
Better finance	−0.001	0.030	0.162***
	(0.025)	(0.021)	(0.024)
Upward (fath./son)	−0.114**	0.027	−0.113***
	(0.035)	(0.028)	(0.033)
Upward (moth./dau.)	−0.091*	0.062$^{\cdot}$	−0.061***
	(0.039)	(0.035)	(0.037)
Rural	−0.114**	−0.069*	0.121***
	(0.037)	(0.034)	(0.034)
Seasonal migrant	−0.176*	−0.095	−0.355***
	(0.084)	(0.094)	(0.085)
Long-term migrant	0.368***	0.598***	0.229***
	(0.069)	(0.034)	(0.056)
(1—2)	−1.933***	−1.979***	−0.839***
	(0.111)	(0.100)	(0.084)
(2—3)-(1—2)	1.048***	1.150***	1.204***
	(0.045)	(0.043)	(0.043)
(3—4)-(2—3)	1.445***	1.558***	0.938***
	(0.050)	(0.048)	(0.036)
Correlations between error terms			
Redis-pref.	1.000		
	(−)		
Poor-misgov	0.186***	1.000	
	(0.012)	(−)	
Poor-lazy	−0.073***	0.016	1.000
	(0.012)	(0.012)	(−)
N	9,811		
Loglik	-20,496		
R (simulation replications)	25		

Average rainfall and total *Water resources* were included in these equations to control for the permanent effect that might be carried by the instrumental variable *Flood severity* used in the migration equations. *Rural* represents all those who are not the urban status.

while the model of Foster (1965) makes it impossible. We are going to see now how our full model provides a more satisfactory answer concerning the rural-urban opposition in term of meritocratic values.

Urban is the reference group and the Rural variable indicates those who are not urban. Because we have two specific dummies representing migrants, the Rural coefficient provides the effect for rural stayers. They are less in favour of redistribution with the negative coefficient -0.114^{**} in Table 8. This result complements and validates the opposition we sketched between the values of urban and rural individuals in Tables 4-6. Rural stayers report also a lower adherence to misgoverning (-0.069^{*}) and a larger support to *Poor-lazy* (0.121^{***}) as a cause for poverty. This confirms the opposition between the two visions of the world that we suggested: the *Image of Limited Good* rural stayers and *meritocracy* for the urban group.

5.6 Diversity among rural migrants

Migrants represent a transition between these two worlds. They should logically start by having the same views as rural stayers because they are rural migrants. But in fact, their decision to migrate implies that they have changed some of their values, for instance by being more ambitious or believing that their fate can be changed.

Assumption 2 states that *Seasonal and long term migrants have different attitudes about the desire for redistribution and the sense of effort.* We have to compare the coefficients of the two dummy variables used for migrants.

Seasonal migrants are slightly more against redistribution than rural stayers (-0.176^{*}). They consider that the extra money they earned in towns is a windfall that should not be taxed. On the contrary, long term migrants are clearly more in favour of redistribution (0.368^{***}) than rural stayers. For them redistribution means access to public services, an access that their *Hukou* status prevents them to have. A t-test rejects the null of equality of those two coefficients with value -5.00. This confirms the opposition between seasonal and long term migrants concerning redistribution. Long term migrants have abandoned the anti-redistribution values of rural stayers, when seasonal migrants have not. In terms of cultural theory, seasonal migrants have kept the rural *strong grid* when long term migrants have a *low grid*.

The sense of effort is measured by the poor-lazy equation. Seasonal migrants, having made the effort to migrate to earn more, think less that poverty comes from laziness (-0.355^{***}). They earn more than rural stayers, but if they are poorer than urban residents, they do not want to consider that this is due to laziness. Long term migrants have opposed views with a positive coefficient of 0.229^{***} (the value of the t-test is -5.74, rejecting

equality). They earn much more than seasonal migrants and certainly do not want to be confused with that types of migrants. Their extra efforts were rewarded, when compared to the fate of seasonal migrants.

5.7 Leaving the countryside without fully reaching the urban world

It is not because migrants have decided to leave the rural world that they have fully managed to share the urban values. They are living in a state of transition, as stated in *Assumption 3* (*Seasonal migrants have different opinion from rural people and long term migrant have different opinion than urban people*).

When comparing seasonal migrants to rural stayers, we have to look at the significance of the Seasonal Migrant coefficient. The t-test of nullity are (-2.10, -1.01, 4.18) for the three equations. Seasonal migrants are different from rural stayers for two items: *Redist* and *Poor-lazy*. But they have identical view as rural stayers for *Poor.misgov*. Going back to the stylised facts, seasonal migrants had higher financial expectations than rural stayers and less belief in fate, assuming thus that their situation could be improved by migration. They have made the effort of seasonal migration, hopping for a better income, at the difference of rural stayers. So they do not want to be considered as lazy because they have managed to increase their income, at the difference of rural stayers.

To compare long term migrants to the urban base line, we have look at the difference *Long term migrant* minus *Rural* and test if this difference is different from zero. The t-test of equality are respectively (6.16, 13.87, 1.65). So long term migrants are different from the urban base line for *Redist* and *Poor-misgov*, but not for *Poor-lazy*. The stylised facts of Table 3 said that they had identical opinions (but higher financial expectations) while Tables 4-6 indicated differences in meritocratic values. The main difference is of course for *Poor-misgov*. Urban people have benefited from the economic growth. Long term migrant have also benefited, but not as much as they expected, because of specific Hukou regulations which were imposed by the government. We have now to measure the impact of discrimination.

5.8 The important role of discrimination

On the basis of the existence of four groups, section 3.3 identified seasonal migrants to the *low group-strong grid* group while long term migrants corresponded to the *strong group-low grid* group, each having abandoned one

of the dimensions of the rural group (*strong-group, strong-grid*). We have checked in the previous subsections the existence of those four groups. What were the mechanisms that made the particular change of values possible? Assumptions 4 and 5 promote the role of discrimination and the time of exposure to discrimination. We have now to introduce our discrimination index in the model.[21] As a matter of fact, when this variable is introduced, the likelihood function goes up from -20,496 to -20,390 leading to a likelihood ratio test of $-2(-20,496+20,390)=212$, much greater than the 5% critical value of 12.59 with six degrees of freedom. So discrimination plays a major role for explaining opinions, with effects that can be analysed by comparing the new Table 9 to the previous Table 8.

Table 9: A new variable to explain preference for redistribution and poverty perception

	Redist	Poor-misgov	Poor-lazy
Rural stayers	-0.130^{***}	$-0.061^{\cdot}$	0.035
	(0.039)	(0.033)	(0.028)
Seasonal migrant	-0.549^{**}	-0.199	0.000
	(0.192)	(0.143)	(0.127)
Discrimination*S.migrant	0.064^{*}	0.010	-0.030
	(0.029)	(0.019)	(0.087)
Long-term migrant	0.128	0.039	1.446^{***}
	(0.202)	(0.209)	(0.121)
Discrimination*L.migrant	0.094^{*}	0.089^{*}	-0.083^{***}
	(0.037)	(0.038)	(0.018)
N		9811	
Loglik		-20,390	
R (simulation replications)		25	

When adding the discrimination variable, the coefficient of the Rural dummy does not change much with t-test of equality of (0.29, -0.17, 1.95). So we can look safely at the other coefficients. The Total effect of discrimination is given by the sum of the migrant dummy and of the discrimination coefficient times the mean of the discrimination variable.[22]

The impact of discrimination is very much contrasted, depending on the length of migration and of the opinion equation, confirming the validity of

[21] Our discrimination index is positive for migrants and zero otherwise. We assume that the impact of discrimination can be different for seasonal and for long term migrants. Discrimination concerns a whole province and is not considered as an individual opinion.

[22] In a typical linear regression like $y_i=\beta_0+\beta_1 Mig_i+\beta_2 Mig_i\times D_i+e_i$ where Mig_i is a dummy variable (being a migrant or not) and D_i the amount of discrimination when a migrant, the total effect of being a migrant is equal to $\beta_1+\beta_2\bar{D}$ where $\bar{D}$ is the average amount of discrimination that a migrant can experience. In our sample, the log of the variable is used and the mean of the log discrimination is equal to 5.0619.

Assumption 4 (*A key variable to explain difference of attitude between seasonal and long term migrants is the time of exposure to discrimination.*

The respective total effects of discrimination for seasonal migrants is -0.225 for redistribution, but is not significant (t-test equal to -0.93). It is effectively 0.000 for *Poor-misgov* and *Poor-lazy* as none of the coefficients are significant. On the contrary, the total effect of discrimination is always significantly different from zero for long term migrants with values (0.476, 0.451, 1.026) and t-tests of nullity of (2.54, 2.34, 6.77).

Do we have a change in total effects compared to the results of Table 8?

For seasonal migrants, considering discrimination does not change their idea for *Redist* (t-test of 0.191), and also for *Poor-misgov* as in both cases no estimated coefficient is significant. However, the highly significant coefficient of -0.355^{***} is now reduced to 0.000 for *Poor-lazy*. Experiencing discrimination in towns make their life insecure and probably lead them to reconsider their idea about the laziness of rural stayers. So considering discrimination makes the seasonal migrants closer to the rural stayers.

Long term migrants are assumed to be more exposed to discrimination because they stay longer in towns. In fact the experience of discrimination does not change the total effect on *Redist* and *Poor-misgov* with t-test of (-0.54, 0.75). The explanatory value of the long term migrant dummy variable in Table 8 is now taken over by the discrimination variable. However, experiencing discrimination increases dramatically their view concerning *Poor-lazy* with a rejection of equality by a t-test of -4.94. If despite discrimination, they have managed to improve a lot their income, they think that the poor who beneficiate from a urban *Hukou* are certainly poor because they are lazy. With this opinion, they strengthen their group value, confirming *Assumption 5* (*The long term exposure to discrimination reinforces the group values of long term migrants as opposed to urban residents, even if the former want to adopt an urban style*). This is the reason why we could see an apparent paradox created by the joint support that long term migrants have for the two poverty statements with 0.451^{*} for *Poor-misgov* and 1.026^{***} for *Poor-lazy*. Because they do not manage to be fully integrated in the urban society (Wang and Fan 2012), they support *Poor-misgov* for themselves. On the other side, they consider that those who are fully integrated thanks to their urban *Hukou* status are poor because they are lazy. This paradox is the expression of their resentment.

5.9 Robustness check

These results were obtained after correcting for possible endogeneity bias, a correction obtained by allowing for possible correlation between the five

error terms. The error correlations panel of Table 8 shows that these corrections were necessary, as most correlations are strongly significant. We also performed a robustness check for the validity of the flood instrument. We have replaced the *Flood severity* index by a dichotomous index valued 1 for provinces that mostly affected by the great flood in 1998 (Sichuan, Hubei, Hunan, Heilongjiang) and 0 elsewhere (in 1998, no region from Yellow river reach were impacted). We got quite similar results (not reported here).

6 Conclusion and discussion

Both Benabou (2000*a*) and Piketty (1995) provide a theoretical model where people's belief in meritocratic ideas is shaped by their perception of effort rewards, which in turn determines their preference for redistribution. However, in those models and in most empirical works, it is assumed that society has already reached a stable equilibrium, so that preferences can be assumed to be exogenous. China is a very particular and interesting case for investigating how preferences can evolve between moving groups. We have shown that the *Hukou* system divides the society in four inter-related groups, the traditional opposition between rural and urban groups with their opposed systems of values and the two floating groups of migrants, one which keeps some of the rural values and the other one which tries to be closer to the urban group, but suffers from discrimination. We have thus two different equilibria (rural versus urban) and two transition mechanisms explained by migration and discrimination.

Following the impact of economic reforms, the urban group started to adhere to meritocratic values which, before the beginning of the eighties were belonging to another planet. Thanks to the migrant groups, we had a chance to find clues about the transformation process, between traditional values of the rural world, mainly impacted by the *Image of Limited Good*, and the more recent *meritocratic values* attached to the urban group.

In order to properly study this transformation process, we had to rely on a simultaneous equation model, providing a joint explanation between values and the decision to migrate. With this model, we measured the impact of discrimination which entailed two important facts among the migrants that suffered the most: an increase in the desire for redistribution (a sentiment which was absent from the rural world including the seasonal migrants) and an increase in doubts about the capability of the government to reduce poverty. This is an important political concern that should be taken seriously. Not changing the rigidity of the discriminatory *Hukou* status for long term migrants could amplify the social volcano that Whyte (2010*b*) tends

to minimise. Knowing that the migrant population has been tremendously increasing since recent years, ignoring their dissatisfaction could ignite the social volcano.

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Appendix

A Occupation and Social Mobility

The CGSS provides information on social mobility in China between father's and son's job occupation using the EGP classification.[23] This is a valuable source to measure the impact of social mobility on opinion formation in China. Five categories are proposed which correspond to the items given in Table 10 together with their frequency in the population. We had to modify the order of the EGP scale, using the stereotype ordered regression of Anderson (1984), in order to adapt it to China. This led to downgrading the Self-Employed category which is usually a despised category in communist countries, compared to manual workers as those societies have a long tradition to inhibit private property.

Table 10: Modified EGP categories and social mobility

EGP	Occupation	Frequency	
I	Farm labour	41%	
II	Self-employed	10%	
III	Skilled-unskilled worker	26%	
IV	Lower sales-service-routine	12%	
V	Higher-lower controller	11%	
		Intergenerational social mobility	
		father	mother
		son	daughter
	Upward mobility	10%	4%

The frequencies were estimated using sampling weights.

Using the corrected EGP scale, we have built a dummy variable of intergenerational upward mobility which is coded as 1 if the status of the male respondent (female) is better than that of his father (mother), and 0 otherwise. Table 10 shows a contrasted picture of social mobility, with a large difference between males and females.

[23]The Erikson, Goldthorpe, and Portocarero classification is a classification initially due to Erikson et al. (1979). The EGP classes are ranked on the basis of two dimensions: Employee monitoring difficulties and human asset specificity (required on the job training).

B Implementing the GHK Simulator

WHAT ABOUT THE MULTINOMIAL EQUALITION FOR MIGRATIONS?

The GHK simulator exploits the fact that a multivariate distribution can be decomposed into the product of sequential conditional univariate distributions, which can be easily simulated on a truncated range. The simulator is used to approximate the joint event probability (4) and (5) R times. The average of these R evaluations is then introduced as proxy of log-likelihood function which is then maximised using a standard algorithm like `BHHH` in the package `maxLik` of `R`.

To compute the joint probabilities, the GHK simulator has to generate R draws of the ϵ's and ν_i's. Let A be the lower triangular Cholesky decomposition of the variance-covariance Σ such that $AA' = \Sigma$ with:

$$A = \begin{pmatrix} a_{11} & 0 & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & a_{55} \end{pmatrix}.$$

We consider five *iid* standard normal random variables η_m, so that we can express the ϵ_m as a linear combination of the five independent η_m, $\epsilon = A\eta$. Let us now replace the ϵ's by their corresponding values in term of the independent η's. We have a marginal Gaussian probability and remaining conditional probabilities which are independent by construction. The first marginal probability is defined as:

$$\Pr_1 = \Pr(\tau_{1,j-1} < \hat{y}_1^* + a_{11}\eta_1 < \tau_{1,j}) = \Phi\left(\frac{\tau_{1,j} - \hat{y}_1^*}{a_{11}}\right) - \Phi\left(\frac{\tau_{1,j-1} - \hat{y}_1^*}{a_{11}}\right), \quad (8)$$

where $\Phi(.)$ is the cumulative distribution of $a_{11}\eta_1$. Conditionally on the value of η_1, the second probability is given by:

$$\begin{aligned} &\Pr(\tau_{2,k-1} < \hat{y}_2^* + a_{21}\eta_1 + a_{22}\eta_2 < \tau_{2,k} \mid \tau_{1,j-1} < \hat{y}_1^* + a_{11}\eta_1 < \tau_{1,j}) \\ &\qquad = \Phi\left(\frac{\tau_{2,k} - \hat{y}_2^* - a_{21}\eta_1}{a_{22}}\right) - \Phi\left(\frac{\tau_{2,k-1} - \hat{y}_2^* - a_{21}\eta_1}{a_{22}}\right), \end{aligned} \quad (9)$$

where $\Phi(.)$ this time is the cumulative distribution of the random variable $a_{22}\eta_2$, η_1 being considered as a fixed quantity. Following the same principle,

the evaluation of the third probability writes as:

$$\begin{aligned}\Pr(&\tau_{3,l-1} < \hat{y}_3^* + a_{31}\eta_1 + a_{32}\eta_2 + a_{33}\eta_3 < \tau_{3,l} \mid \\ &\tau_{2,k-1} < \hat{y}_2^* + a_{21}\eta_1 + a_{22}\eta_2 < \tau_{2,k}; \tau_{1,j-1} < \hat{y}_1^* + a_{11}\eta_1 < \tau_{1,j}) \\ &= \Phi\left(\frac{\tau_{3,l} - \hat{y}_3^* - a_{31}\eta_1 - a_{32}\eta_2}{a_{33}}\right) \\ &\quad - \Phi\left(\frac{\tau_{3,l-1} - \hat{y}_3^* - a_{31}\eta_1 - a_{32}\eta_2}{a_{33}}\right). \quad (10)\end{aligned}$$

The same logic applies for the fourth and fifth probabilities.

The first marginal probability is evaluated directly, using a standard numerical routine for Gaussian CDFs. The second probability is conditional on η_1, which is unobserved. The idea of the GHK algorithm is to replace η_1 by a random draw from a truncated Gaussian distribution in order to simulate the consequence of the first basic event and then describe the conditional event accordingly. Let us call η_1^* a draw of η_1 coming from a truncated standard normal density with lower and upper truncation points respectively $(\tau_{1,j-1} - \hat{y}_1^*)/a_{11}$ and $(\tau_{1,j} - \hat{y}_1^*)/a_{11}$. The second conditional probability is given by:

$$\Pr_2^r = \Phi\left(\frac{\tau_{2,k} - \hat{y}_2^* - a_{21}\eta_1^*}{a_{22}}\right) - \Phi\left(\frac{\tau_{2,k-1} - \hat{y}_2^* - a_{21}\eta_1^*}{a_{22}}\right). \quad (11)$$

The third conditional probability includes two Gaussian random variables, η_1 and η_2. We use the same η_1^* as before and draw η_2^* from a truncated Gaussian with lower and upper truncation points $(\tau_{2,k-1} - \hat{y}_2^* - a_{21}\eta_1^*)/a_{22}$ and $(\tau_{2,k} - \hat{y}_2^* - a_{21}\eta_1^*)/a_{22}$.[24] We have:

$$\Pr_3^r = \Phi\left(\frac{\tau_{3,l} - \hat{y}_3^* - a_{31}\eta_1^* - a_{32}\eta_2^*}{a_{33}}\right) - \Phi\left(\frac{\tau_{3,l-1} - \hat{y}_3^* - a_{31}\eta_1^* - a_{32}\eta_2^*}{a_{33}}\right), \quad (12)$$

the same for the remaining conditional probabilities. Since the computation of (8) is straightforward, we initialise the algorithm by computing it first and then recursively evaluate the remaining probabilities. Now, if we have R draws of $\eta_1^*, \cdots, \eta_5^*$, the simulated joint probability can be approximated by the arithmetic mean of each probability given the r^{th} random draw of η^r:

$$\overline{\Pr}_i(y_1 = j, y_2 = k, y_3 = l, d = 1, 2)_{GHK} = \frac{1}{R}\sum_{r=1}^{R}\left[\Pr_1 \times \Pr_2^r \times \Pr_3^r \times \Pr_4^r \times \Pr_5^r\right],$$

[24] To draw a random number π from a truncated normal distribution between bounds $a < \pi < b$, we apply the inverse transformation method. First draw ξ from a uniform on $(0, 1)$. Then define $\bar{\xi} = (1 - \xi)\Phi(a) + \xi\Phi(b)$. Finally get $\pi = \Phi^{-1}(\bar{\xi})$.

where $\Pr^r$ refers to the simulated probability given the r^{th} draw of η and $\Pr_1$ is simply (8). Finally, the simulated likelihood function is given by:

$$L_{GHK} = \prod_{i=1}^{N} \overline{\Pr}_i(y_1 = j, y_2 = k, y_3 = l, d)^{w_i}_{GHK}, \tag{13}$$

where w_i is the weight value assigned to individual i as our data set is a weighted sample.

C Imposing Positivity Constraints

We treat the positivity constraints at the level of the Cholesky decomposition of Σ in the GHK algorithm.[25] If $\Sigma = AA'$, A has to be built according to:

$$A = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & \sqrt{1-a_{21}^2} & 0 & 0 & 0 \\ a_{31} & a_{32} & \sqrt{1-a_{31}^2-a_{32}^2} & 0 & 0 \\ a_{41} & a_{42} & a_{43} & \sqrt{1-a_{41}^2-a_{42}^2-a_{43}^2} & 0 \\ \cdots & \cdots & \cdots & \cdots & \ddots \end{pmatrix}. \tag{14}$$

This matrix exists if for every line i starting at line two, the following condition is met:

$$\Sigma_{j=1}^{i-1} a_{ij}^2 < 1 \qquad \forall i > 1.$$

The resulting matrix $\Sigma = AA'$ is automatically positive definite symmetric if this condition is met. One way of imposing this condition is obtained for a matrix of dimension n by the spherical coordinate system defined for the $n-$dimensional Euclidean space with a radical coordinate variable $r \in [0, 1]$ and $n-1$ angular coordinates $\omega_1, \omega_2, \cdots, \omega_{n-1}$ where $\omega_{n-1} \in [0, 2\pi[$ and other angles range over $[0, 2\pi]$. The different lower diagonal elements of A, for row i, are given by:

$$\begin{aligned} a_{i1} &= r_i \cos(\omega_1) \\ a_{i2} &= r_i \sin(\omega_1)\cos(\omega_2) \\ &\vdots \\ a_{i,i-1} &= r_i \sin(\omega_1)\cdots\sin(\omega_{i-3})\sin(\omega_{i-2}). \end{aligned} \tag{15}$$

[25] Cappellari and Jenkins (2003, page 290) use a similar decomposition in their `mvprobit` routine. However, they do not impose positivity. If positivity fails, they take the previous value obtained in the optimisation, leading presumably to a local optimum.

We first impose the restrictions $r_i = 1$ in order to have unit variances. It remains $n - 1$ parameters ω to be estimated freely. At the end of the optimisation process, the original parameters have to be reconstructed and the Delta method applied for finding standard deviations.

D Estimates of heteroskedasticity parameters

Table 11: Heteroskedasticty parameters for the three opinion equations

	Redist. Pref	Poor-misgov	Poor-lazy
Age	-0.001	-0.002^{***}	-0.002^{***}
	(0.000)	(0.000)	(0.000)
Believer	-0.005	0.101^{**}	0.070^{*}
	(0.037)	(0.032)	(0.029)
Eldest sibling	0.094^{***}	-0.064^{**}	-0.021
	(0.024)	(0.025)	(0.023)
Water resources	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Rainfall level	-0.000	-0.082^{**}	-0.090^{***}
	(0.033)	(0.028)	(0.026)