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Inequality of Opportunities in the Labor Market: Evidence from Life in Transition Surveys in Europe and Central Asia

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Abstract

This paper attempts to quantify the degree of inequality of opportunity in labor market outcomes for a selection of countries in the Europe and Central Asia (ECA) region. We adapt the Human Opportunity Index (HOI) methodology that has been widely used to study opportunities of children to measures of inequality in the labor market for working age adults, using data from the Life in Transition Surveys (LiTS) conducted in 2006. We decompose the observed inequalities into components that are attributable to circumstances an individual was born into (e.g., gender, parents’ education, minority status, etc) and other characteristics (education and age). We conduct additional exercises with this measure, which examine: (i) comparisons with an expenditure-based measure of inequality of opportunity; (ii) the extent to which the measures of inequality resonate with individual perceptions of life satisfaction and fairness; and (iii) how the results for ECA countries compare with similar measures in the Latin America and the Caribbean (LAC) region. Our findings show substantial inequality of opportunity (attributable to circumstances that an individual was born into) in employment status in the ECA region and a high degree of heterogeneity across countries in the circumstances that matter the most for inequality. The correlations between measures and perceptions of inequality among citizens across ECA countries suggest that inequality between groups, including measures of inequality of opportunity, matter more than overall measures of inequality for citizen perceptions of “fairness”. The results are robust to different definitions of jobs as opportunities.

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1. Introduction

The issue of inequality currently dominates the discourse on political economy across the world. It is estimated that over a third of all countries in the world experienced some form of social and political strife in the last year. While the reasons behind each of these expressions of anger, frustration or dissent were no doubt diverse, some of the more significant movements such as the los Indignados movement in Spain, the Arab Spring, and the Occupy protests across major cities of the United States appear to have a common theme: perceptions of rising inequality, diminishing opportunity for economic mobility (jobs), and the widespread inability or unwillingness on the part of the incumbents in power to do anything about it through appropriate public policy.

Even before the issue of inequality and its discontents was foisted to the center of debates on public policy, however, a large body of social science literature was already concerned with equality of opportunity.\(^2\) John Roemer’s work in 1993 and 1998 were the first to formalize an equality of opportunity principle and remains the most relevant piece of academic work underpinning this literature. The World Bank’s 2006 World Development Report, Equity and Development, argues that inequality of opportunity, both within and among nations, results in wasted human potential and weakens prospects for overall prosperity. Conducting an analysis of inequality of opportunity, however, requires a measure or a set of measures that provide a practical way to track a country’s progress towards equalizing opportunities for all its citizens.

Most of the existing work on quantifying inequality of opportunity in the World Bank, and particularly those that use the Human Opportunity Index (HOI)—a scalar measure that combines coverage and inequality of an opportunity—has been limited to the area of human development among children. In the academic literature, a number of different empirical approaches have been employed to measure inequality of opportunity of a broader population using a variety of definitions.\(^3\) These approaches are, however, based on observed income (or its proxies, like consumption) and do not explicitly consider employment or “jobs”. The ability of working age individuals to access labor markets through jobs that befit the acquired human capital irrespective of one’s circumstances is a critical determinant of economic mobility and reduction in inequality in the long-run. In this paper, we apply certain existing measures of inequality of opportunity to the analysis of employment opportunities. In particular, we analyze the extent to which an individual’s ability to access an opportunity (e.g., a job) depends on “circumstances” that he/she is born to and has no control over (e.g. gender, religion, race, parental background and place of birth) versus characteristics such as education and age. Building upon previous work on inequality of opportunity, we construct measures of inequality, decompositions these measures, and provide cross-country comparisons.

We face at least three key methodological challenges. First, unlike the case of children, parental information for working age adults (say 15-64 years of age) is not readily available in most surveys of household living standards or labor force. Second, while it is possible to argue convincingly that the circumstances we regard as being beyond one’s control (such as location)\(^2\) See Roemer (1993) for a review of the proposals by different authors that attempt to equalize opportunities, rather than outcomes.

\(^3\) These include Bourguignon, Ferreira and Menendez (2007); Van der Gaer (1993); Lefranc, Pistolesi and Trannoy (2008) and Ferreira, Gignoux and Aran (2011). For more discussion of this literature, see next section.
are truly immutable for children, the same cannot be said for working age adults. For example, a job seeker in a particular region could actively exercise the choice of moving to the neighboring region, or the nearest urban center, to look for work. There may well be other restrictions to this mobility, but the general point is that adults can respond to circumstances in ways that children cannot, and that makes it necessary to interpret the results obtained from a straightforward application of the HOI methodology with caution. Third, while there is a certain appeal of universality to opportunities such as education when they are applied to children—the statement that all children should have access to primary schools, for example, is generally acceptable in most societies—what constitutes opportunities in the labor market is less clear-cut. For one, the observed outcome of an individual holding a job is an equilibrium phenomenon; it conveys no information about the individual’s decision or preferences. For example, we cannot distinguish between an individual not having a job because none is available from one who is waiting for a better job (“queuing”), or between a worker who is at their job because s/he is satisfied from another who may be working simply because there is no alternative.

We attempt to overcome some of these methodological challenges in this paper. We use data from the 2006 round of the Life in Transition Survey (LiTS). The LiTS is a survey in 27 ECA countries, Turkey and Mongolia, and collects information on the experience of transition since 1989. Importantly for us, it also contains detailed information on the labor market status and family background of respondents. With the information available from the surveys, we (a) define observed outcomes in the labor market such that they reflect opportunities among a subset of the population, and; (b) identify the extent to which circumstances matter for the likelihood of having a particular opportunity. The choice of data from the LiTS is ideal because it is a homogeneous instrument across countries and contains all necessary information for the analysis. In addition, the issue of inequality of opportunity in general, and the inequality of opportunity in the labor markets in particular, is highly pertinent for the countries in this region given their recent history of economic transition.

In addition to the standard application of the HOI methodology to labor market outcomes, we also conduct a number of supplementary exercises broadly in the spirit of validating this measure. First, we consider the extent to which alternative measures of inequality used earlier in the literature, such as the Theil index applied to continuous outcomes such as household expenditures (Ferreira et al, 2011), relate to measured inequality of opportunity in labor markets. Second, we examine the extent to which our measures of inequality of opportunity resonate with individual perceptions of life satisfaction and fairness. The underlying hypothesis is that if our indices are capturing what we intend for them to, they should be consistent with individual concerns about equality and fair play in the marketplace. Testing hypotheses on perceptions (of fairness and subjective well being) against measured inequality is a research agenda in itself; our foray into this area should be regarded simply as an exploratory attempt to determine whether our measures of inequality of opportunity in the labor market relate sensibly to these perceptions. Finally, in order to contrast our results for the countries in the ECA region with countries in other parts of the world, we apply the same methodology to compute inequality of opportunity in labor market outcomes for Latin American countries using the Latinobarometro surveys.

To the best of our knowledge, this is the first attempt in the literature to quantify inequality of opportunity to labor market outcomes in a discrete setting (where the outcome variables are binary) and validate the measured inequality with perceptions of fairness and life-satisfaction.
The rest of the paper is organized as follows. Section 2 lays out the basic HOI framework and discusses the way in which we adapt this methodology for analysis of opportunities in the labor market. Section 3 presents our first set of results on the application of the methodology to countries in the ECA region. Section 4 presents the results from comparing the measured inequality for ECA countries against alternative measures of inequality, perceptions of fairness and life satisfaction, and similar inequality measures for labor markets in LAC countries from a different dataset. Section 5 summarizes the key results and concludes.

2. Applying the HOI framework to labor market opportunities

2.1 Equality of Opportunity and the HOI framework

While social scientists and philosophers before the 1970s dealt mostly with the fairness of outcomes, the work by Rawls (1971) and Nozick (1974) brought to the forefront the question of fairness of process. Dworkin (1981) and Arneson (1989, 1990) built on this work, dealing respectively with equality of resources and equality of opportunity for welfare. Cohen (1989) proposed equality in “access to advantage”. Sen (1979, 1985) argued for an equitable distribution of “capabilities,” which refer to sets of functionings effectively available for a person to choose from, so that they can pursue “life plans” they have reason to value. Roemer characterizes their proposals as attempts “to equalize opportunities, rather than outcomes: for Rawls and Dworkin, primary goods and resources, respectively, are the wherewithal with which people carry out projects that lead to outcomes that have value to them; for Sen, the capabilities to function in various ways are the prerequisites for what individuals make of themselves; and Cohen's "access" is similar to Arneson's straightforward "opportunity"” (Roemer, 1993). In his work published in 1993 and 1998, Roemer formalized an equality of opportunity principle, arguing that policy should work to equalize opportunities independent of circumstances and outcomes should depend only on effort.

Roemer (1998) distinguishes between five key concepts. Objective is the goal that equal opportunities are expected to achieve. Circumstances are the attributes of the environment of the individual (either social, genetic or biological) that affect the achievement of the objective, but that are beyond the control of the individual and for which society does not regard him or her responsible. Effort refers to individual behaviors and decisions that together with circumstances determine the level of objective accomplished. Instrument refers to the policy—typically the provision of resources—used to equalize opportunities. Type is the set of individuals all of whom have the same circumstances (also referred to as “circumstance groups” in some literature). Equality of opportunity exists when an objective or opportunity is achieved with the same levels of effort across different circumstances groups or types.

The empirical literature on equality of opportunities that followed Roemer’s work has taken several routes. One strand of work has used either parametric or nonparametric techniques to assess the impact of circumstances on some specific wellbeing objective or focused on the

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4 The process involves a transformation function, which depends on individual, social, and contextual (institutional) aspects. A larger set of options (“life plans” or combinations of functionings) in the capability set implies more “effective freedom” (see Basu and Lopez-Calva, 2010 and Sen, 2001).
problem of measurement of the extent of (in)equality of opportunities in a given country or region. Examples of some empirical applications are Betts and Roemer (2001) and Bourguignon, Ferreira and Menendez (2007). Both of these papers analyze the effect that several circumstances (father’s and mother’s education, father’s schooling, race and region of birth) and specific effort variables (such as own education, labor market status and migration as opposed to an undefined residual) on wage earnings differentials in Brazil.

Another strand of work—while remaining rooted in Roemer’s concepts—has operationalized inequality of opportunity in different ways. Van der Gaer (1993), Ooghe et al (2007), Hild and Voorhoeve (2004), and Cogneau and Mesplé-Somps (2008) regard the dependence of the distribution of expected earnings on social origins to be a measure of inequality of opportunities. This body of work generally entails the estimation of the conditional expectations of earnings or consumption from the distribution of average income across several socio-economic categories and performing tests of stochastic dominance. Opportunities are regarded to be more equally distributed if the distribution of earnings or income conditional on social origins cannot be ranked according to the stochastic dominance criteria. (e.g. Lefranc, Pistolesi and Trannoy, 2008).

In this paper, however, we draw from the Human Opportunity Index (HOI) framework (see Barros et al, 2009 and 2010). Developed by researchers at the World Bank in collaboration with external researchers, the HOI has been primarily motivated and used as an intuitive measure of a society’s progress toward equitable provision of opportunities for all children. The HOI methodology takes into account the extent to which personal “circumstances” for which a child cannot be held accountable—say, location, gender, household composition or parental wealth— affect his/her probability of accessing basic services that are necessary to succeed in life, like timely education, vaccination, running water, electricity or connection to the internet. The measure is the coverage rate of a particular service, discounted by a factor that takes into account how equitably the available services are distributed among types. The construction of HOI involves aggregating circumstance-specific coverage rates in a scalar measure that increases with overall coverage and decreases with the differences in coverage among groups with different sets of circumstances. More formally, HOI (H) for a particular opportunity is the average coverage rate of access ($\bar{C}$) multiplied by a factor of equality.

$$H = \bar{C}(1 - D) \quad (1)$$

Where ($1-D$) is the equality factor that is equal to one if access to the opportunity is independent of the circumstances, in which case HOI is equal to the average coverage rate. $D$ can be interpreted as the share of the total number of opportunities that needs to be reallocated between types to ensure equality of opportunities, which we refer to as the dissimilarity index (henceforth, D-index). With disjoint types, one can compute $D$ as follows:

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5 The measure has been used in two regional reports covering most countries in Latin America, a study (in draft) for 20 sub-Saharan Africa countries, and numerous studies conducted (or in progress) for a number of countries around the world.  
6 A “circumstance group” is a group of children that share the same circumstances. For example a circumstance group can be all children who share the traits of living in a rural area with parental income in the lowest quintile and
Here $k$ denotes a type (group of children with a specific set of circumstances); $C_k$ the specific coverage rate of group $k$; $\alpha_k$ the share of group $k$ in total population of children; and $m$ the numbers of disjoint groups defined by circumstances. $D$ is equal to zero when $C_k = \bar{C}$ for all $k$ types, in which case HOI is equal to the coverage rate $\bar{C}$. It can be shown that $D$ is equal to the share of total opportunities that are “misallocated” in favor of (against) types that have coverage rates higher (lower) than $\bar{C}$. This also implies that any reallocation of opportunities to “vulnerable” groups (those with coverage less than $\bar{C}$) from “non-vulnerable groups (with coverage more than $\bar{C}$) will reduce $D$ and increase HOI. Thus HOI improves when inequality between types decreases with a fixed number of opportunities in a society, or when the number of opportunities increases and inequality among types stays constant.

This measure has a number of desirable properties (Barros et al, 2010). The property that is most relevant for us relates to its sensitivity to inequality. The D-index is sensitive to pro-vulnerable reallocation to a degree: any reallocation of an opportunity—i.e. from a type with higher than average coverage rate to one with lower than average coverage rate—will lead to a decline in D-Index and increase in HOI. However, a reallocation from one vulnerable group to another (more or less) vulnerable group will not have any effect on the D-Index.

An important caveat of the D-index and HOI is that they are sensitive to the set of circumstances chosen for analysis. But this is mitigated by an additional property that is highly desirable, given that it is often impossible to identify all relevant circumstances for any population and opportunity: the D-Index (HOI) will not be lower (higher) if more circumstances are added to the existing set of circumstances in the analysis. This follows from the intuition that D-Index is a measure of between-group inequality and as the number of circumstance-groups increases (when the number of circumstances increases), so will inequality between groups. This implies that the computed D-index serves as a lower bound to the “actual” inequality where all circumstances of interest could be included in the analysis.

In practical terms, computing HOI for a particular opportunity when the number of circumstances is relatively large requires an econometric exercise to obtain a prediction of HOI from observed access to opportunities and circumstances among children. The exercise consists of running a logistic regression model to estimate the relationship between access to a particular opportunity and circumstances of the child, on the full sample of children for whom the HOI measure will be constructed. The estimated coefficients of the regression are used to obtain for

\[ D = \frac{1}{2\bar{C}} \sum_{k=1}^{m} \alpha_k |\bar{C} - C_k| \quad (2) \]

parental education of primary level. The number of circumstance groups will depend on the number circumstances being considered and the number of categories within each circumstance.

7 Firstly, the HOI is sensitive to scale – if access improves for all groups by, say, a factor of $k$ (additively or multiplicatively), then the HOI changes by the same factor $k$. Secondly, it rewards Pareto improvement – if coverage rate improves for one circumstance-group without decreasing coverage rates for the remaining groups, the HOI will rise. Thirdly, the measure will always improve if access changes in such a way that the more vulnerable groups (groups with coverage rates lower than the overall coverage rate) have higher access.

8 See Barros, Molinas and Saavedra (2010) for a proof of the “lower bound” property of the D-Index.
each child his/her predicted probability of access to the opportunity; which is then used to estimate the coverage rate, inequality and HOI.

### 2.2 Measuring inequality of opportunity in the labor market

In order to measure inequality of opportunity in the labor market, we first estimate the extent of inequality (in the labor market) between groups. Unlike the case of usual HOI applications, these groups are characterized by *circumstances* as well as *characteristics* like education and age of the individual, which matter greatly for access to a labor market opportunity (like having a job). Thus the D-Index computed in this manner with both circumstances and characteristics reflects the overall level of inequality in the labor market, while the share of the overall inequality attributable only to circumstances can be interpreted as inequality of opportunity. In practical terms, between-group inequality (D-Index) is estimated by running a logistic regression model to estimate the relationship between access to a particular employment opportunity and circumstances as well as characteristics (education and age) of labor market participants. And inequality of opportunity is estimated as the part of between-group inequality that is attributable to circumstances, and obtained by estimating the “contribution” of these circumstances to the D-Index.

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**Box 1: What constitutes an opportunity in the labor market?**

| What do we consider as an opportunity in labor markets? |
|---------------------------------------------------------|
| **With regard to working:**                              |
| • Be occupied                                           |
|   • With a workweek of more than 20 h                   |
|   • With tenure and more than 20 h                      |
|   • Contracts                                           |
|   • Contracts or professional occupation                |
| • Not occupied in job with relevant characteristics     |
| • Be not working or looking for a job due to discouragement |
| • Be looking for a job (unemployed)                     |

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9 Ideally we would want to condition for an individual’s experience in the labor market. But since that information is not available in the surveys, we use the individual’s age as a proxy for experience, as is standard in the literature.

10 Note that the lower bound property of the D-Index referred to earlier (the fact that the index will increase in value if the list of circumstances and characteristics were to be expanded) does not imply the same for our measure of inequality of opportunity here, namely the *contribution* of circumstances to the D-Index. Therefore, we cannot claim that inequality of opportunity as we measure it is the lower bound of the “true” inequality of opportunity if omitted circumstances and/or characteristics were taken into account.
We use two broad definitions of “opportunities” in the labor market (see Box 1). These definitions were chosen as a compromise between (i) information availability in the surveys and (ii) the relevance of an outcome described by the worker for the concept of an “opportunity”. The universe considered is all adults 18-64 years old in the labor force. The labor force includes individuals who are working, those without work but looking for a job, and those without work and not looking for a job because they are discouraged from searching. An individual in this population is characterized as having an opportunity in two different ways: (a) having a job with a defined set of characteristics such as 20 hours of work per week, tenure, or contracts; and (b) having suffered no event of economic distress or shock related to employment in the past one year. Economic distress is defined as a reported event of having collected unemployment insurance, experienced wage cuts, or worked at a job below qualification in the year prior to the survey.

In defining circumstances, we take into account characteristics that an individual is born into, which should not matter for access to the opportunity being considered. Guided by this principle and data availability, the circumstances we select are: gender of the individual, education of father, whether parents were affiliated to the communist party, and self-reported minority status. Gender and minority status are common types of circumstances considered in the literature; father’s education is a proxy for socio-economic background; and whether parents are affiliated to the communist party can be a proxy for social status in these countries.

In addition to circumstances, characteristics like education and age of the individual are included in the estimation exercise as they are common correlates of labor market variables and are generally used to determine returns to education and experience. When we go from measuring the overall level of between-group inequality to measuring inequality of opportunities in the labor market, we will have to isolate the contribution of circumstances to inequality from that of education and age. Finally, to facilitate comparisons across countries, the same set of circumstances and attributes and identical definitions of opportunities are used for all countries.

The correlation between circumstances and access to an opportunity (e.g. having a job of 20+ hours) can occur through two channels: the “direct” effect (e.g. belonging to a particular minority or gender group can affect the likelihood of getting a job just by virtue of these circumstances), and an “indirect effect” (circumstances can also influence the education of a person, which in turn influences the likelihood of getting a job). The approach we use, that of isolating the contribution of circumstances to between-group inequality from that of education and age, is intended to measure the effect through the first (direct) channel and not the second.\footnote{Estimating the “indirect” channel, the effect of circumstances through education, would be difficult because education depends on a host of factors other than the circumstances for which we have information. Moreover, excluding the impact of circumstances through education is justified because we are interested in measuring the extent to which inequality in the labor market is attributable to circumstances. While circumstances may very well have influenced educational attainment, these effects would have occurred at a much earlier stage of life (primarily in childhood), and therefore do not reflect inequality of opportunities specific to the labor market.} The direct effect of circumstances in the labor market can be interpreted as inequality of opportunity that is produced by distortions in the labor market, distinct from that produced in earlier stages of life (prior to the individual’s entry into the labor market).
2.3 Estimating the inequality index and the contribution of circumstances

To decompose the D-index into the contributions of circumstances and characteristics to inequality, we apply the decomposition proposed by Shorrocks (2012), which is based on the Shapley value concept in cooperative games to distribute among the players the surplus produced by a coalition of cooperating players (see Hoyos and Narayan, 2011). The basic idea behind this decomposition is to measure how much the estimated D-Index would change when we add a circumstance or characteristic to different pre-existing sets of circumstances and characteristics. The change in inequality as a result of adding a circumstance or characteristic would be a reasonable indicator of the “contribution” of that variable to inequality of opportunities. Implementing this idea, however, needs to take into account the fact that since the variables (circumstances and characteristics) are correlated to each other, the change in the inequality measure obtained by “adding” a variable depends on the initial set or subset of variables to which it is added. Thus to identify the unique impact of adding a circumstance or characteristic to the measure, we consider all the changes that occur when the variable of interest is added to all possible subsets of pre-existing variables, and take the average of all these possible changes.

Consider a typical D-Index, which is given by $D=D(x)$, where $x$ is the vector of circumstances. Moreover, if we have two sets of circumstances $A$ and $B$, and sets $A$ and $B$ do not overlap, then $D(A, B) \geq D(A)$. The impact of adding a set of circumstances $A$ is given by:

$$D_A = \sum_{S \subseteq N \setminus \{A\}} \frac{|S|!(n-|S|-1)!}{n!} [D(S \cup \{A\}) - D(S)]$$

Where $N$ is the set of all circumstances—$n$ variables in total; $S$ is a subset of $N$ (containing $s$ circumstances and/or characteristics) that does not contain $A$. $D(S)$ is the dissimilarity index estimated with $S$. $D(S \cup \{A\})$ is the dissimilarity index calculated with the set $S$ and the set of variables $A$. We can define the contribution of the set of variables $A$ to the dissimilarity index as:

$$M_A = \frac{D_A}{D(N)}$$

where $\sum_{i \in N} M_i = 1$

Thus the sum of the contributions of all circumstances to $D$ adds up to 100 percent. Among a number of caveats to such decompositions (Israeli, 2007 and Sastre and Trannoy 2002), two are especially important for us. Firstly, this approach provides a statistical decomposition of the index and the results do not indicate causality or channels through which unequal access to opportunities is manifested. Secondly, the estimated contributions of circumstances depend on the choice and definition of opportunities and circumstances.

We estimate the D-Index econometrically as follows. Consider any opportunity (e.g. having a job of 20+ hours) in a country, defined as a discrete (0-1) variable, with “1” denoting “yes” and “0” denoting “no”. To obtain the conditional probabilities of access to this opportunity for each individual in the sample based on his/her circumstances and characteristics, a logistic model is
estimated, linear in the parameters $\beta$, where the event $I$ corresponds to accessing the opportunity and $x$ the set of circumstances and characteristics:

$$\ln \left( \frac{P(I = 1 | X = (x_1, \ldots, x_n))}{1 - P(I = 1 | X = (x_1, \ldots, x_n))} \right) = \sum_{k=1}^{n} x_k \beta_k \quad (5)$$

Where $x_k$ denotes the row vector of variables representing $n$ circumstances/characteristics and $\beta_k$ a corresponding column vector of parameters. From the estimation of regression (6) one obtains estimates of the parameters $\{\beta_k\}$, denoted as $\{\hat{\beta}_{k,m}\}$, where $m$ denotes the sample size.$^{12}$ Given the estimated coefficients, one can obtain for each individual in the sample, his/her predicted probability of the opportunity in consideration:

$$\hat{p}_{i,m} = \frac{\text{Exp}(x_i \hat{\beta}_m)}{1 + \text{Exp}(x_i \hat{\beta}_m)} \quad (6)$$

Using the predicted probabilities ($\hat{p}$) and sample weights ($w_i$), we can find the predicted overall coverage rate ($\hat{C}$) and D-index ($\hat{D}$) as:

$$\hat{C} = \sum_{i=1}^{m} w_i \hat{p}_{i,m} \quad (7)$$

$$\hat{D} = \frac{1}{2\hat{C}} \sum_{i=1}^{m} w_i |\hat{p}_{i,m} - \hat{C}| \quad (8) \quad \text{(Note: } \hat{C} = \tilde{C})$$

$$\hat{H} = \hat{C} (1 - \hat{D}) \quad (9)$$

This is similar to the approach used in HOI estimation for children’s opportunities in past work, with the crucial difference that the covariates of the logit now include both circumstances and characteristics (education and age). In other words, our estimated D now takes into account inequality between groups differentiated by circumstances as well as personal characteristics that are not circumstances.

The decomposition method outlined earlier allows us to estimate the contribution of each covariate to the estimated D-Index, as well as the contributions of groups of covariates (e.g. circumstances or non-circumstance characteristics) taken together. The contribution of covariate $k$ to the D-index for a particular opportunity can be estimated as in (3) and (4), with two

$^{12}$ An important caveat to the estimation model is that the list of regressors does not include any interaction terms between the regressors. Given the number of circumstances and characteristics we have (all of which are dummy variables), limited sample sizes, and the large number of countries and opportunities for which these regressions have to be run, including interactions would lead to intractable problems in at least some of the cases. If the interactions were included, it would result in a higher D-Index (and lower HOI), just as if more circumstances and characteristics were added. This in turn implies that the estimated D-Index for all countries and opportunities is the lower bound of between-group inequality (and the estimated HOI is the upper bound) for a given set of circumstances and characteristics.
differences: (i) \( \hat{D} \) substitutes for \( D \), and (ii) the set \( N \) now includes circumstances and characteristics. As an example, consider the following question: how much does the circumstance gender contribute to the D-Index of having a job of a certain desirable type? The Shapley decomposition method would involve measuring the impact of adding gender as a circumstance on the predicted D-index (\( \hat{D} \)), which involves taking the average of all impacts on \( \hat{D} \) when gender is added to all possible subsets of the other covariates. This is done by estimating the logistic regression given by (5) for all possible subsets of the covariates excluding gender, and then with gender added to each configuration; obtaining \( \hat{D} \) from all these estimations; and using the relationships given by (3) and (4). The contribution of each circumstance to \( \hat{D} \), calculated this way, would add up to 100 percent.\(^\text{13}\)

### 2.4 Key limitations and caveats

There are a number of limitations to our analysis of opportunities in the labor markets, some of which are important to highlight. The first has to do with the question of what constitutes an opportunity. What is ethically acceptable or desirable is generally dependent on the society’s judgment. But we have no information about the quality of the jobs people have—having a “bad” job may not necessarily be an opportunity, especially when the bad job is a last resort against poverty and one that others who can afford to wait would rather not take.

The second caveat is related to the fact that “having a job” is an equilibrium phenomenon that obscures individual choices, including the possibility that individuals with certain circumstances can have a proclivity for certain types of jobs. Gender or parents’ political affiliation, for example, may foster value systems and cultural norms that influence the choices embedded in the equilibrium outcome. This would imply that, ideally, inequality of opportunity in the labor market should be measured by the influence of circumstances on “employability”, rather than the actual state of being employed. But employability is hard to observe and measure from labor force surveys, and it is even more difficult in the surveys we use. Thus, our results have the limitation that they do not differentiate between employability and the equilibrium outcome of employment.

Notwithstanding these caveats, if “having a job with certain characteristics (e.g. 20+ hours)” is considered to be a socially desirable state, as it is in most societies, our exercise with all its caveats is still informative, provided the results are interpreted carefully. Our definition of opportunity does take into account “discouragement”, which refers to individuals not employed or looking for work just because they do not expect to find any. Such individuals are included in our universe and classified as equivalent to those who are in the labor force and do not have a job of the desired quality.

\(^\text{13}\) Instead of treating each circumstance separately one could also compute Shapley values using the entire set of circumstances as a separate block alongside education and age and come up with an aggregate contribution of all circumstances, education and age. To get to the contribution of each individual circumstance, one would then implement an additional step and repeat the process limiting the analysis only to circumstances. The absolute contributions obtained from these two methods would most likely be different. The literature does not offer guidance on which is the “better” method to use. We prefer the method we have used because of its computational simplicity; it is straightforward to apply and also captures the relationship between each circumstance with every characteristic in a flexible manner.
A second important issue is that of selection bias in labor force participation itself. The biases that can arise in a standard logit model—which is what we use—as a result of failing to properly control for this selection are well known. In our case, these biases would in turn affect the inequality estimates and their decompositions. Incorporating standard econometric techniques to correct for selection bias turns out to be non trivial in our approach.\textsuperscript{14} Instead, we opt for non parametric approaches in order to conduct robustness exercises for seven countries (see Appendix A). We find that although selection is an issue, attempts to correct for it would increase the level of measured inequality, but not change the relative ranking of these seven countries in terms of the extent of inequality in their labor markets.

Finally, there is the issue of missing circumstances. In our analysis, we can only consider those circumstances that are measurable and available in the data. The set of these circumstances is only but a subset of the full set of circumstances that may matter for the opportunities we consider. If some of the missing variables are correlated with the ones that are included, as is likely to be the case, our predictions and therefore the D-Index are likely to have omitted variable bias. This is mitigated by the property of the D-Index that as more circumstances are added, its value can only increase. However, the fact that the estimated D is a lower bound of inequality between groups does not necessarily translate to a lower bound for the total contribution of circumstances to the D-index. In other words, if more (hitherto missing) circumstances were to be added, increasing the D-Index, the total estimated contributions of circumstances to the index will also increase in most cases, but not necessarily always.

\subsection*{3. Results}

In this section we present our first set of results from the application of the HOI methodology to labor market outcomes in countries in the ECA region. The data we use is from the LiTS 2006. Between August and October 2006, a nationally representative sample of 1,000 households was interviewed in 29 countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Republic of Macedonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Mongolia, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkey, Ukraine, and Uzbekistan. In order to gather information on the impact of the transition on individuals in the ECA region, data was collected from adults on personal information and family background, material well-being, life satisfaction and attitudes towards the new political and economic setting, and life history since the early nineties. We use the information on family background and labor market experience to compute the main indicators analyzed.

The coverage and the HOI for each of the labor market opportunities and a selection of ECA countries are presented in Figure 1a. The first seven columns include the average incidence of 20 hours+ employment, while the next block in red includes coverage of “no economic distress”. Recall that the “no economic distress” as an opportunity is defined as not having suffered any

\footnote{Since our decomposition method involves running multiple configurations of the model with all possible subsets of covariates, incorporating a first-stage selection model necessarily implies that every configuration of the model has to be run using the 2-stage selection correction. This approach would be computationally intensive and unlikely to converge in all cases.}
event of economic distress or shock related to employment in the past one year. It is important to note that HOI here refers to the inequality-adjusted coverage rate of each opportunity, where inequality is measured between groups differentiated by both circumstances and characteristics (education and age of individual). The gap between the coverage and HOI for each country and opportunity represents the “penalty” due to inequality between groups (the penalty is equal to the D-Index multiplied by the coverage).

In order to see whether taking into account the quality of jobs, to the extent allowed by the data, makes a difference to the results, we impose some additional restrictions to our original definition of opportunity in the labor market (Figure 1b). We start with the original indicator of having a job with more than 20 hours per week. In order to capture the stability aspect of the job in question, we first modify the definition of an “opportunity” to having a job with more than 20 hours/week and at least 6 months of tenure. Next, we define having any job with contract (regardless of hours worked) as the indicator of opportunity, where the sample of analysis consists of only the salaried workers and the unemployed and excludes the self-employed. Since salaried workers are a subgroup of all employed persons, we then broaden the indicator so that it can be defined for all workers: having a job that is either salaried with contract or being self-employed in a professional occupation. Imposing the additional restrictions on the “quality” of jobs make little qualitative difference to the results across the seven countries (compare Figures 1a and 1b). Even the levels (of HOI and coverage) are quite similar for all cases, except when “at least 6 months of tenure” is considered, which reduces the coverage and HOI for all countries.
Figure 2(a-d) we present the share of the inequality (in each of the labor market indicators considered) that are attributable to circumstances, age, and education. The shares are obtained using the Shapley decomposition of the index where the total contribution of circumstances is summed over the contributions of each of the four circumstances: gender, father’s education, parent’s political affiliation, and self-reported minority status.

Figure 2(a) shows that although the level of inequality between groups (D-Index in having jobs with 20+ hours of work) varies among countries, the share of inequality attributable to circumstances is substantial in most cases, contributing to more than half of the overall inequality for pretty much all four opportunities considered. Another notable fact that emerges is that education has a higher contribution to overall inequality when job quality (tenure, contract,
etc.) is considered—something one would expect, given the typical association between the level of education and holding contract jobs (formal employment) or being engaged in a professional occupation. But in case of jobs with 20+ hours, the contribution of education to total inequality is much smaller than that of circumstances. Across countries, it is interesting to see that the country rankings by D-index do not necessarily translate to similar rankings by inequality of opportunity (attributable to circumstances). While Kyrgyzstan has the highest D-index among all countries by all measures of job opportunity, inequality attributable to circumstances in Kyrgyzstan is roughly on par with a number of other countries, particularly for the opportunities of jobs of 20+ hours, and jobs of 20+ hours and tenure.

**Figure 2: Share of Inequality Attributable to Circumstances, Education and Age**

(a) Job with 20+ hours

(b) Job with contract

(c) Job with contract or professional occupation

(d) Job with 20+ hours and tenure
We can also break down the contribution of circumstances into the contributions of each of the circumstance variables considered in the analysis. This will help us identify the circumstances that are most salient in explaining the observed inequality in each of the country contexts. We present the results of these decompositions in Figure 3.

Figure 3: The contribution of each circumstance, as a share of total contribution of circumstances to D-Index
There is no clear pattern in the contribution of each circumstance to the index across countries, although gender and father’s education appear to have an overwhelming contribution in almost all cases. For the opportunity of having a job with 20+ hours of work, for example, the countries with the highest share of inequality explained by circumstances are Slovenia, Kyrgyzstan, and Kazakhstan, in that order (Figure 2). Even within these three countries, there is substantial variation in the relative contribution of each circumstance: father’s education and gender contribute the most in Slovenia, gender’s contribution dominates in Kazakhstan, while all four circumstances contribute almost equally in Kyrgyzstan. Among other countries, minority status (self-reported) contributes the most in Lithuania, parental education the most in Russia, and gender the most in Latvia and Croatia.

For the opportunity of not facing economic distress, the inequality between groups as well as the contribution of circumstances to inequality is the highest by a wide margin in Latvia. In terms of contribution of circumstances to inequality, Latvia and Lithuania were the leaders, followed by Russia and Kazakhstan (with very little to separate the two). In both Latvia and Lithuania, gender and father’s education were the main contributors to inequality. In Russia and Kazakhstan, father’s education and minority status were the two most important contributors.

In Figure 4, we show the D-Index (in having a job of 20+ hours) and the contributions of circumstances, education, and age, for all 29 ECA countries. There is high variation in the extent of inequality (value of D-Index) and inequality of opportunity (contribution of circumstances to D-Index) across countries. The ranking by inequality differs from the ranking by inequality of opportunity. The D-Index ranges from the lowest in the region for Russia to the highest for Armenia and Azerbaijan (in that order). But in terms of the contribution of circumstances to inequality, Azerbaijan ranks the highest, followed by Uzbekistan, Georgia, Turkey and Albania. While Russia has the lowest D-Index among all countries, its inequality attributable to circumstances is not as low and on par with that for Estonia. Interestingly, education plays an outsized role in inequality in job access in some countries—Armenia stands out in particular, with Albania, Bulgaria, and Romania being noteworthy as well.

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15 Figure 1 earlier shows that Latvia had one of the lowest coverage and HOI for not having economic distress, with a relatively high penalty for inequality.
4. Validating our measure of inequality of opportunity

While the results we have presented so far are informative in their own right, it is also useful to pause and think about what exactly we are capturing in our inequality measure and to try and determine whether it has sensible properties. In this section we attempt to benchmark the calculated measure of inequality of opportunity with: (a) alternative measures of inequality, such as the Theil index (particularly the between group component of it) applied to a continuous measures of outcome (household expenditures); (b) perceptions of life satisfaction and fairness, and; (c) results from the measurement of inequality of opportunity in labor markets among countries in a different region (LAC) using the same methodology.

4.1 Comparisons with Theil-L Index for Expenditures

Our analysis of inequality of opportunity in the labor market so far is based on discrete outcomes. But the literature offers ways to analyze and decompose inequality of opportunity in continuous variables. We use one such method proposed and implemented by Ferreira et al (2011) to assess the degree of inequality of opportunity in Turkey. The key question we want to ask is how our measure of the inequality of opportunity in the labor market—as defined by employment in certain types of jobs—compares with inequality of opportunity measures derived from income (or its proxies).

The LiTs surveys also contain a consumption module but these are considerably shorter than the standard household income and budget surveys. Comparisons of the consumption data from LiTS with expenditure data from extensive surveys in the same region have revealed substantial discrepancies in the first moment (mean) of the distributions, but concluded that they provide a
similar ranking of households in the distribution (Zaidi et al, 2009). This suggests that using consumption data from LiTS to conduct distributional analyses of the kind we intend to do would be a reasonable option. Consumption expenditure is widely regarded in the literature as a reasonable approximation for welfare and therefore appears to be appropriate for the analysis of inequality of opportunity.

We use the Theil-L index of consumption as an inequality measure. The goal of this exercises is to decompose the relevant outcome (consumption) into a between component due to circumstances and a within component due to effort or luck (as in Ferreira et al, 2011). In order to decompose the Theil we estimate an equation of the consumption aggregate as a function of circumstances only. From the parametric model we predict the mean consumption of each group. The next step is replacing the observed consumption of each individual by the mean average consumption of the group with his same circumstances –this gives a smoothed distribution. Next, we adjust the original observed consumption of each individual by the mean average consumption of their group with the same circumstances- this gives a standardized distribution. The Theil corresponds to the sum of means of the two constructed distributions (see Box 2 below). The relevant component of the Theil comes from the smoothed distribution: differences across the average advantages of types are due to inequality in opportunities and not effort.

| Box 2: Labor income decomposition—a parametric approach |
|---------------------------------------------------------|
| \[
\text{Theil}_L = E_0(y) = \frac{1}{N} \sum_{i=1}^{N} \log \left( \frac{\bar{y}_i}{y_i} \right)
\]
| \[
E_0(y) = E_0(\{\mu_i^k\}) + E_0(\{\nu_i^k\})
\]

Where,

- \(y_i\) is the vector of labor income
- \(\{\mu_i^k\}\) is the smoothed distribution—obtained by replacing the observed labor income of each individual by the mean average income of the group with the same characteristics and circumstances.
- \(\{\nu_i^k\}\) is the standardized distribution.—obtained by adjusting the observed labor income of each individual by the mean average income of the group with the same characteristics and circumstances.

\[
\nu_i^k = y_i^k \cdot \frac{\mu}{\mu_k}
\]

There are important methodological differences between the Theil index and the D-Indices presented in the previous section, which would justify ample caution in comparing the results produced by the two measures. The Theil index starts with the mean logarithmic deviation as a measure of inequality, which is decomposed into within and between components. The D-Index

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16 Foster and Shneyerov (2000) show that when the set of inequality indices under consideration is restricted to those that use the arithmetic mean as the reference consumption, the mean logarithmic deviation is the single inequality measure that satisfy the Pigou–Dalton transfer axiom and is path-independent decomposable.
is itself a measure of inequality between types when the dependent variable is a binary variable (related to having a certain type of employment), where any inequality amounting from effort, luck or circumstances (that are omitted from the regression) goes to the residual component.\textsuperscript{17, 18} While there are similarities between the between-component of the Theil Index and the D-Index, this is complicated in our case by the fact that the D-Index is estimated including education and age (which are not circumstances), and the \textit{contribution} of circumstances to that index is taken as a measure of inequality of opportunity. In contrast, in estimating the Theil Index we follow Ferreira et al’s method of considering only circumstances to differentiate between groups.

A simple interpretation of the differences between the two approaches is as follows. As stated earlier, the D-index attempts to measure the direct contribution of circumstances to inequality in employment opportunities. By excluding the contribution of education and experience, it also excludes the indirect effect of circumstances on employment opportunities through its effect on an individual’s education. The between-component of the Theil index of consumption, on the other hand, accounts for consumption inequality between groups that subsumes both direct and indirect effects of circumstances, through education and any other channel that ultimately influences consumption.

We compute the Theil index for household expenditures using the LiTS data for 29 countries. The decomposition of the Theil index into between and within components indicates a non-trivial amount of inequality in expenditure coming from the between-component, which is our measure of inequality of opportunity (see Figure 5a). Although there are important methodological differences between Theil and D-Index, we find it reassuring that there is some positive cross-country correlation between the two measures (Figure 5b). But the components of each measure that relate to inequality of opportunity—the between-component of Theil and the contribution of circumstances—have little or no correlation (Figure 5c). Given the conceptual and methodological differences between the two types of measures, the lack of correlation is not surprising. From these results, we conclude that while the inequality indices per se have some correlation, the components of each measure that relate to inequality of opportunity (inequality attributable to circumstances) are best seen as complements of each other, addressing questions that are quite different.

\textsuperscript{17} The comparison with other inequality measures begs the non-trivial question of how much of the results are influenced by our choice of decomposition of the D-Index. In results not reported we construct the index a) using only circumstances as explanatory variables; 2) using circumstances and attributes such as education and age but holding attributes constant at the sample mean while predicting probabilities. The behavior of the index in the two cases is similar and also close to the method we use for the results presented. These comparisons suggest that while the inclusion of attributes captures part of the heterogeneity within types, it does not overwhelm the inequality measured from the circumstances.

\textsuperscript{18} One should note that both D-Index and Theil rely on what is called an ex-ante approach to measurement. The researcher has to evaluate opportunities for each type and compare these to the population’s distribution of opportunities. The ex-ante method does not require observation of effort which is inherently unobservable and could be proxied by individual characteristics such as educational attainment and decisions to migrate. A strict definition of inequality of opportunity is applied in the “tranches” approach. The latter relies on effort ranking within a type. Equality is achieved when similar rankings of effort have the same level of advantages.
4.2 Comparisons with Perceptions of Life Satisfaction and Fairness

To what extent do our measures of inequality in the labor market resonate with perceptions of fairness and satisfaction in society? We investigate this question in this section. Our objective is not so much to make a direct contribution to the vast literature on the relationship between measures of economic well-being (absolute or relative) and subjective measures such as happiness, but to examine if our measured inequality of opportunity relates to these perceptions in a sensible way. In that sense, our work in this area should be viewed at best as a crude validation exercise for our inequality measures discussed in the earlier sections.

In order to be a validation exercise, however, one needs priors—preferably grounded in theory—on what the expected relationship between any measure of inequality of opportunity and perceptions of fairness and life satisfaction should be. Although the idea of fairness is not explicitly formalized in our framework, it is central to the idea of inequality of opportunity. If equality is a legitimate social goal, then inequality originating from circumstances would be associated with unfairness while the inequality coming from differential efforts would constitute...
“fair play”. In other words, a society that has low inequality of opportunity—which is also a society in which any individual irrespective of the circumstances to which he/she is born has a fair chance at being successful—should in principle, also be a fair society. The converse of this is that any society where the system is rigged in favor of those of a certain race, ethnicity, gender or wealth strata, is, by definition an unfair society. By this reasoning, we can expect our measure of inequality of opportunity to be negatively associated with perceptions of fairness in the society.

Theoretically, it is less clear what the relationship between life satisfaction or happiness and inequality of opportunity should be. For the case of inequality in outcomes, there are two main competing hypotheses that lead to opposite predictions on the happiness-inequality relationship. The first is the “tunnel effect” proposed by Hirschman and Rothschild (1973), which suggests that higher inequality signals higher potential for future economic mobility and hence leads to greater life satisfaction today. The second hypothesis forwarded by Runciman (1966) is about relative deprivation: the higher the current economic inequality, the higher the relative deprivation and hence lower the current life satisfaction. The ambiguity about which of these two opposing effects dominates is reflected in the fact that the large body of empirical work that has attempted to test the inequality aversion hypothesis remains largely inconclusive (see Frey and Stutzer, 2002; Stevenson and Wolfers 2008; Verme, 2011 among others).

What we consider here, however, is inequality of opportunities, which is distinct from inequality of outcomes. This distinction becomes particularly relevant in this context because, while the Hirschman/Rothschild mechanism of higher inequality signaling higher potential mobility may be plausible for outcome inequality, it is hard to imagine the same holding true for inequality of opportunities. In fact, a significant fraction of the society—particularly those belonging to the disadvantaged types—would see rising inequality of opportunity as diminishing their chances of economic mobility. By this token, it can be argued that the relationship between inequality of opportunity—unlike the case of inequality of outcomes such as income or expenditure—on perceptions of life satisfaction should be negative.

We examine this issue empirically using measures of perceptions from the LiTS data. We use two questions to obtain our measures of life satisfaction and perception of fairness. The first is a rating of the statement “All things considered, I am satisfied with my life now”. Individuals reporting to agree or to strongly agree are deemed to be satisfied as opposed to those answering strongly disagree, disagree, or neither disagree nor agree. The second is “In your opinion, which of the factors in this list is the most important to succeed in life in this country now?” Individuals answering factors such as effort, hard work, intelligence, and skill are deemed to believe in fairness of the society they live in, while political connections, corruption ties or other reasons indicate skepticism about fairness.
First, we start with a descriptive analysis in the spirit of ensuring that the measures of inequality as well as perceptions that we obtain from the data are broadly consistent. We do this first by examining how subjective perceptions of life satisfaction and fairness—averaged over each country—relate to average level of economic development in a cross-country setting. We present the results of some these explorations in Figure 6. There is no attempt to imply any sort of causality here: what we are presenting are merely associations.\textsuperscript{19} The level of satisfaction or the general level of happiness within a population appears to be positively correlated with the level of economic development as measured by per capita expenditure in a country. This is broadly consistent with what has been established in the literature. There is also a negative relationship between the level of expenditures and perceptions of fairness in society, which is

\textsuperscript{19} In fact, if we were to at all push the causality argument, one of the key sources of bias we would have to contend with would be reverse-causality. A society with a more egalitarian distribution of opportunities in the labor markets may be perceived to be a fairer society but it could also be the case that the inherent fairness in the society is what actually makes opportunities more equitable by, say, lowering the overall level of despondence or discouragement among workers of certain types. This and many other sources of endogeneity arising potentially from numerous omitted variables are beyond the scope of this paper.
counter-intuitive. Finally, in Figure 6, we also examine the relationship between our measures of inequality of opportunity in the labor market—the D-index and the Theil index of expenditures—with the level of expenditures. Broadly, it appears that richer countries are also less unequal, by either measure.

Next, working again with country level averages for perceptions, we look at the relationship between life satisfaction and perceptions of fairness on the one hand and measures of inequality in the other. We do this separately for overall inequality as well as inequality of opportunity which is the between group component for the Theil index and the component of D-index attributable to circumstances. The results are presented in Figures 7 and 8 below.

**Figure 7: Perceptions of Life Satisfaction and Fairness and Inequality**

| a. Theil-index and overall life satisfaction | b. D-index and overall life satisfaction |
|------------------------------------------|----------------------------------------|
| ![Graph](image1)                        | ![Graph](image2)                      |

| c. Theil-index and belief in fairness     | d. D-index and belief in fairness       |
|------------------------------------------|----------------------------------------|
| ![Graph](image3)                        | ![Graph](image4)                      |

From the figures, we see that across countries, the average level of life satisfaction or happiness has a robust negative correlation with inequality measured both by the Theil-between component and D-index. The same relationships for perceptions of fairness, on the other hand, appear weaker (and barely distinguishable from zero for the D-index). When we hone in on inequality of opportunity, we see that there is a robust negative correlation between the between component of the Theil index and both life satisfaction and perception of fairness. (See Figure 8) However, for the D-index attributable purely to circumstances, the relationship appears statistically indistinguishable from zero for life satisfaction and, surprisingly, positive for fairness.
While they are informative visually and provide a good summary of these relationships at a cross-country level, the bivariate analyses we present warrant a lot of caution if the goal is to draw inferences. Consider for example, another variable that captures, say, how satisfied one feels with the general state of the economy or how one feels he/she is doing relative to others in the society. These variables are likely to be positively correlated with the assessment of fairness in the society in general. If this is the case, then the omission of these variables in a bivariate setting could have potentially biased the coefficient on inequality downwards. Similarly, there could be other omitted variables biasing the coefficients in the opposite direction.

The data allows us to examine this issue in much more detail at the level of the individual. We estimate a logit model using life satisfaction and perceptions of fairness as dependent variables, and including different measures of inequality at the country level—Gini of consumption, various D-indices and Theil index (between and within components)—as regressors. Since the inequality indices can be highly correlated with each other, they are added one at a time in the regressions. In order to account for individual level characteristics that could potentially confound our inference of the coefficient on an inequality measure, we control for individual and household characteristics, including gender, employment status (whether one holds a job with...
20+ hours of work), age, squared age, educational level, education of the parents, self reported minority status, parents’ participation in/affiliation to the communist party, religious affiliation, and household expenditure. We include country level expenditure and dummy variables for classes of country (in some specifications), to take into account the level of development or average well-being of a country.\textsuperscript{20} We also include additional variables such as expressed opinions regarding democracy, the market economy, the need to reduce inequality through government action, financial situation in the country, and doing better than others in life—all of which are likely to be related to an individual’s “core beliefs” that affect perceptions of fairness and satisfaction in life.\textsuperscript{21}

We could, in principle, use country fixed effects to account for unobserved heterogeneity at the country level in our regressions. But the benefit of doing so—particularly since our measures of inequality are invariant within country—has to be traded off against the multicollinearity that this is likely to induce. Multicollinearity not only inflates the variance potentially making our parameter estimates imprecise, but in extreme cases can also reverse the sign on the coefficients. Alternatively, clustering the standard errors at some geographic level would be necessary to correct for the possible correlation of beliefs within each country, region or locality. We define clusters at the regional level within each country, effectively giving us a total of 350 cluster units (for 29,000 observations) and present those results as a check for robustness.

Our main results are presented in Table 1. Our goal here is to estimate the partial correlations on the key variables of interest (the inequality measures) and not to examine the causal determinants of life satisfaction or perceptions of fairness in the ECA region. For this reason, we are not worried to find low predictive power of our specifications: the R-squared of the full regressions are around 0.20 and 0.05 for measures of satisfaction and perceptions of fairness respectively (see Appendix for full regression results). In general, there appears to be a negative association between country-level measures of inequality on the one hand and measures of life satisfaction and perception of fairness in society on the other. This relationship is robust to the inclusion of personal characteristics of the respondents as well as other beliefs about their society, economy, and their self assessed relative socio-economic position vis-à-vis others in their reference group. The relationship between life satisfaction and inequality indices is also robust to clustering of standard errors at the regional level within each country and inclusion of country class dummies. The relationship between perception of fairness and inequality indices is less robust, as most of the coefficients on inequality indices turn insignificant with clustering of standard errors and/or inclusion of country class dummies.\textsuperscript{22}

\textsuperscript{20} Country classes are CI Middle, CI Low, EU, South East, and Other.

\textsuperscript{21} Dabalen and Paul (2011) have explored the role of historical events in explaining life satisfaction in transition countries using the same dataset that we use. In addition to the variables we use as controls here, they also control for some measure of the emotional state of the respondents during the interview, since that may affect the responses to life satisfaction questions (see Kahneman and Thaler, 2006). In the LiTS survey, enumerators were required to answer the following questions after each interview: “Did you feel that the respondent was reluctant to answer any questions?” and “How often did the respondent have difficulties answering questions?” Dabalen and Paul use the responses to these questions as proxies for the emotional state of the respondent. The results we present here do not condition on these variables; but this is something we could easily do to test the robustness of our findings.

\textsuperscript{22} For detailed results with one of the inequality measures (D-Index for jobs>20 hours of work), see Annex B, table B1. Detailed results for other regressions are available upon request.
Table 1: Partial Correlations of Life Satisfaction and Perceptions of Fairness with Various Measures of Inequality

| Index          | Professional /contract | Job 20h          | Job 20h & tenure | gini         | theil_b (including within component) | theil_w (including between component) | Clustering (country and region level) | Class dummies | Personal characteristics | Other Beliefs |
|----------------|------------------------|------------------|------------------|--------------|--------------------------------------|---------------------------------------|--------------------------------------|---------------|--------------------------|--------------|
|                | Satisfaction          | Fairness         | Satisfaction     | Fairness     | Satisfaction                          | Fairness                             |                                      |               |                          |              |
| dindex         | -0.0376***            | -0.0153***       | -0.0376***       | -0.0153**    | -0.0408***                           | -0.0067                               |                                       | no            | no                       | yes          |
|                | (0.002)                | (0.002)          | (0.005)          | (0.007)      | (0.008)                              | (0.007)                               |                                       | no            | no                       | yes          |
| dindex         | -0.0541***            | -0.0303***       | -0.0541***       | -0.0302***   | -0.0627***                           | -0.024                                |                                       | yes           | yes                      | yes          |
|                | (0.006)                | (0.005)          | (0.012)          | (0.017)      | (0.015)                              | (0.022)                               |                                       | no            | no                       | yes          |
| dindex         | -0.0393***            | -0.0110**        | -0.0393***       | -0.0111      | -0.0509***                           | 0.0089                                |                                       | yes           | yes                      | yes          |
|                | (0.005)                | (0.005)          | (0.013)          | (0.019)      | (0.017)                              | (0.023)                               |                                       | no            | no                       | yes          |
| gini           | -0.0454***            | 0.0018           | -0.0454***       | 0.0018       | -0.0681***                           | -0.0036                               |                                       | yes           | yes                      | yes          |
|                | (0.005)                | (0.004)          | (0.014)          | (0.012)      | (0.011)                              | (0.014)                               |                                       | no            | no                       | yes          |
| theil_b        | -0.1531***            | -0.0670***       | -0.1531***       | -0.067       | -0.1809***                           | -0.0820*                              |                                       | yes           | yes                      | yes          |
|                | (0.014)                | (0.014)          | (0.043)          | (0.051)      | (0.035)                              | (0.050)                               |                                       | no            | no                       | yes          |
| theil_w        | -0.0354***            | 0.0013           | -0.0354***       | 0.0013       | -0.0480***                           | 0.008                                 |                                       | yes           | yes                      | yes          |
|                | (0.003)                | (0.003)          | (0.008)          | (0.009)      | (0.008)                              | (0.010)                               |                                       | no            | no                       | yes          |
| theil_b        | -0.1115***            | -0.0766***       | -0.1115***       | -0.0766      | -0.1220***                           | -0.1040**                             |                                       | no            | no                       | yes          |
|                | (0.015)                | (0.015)          | (0.041)          | (0.051)      | (0.032)                              | (0.050)                               |                                       | yes           | yes                      | yes          |
| theil_w        | -0.0266***            | 0.0069**         | -0.0266***       | 0.0069       | -0.0372***                           | 0.0168*                               |                                       | yes           | yes                      | yes          |
|                | (0.003)                | (0.003)          | (0.007)          | (0.009)      | (0.008)                              | (0.009)                               |                                       | no            | no                       | yes          |

Note: personal characteristics include gender, having a 20h+ job, age and age2, education of the person, education of parents, self reported minority, parents participation in the communist party, religion affiliation. 350 cluster units. Classes are CI MI.

How do the inequality measures perform in these regressions, relative to each other? Among all indices, the between component of Theil has by far the highest partial correlation with life satisfaction and perception of fairness—the correlation with perception of fairness is significant even with clustering of standard errors and country class dummies, when all other inequality measures become insignificant. The Gini of consumption, the within component of the Theil index and the three D-Indices (for three types of job opportunities) all have statistically significant and negative partial correlations with life satisfaction. The D-Indices also have significant correlations with perception of fairness (except with clustering and country class dummies) whereas the Gini and the within component of Theil do not.23

The results for the between and within components of the Theil Index are particularly interesting. When they are both included in the regressions, higher between-group inequality—a measure of inequality of opportunity—is associated with lower life satisfaction and perception of fairness in the society. And higher within-group inequality—the component of inequality that can be attributed to unobserved effort or luck—is also associated with lower life satisfaction, but higher perception of fairness. When the between and within components of Theil are added one at a time in the regressions, the former has significant and negative correlation with life satisfaction.

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23 We also run regressions using the contribution of circumstances to each D-Index (multiplied by the index itself) as the inequality measure. The results using these measures are mixed: the contribution of circumstances multiplied by the D-Index has negative and significant partial correlation with life satisfaction, but the correlation with fairness is unstable and goes in both directions, depending on the specification used.
and perception of fairness, while the latter is correlated with only life satisfaction. Moreover, the between component of Theil and the D-Indices have consistently better correlation with perception of fairness than Gini of income.

Thus on the whole, people’s perceptions of fairness seem to be inversely correlated with the extent of inequality of opportunity for a country, as measured by the between-component of the Theil Index. In contrast, inequality within types (which is not attributable to circumstances) and overall inequality as measured by Gini coefficients do not have significant correlation with perceptions of fairness. To the extent that inequality of opportunity is fundamentally about individuals in society receiving a fair shot (or equal chance) of achieving success, the consistency between our measures and perceptions is noteworthy. Notably, for life satisfaction and perception of fairness alike, inequality between groups differentiated by circumstances seems to matter much more than other components (or overall level) of inequality.

The results also suggest that life satisfaction, and in particular, perception of fairness, has a higher and more robust correlation with the Theil-based measure of inequality of opportunity than the D-Indices of access to jobs (using different criteria of “good” jobs). This suggests that the between-component of the Theil Index has intuitive appeal as a broad measure of inequality of economic opportunities. The uneven correlation of the D-Indices for jobs with fairness is not surprising, given that the perception indicators we have used relate to “life” in general and not just employment. A better “test” of the D-Indices we use would have been a question that asks respondents to rate fairness in job opportunities. Given that perceptions about employment and jobs are unavailable from LiTS, the fact that the D-Indices have some relationship with broader indicators of life satisfaction and fairness perceptions, even after controlling for a long list of personal and country-level factors, should be seen as encouraging.

In light of the contrast between the robust negative relationship between perception of fairness and our measures of inequality in the individual level regressions with the limited correlation between the same measures at the country level, we also examine more closely the potential confounding factors. In particular, we investigate the hypothesis that instead of having isolated individual beliefs about any one issue in particular, people have a body of beliefs that not only guides how they generally feel about various related things, but also influences how they respond to any particular question. We partition our sample into different groups according to their own assessments of their relative economic success and political tendencies and re-examine the fairness-inequality relationship within these partitions (see Appendix B, Table B2). While this requires more detailed examination, initial results suggest that the fairness-inequality relationships do vary a lot from one partition of the sample to another. Inequality measures tend to be more negative and statistically significant in fairness regressions for the samples of individuals who did worse than their peers, favor redistribution, are not satisfied economically, or do not trust markets—all of which seem to be consistent with intuition.

4.3 Comparisons with countries in Latin America and Caribbean

Finally, we compare how the inequality measure (for job opportunities) we have computed for the ECA region compares with those for other regions, particularly a region such as Latin America and Caribbean (LAC) which is known to have high inequality. We use the data from the Latinobarometro surveys to construct equivalent measures of inequality of opportunity in the
LAC region. For both regions, we use an identical definition of opportunity in the labor market: having a salaried job or self-employment activity in a professional occupation as opposed to being unemployed or being employed as a blue-collar worker.\textsuperscript{24} The attributes considered are the individual’s education, age, education of parents, gender, and ethnicity, closely mirroring what we used for the ECA countries earlier, but omitting communist party membership of parents because it is not relevant for LAC countries.\textsuperscript{25}

**Figure 9: Comparison of Inequality in Labor Markets in the LAC and ECA regions**

The results in Figure 9 show the HOI and coverage rate for all countries analyzed in LAC and ECA, where “HOI” is the inequality-adjusted coverage rate of the opportunity considered, with “inequality” in turn referring to unequal coverage across groups differentiated by education, age and circumstances (parental education, gender and ethnicity). Separately, we also graph the D-Indices for each country, as well as the contributions of circumstances, education and age to each D-Index.

\textsuperscript{24} This is similar to one of the opportunities defined for ECA (see Figure 2c), with the minor difference that “salaried worker” is being used now instead of “having a contract” that was used earlier.

\textsuperscript{25} This implies that the “HOI” and D-Indices reported here will be higher and lower, respectively, than those reported for ECA countries for a similar opportunity earlier in the paper (e.g. Figure 2c).
Overall, there is lower coverage and higher between-group inequality in having a salaried job or professional occupation in the LAC region in comparison to countries in the ECA region. The top six LAC countries in terms of HOI and coverage rank higher than just the bottom five of the ECA countries. The comparison should, however, be tempered by important differences between the two regions that would directly affect the measures used here: ECA countries typically have a high rate of “formalization” in the labor market, which is in part a legacy of their past and quite different from what is seen in most LAC countries. In other words, being a salaried worker in one region may not indicate the same outcome in the labor market, relative to not being a salaried worker, as it does in the other region.

The comparison of inequality between the two regions shows that education and circumstances, on the average, contribute about equally to the D-Index in all countries. In fact in most countries in both regions where D-Index is relatively high, education contributes to more than half of the D-Index. On the whole, an important conclusion we draw from this exercise (as well as earlier results in Figure 2) is that education of the worker and the circumstances s/he was born into play important roles in explaining inequalities in the labor market; and the role of education is especially important when the definition of “desirable” labor market outcomes is equated with regular employment in the formal sector.

## 5. Conclusion

In this paper we extend the HOI methodology—commonly used to assess the extent of inequality of opportunity among children—to study inequality of opportunity in labor markets in a number of countries in the Europe and Central Asia region. In addition to computing the absolute magnitude of these inequalities, we also decompose the inequality into contributions related to exogenous circumstances such as gender, parents’ education, parents’ affiliation to the dominant political party, and self reported minority status on the one hand and characteristics such as education and age on the other. To our knowledge, this is the first attempt to compute inequality of opportunity in labor markets in a discrete setting (i.e., where the opportunity relates to a binary outcome variable). Our findings show substantial inequality of opportunity in the labor market, estimated as the contribution of circumstances (that an individual was born into) to between-group inequality in employment status in a number of countries in the ECA region. There is a high degree of heterogeneity across countries in the circumstances that matter the most for inequality, with gender, parental education, and self-reported minority status all mattering to varying degrees in different countries.

In interpreting our results with the HOI-based inequality measures, it is important to recall that the contribution of circumstances to inequality does not include the “indirect” contribution of the same circumstances through the channel of education. As noted earlier, circumstances can also influence the education of a person, which in turn influences the likelihood of getting a job. An important justification for isolating the direct effect of circumstances is that these are likely to be a result of imperfections in the labor market, which are distinct from the inequality attributable to differences in education among the workers that is likely to have occurred at an earlier stage of their lives. This also implies, however, that our estimate of how circumstances contribute to inequality is likely to be an underestimation of the overall contribution of circumstances to
inequality, once the contributions of circumstances to inequality in education achievements (through the “indirect” channel we have ignored) are taken into account.

We supplement this analysis with a number of additional exercises broadly in the spirit of comparing and validating our measure of inequality of opportunity in the labor markets. First, we compute a Theil index of an outcome such as household expenditure and separate the component of the inequality in the outcome that is attributable to circumstances versus the component that is due to unobserved effort or luck. This generates an alternate measure of inequality of opportunity, similar to measures used in the academic literature in the past, for a large number of countries. While the Theil-based measure has low cross-country correlation with the HOI-based measure created with the binary employment variable, this is to be expected given that the two measures are considering very different types of opportunities. Given these differences we conclude that the two types of measures are best seen as complements, rather than substitutes, for each other.

Second, we make use of an extensive module on perceptions and attitudes available in our survey to check the degree to which our measures of inequality resonate with expressed satisfaction with life and perceptions of overall fairness in a country. We find that our measures of inequality resonate fairly well with expressed life satisfaction in expected ways: higher inequality is associated with lower life satisfaction. Interestingly, the component of the Theil measure that is a reasonable measure of inequality of opportunity correlates the best in the expected direction with individual perceptions of fairness, compared to other measures of inequality. The correlation of the various HOI-based indices with perception of fairness is significant in some cases but unstable, which (we hypothesize) may be related to the perception questions being much broader than the relatively narrow area of job opportunities these indices are concerned with. In this context, the fact that the between-group component of the Theil measure, which is about income inequality measured across the entire sample, correlates more closely to broad perceptions about fairness in life, is consistent with our initial expectations. Most of our measures also seem to be better correlated than the Gini of consumption with perceptions of life satisfaction and fairness. Thus the evidence appears to be consistent with the hypothesis that inequality between groups (including inequality attributable to circumstances) matters more for perceptions than overall inequality.

Finally, we also compare our results on the inequality of opportunity in the labor market for countries in the ECA region with results from a number of countries in the Latin America and Caribbean region. Given that our definition of “opportunity” is based on salaried or formal employment, it does not come as a surprise to see that ECA countries do better in coverage and extent of inequality across groups than LAC countries. The results for ECA and LAC, as well as for different definitions of job opportunities in ECA, all suggest that, in countries where inequality is relatively high, the education of the worker, and the circumstances s/he was born into, play equally important roles in explaining inequality in having “good” jobs in the formal sector.
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APPENDIX A

The Issue of Selection

Different groups have different propensities of participating in the labor market. These propensities are influenced by circumstances and characteristics that we may or may not have included in the logit model that has to be estimated when we calculate the HOI. The fact that our job market opportunities are defined only on the set of people who we observe in the labor market creates a selection problem: missing circumstances or unobserved characteristics may drive labor participation. If these variables are correlated with circumstances included in the analysis, then there may be inequality of opportunity embedded in the very choice of being “occupied” which we are unable to account for in the way we are defining our opportunity.

We perform a number of exercises to assess the severity of the selection problem on a subset of seven ECA countries. These exercises are based on work from Dinardo, Fortin and Lemieux (1996), Ferreira and Gignoux (2011), and Campos and Jolliffe (2007). The first correction is based on a judicious choice of a reweighting function. The reweighting is a counterfactual which asks what the inequality in the predicted probabilities of the HOI logit would be if the sample of workers had the same observables characteristics as the entire population. In practice we partition the observations in terms of covariates—creating types—and use the ratio of the sample weight of each type in the sample of all working age adults over the sample weight of the same type in the labor force as a reweighting function Ф. The individual sample weights in the logit are multiplied by Ф. As in Ferreira and Gignoux (2011), we call this counterfactual a correction on observables.

The second correction uses an extreme assumption: all persons out of the labor force could perform no better than their equivalent type in the labor force. We assign to persons out of the labor force the lowest predicted probability of obtaining the opportunity of their type. This emulates a correction on non-observables under the assumption that individual characteristics not measured in our data will select persons out of the labor force in a systematic fashion. In practice, we build a counterfactual D-Index assigning to out of the labor force individuals the lowest probability of their respective type. The third exercise is an extension of the second or the extreme case where we expand the reference group to include all working age persons in the sample. This implies that anyone outside of the workforce is regarded as not having the opportunity of working and the HOI is estimated over the entire sample of working age adults. The results suggest that selection is a non-trivial problem. The upper bound of the inequality index can be more than 50 percent higher than non-corrected numbers. Moreover, selection is likely to be stronger on non-observables, which cannot be easily addressed in the absence of a rich data set with potential instrumental variables. That being noted, the correction on observables or non-observables does not change the ranking or relative degree of inequality of each country in the region. Albeit a lower bound to the actual inequality of opportunity, our measure still conveys relevant information about the countries studied.
Figure A1: The D-Index under different corrections for selection corrections

Note: Opportunity of having a job with more than 20 h per week. Selection on observables partition the data with a dummy on age (youth or under 36 years old), gender, person’s education, and parents education.
### APPENDIX B

Table B1: Relationship of life satisfaction and perceptions of fairness with inequality of opportunity in the labor market (for the opportunity of having a job with 20+ hours of work)

| Good job? | Satisfaction | Fairness |
|-----------|--------------|----------|
| 0.1722*** | 0.1722***    | 0.1675***|
| (0.036)   | (0.055)      | (0.051)  |

| Age       | Satisfaction | Fairness |
|-----------|--------------|----------|
| -0.0504***| -0.0504***   | -0.0645***|
| (0.005)   | (0.007)      | (0.007)  |

| Squared age| Satisfaction | Fairness |
|------------|--------------|----------|
| 0.0005***  | 0.0005***    | 0.0005***|
| (0.0000)   | (0.0000)     | (0.0000) |

| Gender    | Satisfaction | Fairness |
|-----------|--------------|----------|
| -0.0397   | -0.0397      | -0.0296  |
| (0.032)   | (0.048)      | (0.047)  |

| Secondary education | Satisfaction | Fairness |
|---------------------|--------------|----------|
| 0.2570***           | 0.2570***    | 0.1819***|
| (0.047)             | (0.075)      | (0.070)  |

| Vocational training | Satisfaction | Fairness |
|---------------------|--------------|----------|
| 0.0621              | 0.0621       | -0.0802* |
| (0.047)             | (0.082)      | (0.073)  |

| College educated | Satisfaction | Fairness |
|------------------|--------------|----------|
| 0.2213***        | 0.2213***    | 0.1541***|
| (0.057)          | (0.087)      | (0.083)  |

| Coll post | Satisfaction | Fairness |
|-----------|--------------|----------|
| 0.2912*   | 0.2912       | -0.1843  |
| (0.177)   | (0.215)      | (0.211)  |

| Second father | Satisfaction | Fairness |
|---------------|--------------|----------|
| 0.1859***     | 0.1859***    | -0.0936  |
| (0.048)       | (0.070)      | (0.068)  |

| Voc father | Satisfaction | Fairness |
|------------|--------------|----------|
| 0.1151**   | 0.1151*      | 0.0601   |
| (0.045)    | (0.066)      | (0.057)  |

| Father collar degree | Satisfaction | Fairness |
|----------------------|--------------|----------|
| 0.1438**             | 0.1438*      | -0.0742  |
| (0.059)              | (0.081)      | (0.080)  |

| Father coll post | Satisfaction | Fairness |
|------------------|--------------|----------|
| 0.0911            | 0.0911       | -0.0777  |
| (0.223)           | (0.250)      | (0.234)  |

| Parent communist party | Satisfaction | Fairness |
|------------------------|--------------|----------|
| -0.1563***             | -0.1563***   | 0.0703   |
| (0.044)                | (0.073)      | (0.073)  |

| Consider minority | Satisfaction | Fairness |
|-------------------|--------------|----------|
| -0.058            | -0.058       | -0.1042  |
| (0.051)           | (0.069)      | (0.066)  |

| Lexp | Satisfaction | Fairness |
|------|--------------|----------|
| 0.0209*** | 0.0209*** | 0.2808***|
| (0.024)   | (0.053)     | (0.036)  |

| D-index | Satisfaction | Fairness |
|---------|--------------|----------|
| -0.0541*** | -0.0541*** | -0.0627* |
| (0.006)   | (0.025)     | (0.033)  |

| Country exp | Satisfaction | Fairness |
|-------------|--------------|----------|
| 0.1949***   | 0.1949***    | 0.1825***|
| (0.017)     | (0.088)      | (0.078)  |

| Satisfied with the economy? | Satisfaction | Fairness |
|-----------------------------|--------------|----------|
| 1.8749***                   | 1.8749***    | 1.8725***|
| (0.039)                     | (0.101)      | (0.094)  |

| Reduce eco | Satisfaction | Fairness |
|------------|--------------|----------|
| 0.1023***  | 0.1023       | 0.1278*  |
| (0.041)    | (0.077)      | (0.075)  |

| Better now | Satisfaction | Fairness |
|------------|--------------|----------|
| 0.0930***  | 0.0930***    | 1.1103***|
| (0.038)    | (0.066)      | (0.062)  |

| Better demo | Satisfaction | Fairness |
|-------------|--------------|----------|
| 0.2668***   | 0.2668***    | 0.2668***|
| (0.055)     | (0.055)      | (0.056)  |

| Buddhist | Satisfaction | Fairness |
|---------|--------------|----------|
| 0.1435   | 0.1435       | 0.1854   |
| (0.116)  | (0.116)      | (0.115)  |

| Jewish | Satisfaction | Fairness |
|--------|--------------|----------|
| -0.6793*** | -0.6793*** | -0.6600***|
| (0.416)   | (0.286)      | (0.306)  |

| Christian | Satisfaction | Fairness |
|-----------|--------------|----------|
| -0.0996*** | -0.0996*** | -0.0116  |
| (0.053)    | (0.104)      | (0.089)  |

| Muslim | Satisfaction | Fairness |
|--------|--------------|----------|
| 0.2141*** | 0.2141*** | 0.3246*  |
| (0.064)   | (0.222)      | (0.185)  |

| Other Religion | Satisfaction | Fairness |
|----------------|--------------|----------|
| -0.1174       | -0.1174      | -0.1329  |
| (0.141)       | (0.160)      | (0.142)  |

| Cl Mide | Satisfaction | Fairness |
|---------|--------------|----------|
| -0.3883 | -0.3883      | -0.386   |
| (0.222) | (0.384)      | (0.384)  |

| EU | Satisfaction | Fairness |
|---|--------------|----------|
| -0.089 | -0.089 | -0.089 |
| (0.384) | (0.384) | (0.384) |

| Other | Satisfaction | Fairness |
|------|--------------|----------|
| -0.235 | -0.235 | -0.235 |
| (0.335) | (0.335) | (0.335) |

| South East | Satisfaction | Fairness |
|------------|--------------|----------|
| -0.7785** | -0.7785** | -0.2817 |
| (0.312) | (0.312) | (0.312) |

| _cons   | Satisfaction | Fairness |
|---------|--------------|----------|
| -1.7829*** | -1.7829*** | -1.8321***|
| (0.212)   | (0.514)      | (0.550)  |

| r2_p | Satisfaction | Fairness |
|------|--------------|----------|
| 0.1992 | 0.1992 | 0.2097 |
| (0.0414) | (0.0414) | (0.0414) |

| N | Satisfaction | Fairness |
|---|--------------|----------|
| 28717 | 28717 | 28717 |
| (28243) | (28243) | (28243) |

| Clustering (country and region level) | Satisfaction | Fairness |
|---------------------------------------|--------------|----------|
| No | Yes | Yes | No | Yes | Yes |

| Country group dummies | Satisfaction | Fairness |
|-----------------------|--------------|----------|
| No | Yes | Yes | No | Yes | Yes |

| Personal characteristics | Satisfaction | Fairness |
|--------------------------|--------------|----------|
| Yes | Yes | Yes | Yes | Yes | Yes |

| Other Beliefs | Satisfaction | Fairness |
|---------------|--------------|----------|
| Yes | Yes | Yes | Yes | Yes | Yes |
Table B2: Perceptions of fairness and inequality in various subsamples

|                | Did better | Did worst | Redistribution | No redistribution | Satisfied econ | Not Satisfied econ | Market better | Market worst | Democracy better | Democracy worst |
|----------------|------------|-----------|----------------|-------------------|---------------|-------------------|--------------|--------------|-----------------|----------------|
| gini           | -0.023***  | -0.003    | -0.005         | -0.019***         | 0.005         | -0.036***         | 0.011*       | -0.087***    | 0.021***        |                |
|                | (0.009)    | (0.005)   | (0.006)        | (0.010)           | (0.005)       | (0.007)           | (0.005)      | (0.006)      | (0.006)         |                |
| thell_w        | -0.008     | 0.004     | 0.003          | -0.009            | -0.023***     | 0.021***          | -0.027***    | 0.018***     | -0.024***       | 0.020***       |
|                | (0.007)    | (0.004)   | (0.003)        | (0.008)           | (0.009)       | (0.003)           | (0.006)      | (0.004)      | (0.004)         | (0.005)        |
| thell_b        | -0.025***  | -0.004***  | -0.003***      | -0.009***         | -0.115***     | -0.062            | -0.087***    | -0.042*      | -0.106***       | -0.188***      |
|                | (0.002)    | (0.017)   | (0.019)        | (0.038)           | (0.040)       | (0.015)           | (0.016)      | (0.018)      | (0.011)         | (0.021)        |
| diindex        | -0.025*    | -0.031***  | -0.018***      | 0.001             | -0.099***     | -0.037***         | -0.023***    | -0.038***    | -0.089***       | -0.081***      |
|                | (0.012)    | (0.005)   | (0.003)        | (0.013)           | (0.011)       | (0.006)           | (0.005)      | (0.006)      | (0.007)         | (0.007)        |

Note: Personal characteristics include gender, having a 20+ job, age and age^2, education of the person, education of parents, self-reported minority, parents' participation in the communist party, religion affiliation.