Relative deprivation and economic aspiration: evidence on aspiration failure for a developing country

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Abstract

This paper contributes new evidence on the role of relative deprivation and Locus of control (LOC) in income aspiration formation, empirically exploring the validity of the assumptions used by Genicot and Ray (2014) to model aspiration and assessing the presence of aspiration failures in a developing country. Aspiration failures suggest that individuals may reduce their economic aspirations due relative deprivation and the perception that their destiny is beyond their control. This hypothesis is explored using both indirect and direct measures of economic aspirations and considering alternative measures of relative income. We focus on the role of LOC, which provides information about how individuals perceive the causal connection between their actions and experienced outcomes. Estimates are based on a panel survey from Uruguay. The results confirm the relevance of LOC in explaining economic aspiration, but its incidence varies with the domain. While higher internality and relative power lead to higher economic aspiration, fatalistic belief leads to lower aspiration. Furthermore, they confirm the role of relative income in the levels of economic aspiration, but the responses would be asymmetric. This result suggests that relative income is relevant only for individuals with positive relative income, but the incentive effect of reference groups disappears when individuals face relative deprivation. Finally, they show that, among fatalistic individuals, higher relative deprivation reduces economic aspiration.

Keywords: Economic satisfaction, relative income, aspirations failure.

1 Introduction

The idea that aspiration formation plays a crucial role in explaining income mobility has a long history in the social sciences, but it has received little attention in theoretical literature in economics. There is growing interest in economics in this field, which has motivated new theoretical models to contribute to undestand the conformation of individual aspirations and their economic implications (Ray, 2006; Genicot and Ray, 2014; Dalton et al., 2015).

Previous theoretical literature on the conformation of individual aspiration shares several common features. First, aspirations are associated with a reference point, which in turn establishes goals or desired future end-states (Dalton et al., 2015, Appadurai, 2004). Second, aspirations are always formed in social life. Individuals observe the achievements and experiences of others in their immediate environment to shape their desires and goals (Bandura, 1977; Genicot and Ray, 2014). Third, aspirations affect people's incentives and motivations and, therefore, shape the intention to make an effort or invest in order to obtain certain goals (Appadurai, 2004; Genicot and Ray, 2014).

These issues are present in Ray (2006), who emphasizes the role of social interaction in aspiration formation and suggests that aspirations are based on the current and past achievements of an agent's socioeconomic neighborhood. He identifies two types of aspiration failures, which partly explain inequality persistence and low income mobility traps. Type I occurs when agents with low social origins do not include agents with high social origins in their reference group.[1] As a result, the aspiration gap is low, as will be individual incentives for investment for the future. In aspiration failure type II, agents with low social origins include individuals from higher origins in their reference group, but they perceive the goal

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[1]Instead of reference group, Genicot and Ray (2014) use the idea of aspiration window. which defines the individual's cognitive world.

to be unattainable and they are discouraged. In this case, the low chances of success are internalized in order to avoid frustration and then transformed into low individual aspiration.

Previous empirical literature has examined aspiration formation based on some direct self-reported measure (Stutzer, 2004; Castilla; 2012). Their findings postulate that higher income aspiration decreases subjective satisfaction. Other empirical papers use experimental design to explore economic aspiration. Card et al., (2012) provide experimental evidence about the relevance of peers' wages in explaining job satisfaction. Mc Bride (2010) proposes a game to measure aspirations. His work shows that players are more satisfied when: the more they win; the less others win; and their initial aspiration level is lower. Bernard et al. (2014) carried out an experiment in rural Ethiopia to measure aspirations. The treatment is people being shown a short documentary in which people with similar backgrounds to the audience talk about successful experiences in their lives. It shows that treated individuals improve their aspirations, and the effect is higher among those with higher aspiration at the beginning.

Happiness literature uses self-reported satisfaction to indirectly measure aspiration and the results suggest three factors to describe how aspirations are formed. First, a higher past income leads to higher aspirations and lower levels of satisfaction (Di Tella et al., 2010; Easterlin, 2005; Ferrer-i-Carbonell and Van Praag, 2009; Pudney, 2011). Second, the evidence suggests that an individual's aspiration depends positively on the outcomes of their reference group (Clark and Oswald, 1996, Mc Bride, 2001, Luttmer, 2005, Clark and Senik, 2010). Finally the third factor, which has received less attention in empirical research, suggests that aspirations depend on the expected result (Clark et al. 2009a; 2009b, Senik, 2004).

Furthermore, previous literature suggests that personality traits could affect economic satisfaction, income aspirations and social comparisons (for a review see Lucas and Diener, 2009). Rotter's Locus of Control (LOC) is one important aspect of personality, which measures

the individual's perception of the extent to which his life is under his control or depends on external factors (Rotter, 1966). Although happiness literature agrees about the role of an individual's personality in explaining individual heterogeneity in subjective responses (Ferrer-i-Carbonell and Frijters, 2004; Boyce, 2010), the relationship between happiness and LOC has received less attention in income-happiness literature from economists. Previous research has found a positive correlation between individuals with internal LOC and happiness (Argyle, 2001; Cummings and Communistic, 2002). There is some evidence suggesting that people with internal LOC are more active in setting and pursuing valued goals, (Shah and Higgins, 2001; Caliendo et al.; 2015) and tend to invest more in their future (Coleman and DeLeire, 2003; Cobb-Clark et al., 2014; Lekfuangfu et al., 2014) which could explain the positive relationship with economic satisfaction. However, DeNeve and Cooper's (1998) meta-analysis found that correlations between personality traits and subjective well-being are only weak to moderate. Lu, (1999) suggests that the correlation correlation between LOC and happiness is affected by life experiences. Boyce and Wood (2011) and Budria and Ferrer-i-Carbonell (2012) found that the marginal utility of income differs across personalities. Furthermore, Proto and Rustichini (2015) and Budria and Ferrer-i-Carbonell (2012), found differences in income comparison depending on individual personality, which suggests that the role of income comparison in life satisfaction is mediated by individual personality characteristics.

Furthermore, the previous literature generally uses a unique aggregate indicator of LOC, but some authors suggest that it comprises different dimensions which could be independent of each other (Levenson,1981). Some exceptions are Heckman et al. (2006) Heckman and Kautz (2012) and Bernard et al. (2014), who consider three domains of LOC separately: *internality*, *powerfull others* and *chance*. Bernard et al. (2014) study the role of these domains in

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income aspiration and they found that aspirations are negatively and significantly correlated with *internality*, but not significantly correlated with *powerful others* and *chance*. This suggests that there is ambiguous evidence about the role of the different LOC dimensions in economic aspiration. Furthermore, LOC provides information about how individuals perceive the causal connection between their actions and experienced outcomes (Lefcourt, 1991). Therefore their link with aspiration failure seems immediate.

To the best of our knowledge, the aspiration failure hypothesis has not been tested by previous empirical studies. The purpose of this paper is to fill this gap by contributing new evidence on the role of relative deprivation and LOC in income aspiration formation, empirically assessing the presence of aspiration failures in a developing country. Furthermore, we explore the validity of the assumptions used by Genicot and Ray (2014) to model aspiration.

In order to contribute new evidence on these issues, we use self-reported economic satisfaction to indirectly measure economic aspirations. As complementary evidence we also use a direct meassure of income aspiration, the individual minimum income aspiration. Furthermore, relative income is defined as the gap between income and a reference income level, which is a proxy of the aspiration gap defined by Genicot and Ray (2014). We consider alternative measures of reference income. We explore how each domain of *LOC* (*internality*, *powerful others* and *chance*) is related with economic satisfaction and aspiration. They are statistically more independent of one another than previous dimensions used in Rotter's scales. This strategy allows us to better consider the origin of an individual's perceptions on actions-outcome causal relationships. Furthermore, we identified fatalistic individuals as those who believe that their destiny is pre-ordained and beyond their control and we explore if the relative situation affects their economic satisfaction differently. We also consider the interaction between income gap and LOC domains, which allows us to explore how individ-

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ual perceptions and relative deprivation affect economic satisfaction. This allows us to assess how a relatively unfavorable situation and low expected results can result in a reduction of economic aspirations.

Our estimates are based on three waves of the Uruguayan panel survey, "Multidimensional Well-being Trajectories in Childhood" (MWTC). The sample is representative of households in the metropolitan area with children attending the first year at public primary schools in 2004 (90% of the cohort). The majority of the previous papers use data from developed countries, so this research provides new evidence for a developing country, where aspiratioin failure could be a real problem.

This paper contributes new evidence on how unfavorable situations and individual perceptions about the causal connection between their actions and outcomes could result in a reduction of economic aspirations. Our results confirm the relevance of LOC in explaining economic aspirations and suggest that the sign and magnitude of the correlation between economic satisfaction and LOC dimensions are not the same. An increase in *internality* and *powerful others* dimensions leads to higher economic satisfaction, which is consistent with the previous evidence. However, higher LOC-Chance has a negative incidence on economic satisfaction, which shows that more fatalistic individuals are more conformist and present lower income aspiration. Furthermore, our results show that among fatalistic individuals, *ceteris paribus*, a higher relative deprivation increases economic satisfaction. These results are in line with recent findings presented in Proto and Rustichini (2015) and Budria and Ferrer-i-Carbonell (2012). Finally, it would be consistent with a reduction in their aspirations due to the unfavorable situation in their reference group and the perception of a low chance of economic improvement.

The rest of the paper is organized as follows. Firstly, we present the analytical model and

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the main hypothesis. Section 3 presents the data, the definitition of variables and the estimation procedure. In section 4 the main results are presented and the main conclusions are summarized in section 5.

2 Analytical model and the main hypothesis to be tested

The dependent variables used in this research are satisfaction with economic conditions (Economic Satisfaction - ES) and a subjective poverty line. The former provides an indirect measure of economic aspiration, while the second variable is a direct proxy of individuals' minimum income aspiration (MIA). Though there is a debate in economics on the advantages and limitations of using measures of self-reported information, previous literature highlights the opportunities provided by this type of variable for a better understanding of the economic behavior of people (Diener and Lucas, 1999; Kahneman and Krueger, 2006; Frey and Stutzer, 2002; Clark et al., 2008).

An indirect measure of income aspiration

The responses on ES indicate an individual's evaluation of their economic achievement relative to a certain objective. The differences between self-assessment and economic results are not random, but they respond in part to heterogeneous economic aspirations. As a result, people's answers provide indirect information about their economic aspiration. Previous empirical research has used self-reported satisfaction to indirectly measure aspiration (Clark et al.,2008; Stutzer, 2004) and the incidence of the reference group (Clark and Oswald, 1996, Mc Bride, 2001, Luttmer, 2005, Clark and Senik, 2010). This approach has the advantage

of avoiding the use of direct aspiration measures and their accompanying problems.[2] Furthermore, as economic needs, aspirations and relative income deprivation can be expressed in monetary terms, compared to happiness, the ES variable has the advantage that responses are expressed in the same metric.

There are two main limitations with the self-reported economic satisfaction variable, it is a discrete ordered categorical variable and it contains non random measurement errors (Ferrer-i-Carbonell and Frijters, 2004 and Van Praag and Ferrer-i-Carbonell, 2008). In general, studies that utilize self-reported satisfaction assume an ordinal perspective, and in the economics literature this type of responses is estimated by means of ordered Probit models. Ferrer-i-Carbonell and Frijters (2004) discuss the implications of using an ordinal or cardinal perspective. They also show that the estimates that assume interpersonal ordinality obtain the same results as estimates which assume cardinality in self-reported satisfaction, which supports our decision. We assume cardinality of the economic satisfaction answers in our estimate model, as we discussed in section 3.3. The standard empirical model of self reported satisfaction is the following:

$$ES = \alpha + \beta ln(Y) + \gamma G(Y^R) + \delta X + e \qquad (1)$$

where Y is household income, X is a vector of control variables and $G(Y^R)$ considers the relative income effect, while the Greek letters represent the parameters to be estimated. The

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[2]Clark et al. (2008) discuss the problems involved in obtaining an accurate measure of income aspiration. Direct measurements of economic aspirations could be subject to measurement errors. One issue is that the measurement could reflect the individual's expectation rather than aspiration. On the other hand, individuals could respond strategically to questions about aspirations. Finally, experienced utility is about past enjoyment, while aspiration refers to future outcome. This raises the question of how people consider the uncertainty of their future when responding about their aspirations.

logarithm of household income considers income to have a positive but decreasing effect. Relative income is defined as the difference between household income and the reference income ($Y^R = Y - Y^{ref}$). As we describe in section 3.2, we use alternative reference incomes (Y^{ref}) to measure income gap. Considering the assumption used in the Genicot and Ray (2014) model, we assume a more general functional form about how relative income affects levels of economic satisfaction:

$$G(Y^R) = \gamma_+ \left(Y^R \right) (\text{I}) + \gamma_- \left(Y^R \right) (1 - \text{I}) + \theta_+ \left(Y^R \right)^2 (\text{I}) + \theta_- \left(Y^R \right)^2 (1 - \text{I}) \tag{2}$$

Substituting leads to the following equation:

$$\begin{aligned} ES = \alpha + \beta ln(Y) + \gamma_+ \left(Y^R \right) (\text{I}) + \gamma_- \left(Y^R \right) (1 - \text{I}) + \\ \theta_+ \left(Y^R \right)^2 (\text{I}) + \theta_- \left(Y^R \right)^2 (1 - \text{I}) + \delta X + e \end{aligned} \tag{3}$$

Equation 3, incorporates parameters γ_+, γ_-, θ_+ and θ_-, which allows relative income to differentially affect those individuals with relative deprivation and those with positive relative income. Evidence that $\gamma > 0$, $\theta_+ \leq 0$ and $\theta_- \geq 0$ agrees with the assumptions used by Genicot and Ray (2014) to model aspiration.

We propose an additional specification in order to analyze the correlation between satisfaction (and aspiration) and LOC domains.[3] The extended empirical model is:

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[3]In equation 4 we use two variables to measure the dimensions of LOC proposed by Levenson (1981): LOC_{IP} measures *internality* and *powerful others*, while LOC_C meassures chance.In section 3.2 we explain that decision.

$$ES = \alpha + \beta ln(Y) + \gamma_+ \left(Y^R \right) (\text{I}) + \gamma_- \left(Y^R \right) (1 - \text{I}) + \theta_+ \left(Y^R \right)^2 (\text{I}) \\ + \theta_- \left(Y^R \right)^2 (1 - \text{I}) + \lambda_C LOC_C + \lambda_{IP} LOC_{IP} + \delta X + e \tag{4}$$

where LOC_j and the vector λ_J, represent the *jth* dimension of the LOC and their association with economic satisfaction respectively. The analysis of the sign and significance of these parameters allows us to assess the relationship between LOC domains and economic satisfaction. Furthermore, it allows us to test the main hypotheses of this paper on the presence of aspiration failures.

On one hand, evidence that $\hat{\lambda}_j > 0$ establishes a positive relationship between internal individuals and ES. This is consistent with the previous evidence and postulates that individuals with internal LOC are more active in setting and achieving valued goals. As a result, it represents contrary evidence on aspiration failure. On the other hand, evidence that $\hat{\lambda}_j < 0$ supports the idea of aspiration failure. This channel suggests that when people believe that outcomes are not contingent upon their effort, they reduce their targets and subsequently increase their satisfaction. Specifically, individuals who perceive that they have low capacity or chance to change their destiny, under equal conditions declare themselves to be more satisfied with their economic situation.

Finally, we use information about one dimension of LOC_C to distinguish fatalistic individuals. A dummy variable identifies individuals that consider that their future depends entirely on external circumstances and luck. Fatalistic beliefs could affect the responsiveness to social comparisons. In order to advance in this direction, in equation 5 we also consider an interaction term between the relative income gap and a variable which identifies fatalistic individuals.

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$$ES = \alpha + (\beta)ln(Y) + G(Y^R) + \gamma_{F-}\left(Y^R\right)(1\text{-}I)\,F + \gamma_{F+}\gamma_+\left(Y^R\right)(I)\,F + \lambda_F F + \lambda_{IP}LOC_{IP} + \delta X + e$$

$$(5)$$

where F is an indicator function which identifies fatalistic individuals, and LOC_{IP} measures *internality* and *powerful others*. Evidence that $\hat{\lambda}_C<0$ supports the idea of aspiration failure. When individuals have a strong belief that their destiny is pre-ordained and beyond their control, this leads them to reduce their aspirations in order to avoid frustration, or because they believe that their chances of achieving better results are low.

Furthermore, γ_{F+} and γ_{F-} measure whether the relative situation affects fatalistic individuals differently. In this case, the hypothesis is that, under equal conditions, fatalistic individuals with higher relative deprivation declare themselves to be more satisfied and reduce their economic situation. Therefore, evidence that $\hat{\gamma}_{F-} > 0$ supports the idea that, for fatalistic individuals with relative deprivation, a high relative deprivation leads to higher economic satisfaction. Evidence that $\hat{\gamma}_{F+} < 0$ also agrees with a reduction in economic aspirations, because fatalistic individuals, *ceteris paribus,* demand a lower relative income to declare themselves to be more satisfied. However, given their relative situation, it is difficult to interpret this evidence as aspiration failure in the sense of Ray (2006).

A direct measure of income aspiration

As complementary evidence, minimum income aspiration is used as a dependent variable, which will allow us to directly assess the relationship between income aspiration, LOC and relative deprivation. Stutzer (2004) argues that the subjective poverty line is expected to have a direct link with the level of minimum income aspirations (MIA). The following equation

allows us to explore the determinants of minimum income aspirations:

$$MIA = \alpha' + (\beta')ln(Y) + \gamma'_+ \left(Y^R\right)I + \gamma'_- \left(Y^R\right)(1-I) + \lambda'_C LOC_C + \lambda'_{IP} LOC_{IP} + \delta'Z + e$$
$$(6)$$

where Z represents the same controls used by Stutzer (2004). An alternative specification of equation 6 substitutes $\lambda'_C LOC_C$ by $\lambda'_F F$. Evidence that $\widehat{\lambda}'_C < 0$ and $\widehat{\lambda}'_F > 0$ supports the hypothesis of aspiration failure. When people believe that outcomes are not contingent upon their actions, they reduce their economic aspirations. Furthermore, evidence that $\widehat{\gamma}'_- = 0$ and $\widehat{\gamma}'_+ > 0$ suggest that incentive effect of reference group disappears when individuals face relative deprivation.

3 Data, definition of variables and estimation procedure

3.1 Data

This research uses the "Multidimensional Well-being Trajectories in Childhood" (MWTC) survey as the information source. This panel is representative of households which had children attending the first year of public primary school in 2004. In Uruguay public school coverage is close to 90% among children in the first year. In this paper we only work with the information for the metropolitan area, a region which provides the possibility of working with a panel with two waves (information about self-reported satisfaction is only available for the second and third waves). But we also use the first wave to include the lags of some contol variables. The use of self-reported satisfaction leads to the unit of analysis being

the individual and not the household, which creates an additional attrition problem. This reduces the panel to a total of 722 individuals surveyed both in 2006 and in 2011-2012. The samples are balanced in the sense that the difference in means test between the individuals in the cross-section data and individuals in the panel survey do not reject the null hypothesis of equal means at conventional significance levels (see Tables A.1 andA.2 in the Annex). The only exception are two variables, sex and hours worked only in the first wave. In addition, all the available information for each wave is also used in the OLS estimations (1283 for the second set and 1084 observations for the third).

"Multidimensional Well-being Trajectories in Childhood" (MWTC)	wave 2004	wave 2006	wave 2011-12
Household sample (Metropolitan area, Montevideo and Canelones)	1800 household	1283 households	1084 households
Individuals panel sample(Metropolitan area, Montevideo and Canelones)	722 individuals	722 individuals	722 individuals

This source of information provides some advantages in addressing the proposed hypotheses, with some questions being specifically designed to work on these issues. In addition, there are very few panels containing this type of information for developing countries.

3.2   Variables and measures of reference income

In this research, the dependent variable used in the baseline estimations is the economic satisfaction ES which, as argued, seems more appropriate when testing the economic aspiration hypothesis. Economic satisfaction is reported on a scale of 1 to 5. As complementary

evidence, we use subjective poverty lines as a proxy of income aspiration, which is a cardinal variable. This variable is a better measure of income aspiration for low income household.

We use alternative strategies to approximate the reference income level. First, following Vendrik and Woltjer (2007) and Ferrer-i-Carbonell (2005), reference groups are defined based on observable characteristics, considering 4 age groups, 6 educational levels and sex (see Table A.3)[4]. We estimate the income averages for each group, and each person belonging to that group is assigned this statistic as a reference income.

Considering that the size of the panel sample of the MWTC and its representativeness could cause problems in estimating the average income of the reference group of each individual, we use the Continuous Household Survey (CHS) to estimate the average income for the corresponding years. This alternative allows us to define more homogeneous reference groups and estimate their mean income with greater precision (we use a large enough number of individuals in each reference group). Moreover, using the MWTC income information would involve assuming that individuals only compare themselves with individuals who, at some point, sent their children to the first year of public school in their reference groups. However, this decision could lead to some problems, as there may be measurement errors in the income reported in the MWTC that were not present in the CHS. The strategy used to mitigate this problem was to use the median income of the groups as a reference, an indicator which is less sensitive to outliers.

Previous literature discusses potential endogeneity concern in the choice of the reference group (Heffetz and Frank, 2011). However the treatment of this issue is still in its early stages, and generally the reference group is assumed to be exogenous in empirical studies (Clark et al,

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[4]Uruguay is a very homogeneous country and regional dimension is not necessary to define reference group income.

2008), which assume that the researcher knows the income of the reference group Y^{rg}. This strategy leads to the problem that individuals with similar characteristics have the same reference group. In this paper this aspect will be considered by approximating reference income in alternative ways. The first alternative uses information about the perception of individuals of their position in the income distribution to adjust $Y_i^{rg-observed}$ and generate the corrected reference income Y^{rgcorr}.[5] A second alternative to approximate the reference income level is to consider the minimum income levels for a hypothetical household (composed of two adults and two children) that each individual identifies as being necessary to avoid poverty, which represents a minimum income aspiration level (MIA). This avoids defining a reference group exogenously and allows us to define the relative position as an aspirations gap, based on the difference between household income and MIA.[6]

We use a proxy of LOC (LOC) as a control variable. The LOC is defined as the individual's perception of their control of their life, which is explained as the degree to which an individual believes that his life is under his control or depends on external factors (actions of others, luck, etc). Some authors consider LOC as one important aspect of individuals' personalities, which indicates attitudes regarding the causes of their present achievement.[7] Other authors focus on the role of the individuals' environments in shaping their perceptions of response-outcome relationships (Almlund, 2011; Lefcourt, 1984). When environments are adverse in

[5]We assume that biases about relative position depend on with whom each individual interacts and on the threshold taken as a reference. The fact that individuals perceive themselves to be in a better relative position than their real position is due to the fact that they compare with a lower reference threshold because the individuals within their reference group are located on the left tail of the overall income distribution. For a more detailed description of the corrected reference income, see Leites and Ramos (2015).

[6]This alternative could generate potential endogeneity problems, because reference points incorporate a subjective component and this variable may contain non-random measurement errors (Stutzer, 2004). Nonetheless, an advantage in relation to Stutzer (2004) is that in this case the responses do not refer to the well-being of the respondent's household, but that they have an imaginary household as a benchmark.

[7]In more recent years there has been increasing attention to consider explicit personality measures in empirical research in economics (Almlund et al. 2011; Borghans et al., 2008; Cobb-Clark and Schurer, 2013).

terms of opportunity, it is more difficult to ascribe such perceptions to personality, and it is likely that they would change if these constraints disappeared.When the environments are favorable it is easier to relate LOC scores with relatively stable differences in personality characteristics (Lefcourt, 1984).

There is extensive research which has proposed alternative methodologies to measure LOC, whose findings are convergent. Levenson (1981) proposes three dimensions to measure the LOC, *internality*, *powerful others* and *chance*, which are more statistically independent of one another than previous dimensions used in Rotter's scales.[8] *Internality* indicates the extent to which individuals perceive that they have control over their own lives, meanwhile *powerful others* indicates the perception that other people control the events in one's life. Finally, *chance* indicates the degree to which an individual perceives that their experiences and outcomes are contingent upon their actions.

Table A.4 in the Annex presents a detailed description of the LOC variable construction, while Table A.6 summarizes the main statistics for each LOC domain, and also shows their domain range. Table A.5 in the Appendix presents the correlation matrix between the three components (and sub-components) of LOC (internality, powerful others, and chance) separately as well as their correlation with life satisfaction, economic satisfaction, consumption satisfaction and minimum income aspiration. It shows a positive correlation between the three LOC components and life and consumption satisfaction. Second, the three LOC domains are correlated with MIA; individuals with *internal LOC*, powerful other and *chance*, are correlated with higher income aspiration. Both results agree with the previous literature. Finally, while the LOC domains *internality* and *powerful others* have a positive correlation with economic satisfaction (internal and more powerful individuals are more satisfied), the

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[8]These three dimensions have been used in economics, for example by Heckman et al. 2006 and Heckman and Kautz (2012).

component of *chance* has a negative correlation (low chance views are associated with higher economic satisfaction). Considering these results we aggregate the components *internality* and *powerful others* across individuals (LOC_{IP}), and we use our disaggregated LOC- chance index (LOC_C).

In order to make the estimation results comparable, we use the same controls used in the happiness literature. Tables A.1 and A.2 in the Annex, summarize the variables used in the empirical analysis, presenting its definition, source of data and main statistics.

3.3 Estimation procedure

The extended random effects model (which considers a Mundlak term, Mu) and fixed effects model (Fe) are used to estimate the equation of economic satisfaction.[9] This strategy requires a strong assumption, because estimates demand interpersonal comparison and cardinality assumptions, which implies that, for all individuals, a one unit fall in satisfaction from 5 to 4 is equivalent to a fall from 3 to 2. Ferrer-i-Carbonell and Frijters (2004) provide a more detailed explanation of the implications of this assumption. This paper also demonstrates that the estimates which assume that the subjective responses are ordinal produce the same results as the methods which assume cardinality, which supports our strategy.[10] Furthermore, we incorporate a fixed individual effect to account for differences in time-invariant explanatory

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[9] In the presented results, we use the average over the two waves. We also estimate the OLS for each wave separately and for pooling data from all observations of the two waves. The results of which are not included but are consistent with those we present in Table 1.

[10] Ferrer-i-Carbonell and Frijters (2004) found that when fixed effects are used to explain self-reported satisfaction, the ordered Probit models show results which are very close to the findings of an OLS model. The main conclusion is that assuming cardinality or ordinality in the satisfaction responses has little effect on the results. In order to check our results, we replicate our estimates using the alternative assumption of ordinality in the individual's responses and the Probit adapted OLS procedure (Van Praag and Ferrer-i-Carbonell, 2008). This approach provides results with respect to the magnitude, significance and sign of the parameters, which are fully consistent with our OLS estimates. This is true, in particularly with respect to the parameters associated with relative concern and LOC variables.

variables (e.g. personality characteristics or ability). That model uses only within-individual variation to estimate the regression coefficients. As Vendrik and Woltjer (2007) highlight, as this model does not use information about interpersonal variation, our estimates only require the interpersonal comparability of the individual mean economic satisfaction responses.

Previous research in the field suggests the presence of omitted individual characteristics that could lead to endogeneity problems when using self-reported measures in econometric estimations (Clark et al., 2008; Van Praag and Ferrer-i-Carbonell, 2008). For example, the existence of some idiosyncratic variables such as personality traits might affect access to resources (income or wealth) and satisfaction levels. Ferrer-i-Carbonell and Frijters (2004) conclude that unobservable time-invariant characteristics are highly relevant to explain the levels of self-reported satisfaction. This result is consistent with Diener and Lucas' (1999) and Argyle's (1999) literature surveys, which suggest that very persistent personality traits are the best predictors for life satisfaction answers. A second source of endogeniety arises from simultaneity problems between some of the regressors and the dependent variable. For example, if happier people are more successful in economic terms, then, higher income is an outcome rather than a casual factor (Stutzer and Frey, 2006; Graham et al. 2004).

According to Ferrer-i-Carbonell (2011) the literature on the field has not yet been successful in identifying appropriate methods to address these problems. Ferrer-i-Carbonell and Frijters (2004) suggest that the use of Fe can mitigate endogeneity problems that may arise due to the presence of unobservable invariants over time. The latter is applied in this research, although only three waves are available in the data-set used in this study. Furthermore, Fe estimates rely on within variations in the variables of interest, which poses a potential problem if an significant fraction of individuals do not change their relative situation (Blázquez and Budria, 2014). To address this issue we use an extended random effects model, containing

a Mundlak correction term. We include the individual mean across the two waves of those variables that are correlated with the individual time persistent unobservable term.[11] As a result this term controls the respondents' personality traits (and other unobservables) and corrects the potential correlation between the individual time persistent unobservable term and explanatory variables (Mundlak, 1978).

An alternative procedure to mitigate the potential simultaneity problem is to exploit the possibilities offered by exploiting the longitudinal nature of the information. The robustness of the results is analyzed with lagged income instead of contemporary income.

Another issue that deserves attention is the potential endogeneity problem of the variables reflecting the LOC. If there is an effect of the individuals' environments on shaping their percepections, omitted variables correlated with LOC could lead to endogeneity problems. For example, the relationship between ES and LOC could be explained by the fact that individuals with internal LOC are more likely to remember their economic success than those with external locus (Rotter, 1966; Argyle, 2001). Another source could arise from the correlation between internal LOC and cognitive ability, which is an omitted variable in our model. However, there is not a consensus in the empirical literature about this issue.[12]

To address these issues, we first include individual fixed effects which control unobservable invariants over time. Secondly we use alternative meassures of LOC variables. Third, we use lagged LOC variables.[13] Finally, some authors emphasize that the LOC reflects some

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[11]The variables considered are: household income, working hours, years of education, number of children, household members and unemployment. We tested with alternative groups of variables and the results were the same. For the individual average variable of the Mundlack term, we use the information from three and two waves alternatively. Both alternatives provide the same results.

[12]While Coleman and DeLeire (2003) confirm this correlation, Stankov (2005) and Ackerman and Heggestad (1997) suggest that these personality traits are weakly correlated with IQ. Furthermore, Almlund, et al. (2011) highlight that LOC is empirically easily distinguished from general cognitive ability.

[13]TableA.6 in the Annex presents statistics about the distributions of LOC domains and FigureA.1 reports the individual time variation of LOC domains.

stable aspects of individuals' personalities which indicate attitudes regarding the causes of their present achievement. In this case, the endogeneity problem is limited.[14]

An additional source of bias can arise from the interaction between some personality traits and social comparisons, which could affect self reported satisfaction (Proto and Rustichini, 2015 and Budria and Ferrer-i-Carbonell, 2012). The latter issue could be particulary relevant, if relative deprivation affects individual percepetions. Specification 5 incorporates an interaction term between LOC and relative concern, which could help us to address this problem.

Finally, we adapt the strategy of Stutzer (2004), in order to explore the determinants of income aspirations. We follow his strategy and we focus in the role of relative deprivation and LOC variables. We use the OLS estimator to estimate equation 6. This procedure has several desirable properties under the basic assumptions of the linear regression model. However, MIA is expected to be lower than real income aspiration for high income individuals (non-random measurement error). As a result, our model may underestimate the level of β'.

4 Empirical results

4.1 Indirect evidence on income aspirations

Table 1 presents the results for the extended random effects model (Mu) and the fixed effects model (Fe) for the specification of equation 4. First we focus on the relative concern parameters. The coefficients associated with the income gap among individuals with relative deprivation are always significantly different from zero and positive ($\hat{\gamma}_- > 0$), while the

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[14]Cobb-Clark and Schurer (2013), using data from Australia, found that short- and medium-run changes in LOC are modest on average, and are concentrated among young and very old people. Although they confirm its stability, they suggest that LOC is not time invariant. On the other hand, there is evidence about the effect of public programs or experimental treatments on LOC (Gottschalk, 2005; Bernard, et al., 2014).

coefficients associated to the individuals with a positive income gap are not individually significantly different from zero and in all cases $\hat{\gamma}_+ < \hat{\gamma}_-$. Moreover, both estimates provide robust evidence in relation to the convexity of the curve for those in a position of relative deprivation, while the evidence is weak with respect to the concavity for those with a positive relative income gap. [15]

 These findings are fully consistent with the assumptions used by Genicot and Ray to model aspirations. Furthermore, Leites and Ramos (2015)'s model predicts that when the relative concern is convex, with a more demanding reference income, individuals respond by reducing their aspirations and effort. As a result, this evidence is suggestive of the potential effect of relative deprivation on aspiration formation.

In order to advance in this direction, we focus now on the significance of the LOC components. Both the Mu and Fe results confirm that the LOC_C and LOC_{IP} are significant, but their incidence is opposite. Higher internal LOC and lower powerful others are associated with higher economic satisfaction ($\lambda_{IP} > 0$). This is consistent with the previous evidence, and with the idea that individuals with internal LOC are more active in setting and achieving valued goals (Levenson, 1974; Lefcourt, 1991; Caliendo et al.,2015; Cobb-Clark et al., 2014). On the other hand, LOC_C has a negative incidence on economic satisfaction ($\lambda_C < 0$), which shows that more "fatalistic" (external) individuals are more satisfied. That is, individuals who perceive that they have no possibility of influencing their future, under equal conditions, declare themselves to be more satisfied with their economic situation. This suggests a reduction in aspirations in order to avoid frustration.

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[15] The hypothesis $\hat{\gamma}_+ = \hat{\gamma}_-$ is rejected at 10% of significance level. Furthermore, the hypothesis $\hat{\theta}_+ = \hat{\theta}_-$ is rejected in all cases, confirming $\left|\hat{\theta}_+\right| < \left|\hat{\theta}_-\right|$.

Table 1: **Economic satisfaction, specification based on equation 4**

Cardinal approach (two waves sample)					
Estimation procedure		**Mu**		**FE**	
Variables		**Coefficient**	**T-Ratio**	**Coefficient**	**T-Ratio**
Income gap if RD<0 (y-yrg<0)	γ_-	**0.01826*****	**3.45**	**0.01722****	**2.54**
Income gap if RD>0 (y-yrg>0)	γ_+	**0.0051**	**1.17**	**-0.0007**	**-0.11**
Squared income gap if RD>0 (y-yrg>0)	θ_+	**0.0000**	**-0.62**	**0.0000**	**-0.31**
Squared income gap if RD<0 (y-yrg<0)	θ_-	**0.00021****	**2.40**	**0.00031****	**2.34**
Household income (log y)	β	**0.0141**	**0.39**	**0.0391**	**0.80**
Years of education		0.02352*	1.65	0.04407*	1.87
Unemployment		-0.23061*	-1.88	-0.0939	-0.66
log(Active household members)		0.0839	0.44	-0.2528	-0.99
log(Active household members)		0.0718	0.41	0.2033	1.00
Log (age)		0.0318	0.17	-0.0645	-0.15
Male		-0.21122*	-1.70	#¡REF!	#¡REF!
log (1+working hours)		-0.05949***	-2.76	0.0130	0.47
Marital status		-0.28436***	-3.55	-0.36141***	-3.03
Log (number of children)		-0.23587***	-3.14	-0.17582*	-1.83
LOC $_C$	λ_C	**-0.12261*****	**-3.99**	**-0.10567*****	**-2.64**
LOC $_{IP}$	λ_{IP}	**0.30235*****	**6.09**	**0.13896****	**2.19**
Constant		2.29096***	2.29096***	2.5948	2.59
Individual means (Mundlack)					
Mean (ln(Household income))		0.0305	0.69		
Mean (ln(1+working hours))		0.1490	1.60		
Mean (ln(1+Years of education)		0.0220	0.67		
Mean (ln(number of children))		0.53480***	2.72		
Mean (ln(household members))		-0.38010*	-1.67		
Mean (Unemployment)		-0.1723	-0.26		
Observations		1,444		1,444	
Individuals		722		722	
R-squared		#¡REF!		0.060	
Joint sigjificance tests †		211		3	
Hypotheses		**Relative concern test (Pvalue)**			
Test: $\gamma+ = \gamma-$		0.099		0.087	
Test: $\theta+ = \theta-$		0.008		0.014	
Test: $\gamma+ = \gamma-= \theta+ = \theta- =0$		0.000		0.089	
Test: $\gamma+ = \theta+ = 0$		2.625		0.288	

The reference income is defined as the average income of all individuals in the same reference group. The reference group is defined by education, age and sex. (†) The Joint sginificance test is a Chisquared test and F -test., in the MU estimates and FE estimates respectively.

 *** p<0.01, ** p<0.05, * p<0.1

Tables 2 and 3 provide additional evidence how the relationship between fatalistic beliefs and relative deprivation affects economic satisfaction. We substitute LOC_C for an indicator function which identifies fatalistic individuals as "1" (Table 2).[16] Additionaly, in Table 3 estimates include an interaction term between the indicator function (fatalistic individuals) and their income gap.

The significance and magnitude of the coefficients of relative concern remain unchanged and they agree with the aspiration model assumptions. Second, the LOC_{IP} coefficient is still significant in all estimates and is associated with higher economic satisfaction ($\hat{\lambda}_{IP} > 0$). Third, estimates of fatalistic indicator function coefficients are always positive and significant (see Table 2). Namely, more fatalistic individuals, *ceteris paribus*, have higher economic satisfaction.

When an interaction term is included, the LOC_{IP} coefficient is still significant and positive (see Table 3). The Mu estimate confirms that the coefficient of the indicator function is still positive and significant ($\hat{\lambda}_F > 0$), while the coefficient of the interaction term between income gap and fatalistic individuals is only significant among those facing relative deprivation and its sign is negative ($\hat{\gamma}_{F-} < 0$). The Fe estimate confirms the sign of these coefficients but in this case, they are not statistically significantly different from zero. Furthermore, the joint test for both Mu and Fe estimates reject the hypotheses $\hat{\lambda}_{IP} = \hat{\lambda}_F = 0$ and $\hat{\lambda}_F = \hat{\gamma}_{F-} = \hat{\gamma}_{F+} = 0$, which provides favorable evidence about the incidence of fatalistic belief on relative concern (see the bottom of Table 3). These findings are in line with the results of Proto and Rustichini (2015) and Budria and Ferrer-i-Carbonell (2015), which suggest that the role of income

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[16]This definition should be interpreted with caution. Lefcourt (1991) remarks about the problem of the use of LOC scales to develop typologies.

Table 2: Economic satisfaction, specification based on equation 5

Variables		Mu Coefficient	T-Ratio	FE Coefficient	T-Ratio
Cardinal approach (two waves sample)					
Estimation procedure		**Mu**		**FE**	
Variables		Coefficient	T-Ratio	Coefficient	T-Ratio
Income gap if RD<0 (y-yrg<0)	γ_-	**0.0192*****	**3.63**	**0.0185*****	**2.74**
Income gap if RD>0 (y-yrg>0)	γ_+	**0.0056**	**1.30**	**0.00010**	**0.01**
Squared income gap if RD>0 (y-yrg>0)	θ_+	**0.0000**	**-0.80**	**0.00000**	**-0.41**
Squared income gap if RD<0 (y-yrg<0)	θ_-	**0.0002*****	**2.58**	**0.0003****	**2.54**
Household income (log y)	β	**0.0119**	**0.33**	**0.03730**	**0.78**
Years of education		0.0235*	1.66	0.0427*	1.81
Unemployment		-0.2353*	-1.92	-0.09700	-0.68
log(Active household members)		0.0940	0.49	-0.26020	-1.01
log(Active household members)		0.0628	0.36	0.20900	1.03
Log (age)		0.0076	0.04	-0.11060	-0.27
Male		-0.2123*	-1.72	#¡REF!	#¡REF!
log (1+working hours)		-0.0594***	-2.76	0.01460	0.53
Marital status		-0.2834***	-3.53	-0.3548***	-2.95
Log (number of children)		-0.2193***	-2.92	-0.1645*	-1.72
LOC-$_{IP}$	λ_{IP}	0.2988***	6.09	0.1306**	2.08
"Fatalistic" (1 if LOC-C=1)	λ_F	0.5093***	5.19	0.4460***	5.19
Constant		2.3151***	2.88	2.7355*	1.69
Individual means (Mundlack)					
Mean (ln(Household income))		0.0315	0.70		
Mean (ln(1+working hours))		0.1450	1.58		
Mean (ln(1+Years of education)		0.0285	0.86		
Mean (ln(number of children))		0.5032**	2.56		
Mean (ln(household members))		-0.3743*	-1.66		
Mean (Unemployment)		-0.1838	-0.28		
Observations		1,444		1,444	
Individuals		722		722	
R-squared		#¡REF!		0.0693	
Joint significance tests (F-statistic) †		233.7000		3.1400	
Hypotheses		**Relative concern test (Pvalue)**			
Test: $\gamma+ = \gamma- =0$		0.090		0.074	
Test: $\theta+ = \theta-$		0.003		0.007	
Test: $\gamma+ = \gamma-= \theta+ = \theta- =0$		0.000		0.054	
Test: $\gamma+ = \theta+ = 0$		0.003		0.322	
Hypotheses		**LOC domains test (Pvalue)**			
Test $\lambda_{IP}=\lambda_F=0$		0.000		0.000	

The reference income is defined as the average income of all individuals in the same reference group. The reference group is defined by education, age and sex. (†) The Joint sginificance test is a Chisquared test and F -test., in the MU estimates and FE estimates respectively.
 *** p<0.01, ** p<0.05, * p<0.1

Table 3: **Economic satisfaction, specification based on equation 5**

Cardinal approach (two waves sample)					
Estimation procedure		**Mu**		**FE**	
Variables		**Coefficient**	**T-Ratio**	**Coefficient**	**T-Ratio**
Income gap if RD<0 (y-yrg<0)	γ_-	**0.0215*****	**3.9729**	**0.0191*****	**2.7581**
Income gap if RD>0 (y-yrg>0)	γ_+	**0.0050**	**1.1447**	**-0.0006**	**-0.1102**
Squared income gap if RD>0 (y-yrg>0)	θ_+	**0.0000**	**-0.7719**	**0.0000**	**-0.5169**
Squared income gap if RD<0 (y-yrg<0)	θ_-	**0.0003*****	**2.8624**	**0.0003****	**2.5261**
Household income (log y)	β	**0.0128**	**0.3523**	**0.0341**	**0.7191**
Years of education		0.0237*	1.6679	0.0425*	1.8056
Unemployment		-0.2299*	-1.8770	-0.1008	-0.7064
log(Active household members)		0.0963	0.5041	-0.2632	-1.0285
log(Active household members)		0.0594	0.3429	0.1989	0.9834
Log (age)		-0.0011	-0.0059	-0.0996	-0.2385
Male		-0.2141*	-1.7219		
log (1+working hours)		-0.0599***	-2.7886	0.0155	0.5621
Marital status		-0.2793***	-3.4638	-0.3547***	-2.9411
Log (number of children)		-0.2156***	-2.8675	-0.1526	-1.5923
LOC$_{IP}$	λ_{IP}	0.3020***	6.1499	0.1370**	2.1957
"Fatalistic" (1 if LOC-C=1)	λ_F	0.2949*	5.1864	0.3317	5.1864
Interaction "Fatalistic" *income gap					
Income gap if RD<0 & Fatalistic	γ_{-F}	-0.0155*	-1.7381	-0.0056	-0.4622
Income gap if RD>0 & Fatalistic	γ_{+F}	0.0069	0.7489	0.0175	1.4557
Constant		2.3798***	2.9690	2.7466*	1.6954
Individual means (Mundlack)					
Mean (ln(Household income))		0.0288	0.6423		
Mean (ln(1+working hours))		0.1442	1.5732		
Mean (ln(1+Years of education)		0.0293	0.8801		
Mean (ln(number of children))		0.4959**	2.5226		
Mean (ln(household members))		-0.3672	-1.6227		
Mean (Unemployment)		-0.1971	-0.3013		
Observations		1,444		1,444	
Individuals		722		722	
R-squared		#¡REF!		0.0722	
Joint significance tests (†)		241.60		2.9840	
Hypotheses		**Relative concern test (Pvalue)**			
Test: γ+ = γ- =0		0.041		0.060	
Test: θ+ = θ-		0.001		0.007	
Test: γ+ = γ-= θ+ = θ- =0		0.000		0.043	
Test: γ+ = θ+ = 0		0.001		0.164	
Hypotheses		**LOC domains test (Pvalue)**			
Test λ$_{IP}$=λ$_F$=0		0.000		0.028	
Test λ$_F$=γ$_{+F}$ =γ$_{+F}$=0		0.000		0.002	

The reference income is defined as the average income of all individuals in the same reference group. The reference group is defined by education, age and sex.(†) T

*** p<0.01, ** p<0.05, * p<0.1

comparison on life satisfaction is mediated by individual personality characteristics.

The coefficient $\widehat{\gamma}_{F-}$ must be interpreted in conjunction with what arises from the relative deprivation term, $\widehat{\gamma}_{-}$. Results show that higher relative income with respect to the reference group leads to higher economic satisfaction, a relationship that is strongest among individuals who face relative deprivation. However, among fatalistic individuals, *ceteris paribus*, higher relative deprivation increases economic satisfaction. This would be consistent with a reduction in their aspirations due to the unfavorable situation of their reference group and fatalistic beliefs. When social environments are adverse in terms of opportunity and relative deprivation, individuals may be less likely to perceive a connection between their actions and their experienced outcomes and, as a result, reduce their aspirations in order to avoid frustration.

All these results hold when the median income of the reference group is used as a reference (see Table A.7 in the Annex).

Robustness

To address potential endogeneity problems of LOC variables, they are substituted by their lags. As this information is only available for two waves, we estimate an OLS model in cross section data. We use the same variable controls as the previous section, and we also consider a specification with Mundlak's controls.

Table A.8 in the Annex presents the OLS estimates, which provide comparable results with respect to the estimates presented in Tables 2 and 3. The signs of lagged LOC_{IP} and lagged LOC_{C} remain unchanged, although their magnitudes show a small decrease compared with

the current variables. The coefficient of lagged LOC_{IP} is significant and similar to the current LOC_{IP}, whereas the incidence of lagged LOC_C is not significant (Panel A). However, in all cases the joint tests carried out reject the hypothesis that both coefficients are zero (see the bottom of Table A.8). A second specification includes a lag of the indicator function, which identifies fatalistic individuals who were identified as fatalistic in the previous wave as "1" (Panel B). The results are consistent with the comments of the previous paragraph, although in this case the coefficient of the lag of the indicator function is not significant and its magnitude declines 70% with respect to the coefficient of the current indicator function. However, the joint test carried out rejects the hypothesis that the "fatalistic" indicator function and LOC_{IP} are zero (see the bottom of Table A.8).

Finally, following the previous section, we consider an interaction term between the lagged "fatalistic" indicator function and current income gap (Table A.8 in the Annex, Panel C). The coefficients of lagged LOC_{IP} and the "fatalistic" indicator function do not change. The results of the interaction term coefficient are consistent with previous results, $\hat{\gamma}_{F-}$ is significant and negative while the hypotesis $\hat{\gamma}_{F+} = 0$ is not rejected, which confirms the asymmetric incidence. Futhermore, the joint test provides evidence about the relevance of fatalistic beliefs and relative deprivation (see the bottom of Table A.8 in the Annex). It shows that for those fatalistic individuals, higher relative deprivation with respect to their reference group increases economic satisfaction. These results provide a test of robustness and show that under equal conditions fatalistic individuals with relative deprivation declare themselves to be more satisfied, which is consistent with a reduction of economic aspiration.

Robustness based on alternatives reference income

The potential heterogeneity of the reference points between individuals with similar observable characteristics may lead to biased estimates due to specification problems. To address this issue, we explore alternative ways of approximating the reference income. First, we consider the perception of individuals about their position in the income distribution to define the corrected reference income (Y^{RGcorr}). Second, we consider the level of income that each person identifies as the minimum necessary for a household not to fall into poverty (subjective poverty line) as a reference point (Stutzer, 2004). Both strategies introduce heterogeneity in the reference income set for each individual.

Estimates based on the corrected reference group income (Y^{RGcorr}) are presented in Table A.9 in the Annex. While Table A.10 in the Annex presents estimates in which minimum income aspiration (MIA) is used as a reference level.

All the results associated with the relative concern parameters are confirmed. In relation to LOC variables, the pattern mentioned in the previous section is repeated. Higher LOC_{IP} is associated with higher economic satisfaction ($\hat{\lambda}_{IP} > 0$), while LOC_C presents a negative relationship with economic satisfaction ($\hat{\lambda}_C > 0$). Finally, more fatalistic individuals, *ceteris paribus*, have lower economic aspiration. Furthermore, $\hat{\gamma}_{F-} < 0$ and $\hat{\gamma}_{F+} > 0$, but they are not significant. However, in all cases joint tests reject the hypotheses $\hat{\lambda}_{IP} = \hat{\lambda}_F = 0$ and $\hat{\lambda}_F = \hat{\gamma}_{F-} = \hat{\gamma}_{F+} = 0$, which provides favorable evidence about the incidence of fatalistic beliefs on relative concern.

Figure 2: Conditional mean function of MIA, by fatalistic and non fatalistic individuals

(a)

(b)
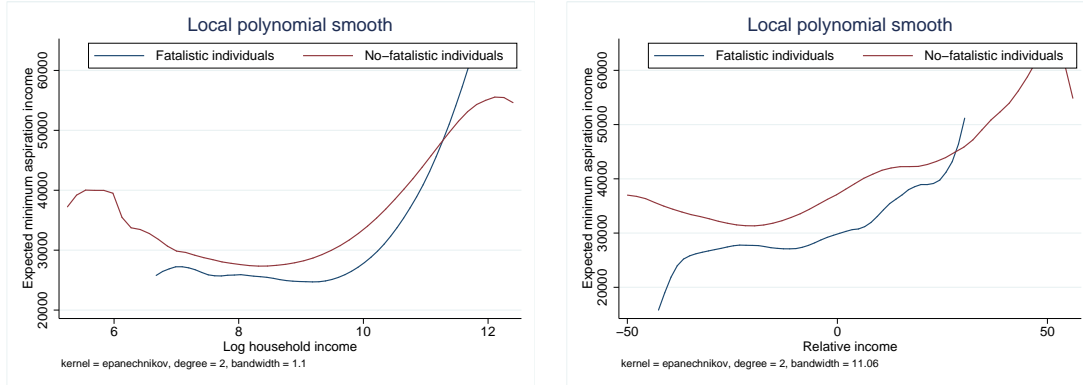
Note: 2011-2012 wave sample

4.2 Direct evidence on income aspiration

As complementary evidence on the role of internal and external constraints in explaining aspiration formation we use minimum income aspiration as a proxy of economic aspiration. Figure 1 presents the univariate kernel density estimation of MIA, by fatalistic and non-fatalistic individuals. We confirm that the former individuals are more concentrated on low income aspiration, compared with the latter.

Figure 1: Kernel density estimation of MIA, by fatalistic and non fatalistic individuals
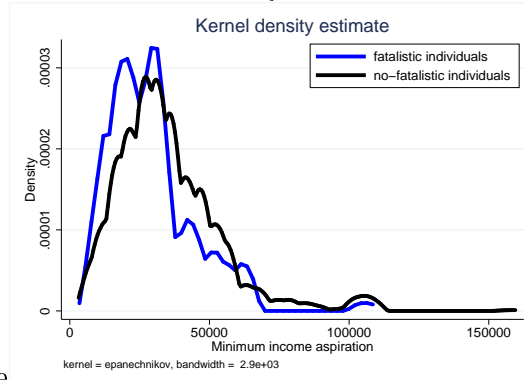
Note: 2011-2012 wave sample

Figures 2a and 2b present the expectation of income aspiration given household income and relative income gap respectively.[17] We estimate the conditional mean function of MIA for fatalistic and non fatalistic individuals. The results confirm that for each household income levels, fatalistic individuals present lower expected MIA than non-fatalistic individuals. Futhermore, given their relative income situation, fatalistic beliefs are associated with lower expected MIA.

In order to advance in this preliminary evidence, we estimate a model to explain the minimum income aspiration (MIA) as a dependent variable, which is a proxy of economic aspiration. Table 4 presents the OLS estimates based on the whole sample of 2011-2012, and we use a robust estimator of variance. In a first step, we incorporate household income, relative income and LOC variables as regressors (Panel A). We confirm the expected sign for these variables. Higher MIA is associated with higher household income, higher LOC_{IP} *(internality and powerful dimension)* and *LOC-Chance*. Furthermore, tbe "fatalistic" indicator function is associated negatively with MIA.

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[17]We estimate the conditional mean function of MIA given household income and relative income, using linear nonparametric regression. The weighted local polynomial estimate uses the kernel function, based on epanechikov function and the "rule of thumb" bandwidth estimator.

Table 4: Determinants of minimum income aspirations (MIA)

		OLS estimates based on Minimum Income Aspiration (2011-2012 entire sample)							
		Panel A				**Panel B**			
		Coeff.	**T-Ratio**	**Coeff.**	**T-Ratio**	**Coeff.**	**T-Ratio**	**Coeff.**	**T-Ratio**
Household income (log y)	β'	1,947.72***	3.46	1,925.20***	3.47	293.75	0.75	290.51	0.75
Income gap if RD>0 (y-yrg>0)	γ'	44.66	1.40	48.57	1.53	123.62***	3.45	125.25***	3.49
LOC$_C$	λ'_{IP}	**1,233.07****	**2.23**			**900.46***	**1.74**		
LOC-$_{IP}$	λ'_C	**2,252.13****	**2.28**	**2,124.16****	**2.13**	**-215.01**	**-0.23**	**-186.87**	**-0.20**
Fatalistic (1 if LOC-C- =1)	λ'_F			**-5,220.12****	**-3.22**			**-2315.14**	**-1.52**
Financial situation									
Amount of borrowed money (last year)						0.11***	3.44	0.11***	3.37
Amount of saved money (last year)						-0.02	-0.91	-0.02	-0.96
Missing borrowed money (61 obs)						-527.26	-0.20	-356.55	-0.14
Missing saved money (56 obs)						788.92	0.25	823.99	0.26
Socio-demographic characteristics									
No. of adults						-1,504.11***	-3.21	-1,498.50***	-3.20
No. of children						-1,336.41***	-2.71	-1,285.82***	-2.58
Divorced						-2045.99	-1.54	-2028.72	-1.53
Widow						-2250.45	-0.78	-2258.45	-0.78
Middle education (omitted Low education)						3,984.56***	2.72	4,029.70***	2.75
High education (omitted Low education)						14,390.67***	5.79	14,381.90***	5.77
Age						552.18	1.40	573.03	1.47
Age^2						-4.93	-1.18	-5.15	-1.24
Unemployment						-1610.95	-0.72	-1618.54	-0.72
Male						595.57	0.38	690.37	0.44
Constant		15,719.26***	2.72	16,714.02***	2.92	20,288.29***	2.11	20,055.85**	2.10
Observations		1,042		1,042		1,042		1,042	
Joint significance tests		10.28		12.72		11.72		11.69	
LOC domains test (Pvalue)									
Joint significance tests $\lambda'_i=0$ V i		0.026		0.001		0.082		0.130	

*** p<0.01, ** p<0.05, * p<0.1

Panel B in Table 4 presents the results for the extended equations. In this case, following Stutzer (2004) we incorporate, financial situation in the past variables and socio-demographic characteristics as control. Our results support the idea that social comparisons contribute to the formation of income aspirations. A \$ 1000 higher average relative income increases reported AIM by \$ 123.6 (the average AIM is \$34448). Results for Panel B show that a higher household income has no effect on the aspiration levels. However, education levels, which are a proxy for permanent income, have a significant and positive correlation. Finally, although the coefficients associated with LOC variables present the expected sign, only LOC_C

is significant and positive. The results are consistent with the previous section, and they indicate a positive relationship between *LOC-Chance* and minimum income aspiration.

Estimates presented in Table 5 open the possibility of an asymmetric effect of relative income on MIA. Results confirm the importance of relative income on MIA but the responses are asymmetric (Table 5 Panel A). The coefficients associated with the income gap among individuals with relative deprivation are not significantly different from zero, while the coefficients associated with the individuals with a positive income gap are significantly different from zero and positive. The asymmetric effect of relative income suggests that this channel is relevant only for individuals with positive relative income, but the incentive effect of reference group disappears when individuals face relative deprivation. This represent indirect evidence on the presence of aspiration failure type II.

Furthermore, results with respect to LOC variables are consistent with the conclusion of the previous paragraph and they confirm that only λ_C is significant and positive.

Finally, a potential endogeneity problem in people's reported economic aspiration equation may arise due to simultaneity problems or the presence of contemporary unobservable variables. This problem is addressed by exploiting the longitudinal nature of the information, including lagged LOC variables instead of contemporary variables. We use the two waves samples and we estimate an OLS model in cross section data.

First, the two waves sample estimates provide comparable results with respect to estimates based on the entire 2011-2012 sample (Panel A and Panel B of Table 5). Estimates presented in Panel C incorporate the lagged variables. There is evidence of an asymmetric effect of relative income, a positive income gap presents a significant and positive coefficient, while relative deprivation coefficients are not significantly different from zero. The lagged LOC_{IP} and the lagged "fatalistic" indicator function show a significant coefficient ($\hat{\lambda}_C^{lag}$ and $\hat{\lambda}_F^{lag}$) in all

estimates, which is consistent with a reduction in income aspirations due to fatalistic beliefs and the perception of a low chance of economic improvement.

In sum, we confirm that that LOC variables are relevant to explain differences on economic aspiration. The sign and significance of the correlation between economic aspiration and LOC domains depend on which of them we are considering. Our results show that fatalistic individuals reduce their aspirations, which represent complementary evidence about aspiration failures. Furthermore, we confirm the asymmetric effect of relative income with respect to reference groups on people's aspirations.

5   Conclusions

This paper contributes new evidence to the economic literature on the role of relative deprivation and Rotter's LOC in aspiration formation, exploring the validity of the assumptions used by Genicot and Ray (2014) to model aspiration and empirically evaluating the presence of aspiration failures in a developing country .

Firstly, we use economic satisfaction as a dependent variable, which provides indirect information about economic aspiration formation. Our findings confirm the "reference dependence" of economic aspiration, a greater sensitivity to relative deprivation and the convexity of relative concern between people facing relative deprivation. The latter result was identified as a key factor to explain aspiration failure in Leites and Ramos' (2015) model. In order to advance on this issue we consider LOC domains, which allow us to explore how an individual's expectation about the connection between his personal characteristics and experienced

Table 5: Determinants of minimum income aspirations (MIA)

These results are robust to alternative estimation procedures, control variables as well as to alternative definitions of the reference group.

OLS estimates based on Minimum Income Aspiration

Columns: Panel A and Panel B belong to the *Entire 2011-12 sample*; Panel C belongs to the *Two waves sample*. Each panel has two model columns, each reporting Coeff. and T-Ratio.

Variable	Sym.	A — Coeff.	A — T	A — Coeff.	A — T	B — Coeff.	B — T	B — Coeff.	B — T	C — Coeff.	C — T	C — Coeff.	C — T
Income gap if RD<0 (y-yrg<0)	γ'_-	94.54	1.56	96.30	1.59	78.14	0.99	80.96	1.02	85.95	1.10	89.66	1.15
Income gap if RD>0 (y-yrg>0)	γ'_+	160.59***	3.10	162.18***	3.11	209.11***	2.90	213.74***	2.96	195.22***	2.69	202.43***	2.77
Household income (log y)	β'	409.98	0.94	406.49	0.94	580.45	1.07	546.34	1.00	538.15	1.01	466.03	0.86
LOC$_C$	λ'_C	918.57*	1.78			1,116.18*	1.67						
LOC$_{TP}$	λ'_{IP}	-230.78	-0.24	-203.01	-0.21	276.29	0.22	364.64	0.22		0.29	364.64	0.09
Fatalistic (1 if LOC-C =1)	λ'_F			-2383.29	-1.56			-2683.71			-1.30		
Lagged LOC$_C$	λ^{lag}_C									1,095.50*	1.73		
Lagged LOC$_{TP}$	λ^{lag}_{IP}									1472.21	1.17	1409.20	1.13
Lagged "Fatalistic" (1 if LOC-C =1)	λ^{lag}_F											-4,492.98**	-2.73
Financial situation													
Amount of borrowed money (last year)		0.11***	3.44	0.11***	3.37	0.11***	2.72	0.11***	2.62	0.11***	2.68	0.11***	2.64
Amount of saved money (last year)		-0.03	-1.12	-0.03	-1.17	0.00	0.01	0.00	0.01	0.00	-0.05	0.00	-0.19
Missing borrowed money (61 obs)		-500.73	-0.19	-328.26	-0.12	66.33	0.02	402.26	0.02	-63.43	-0.02	131.26	0.04
Missing saved money (56 obs)		783.45	0.25	821.24	0.26	377.18	0.09	366.85	0.09	-4.11	0.00	-30.85	-0.01
Socio-demographic characteristics													
No. of adults		-1,466.42***	-3.08	-1,460.66***	-3.07	-1,300.30**	-2.36	-1,293.40**	-2.35	-1,281.58**	-2.33	-1,294.17**	-2.37
No. of children		-1,350.33***	-2.71	-1,298.40***	-2.58	-1,366.52**	-1.97	-1,316.42*	-1.94	-1,352.62*	-1.89	-1,295.24*	-1.85
Divorced		-2086.30	-1.57	-2068.23	-1.56	-1436.39	-0.88	-1400.32	-0.86	-1570.93	-0.97	-1542.04	-0.96
Widow		-2281.52	-0.79	-2288.58	-0.79	-1753.15	-0.45	-1506.20	-0.49	-1943.94	-0.38	-2125.85	-0.53
Middle education (omitted Low edu.)		3,892.68***	2.62	3,937.18***	2.65	4,002.39***	2.09	4,076.88**	2.11	3,679.93*	1.94	3,620.00*	1.85
High education (omitted Low educ.)		13,960.21***	5.11	13,949.25***	5.09	13,415.50*	3.81	13,519.86**	3.81	12,847.02*	3.81	12,923.10*	3.80
Age		502.96	1.26	524.39	1.33	495.93	0.97	510.90		515.69	1.01	529.09	1.05
Age^2		-4.48	-1.06	-4.70	-1.13	-4.58	-0.84	-4.73	-0.88	-4.88	-0.93	-4.98	-0.93
Unemployment		-1659.20	-0.74	-1667.75	-0.74	-3380.69	-1.32	-3273.19	-1.20	-3136.16	-1.27	-3263.72	-1.26
Male		583.02	0.37	678.89	0.43	1303.52	0.35	1394.06	0.38	705.33	0.19	829.01	0.22
Mean (Unemployment)		0.34				276.29		364.64				0.00	
Observations		1042		1042		707		707		707		707	
R-squared		0.17		0.17		0.18		0.18		0.18		0.18	
Joint significance tests (†††)		11.42		11.38		8.89		8.84		8.83		9.22	
Hypotheses													
Relative concern test													
Test: $\gamma'_+ = \gamma'_-$		0.46		0.46		0.00		0.00		0.00		0.00	
Test: $\gamma'_+ = \gamma'_- =0$		0.00		0.00		0.00		0.00		0.00		0.00	
Hypotheses													
LOC domains test (Pvalue)													
Joint significance tests $\lambda'_i=0\,\forall i$		0.08		0.12		0.22		0.37		0.10		0.01	

*** p<0.01, ** p<0.05, * p<0.1

outcomes affects economic satisfaction. Our estimates present evidence that LOC domains are relevant to explain differences in economic satisfaction and economic aspiration. An increase in *the internality* and *powerful others* dimensions leads to higher economic satisfaction, which is consistent with an increase of income aspirations and the previous findings. However, higher LOC-Chance has a negative incidence on economic satisfaction. When individuals believe that their outcome is not contingent upon the effort made, they adapt and reduce their economic aspirations. Finally, we confirm the relevance of fatalistic beliefs on relative concern. Our results show that among fatalistic individuals, *ceteris paribus*, higher relative deprivation increases economic satisfaction. This would be consistent with a reduction in their aspirations due to the unfavorable situation in their reference group and the perception of a low chance of economic improvement. This interpretation is consistent with the convexity of relative concern between people facing relative deprivation

These results are robust to alternative estimation procedures, control variables and alternative definitions of the reference group.

Furthermore, we explore the aspiration failure hypothesis using a direct measure of income aspiration. We confirm that fatalistic individuals reduce their aspirations. Relative concern is relevant to explain economic aspiration only for individuals with positive relative income, but not when they face relative deprivation. The asymmetric effect of relative income suggests that higher reference group income only leads to higher aspiration for individuals with positive relative income, but this incentive disappears when they face relative deprivation. This represents indirect evidence for the presence of aspiration failure type II.

These results represent preliminary evidence about the aspiration failures predicted in the model of Ray (2006), Dalton et al. (2015) and Ray and Genicot (2014). There are several arguments that support the relevance of these results. Firstly, our findings validate

the assumptions used in Ray and Genicot (2014)' aspiration model. The functional form of the relative concern is robust when a proxy of the aspirations is considered as a threshold, and contributes to a better understanding of the aspirations formation process, so its link with mobility is immediate. Secondly, they confirm the role of relative income in the levels of economic satisfaction and economic aspiration, but the responses could be asymmetric. Inequality within reference groups (and between reference groups) could determine situations where the relative concern could generate incentives to achieve economic success or, conversely, discourage certain behavior in order to avoid frustration. This has important consequences in the decisions of individuals and levels of social well-being and income inequality.

Third, aspirations are relevant in explaining income distribution and social mobility but, in turn, the distribution of income and wealth and the income mobility possibilities are relevant in shaping them. Genicot and Ray (2014) argue that aspiration and income (and its distribution) evolve jointly, and sometimes in a self-reinforcing pattern. Findings from psychological studies allow us to better understand the nature of this problem, and show that the causes and consequences of poverty and inequality are mediated by behavioral patterns, which could lead to poor individuals choosing lower-return options among the alternatives available. Haushofer and Fehr (2014) and Congdon et al. (2011) suggest that extreme poverty may have psychological consequences, which affect economic behavior and could lead to discourage people from making better mobility-enhancing investments, contributing to poverty persistence. Our preliminary evidence about the role of relative deprivation and fatalistic beliefs on aspiration failures furhter contributes to understand this issue. A first implication is that if this behavioral dimension reinforces poverty persistence, programs aiming to reduce the poverty and to promote income mobility should go beyond reducing material deprivation

(Mullainathan and Shafir, 2009, 2008; Congdon et al, 2011, Dalton et al., 2015).

Furthermore, if reference groups and social interactions are primary determinants of individual aspirations, it may be necessary to understand how redistributive policies can affect group membership. For example, conditional cash transfer programs aiming to reduce poverty, which are an expanding intervention in the context of developing countries, could affect the composition of the reference group and the reference income level, which in turn could affect effort decisions and long term income mobility. The cash transfer could increase the reference point (and aspirations), because families gain access to an expanded basket of goods or gain access to new social interactions. However, there may be effects in the opposite direction if the program reduces the amplitude of the composition of the reference group of the beneficiaries. For example, negative or discriminatory attitudes towards beneficiaries could emerge among individuals who do not participate in the transfer program. This might increase the social distance (or social polarization), reduce the social rewards and negatively affect the composition of the reference group.

Finally, further research is required in order to better understand the aspiration failure hypothesis. Our empirical research is based on a short panel survey for a developing country. New strategies could contribute to address potential endogeneity problems. Furthermore, new waves of the survey used in this study could be useful to better address these issues.

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Annex

Table A.1: **Definitions of the variables**

Variable	Variable definitions	Source/years
Dependent variable		
ES- Economic Satisfaction	1 very dissatisfied, 5 very satisfied	MWTC. 06/11 **(2 waves)**
MIA-Minimum income aspiration	We use the information from responses to the following question: A family composed of a husband, wife and two children: Aproximately how much do you think this family needs to earn per month in order to not be consdered poor? The responses are expressed in real terms at July 2012 prices.	MWTC 11 (1 waves)
Control variable		
Household income	Log (1+real household income); July 2012 prices	MWTC. 04/06/11 (3 waves)
Age	Age of the respondent in year	
Male	(1) Male; (0) Female.	
Unemployment	Identify unemployed individuals at the moment of the survey	
Household members	log(number of members in the household)	
Active household members	log(Number of labor active members in the household)	
Marital status	Dichotomous variable. Identifies seperated and divorced individuals	
Working hours	log (1+respondent's working hours)	
Log (number of children)	log(1+number of children in the household). Children <14 year old	
Education	Years of education of the respondent	
Middle education household	(1) if the average years of education of household members (between 20 and 64 years old) is higher than 6 and lower than 12	
High education household	(1) if the average years of education of household members (between 20 and 64 years old) is higher than 11	
Amount of borrowed money	Amount of borrowed money in the last 12 months; July 2012 prices	
Amount of saved money	Amount of saved money in the last 12 months; July 2012 prices	
No. of adults	Number of household members over 18 years old.	
No. of children	Number of household members who are 18 years old or less	
Divorced	(1) Divorced; (0) else.	
Widow	(1) Widow; (0) else.	

Table A.2: **Descriptive statistics of variables used in analysis and test for the difference between sample means (MWTC - metropolitan area)**

Variables		Year 2006				Years 2011-2012			
		Media	D. S.	Int. Inf.	Int. Sup	Media	D. S.	Int. Inf.	Int. Sup
	*	2.762	0.043	2.678	2.846	3.032	0.067	2.901	3.162
Economic satisfaction	**	2.889	0.040	2.811	2.966	2.957	0.043	2.872	3.041
	Total	2.831	0.029	2.774	2.889	2.977	0.036	2.906	3.048
	*	9.808	0.046	9.717	9.898	9.771	0.077	9.620	9.922
log(1+household income)	**	9.832	0.039	9.755	9.909	9.848	0.049	9.751	9.945
	Total	9.818	0.030	9.760	9.877	9.822	0.042	9.740	9.904
	*	8.804	0.158	8.494	9.114	8.894	0.201	8.500	9.288
Years of education	**	9.290	0.145	9.006	9.574	9.497	0.134	9.235	9.759
	Total	9.081	0.107	8.871	9.291	9.312	0.112	9.093	9.531
	*	0.110	0.013	0.084	0.136	0.077	0.014	0.049	0.105
Unemployment	**	0.103	0.011	0.081	0.125	0.070	0.009	0.052	0.089
	Total	0.107	0.009	0.090	0.124	0.073	0.008	0.057	0.088
	*	0.967	0.008	0.952	0.982	0.954	0.011	0.932	0.976
log(Active household members)	**	0.967	0.007	0.955	0.980	0.978	0.005	0.968	0.989
	Total	0.967	0.005	0.957	0.977	0.970	0.005	0.960	0.981
	*	1.542	0.015	1.513	1.572	1.506	0.022	1.463	1.550
log(Household members)	**	1.532	0.013	1.508	1.557	1.509	0.013	1.483	1.535
	Total	1.536	0.010	1.517	1.555	1.507	0.011	1.485	1.530
	*	3.579	0.010	3.560	3.598	3.736	0.012	3.712	3.759
log(age)	**	3.582	0.008	3.567	3.597	3.708	0.007	3.695	3.721
	Total	3.584	0.006	3.572	3.595	3.720	0.006	3.709	3.731
	*	0.211	0.017	0.176	0.245	0.246	0.023	0.201	0.292
Male	**	0.056	0.008	0.039	0.072	0.045	0.008	0.030	0.060
	Total	0.121	0.009	0.103	0.139	0.108	0.009	0.089	0.126
	*	2.410	0.075	2.263	2.558	2.676	0.091	2.497	2.855
log (1+working hours)	**	2.074	0.065	1.946	2.203	2.640	0.059	2.524	2.757
	Total	2.211	0.050	2.114	2.309	2.656	0.050	2.558	2.753
	*	0.141	0.015	0.112	0.170	0.175	0.020	0.135	0.215
Marital status	**	0.152	0.013	0.126	0.178	0.188	0.014	0.160	0.217
	Total	0.148	0.010	0.129	0.168	0.185	0.012	0.162	0.209
	*	1.091	0.015	1.062	1.120	0.495	0.029	0.438	0.552
Log (number of children)	**	1.082	0.012	1.058	1.107	0.488	0.019	0.452	0.525
	Total	1.086	0.010	1.067	1.104	0.489	0.016	0.458	0.520
	*	543				346			
Number of observations	**	738				738			
	Total	1281				1084			

(*): Individual outside the Panel in each year; (**) Individuals in both panel waves;

Source: MWTC 06/11

Table A.3: Definitions of the Reference levels

Variable	Variables definitions	Source/years
Y^{RG}-Reference group income level $(Y_i^{rg-observed})$	Mean reference group income. Groups are defined considering 4 range ages (20 to 34 years old; 35 to 44 years old; 46 to 65 years old; over 65) , 6 educational levels (i without formal education, ii primary, iii secondary, iv technical, police or military; v high school teaching; vi tertiary education and university) and sex.	CHS 04/06/11
Y_{median}^{RG}-Reference group median income level	Median reference group income. Groups are defined identical to Y^{RG}.	CHS 04/06/11
Y^{RGcorr}-Corrected reference group income	It is defined as $Y_i^{rgcorr} = \frac{Y_i^{rg}}{1+e_i^p)}$	CHS/MWTC 04/06/11
e_i^p - bias in individuals' evaluations of their own relative position	The bias is constructed as the perceived own income decile minus the objective income decile. Objective income decile is constructed using CHS data.	CHS/MWTC 11 (1waves)
MIA-Minimum income aspiration	It is defined in Tab le $A.1$	MWTC 11 (1 waves)

Table A.4: **Definition of LOC variables (MWTC, two waves 06/11)**

Label	Variable definitions
LOC_{IPC}	Is the individual average between LOC_I, LOC_P and LOC_C. A high score represents high internal Locus.
LOC - Internality (LOC_I)	Is the individual average between LOC_{Ia} and LOC_{Ib}. A high score represents high internality.
LOC_{Ia} (Sub-component of internality)	We use three questions: (a) Do you feel that your views are considered in your work?. (b) Do you feel that your views are considered in your family, neighborhood or group of friends? (c) Recently do you feel that you play an important role in some family or community events?. The answers provide 3 dichotomous variables, identified by "1" yes and "0" no. We aggregate these responses, where 3 represents high internality, then we use a standardized index.
LOC_{Ib} (Sub-component of internality)	We use the question: "who will contribute more to a change in your life". Respondents have 8 categories. We define a categorical variable, which identifies "3" when "they are responsible for their changes"; and "2" when their family is responsible for their changes, and 1 otherwise (the State, God, local government, other groups of people or another person). Note that 3 represents high internality, then we use a standardized index.
LOC - Powerful LOC_P	We use the question: Please imagine a ladder with nine levels. In the first level are those with high power, and in the highest level (the ninth), are those with low power. Which level are you?. This categorical variables have 9 values, where 9 is greater power. Then we use a standardized index.
LOC_{IP}	Is the individual average between LOC_I and LOC_P.
LOC Chance LOC_C	The survey includes a categorical variable with a scale of 5 categories, where 1 is "We make our own destiny " and 5 "everything is determined by destiny or external forces". Then we use a standardized index.
Fatalistic	Dichotomous variable, where it is 1 when $LOC_C = 1$.

Table A.5: Correlation matrix between satisfaction domains, Minimum income aspirations and LOC domains, (MWTC - metropolitan area).

	Economic Satisfaction	Life Satisfaction	Consumption satisfaction	Minimum income aspirations	LOC-Ia	LOC-Ib	LOC-I	LOC-P	LOC-IP	LOC-C	Aggregated variables (LOC-IPC)
Economic Satisfaction	1										
(P-value)											
Life Satisfaction	0.481	1									
(P-value)	0.000										
Consumption satisfaction	0.504	0.428	1								
(P-value)	0.000	0.000									
Minimum income aspirations	-0.047	0.024	-0.065	1							
(P-value)	0.127	0.427	0.035								
LOC-Ia	0.130	0.107	0.118	0.124	1						
(P-value)	0.000	0.000	0.000	0.000							
LOC-Ib	0.062	0.024	0.050	0.012	0.071	1					
(P-value)	0.003	0.248	0.099	0.704	0.001						
LOC-I	0.131	0.092	0.113	0.090	0.743	0.732	1				
(P-value)	0.000	0.000	0.000	0.003	0.000	0.000					
LOC-P	0.204	0.190	0.247	0.048	0.044	0.000	0.029	1			
(P-value)	0.000	0.000	0.000	0.122	0.032	0.988	0.159				
LOC -IP	0.219	0.179	0.223	0.101	0.624	0.600	0.826	0.590	1		
(P-value)	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000			
LOC- C	-0.039	0.003	0.023	0.076	0.111	0.097	0.138	-0.042	0.092	1	
(P-value)	0.054	0.884	0.451	0.013	0.000	0.000	0.000	0.043	0.000		
Aggregated variables (LOC-IPC)	0.129	0.139	0.195	0.092	0.138	0.521	0.423	0.534	0.647	0.537	1
(P-value)	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	

Source: MWTC 06/11

Table A.6: Summary statistics of LOC domains variables, MWTC panel survey

	LOC-I		LOC-P		LOC-IP		LOC-C		Aggregated variables (LOC-IPC)	
	2006	2011	2006	2011	2006	2011	2006	2011	2006	2011
Mean	-0.06	0.08	0.09	0.02	-0.01	0.02	-0.13	0.14	0.00	0.00
Std. Dev.	0.73	0.73	0.99	0.61	0.59	0.61	1.00	0.96	0.55	0.54
Percentiles										
1%	-1.80	-1.80	-1.71	-1.71	-1.46	-1.46	-2.00	-2.00	-1.28	-1.41
5%	-1.33	-1.33	-1.71	-1.71	-1.05	-1.15	-2.00	-2.00	-0.97	-0.95
10%	-0.99	-0.87	-1.71	-1.71	-0.77	-0.84	-2.00	-2.00	-0.72	-0.67
25%	-0.72	-0.40	-0.38	-0.82	-0.46	-0.35	-0.48	-0.48	-0.34	-0.34
50%	-0.11	0.21	0.07	0.07	-0.03	0.07	-0.48	0.27	0.04	0.02
75%	0.82	0.82	0.51	0.51	0.54	0.57	1.03	1.03	0.35	0.40
90%	0.82	0.82	1.40	1.40	0.72	0.72	1.03	1.03	0.65	0.65
95%	0.82	0.82	1.85	1.85	0.86	0.86	1.03	1.03	0.85	0.85
99%	0.87	0.82	1.85	1.85	1.16	1.16	1.03	1.03	1.24	1.10

Source: MWTC 06/11

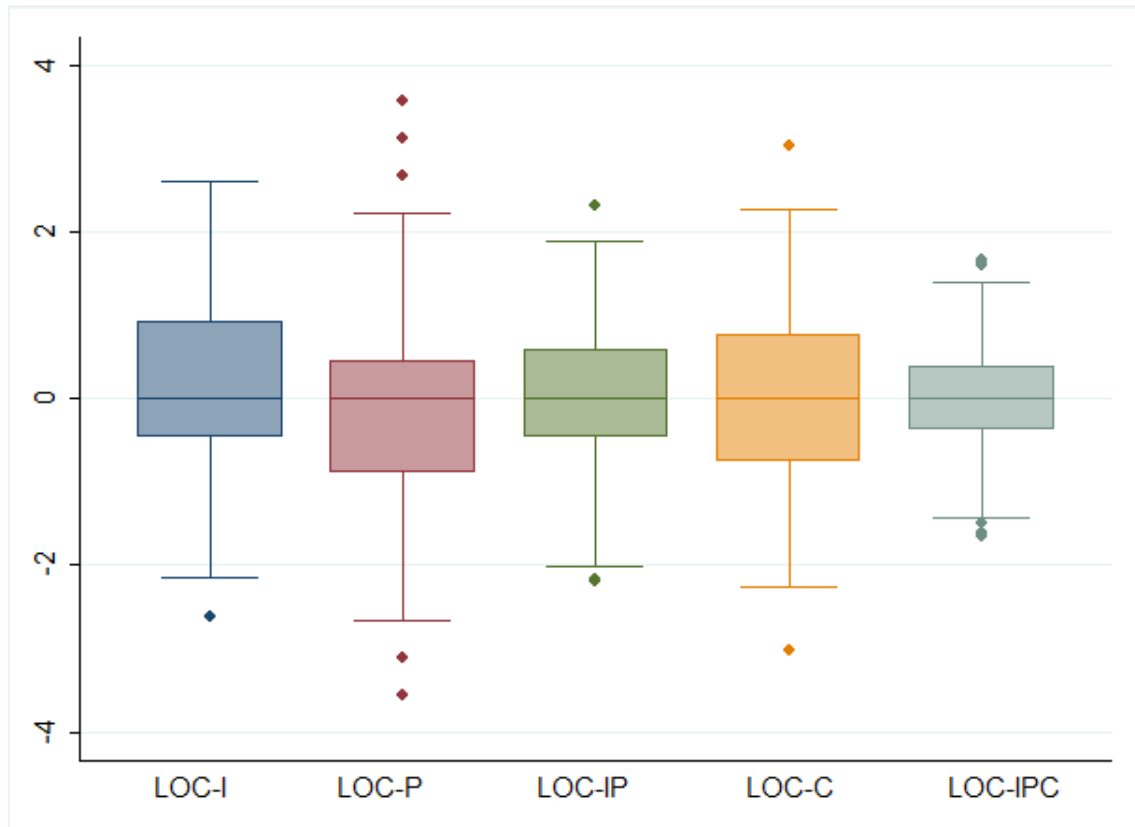Figure A.1: **Individuals temporal variation in the LOC** ($\Delta LOC = LOC_t - LOC_{t-1}$)

Table A.7: **Economic satisfaction, specification based on equation 3 and median reference group income**

		Cardinal approach (two waves sample)							
Estimation procedure		Mu		FE		Mu		FE	
Variables		Coefficient	T-Ratio	Coefficient	T-Ratio	Coefficient	T-Ratio	Coefficient	T-Ratio
Income gap if RD<0 (y-yrg^{Median}<0)	γ_-	**0.01822*** **	**3.3102**	**0.01679** **	**2.4055**	**0.0213*** **	**3.7988**	**0.0184** **	**2.5826**
Income gap if RD>0 (y-yrg^{Median}>0)	γ_+	**0.0062**	**1.4760**	**0.0010**	**0.1794**	**0.0064**	**1.5369**	**0.0014**	**0.2431**
Squared income gap if RD<0 (y-yrg^{Median}<0)	θ_+	**0.0000**	**-0.8276**	**0.0000**	**-0.5912**	**0.0000**	**-1.0185**	**0.0000**	**-0.8215**
Squared income gap if RD>0 (y-yrg^{Median}>0)	θ_-	**0.00024** **	**2.5687**	**0.00034** **	**2.3880**	**0.0003*** **	**3.0201**	**0.0004** **	**2.5279**
Household income (log y)	β	**0.0177**	**0.4897**	**0.0419**	**0.8706**	**0.0162**	**0.4508**	**0.0361**	**0.7738**
Years of education		0.0225	1.5839	0.04315*	1.8413	0.0226	1.5984	0.0415*	1.7676
Unemployment		-0.22699*	-1.8483	-0.0895	-0.6277	-0.2253*	-1.8371	-0.0976	-0.6834
log(Active household members)		0.0788	0.4104	-0.2589	-1.0155	0.0891	0.4662	-0.2698	-1.0569
log(Active household members)		0.0744	0.4273	0.2030	0.9948	0.0624	0.3603	0.1983	0.9790
Log (age)		0.0262	0.1382	-0.0625	-0.1504	-0.0056	-0.0299	-0.0982	-0.2363
Male		-0.21112*	-1.6977			-0.2135*	-1.7112		
log (1+working hours)		-0.05913***	-2.7456	0.0130	0.4691	-0.0593***	-2.7676	0.0159	0.5761
Marital status		-0.28605***	-3.5727	-0.36412***	-3.0581	-0.2813***	-3.4879	-0.3576***	-2.9732
Log (number of children)		-0.23605***	-3.1533	-0.17626*	-1.8455	-0.2152***	-2.8713	-0.1522	-1.5955
LOC$_{IP}$	λ_{IP}	0.30210***	6.0758	0.13946**	2.1979	0.3020***	6.1485	0.1377**	2.2073
LOC $_C$	λ_C	-0.12240***	-3.9758	-0.10589***	-2.6469				
"Fatalistic" (1 if LOC-C=1)	λ_F					0.3201**	1.9713	0.3170	1.5036
Interaction "Fatalistic" *income gap									
Income gap if RD<0 & Fatalistic	γ_{-F}					-0.0166*	-1.6962	-0.0072	-0.0072
Income gap if RD>0 & Fatalistic	γ_{+F}					0.0060	0.7114	0.0170	1.5076
Constant		2.23042***	2.7655	2.5421	1.5694	2.3098***	2.8837	2.6981*	1.6716
Individual means (Mundlack term)		YES		NO		YES		NO	
Individual fixed effect		NO		YES		NO		YES	
Observations		1,444		1,444		1,444		1,444	
Individuals		722		722		722		722	
Joint significance tests (†)		208.80		2.77		241.3000		2.9890	
Hypotheses		Relative concern test (Pvalue)							
Test: $\gamma+ = \gamma- =0$		0.131		0.127		0.063		0.101	
Test: $\theta+ = \theta-$		0.004		0.009		0.001		0.005	
Test: $\gamma+ = \gamma-= \theta+ = \theta- =0$		0.000		0.079		0.000		0.044	
Test: $\gamma+ = \theta+ = 0$		3.889		0.317		0.001		0.215	
Hypotheses		LOC domains test (Pvalue)							
Test $\lambda_{IP}=\lambda_F=0$		0.000		0.000		0.000		0.027	
Test $\lambda_F=\gamma_{+F} =\gamma_{+F}=0$		0.000		0.000		0.000		0.002	

The reference income is defined as the median income of all individuals in the same reference group. The reference group is defined by education, age and sex.(†) The Joint sginificance test is a Chisquared test and F -test, in the MU estimates and FE estimates respectively.

*** p<0.01, ** p<0.05, * p<0.1

Table A.8: Economic satisfaction, specification based on equations 4 and 5, including lagged LOC variables

Cardinal approach-OLS estimates based on Economic satisfaction reported in 2011-12 wave (Two waves subsample)

	Panel A				Panel B				Panel C			
	Coeff.	T-Ratio	Coeff.	T-Ratio	Coeff.	T-Ratio	Coeff.	T-Ratio	Coeff.	T-Ratio	Coeff.	T-Ratio
Income gap if RD<0 (y-yrg<0) γ_-	0.02260***	2.97	0.02295***	2.87	0.02269***	2.98	0.02284***	2.85	0.02697***	3.47	0.02727***	3.32
Income gap if RD>0 (y-yrg>0) γ_+	0.01954**	2.06	0.01936**	2.02	0.01923**	2.02	0.01885*	1.96	0.02235**	2.10	0.02226**	2.08
Squared income gap if RD>0 (y-yrg>0) θ_+	-0.00031**	-2.41	-0.00031*	-2.33	-0.00031**	-2.37	-0.00030**	-2.26	-0.00042**	-2.33	-0.00043**	-2.33
Squared income gap if RD<0 (y-yrg<0) θ_-	0.00023**	2.06	0.00023**	2.02	0.00022**	2.02	0.00022**	1.98	0.00027**	2.39	0.00026**	2.31
Household income (log y) β	0.07042	1.12	0.07197	0.96	0.06969	1.08	0.06816	0.90	0.06032	0.96	0.06573	0.88
Years of education	0.04627***	3.17	0.04844**	2.14	0.04422***	3.03	0.04540**	2.01	0.05308***	3.60	0.05235**	2.29
Unemployment	-0.20835	-1.07	-0.24221	-1.12	-0.21032	-1.08	-0.24813	-1.15	-0.19133	-1.00	-0.21915	-1.04
log(Active household members)	0.61092**	2.07	0.62422**	2.01	0.59033**	1.99	0.59876*	1.92	0.57095*	1.96	0.57449*	1.86
log(household members)	-0.34606**	-2.10	-0.45153	-1.61	-0.35037***	-2.13	-0.45356	-1.61	-0.31265*	-1.92	-0.39340	-1.43
Log (age)	0.29175	1.17	0.25948	1.01	0.28992	1.16	0.25525	0.99	0.20822	0.84	0.17443	0.69
Male	-0.17541	-1.03	-0.16674	-0.96	-0.19061	-1.11	-0.18237	-1.04	-0.19736	-1.15	-0.19413	-1.11
log (1+working hours)	-0.04841	-1.46	-0.04996	-1.39	-0.04760	-1.43	-0.05001	-1.38	-0.04994	-1.53	-0.05163	-1.46
Marital status	-0.48909***	-4.43	-0.49073***	-4.33	-0.48795***	-4.42	-0.48794***	-4.32	-0.46579***	-4.24	-0.46660***	-4.14
Log (number of children)	0.15681	1.25	0.22550	1.09	0.15862	1.26	0.22553	1.09	0.11376	0.91	0.16121	0.78
Lagged LOC$_C$ λ^{lag}_C	0.06459	1.46	0.06404	1.44								
Lagged LOC$_{IP}$ λ^{lag}_{IP}	-0.31859***	-3.88	-0.31994***	-3.85	-0.31609***	-3.85	-0.31714***	-3.83	-0.33192***	-4.07	-0.33257***	-4.04
Lagged "Fatalistic" (1 if LOC-C =1) λ^{lag}_C					0.09151	0.66	0.08949	0.64	0.06909	0.51	0.06882	0.51
Interaction "Fatalistic"*income gap (*)												
Income gap if RD<0 & Lagged Fatalistic $\gamma^{lag}_{-,F}$							-0.02741***	-4.18			-0.02724***	-4.16
Income gap if RD>0 & Lagged Fatalistic $\gamma^{lag}_{+,F}$							0.01753	1.58			0.01880*	1.66
Constant	1.04	0.98	1.16	1.02	1.09	1.03	1.19	1.04	1.39	1.32	1.55	1.38
Individual means (Mundlack term)	No		Yes		No		Yes		No		Yes	
Observations	722		722		722		722		722		722	
R-squared	0.1369		0.1376		0.1347		0.1354		0.1552		0.1559	
Joint significance tests (†††)	8.5020		6.2940		8.4610		6.2890		8.5400		6.5610	
Hypotheses												
Relative concern test												
Test: $\gamma_+=\gamma_-=0$	0.832		0.805		0.811		0.786		0.768		0.751	
Test: $\theta_+=\theta_-$	0.000		0.001		0.000		0.001		0.000		0.000	
Test: $\gamma_+=\gamma_-=\theta_+=\theta_-=0$	0.000		0.000		0.000		0.000		0.000		0.000	
Test: $\gamma_+=\theta_+=0$	0.055		0.068		0.061		0.078		0.066		0.066	
Hypotheses												
LOC domains test (Pvalue)												
Joint significance tests $\lambda^{lag}_C=\lambda^{lag}_{IP}=0$	0.000		0.000		0.001		0.001		0.000		0.000	
Joint significance tests $\lambda^{lag}_C=\lambda^{lag}_{IP}=\gamma^{lag}_{-,F}=\gamma^{lag}_{+,F}=0$							0.000				0.000	

Table A.9: **Economic satisfaction, specification based on equation 3 and corrected reference group income** (Y^{RGcorr})

		Cardinal approach (two waves sample)							
Estimation procedure		**Mu**		**FE**		**Mu**		**FE**	
Variables		**Coefficient**	**T-Ratio**	**Coefficient**	**T-Ratio**	**Coefficient**	**T-Ratio**	**Coefficient**	**T-Ratio**
Income gap if RD<0 (y-yrg^{Corr}<0)	γ_-	**0.01946*****	**5.3120**	**0.01017****	**2.1265**	**0.0203*****	**5.3905**	**0.0101****	**2.1137**
Income gap if RD>0 (y-yrg^{Corr}>0)	γ_+	**0.0050**	**1.2545**	**0.0011**	**0.2124**	**0.0056**	**1.3645**	**0.0009**	**0.1711**
Squared income gap if RD<0 (y-yrg^{Corr}<0)	θ_+	**0.0000**	**-0.7944**	**0.0000**	**-0.8556**	**0.0000**	**-0.9571**	**0.0000**	**-0.7915**
Squared income gap if RD>0 (y-yrg^{Corr}>0)	θ_-	**0.00015*****	**5.4970**	**0.00011*****	**2.7044**	**0.0002*****	**5.4209**	**0.0001*****	**2.6762**
Household income (log y)	β	**0.0484**	**1.4592**	**0.08056***	**1.9167**	**0.0469**	**1.3569**	**0.0812***	**1.9342**
Years of education		0.02653*	1.9169	0.04431*	1.9311	0.0260*	1.8879	0.0409*	1.7801
Unemployment		-0.23847*	-1.9595	-0.1232	-0.8741	-0.2401**	-1.9731	-0.1321	-0.9351
log(Active household members)		0.0572	0.2995	-0.2793	-1.0970	0.0671	0.3528	-0.2895	-1.1364
log(Active household members)		0.0625	0.3601	0.2287	1.1264	0.0502	0.2917	0.2261	1.1195
Log (age)		0.0963	0.5052	-0.0722	-0.1743	0.0666	0.3505	-0.1272	-0.3071
Male		-0.1828	-1.4371			-0.1841	-1.4385		
log (1+working hours)		-0.05728***	-2.6856	0.0130	0.4693	-0.0576***	-2.7072	0.0152	0.5505
Marital status		-0.28089***	-3.5416	-0.36319***	-3.0887	-0.2790***	-3.4970	-0.3579***	-3.0114
Log (number of children)		-0.21914***	-2.9524	-0.16154*	-1.7062	-0.2006***	-2.6832	-0.1397	-1.4684
LOC$_{\neg IP}$	λ_{IP}	0.28223***	5.6540	0.13704**	2.1371	0.2799***	5.6633	0.1327**	2.0961
LOC $_C$	λ_C	-0.12655***	-4.1502	-0.11020***	-2.7581				
"Fatalistic" (1 if LOC-C->1)	λ_F					0.4343***	2.6258	0.3614*	1.7093
Interaction "Fatalistic" *income gap									
Income gap if RD<0 & Fatalistic	γ_{-F}					-0.0078	-0.0078	-0.0040	-0.0040
Income gap if RD>0 & Fatalistic	γ_{+F}					0.0030	0.3072	0.0139	1.0774
Constant		1.89994**	2.3740	2.1376	1.3225	1.9330**	2.4215	2.3042	1.4300
Individual means (Mundlack)									
Mean (ln(Household income))		0.0087	0.2096			0.0092	0.2145		
Mean (ln(1+working hours))		0.15402*	1.6908			0.1507*	1.6749		
Mean (ln(1+Years of education)		0.0381	1.1772			0.0465	1.4301		
Mean (ln(number of children))		0.57605***	2.9622			0.5413***	2.7863		
Mean (ln(household members))		-0.46543**	-2.0732			-0.4553**	-2.0330		
Mean (Unemployment)		-0.1240	-0.1873			-0.1457	-0.2227		
Observations		1,440		1,440		1,440		1,440	
Individuals		720		720		720		720	
R-squared		0.0000		0.0656		0.0000		0.0751	
Joint significance tests (†)		243.50		3.27		275.0000		3.3030	
Hypotheses			**Relative concern test (Pvalue)**						
Test: $\gamma+ = \gamma- =0$		0.019		0.271		0.020		0.270	
Test: $\theta+ = \theta-$		0.000		0.009		0.000		0.009	
Test: $\gamma+ = \gamma-= \theta+ = \theta- =0$		0.000		0.034		0.000		0.038	
Test: $\gamma+ = \theta+ = 0$		2.146		0.177		0.000		0.185	
Hypotheses			**LOC domains test (Pvalue)**						
Test $\lambda_{IP}=\lambda_F=0$		0.000		0.000		0.000		0.025	
Test $\lambda_F=\gamma_{+F} =\gamma_{+F}=0$		0.000		0.000		0.000		0.003	

The reference income is defined as the median income of all individuals in the same reference group. The reference group is defined by education, age and sex.(†) The Joint sginificance test is a Chisquared test and F -test., in the MU estimates and FE estimates respectively.

*** p<0.01, ** p<0.05, * p<0.1

Table A.10: Economic satisfaction, specification based on equation 3 and MIA as reference income level

Estimation procedure		Cardinal approach-OLS											
		(†)		(††)		(†)		(††)		(†)		(††)	
Variables		Coefficient	T-Ratio	Coefficient	T-Ratio	Coefficient	T-Ratio	Coefficient	T-Ratio	Coefficient	T-Ratio	Coefficient	T-Ratio
Income gap if RD<0 (y-MIA<0)	γ_-	0.0163***	5.9154	0.01204***	3.4912	0.0162***	3.4516	0.0118***	5.8847	0.0169***	5.9196	0.0124***	3.5158
Income gap if RD>0 (y-MIA>0)	γ_+	0.0197***	4.1621	0.03625***	4.5766	0.0199***	4.6039	0.0363***	4.1904	0.0201***	4.1789	0.0366***	4.6527
Squared income gap if RD<0 (y-MIA<0)	θ_+	-0.0001**	-2.0624	-0.00038***	-3.8633	-0.0001***	-3.8341	-0.0004***	-2.0706	-0.0001**	-2.0908	-0.0004***	-3.8671
Squared income gap if RD>0 (y-MIA>0)	θ_-	0.0001***	5.1960	0.00004***	2.9887	0.0001***	2.9814	0.0000***	5.1769	0.0001***	5.2670	0.0000***	3.0904
Household income (log y)	β	-0.0246	-0.8282	0.0029	0.0907	-0.0261	0.1092	0.0035	-0.8878	-0.0270	-0.9131	0.0030	0.0950
Years of education		0.0060	0.5704	0.0139	1.1200	0.0089	1.4858	0.0183	0.8377	0.0083	0.7848	0.0171	1.3701
Unemployment		-0.5675***	-3.6158	-0.1862	-1.0028	-0.5661***	-1.1018	-0.2018	-3.6277	-0.5651***	-3.6268	-0.2034	-1.1108
log(Active household members)		0.4357*	1.7180	0.61817*	1.9564	0.4514*	2.0289	0.6315**	1.7937	0.4481*	1.7780	0.6265**	1.9989
log(Active household members)		0.2354*	1.7673	0.1100	0.6735	0.2286*	0.7251	0.1177	1.7214	0.2330*	1.7468	0.1211	0.7412
Log (age)		-0.1572	-0.7726	-0.0321	-0.1309	-0.1766	-0.3089	-0.0749	-0.8672	-0.1733	-0.8511	-0.0650	-0.2690
Male		0.0538	0.5403	-0.2395	-1.6104	0.0514	-1.7671	-0.2626*	0.5158	0.0513	0.5135	-0.2627*	-1.7505
log (1+working hours)		-0.0867***	-3.1053	-0.06986***	-2.0961	-0.0892***	-2.2796	-0.0750**	-3.2138	-0.0887***	-3.1966	-0.0752**	-2.2845
Marital status		-0.3843***	-4.2237	-0.46447***	-4.4024	-0.3878***	-4.3690	-0.4608***	-4.2372	-0.3901***	-4.2577	-0.4630***	-4.3760
Log (number of children)		0.0367	0.3738	0.0617	0.5053	0.0213	0.1981	0.0239	0.2173	0.0178	0.1815	0.0205	0.1692
LOC$_{IP}$	λ_{IP}	0.4693***	7.7164	0.41213***	5.5872	0.4747***	5.6406	0.4139***	7.7928	0.4735***	7.7562	0.4113***	5.5809
LOC $_C$	λ_C	-0.0685*	-1.8434	-0.11204**	-2.4633								
"Fatalistic" (1 if LOC-C=1)	λ_F					0.3359***	3.7962	0.5373***	2.8608	0.2476	1.3863	0.4646**	2.1237
Interaction "Fatalistic"*income gap													
Income gap if RD<0 & Fatalistic	γ_{-F}									-0.0022	-0.1935	-0.0029	-0.3433
Income gap if RD>0 & Fatalistic	$_F$									-0.0065	-0.9149	-0.0061	-0.6562
Constant		3.4195***	3.8503	2.44100**	2.3517	3.4428***	2.4069	2.4872**	3.8827	3.4483***	3.8847	2.4751**	2.3988
Observations		1,042		720		1,042		720		1,042		720	
Joint significance tests		16.54		10.47		16.74		11.00		14.98		9.85	
Hypotheses						**Relative concern test (Pvalue)**							
Test: $\gamma+ =\gamma- =0$		0.573		0.011		0.540		0.010		0.599		0.011	
Test: $\theta+ = \theta-$		0.001		0.000		0.001		0.000		0.001		0.000	
Test: $\gamma+ = \gamma-= \theta+ = \theta- =0$		0.000		0.000		0.000		0.000		0.000		0.000	
Test: $\gamma+ = \theta+ = 0$		0.000		0.000		0.000		0.000		0.000		0.000	
Hypotheses						**LOC domains test (Pvalue)**							
Test $\lambda_{IP}=\lambda_C=0$		0.000		0.000		0.000		0.000		0.000		0.000	
Test $\lambda_{IP}=\lambda_F=0$										0.000		0.000	
Test $\lambda_F=\gamma_{-F}=\gamma_{+F}=0$										0.018		0.001	

The reference income is defined as the average income of all individuals in the same reference group. The reference group is defined by education, age and sex.(†) 2011-2012 entire sample. (††) Two waves sample
*** p<0.01, ** p<0.05, * p<0.1