



## Education and Life Satisfaction: Perception or Reality?

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## Abstract

Using data from the Gallup World Poll, this paper analyze the way in which perceptions on the quality of education affect wellbeing. In addition, we explore if educational quality perceptions are determined by objective educational outputs, such as international standardized tests scores (i.e. PISA scores) and individual educational attainment. Results indicate that educational quality perceptions are positively correlated with standardized test scores but negatively correlated with individual educational attainment. Similarly, favorable perception on the quality of education contributes to higher individual wellbeing, even after controlling for individual educational attainment and other traditional determinants of wellbeing.

**Key words:** Wellbeing, educational quality perceptions, educational outcomes.

**JEL Classification:** I20, I31.

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## **I. Introduction**

A consistent finding in recent research on wellbeing is the large influence of non-financial variables on self reported satisfaction. As underscored by Amartya Sen, among others, factors such as health, freedom of expression and the possibility to use ones' capabilities, may be determinants, in part, of an individual's happiness. In other words, income and consumption are two variables among life's many dimensions which may be associated with wellbeing. In the tradition started by Easterlin (1974), this study focuses on some non-income determinants of human wellbeing.

Education is one of the pillars of development, being both an end in itself and a mean towards the attainment of higher income, equity, and personal self fulfillment. As such, the expansion of education has often been hailed as a priority in both developed and developing nations. Development studies have long emphasized that the quality of education provided is as important, or even more, as the quantity of education (i.e. years of schooling and enrollment rates) received by the population, particularly among the poor.

This is particular relevant for Latin America where, as Navarro (2007) mentions, significant increases in educational expenditures, as well as in enrolment rates, have not resulted in proportionate progress in economic growth nor in declines in income inequality. Consequently, much of the debate now focuses on ways to improve quality of education and provide better access to the poor. However, little or no attention has been placed on people's perceptions of education quality, their relationship with wellbeing, and the way in which these variables can influence policy.

Perceptions are not only important on their own, as a crucial component of individual welfare, but they might play an important role in the formulation of public actions and the allocation of government expenditures. Indeed, perceptions may be a powerful instrument to shape public policies, in the sense that citizens have the power to translate what they regard as needs into policy demands to their local or national government. If perceptions are dissociated from reality, then policy demands can result in suboptimal policy actions. But even if we ignore policy implications, perceptions can directly affect wellbeing, so they are important in their own right. Thus, it is important to understand how perceptions are shaped and, more importantly, how they impact life satisfaction.

The purpose of this paper is to analyze the determinants of individual perceptions regarding the quality of the educational system and its effect on wellbeing. In particular, we want to understand whether educational quality perceptions replicate objective educational outputs, such as standardized tests scores and individual educational attainment. Additionally, we seek to establish whether perceptions on education matter for three dimensions of life satisfaction: (i) overall life satisfaction, (ii) satisfaction with living standards, and (iii) satisfaction to choose freely over one's life. Given that educational outcomes explain a great deal of the perceptions about the quality of the educational system, we want to understand whether the latter still matter for wellbeing, after controlling for individual educational outcomes.

Even though results are robust to different specifications and remain unchanged when estimations are conducted using country averages instead of individual data, it is necessary to underline a caveat. Given our framework, we interpret our results in causal terms, where education quality perceptions and education output determine life satisfaction. Nonetheless, there might be an endogeneity problem, due to the fact that overall life satisfaction may affect educational quality perceptions. Therefore, results should be interpreted carefully.

More concretely, the paper addresses two main research questions: 1) Are objective measures (e.g. test scores and individual educational attainment) important in the formation of perceptions about educational quality? 2) Are educational quality perceptions and educational outcomes relevant for wellbeing? To explore this set of questions we use a multi-country approach based on the Gallup World Poll surveys (2006 and 2007 waves).<sup>1</sup>

Our results indicate that objective measures of educational quality (at the country level) determine individual perception of the quality of education. In particular, people (individuals and business managers) in countries with higher scores on standardized tests report to be more satisfied with the quality of education in their city and country. Similarly, educational quality perceptions affect self-reported wellbeing at the individual level, once we control for other variables that have been identified in the literature as important determinants of perceived happiness (i.e. age, sex, marital status, income, employment status, etc.). People satisfied with the educational system of the city or area where they live report higher satisfaction in the three different dimensions analyzed. A remarkable result is that the positive relationship between educational quality perceptions and wellbeing indicators is independent of objective educational output at the individual level (i.e. highest level of education completed), suggesting that perceptions are relevant on their own.

This paper is organized as follows. Section II briefly discusses the limitations of working with self-reported measures of life satisfaction and summarizes some results consistently found in the literature. Section III describes the datasets to be used in the empirical analysis. Section IV presents some descriptive statistics of the educational quality perceptions, educational output and wellbeing measurements using the 2007 wave of the Gallup World Poll, and thus, focusing on Latin America. The empirical exercises that address the research questions are contained in Section V, while Section VI concludes.

## **II. Self-Reported Satisfaction Data and Determinants of Quality of Life**

As Graham (2008) points out, while psychologists have long used surveys of reported wellbeing to study welfare, economists have only recently begun to study them thoroughly, in an attempt to complement income-based measures of welfare. This approach relies on expressed preferences instead of revealed preferences because in ‘happiness surveys’ (or surveys with ‘happiness questions’)

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<sup>1</sup> Our goal is to complement the analysis presented in this paper with a country focused paper on Colombia, using the *Encuesta Social* (wave 2007) of Fedesarrollo, which also contains information on education quality perceptions, educational output and on socioeconomic characteristics of the respondent.

respondents are directly asked how satisfied they are with their life in a scale which varies depending on the survey.<sup>2</sup>

Without doubt, the approach presents many methodological challenges.<sup>3</sup> Self reported perspectives may be affected by the mood of the respondent at the moment of the survey or by a particular idiosyncratic unobserved event. Similarly, unobserved personality traits and correlated measurement errors may be a source of bias when conducting statistical inferences with this type of questions. Nonetheless, reliability studies indicate that reported subjective wellbeing is moderately stable and error measurement is uncorrelated with observed variables and likely to average out in representative population samples (Kahneman and Krueger, 2006).<sup>4</sup> This has permitted to obtain remarkably consistent patterns in the analysis of the determinants of wellbeing.

A widely studied topic in happiness economics is the relationship between income and wellbeing. As reviewed by Frey and Stutzer (2002a), most studies find that at a given place and at a given moment in time, richer people, on average, report higher subjective wellbeing, suggesting that “income buys happiness”. This is true also for country averages: wealthier countries, on average, are happier than poor countries. However, according to the *Easterlin Paradox* increases in per capita income over time are not translated in higher overall life satisfaction. This is the case of western countries such as United States, the United Kingdom, Belgium and France, where per capita income has risen sharply while life satisfaction has remained constant.<sup>5</sup> Recently, this paradox has been confronted by Stevenson and Wolfers (2008), who use multiple rich datasets to establish a clear relationship between GDP per capita and average wellbeing indicators, with no evidence of a satiation point beyond which wealthier countries have no further increases in their happiness. Nonetheless, the debate continues.

Other studies, such as Guven and Sorensen (2007), have shown that relative income, not the absolute level, is the important element to explain happiness, since people usually evaluate themselves in comparison to others. In the same way, others have researched the reversed causality between income and happiness; that is, the effect of happiness on income, finding that people reporting higher overall life satisfaction perform better in the labor market and tend to earn higher salaries (Diener *et al.* 1993).

A related question addressed in the literature deals with the effect of income inequality on self reported wellbeing. In a study comparing the United States and Europe, Alesina, Di Tella and MacCulloch (2004) find a large, negative, and significant effect of inequality on happiness in the latter but not in the former. A reasonable explanation is that inequality affects Europeans due to their low social mobility. This result extends to Latin American countries, where wellbeing is reduced

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<sup>2</sup> For example, the Gallup World Polls asks in a scale ranging from 0 to 10, while the Euro-barometer’s scale goes from 1 to 4.

<sup>3</sup> For a detailed description see Frey and Stutzer (2002).

<sup>4</sup> Ehrhardt, Saris and Veenhoven (2000) also demonstrate that subjective wellbeing indicators are reasonable stable, change with life occurrences and wellbeing present a high correlation when taken within a two week difference.

<sup>5</sup> A common interpretation of the Easterlin Paradox is the aspirations theory, according to which happiness is determined by the gap between aspirations and achievement, and aspirations increase along with income, so that after a point, further increases in income don’t raise happiness.

by inequality, indicating that inequality in this region signals persistent disadvantage rather than opportunity (Graham, 2008).

Self reported satisfaction data has also been used to disentangle the effect of personal employment and macroeconomic variables, such as inflation, on the level of wellbeing. As summarized in Frey and Stutzer (2002a), different studies show that personal unemployment is welfare reducing. Interestingly, the effect is diminished when the unemployment rate is high, suggesting that the stigma of not having a job is attenuated if many others are found to be in the same situation. Likewise, inflation negatively affects wellbeing, once controlling for unemployment rate.

Institutional arrangement and political factors also matter when explaining wellbeing. Existing evidence indicates that democratic governments and the possibility to participate in public decision making enhance individually self reported satisfaction with life. Similarly, much of the literature finds that trust and other variables related to the concept of social capital have positive effects on wellbeing.

Economists have also studied the link between individual characteristics and reported wellbeing. Marriage raises reported welfare, as documented by a large set of studies for different countries and time periods. Regarding age, Deaton (2007) finds that age profiles of life satisfaction vary significantly from country to country, sometimes exhibiting the inverse U shape predicted by Oswald (1997) and Blanchflower and Oswald (2000), but often showing no particular pattern. Other intrinsic personal traits such as race, gender and status, all seem to be highly significant determinants of self reported welfare.

On average, people belonging to minority ethnic groups (blacks, indigenous, etc.) report to be less satisfied with their past, current and future situation. However, when other socioeconomic variables such as income and employment are considered, the effect loses significance, suggesting that it is not race but circumstances related to race that affect wellbeing. Finally, a higher social status increases perceived welfare (reflecting the importance of relative income), while females tend to be happier than men (a result that can be associated with emotional and psychological differences).

Regarding a central aspect of our analysis, the effect of educational attainment on overall life satisfaction, results are mixed. Earlier work by Wilson (1967) shows a positive, strong correlation between education attainment and life satisfaction. Similar conclusions are met by Di Tella et al. (2002), who used psychological data from Europe and the United States to prove that higher education affects positively self reported wellbeing. Frey and Stutzer (2002b) also obtain a positive correlation, even after taking in account factors that are considered a channel through which education may influence wellbeing, such as income, and health. Recent work by Blanchflower (2008) also shows that life satisfaction is higher for the more educated.

On the other hand, Helliwell (2002), analyses measures of subjective wellbeing from three successive waves of the World Values Survey and finds no effect of increasing levels of educational attainment, both at the individual and national level. The author argues that this effect maybe already captured through higher income, better health and higher trust levels as well as higher political participation rates among the most educated. Similar results are obtained by Schwarze and Winkelmann (2005), using data from the German Socio-Economic Panel, which provides the advantage of being able to

include individual fixed effects, which may capture unobservable characteristics that could bias statistical results.

### **III. The data**

To study the link between educational quality perceptions and wellbeing we use mainly the Gallup World Poll (or Gallup Survey) in a multi-country approach. The analysis is complemented with the use of two international standardized tests measuring quality of education (PIRLS and PISA) and the 2006 Global Competitiveness Report (GCR). This section provides a brief description of the data used.

- Gallup survey: the Gallup World Poll is an extensive database on quality of life from household surveys in around 80 countries, many of them from Latin America. As explained in detail in the following sections, the survey enquires on self-reported perceptions on educational quality, educational attainment and socioeconomic background. We use the 2006 and 2007 waves, noting that the latter only covers Latin American and North American countries.
- International standardized tests measuring quality of education: PIRLS and PISA. The 2001 PIRLS database contains reading scores for 4th grade students, while the 2003/2006 PISA dataset contains math literacy, problem solving, reading and scientific literacy scores for 15 year old students. In all cases, the scores are comparable among countries and thus, can be used as an objective measure of educational quality.
- Global Competitiveness Report (GCR) -World Economic Forum: covering 125 economies, the report assesses the ability of countries to provide high levels of prosperity to their citizens. It provides information on institutions, infrastructure, macroeconomic variables, health and primary education, markets' efficiency, technology and innovation and business development. Of particular interest is the respondents' (mostly from businesses) assessment on whether the educational system of their country meets the needs of a competitive economy.

### **IV. Educational quality perceptions, educational outputs and wellbeing in Latin America**

Throughout the analysis, three indicators of educational quality perceptions (*EQP*) and one on education accessibility are used. Three of them come from the following Gallup World Poll questions, waves 2006 and 2007:

- *In the city or area where you live, are you satisfied (1) or dissatisfied (0) with the educational system or the schools?*<sup>6</sup>

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<sup>6</sup> We use only observations from individuals reporting having children under 16 (to capture the opinion of those closer to the educational system).

- *Generally speaking, would you say the education that college students receive in this country is of superior or inferior quality than that of most countries?*<sup>7</sup>
- *Is education in [country] accessible to anybody who wants to study, regardless of his or her economic situation, or not?*

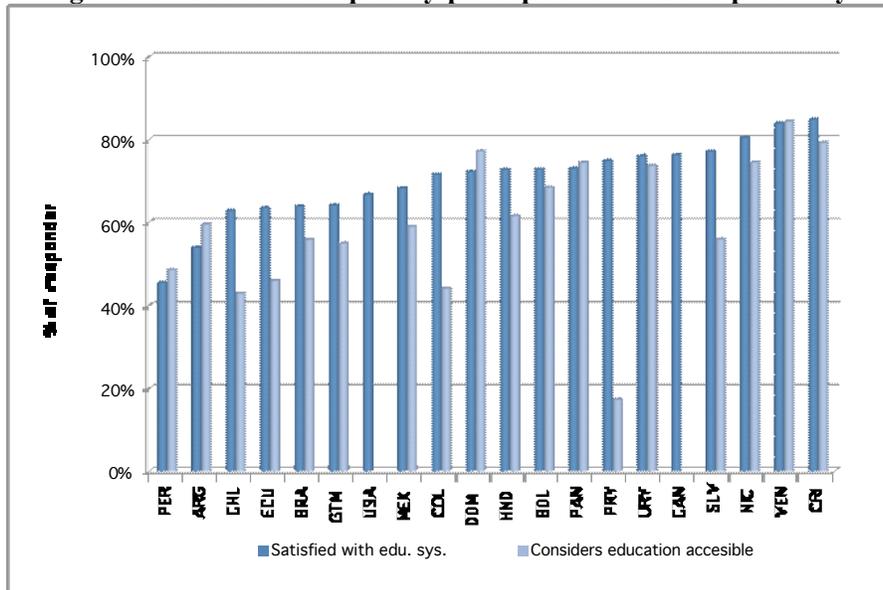
Figure 1 depicts the first and third indicators of EQP for a set of twenty Latin American countries in the year 2007. In both cases, average perceptions vary significantly from one country to another. While in Peru only 45% of the respondents are satisfied with the educational system, in Venezuela and Costa Rica this percentage rises to more than 80%. In a similar fashion, while in Venezuela 84% of the respondents consider that education is accessible regardless of socioeconomic considerations; in Paraguay only 17% share this opinion. A surprising fact is that perceptions on the educational system are not higher in the United States (66%) and Canada (76%). Contrary to our priors, Figure 2 shows that educational quality perceptions (at the individual level) do not vary considerably with income level, even though individuals in the highest income quintile are slightly less satisfied with the educational system and consider that education is accessible in a lesser proportion. Interestingly, a higher proportion is satisfied with the educational system than with education accessibility. The picture of how perceptions on the educational system change by income holds for every country in Latin America, except for Bolivia and Honduras.

As can be expected, perceptions may differ from objective indicator of what is being measured. For example, Chile is widely recognized for the numerous reforms introduced since 1990 in order to improve the coverage and quality of education (Navarro, 2007), but only 63% of Chileans are satisfied with the education system. Similarly, it is particularly surprising that less than 20% of the respondents in Paraguay consider education to be accessible irrespective of income given that enrollment rates for youngsters of 6 to 7, 8 to 13 and 14 to 18 years are, respectively, 94%, 98.1% and 75% (CAF, 2007).

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<sup>7</sup> In the 2007 wave, this question is only available for two out of twenty countries, so it is not considered in the descriptive statistics of this year and in the econometric exercises of that year.

**Figure 1. Educational quality perceptions in Gallup Survey**



Source: Gallup World Poll 2007.

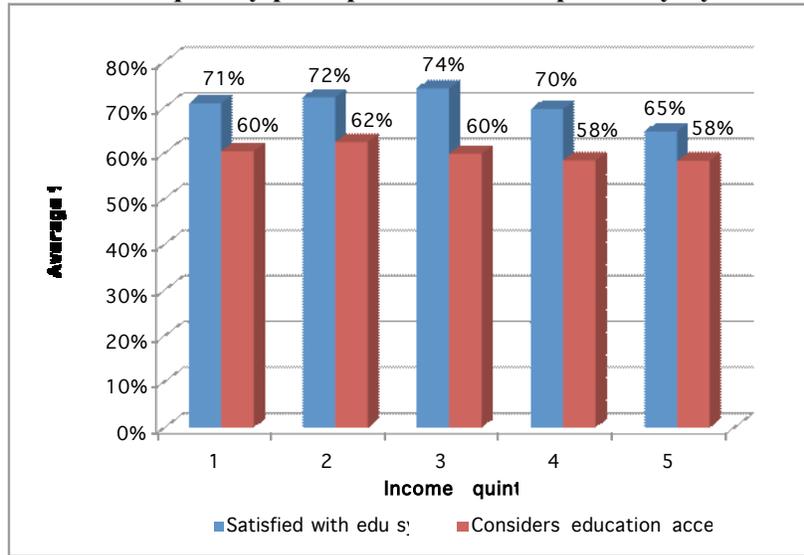
The fourth indicator comes from the Global Competitiveness Report and captures the managers' average perception on the education quality of the labor force in a particular country, measured in a 1 to 7 scale. More precisely,

- *The educational system in your country 1=does not meet the needs of a competitive economy, 7=meets the need of a competitive economy.*

Again, as shown in Figure 3, educational quality perceptions are heterogeneous throughout the region. In this case, the two high income countries (US and Canada) score 5 points, followed by Costa Rica (4.1). On the other hand, business managers in Bolivia, Peru and Paraguay do not consider that the educational system provides the appropriate tools for the labor force in those countries. Clearly, perceptions from the Gallup World Poll do not necessarily match perceptions from the GCR, suggesting that ordinary people and business managers may not coincide in their assessment of the educational system for a particular country.

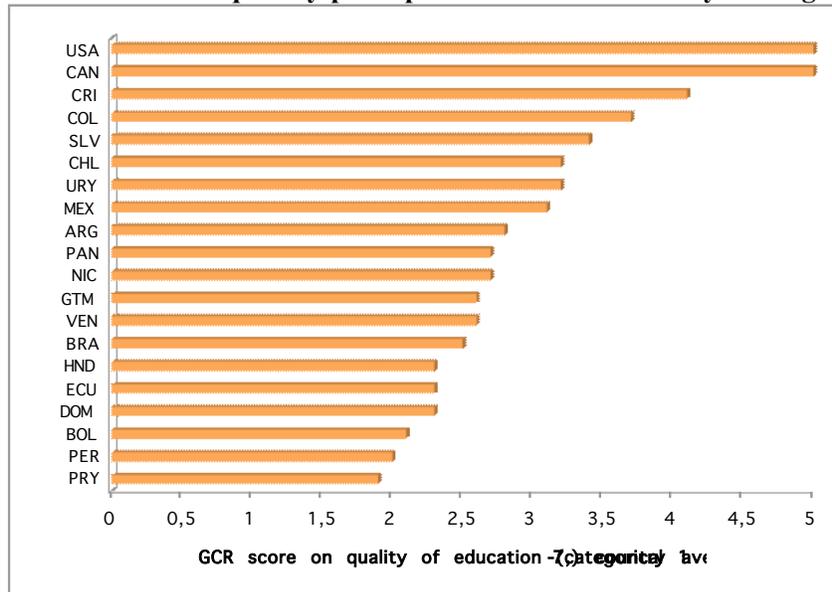
A central aspect of the analysis is the reference group to which respondents compare when asked for the quality of education. The first of the indicators refers to the education quality of the city (area) compared to other cities (areas), while the other refers to the education system of the country compared to other countries.

**Figure 2. Educational quality perceptions in Gallup Survey by income quintiles**



Source: Gallup World Poll 2007.

**Figure 3. Educational quality perceptions in GCR country averages, 2006**



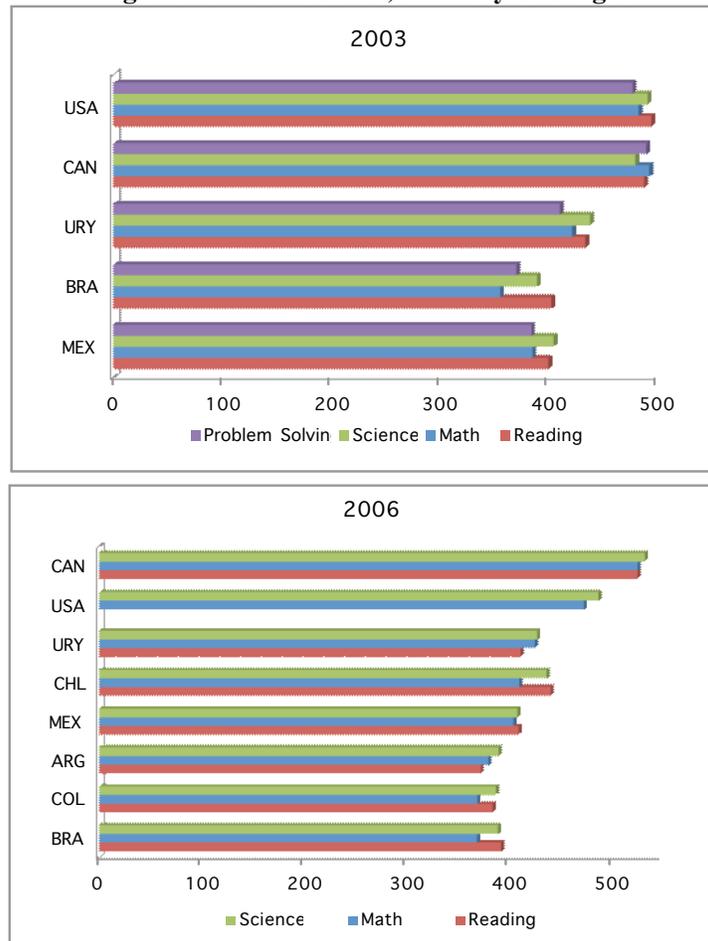
Source: Global Competitiveness Report 2006.

Regarding the measurements of educational output (*EO*), we consider scores in reading, math, science, and problem solving tests from PISA 2003 and 2006<sup>8</sup> and the reading scores from PIRLS 2001, at the national level. Unfortunately, PISA 2003 scores are only available for five countries (United States, Canada, Uruguay, Brazil and Mexico) and the PISA 2006 for eight (the same five plus Chile,

<sup>8</sup> The problem solving scores are not available in the PISA 2006 data.

Argentina and Colombia), as shown in Figure 4. On average, and as with the CGR 2006 data, the United States and Canada score better in all test areas. The rest of the countries in the sample report similar average scores, and in every case (year and country) math scores are lower and the other areas' scores.

**Figure 4. PISA scores, country averages**



Source: PISA.

The 2007 wave of the Gallup World Poll contains information on individual educational attainment (albeit only for Latin American countries). The fact that it is possible to trace the respondent's highest educational level completed is crucial for this paper. However, a note of caution is relevant because education categories vary from country to country, so we used the broadest category definitions and recoded all the observations in the surveys. More concretely, we used categorical variables ranging from 1 (no level of education completed) to 10 (post-graduate studies). The complete set of categories is: 1-None, 2-Incomplete primary, 3-Complete primary, 4-Incomplete secondary, 5-Complete secondary, 6-Incomplete technological, 7-Complete technological, 8-Incomplete college, 9-Complete college and 10-Post-graduate studies.

Figure 5 presents the average educational level completed in each country. As expected, the United States and Canada present the highest attainment. The average respondent in the U.S. has completed technological studies (and completed high school and begun some technical studies in Canada). Using

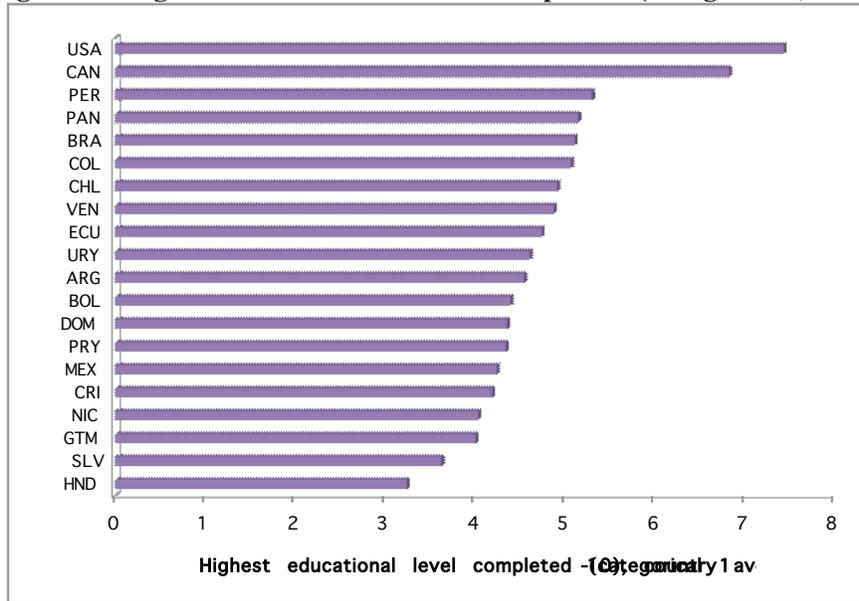
country specific information on the equivalence of educational level in terms of years of schooling, and assuming that when an individual reported not to have finished a level, he was able to complete half of the years required to attain that level, we computed the corresponding years of schooling for each individual observation. For example, if a person reported incomplete secondary (or high school) and in his country secondary entails six years of schooling (in addition to ones needed to complete primary, not in absolute value), then he would be imputed the years of schooling corresponding to primary level plus three more years.

The country averages of the estimated years of schooling are shown in Figure 6. When comparing to the country ranking when educational level attained is used, several changes arise due to the fact that education levels have different equivalent years of schooling across countries, but no significant differences are visible (with the exception of Brazil). Nonetheless, we use the categorical variable to avoid biases arising from strong assumptions and because the years of schooling variable is still not continuous.

Regarding highest educational level attained, there is significant variance across Latin American countries. While in Peru, Panama, Brazil and Colombia, complete secondary is the average level attained, in most Central American countries average respondents rarely reach that stage (with the exception of Panama). As anticipated, income and educational attainment are positively correlated (see Figure 7). In quintiles 1 and 2, the average individual completed primary, while in quintiles 4 and 5 the average education levels are complete secondary and incomplete technological studies, respectively. This is true also at the country level.

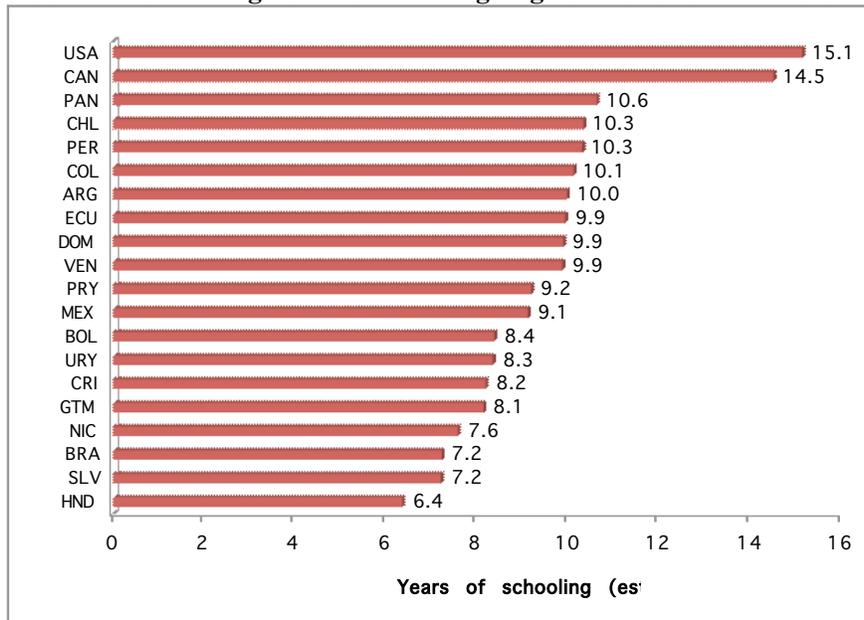
Importantly, there is significant variation of the educational level *within* each country. Figure 8 presents a box graph of the variable for the LAC countries in the sample, which summarizes the median (line inside the box), the upper and lower quartiles (Q1 and Q3, upper and lower edges of the box also known as the inter-quartile range), and the upper and lower adjacent values (median plus and minus 1.5 times the inter-quartile range), represented by the 'whiskers' of the graph. In countries like Peru, Nicaragua, Guatemala and Bolivia, the dispersion is large suggesting that there are large differences the educational attainment within the population. In the other countries in the sample, with the exception of Guyana, Honduras and Panama, the dispersion is lower, but nonetheless considerable.

**Figure 5. Highest level of education completed (categorical, 0-10)**



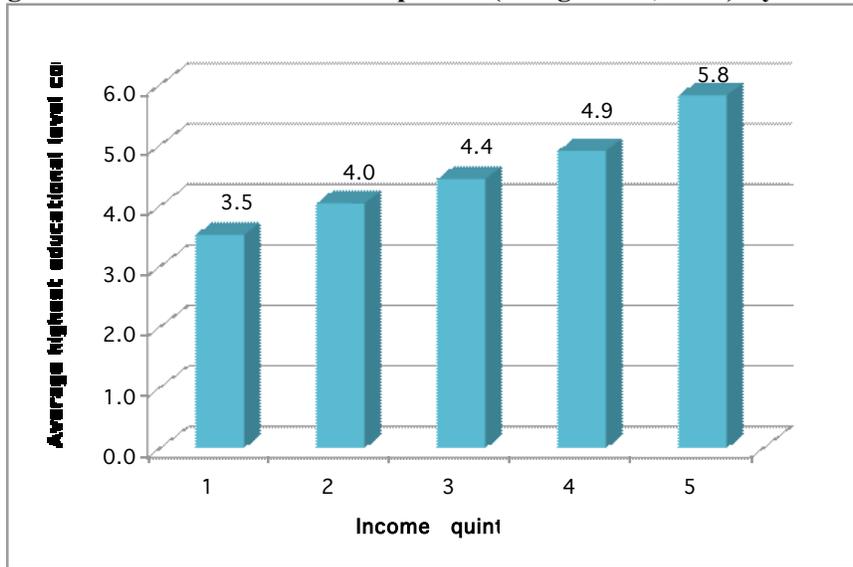
Source: Authors' calculations using Gallup World Poll 2007.

**Figure 6. Years of schooling estimated using highest level of education completed**



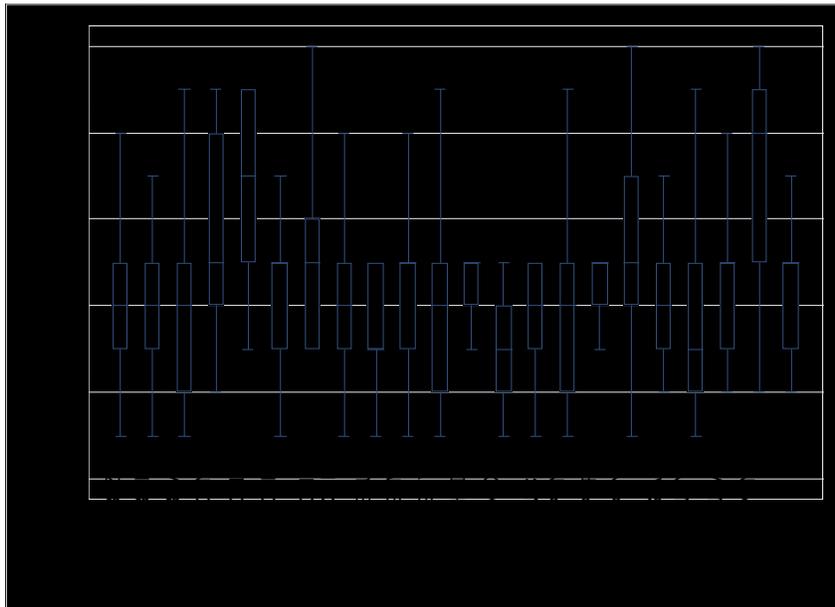
Source: Authors' calculations using Gallup World Poll 2007.

**Figure 7. Highest level of education completed (categorical, 0-10) by income quintiles**



Source: Authors' calculations using Gallup World Poll 2007.

**Figure 8. Box graph of highest level of education attained, (categorical, 0-10)**



Source: Authors' calculations using Gallup World Poll 2007.

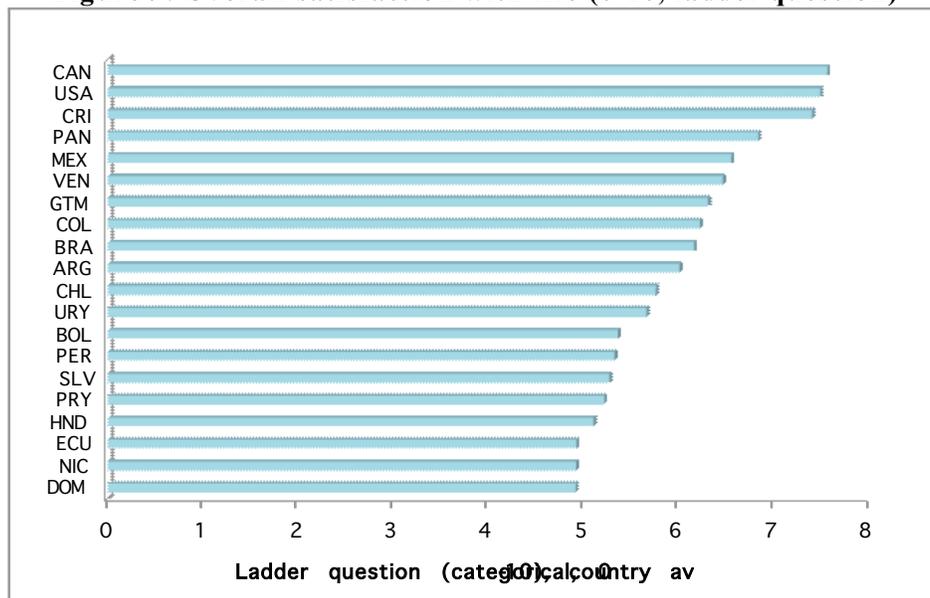
As indicators of wellbeing, we use the following three questions of the Gallup World Poll (2006 and 2007 waves):

- From zero to ten, where do you personally feel at this time, assuming that the higher score the better you feel about your life, and the lower score the worse you feel about it? (Also known as the ladder question of wellbeing).
- Are you satisfied (1) or dissatisfied (0) with your standard of living, all the things you can buy and do?
- (In your country) Are you satisfied (1) with the freedom to choose what you do with your life?

Although the ladder question is closer to the broader of wellbeing that frames this paper, the life satisfaction and freedom questions proxy for general concept wellbeing from two different perspectives: material and non material wellbeing.

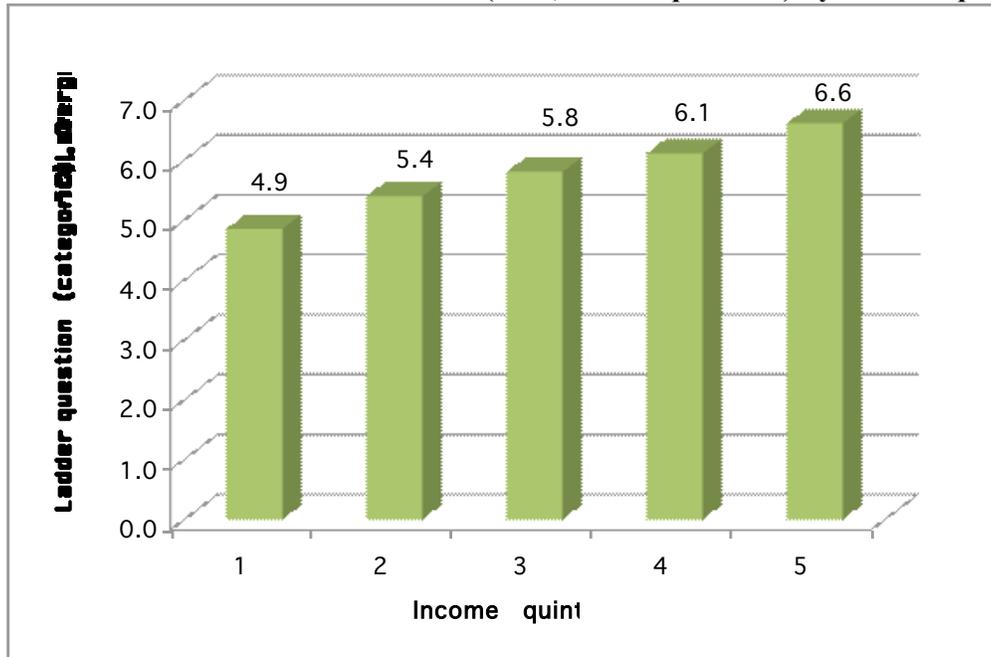
Canada and the United States present the highest averages of overall satisfaction with life, in a scale from 0 to 10 (7.6 and 7.5, respectively) (see Figure 9). Of the Latin American countries, respondents in Costa Rica, Panama and, to a lesser extent, Mexico, also report high satisfaction levels. The data confirms that there are substantial differences across Latin America, and that it would be a mistake to ignore country specific factors in the analysis of wellbeing. As with the educational attainment variable, there is considerable variation among the respondents within each country, as shown in Figure 11. The dispersion is lower in the developed countries of the sample (United States and Canada), as well as in Ecuador and Paraguay, and higher in most Central America. Figure 10 presents average response to the ladder question by income quintiles. Consistent with previous findings in the literature, self reported wellbeing increases with income. Individuals belonging to the highest 20% of the sample reported an average life satisfaction of 6.6, while those in the lowest 20% averaged 4.9. The highest change in average scores (0.5 in a 0 to 10 scale), occurs between quintile 1 and 2.

**Figure 9. Overall satisfaction with life (0-10, ladder question)**



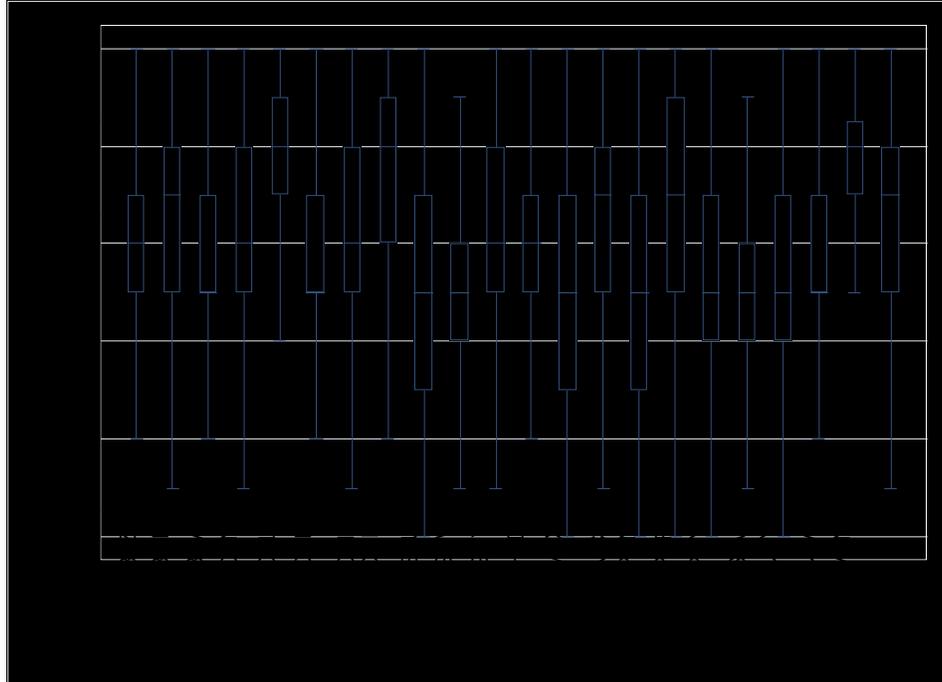
Source: Gallup World Poll 2007.

**Figure 10. Overall satisfaction with life (0-10, ladder question) by income quintiles**



Source: Gallup World Poll 2007.

**Figure 11. Box graph of ladder question (categorical, 0-10)**

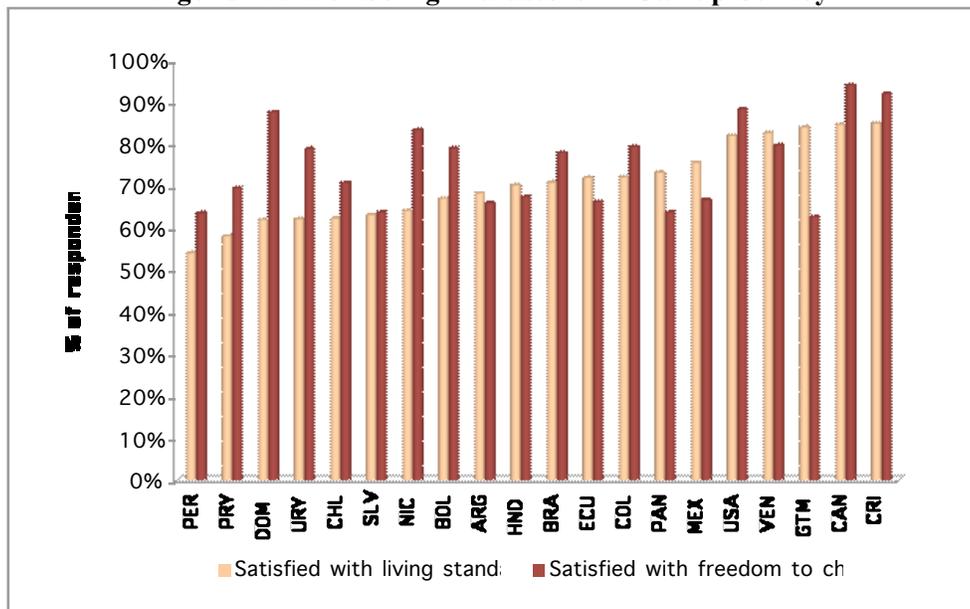


Source: Authors' calculations using Gallup World Poll 2007.

Figure 12 presents the other two wellbeing indicators found in the Gallup World Poll, satisfaction with living standards and satisfaction with freedom to choose over your life. Once more, there is significant dispersion across the region. The two extremes are Peru- where only 55% of the respondents are pleased with their living standards- and Costa Rica –where a remarkable 85% of the respondents report satisfaction with their living standards. Venezuela and Guatemala report similar average levels of satisfaction with standards of living to those in the United States and Canada (i.e., around 80%). As for the satisfaction with the capacity to decide freely upon one’s life, average satisfaction levels are higher than with living standards, but not necessarily coincident, which confirms that these two variables capture different dimensions of overall life satisfaction. Therefore, it is likely that factors determining one of them may not inevitably determine the other, or at least, in the same direction, as confirmed in the empirical exercises of the following section.

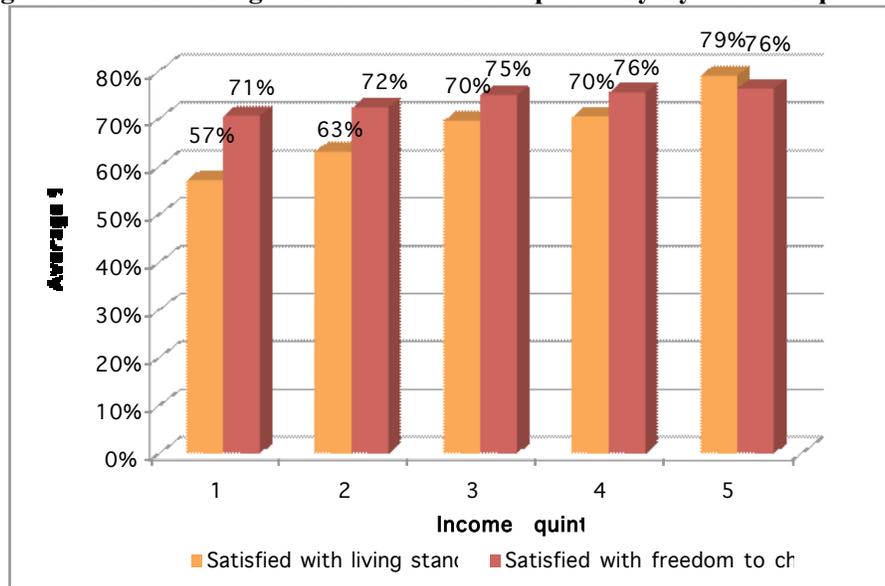
As with the ladder question, satisfaction with living standards is higher for individuals with higher income, as shown in Figure 13. The average percentage of respondents fulfilled with *all the things that they can buy and do* (as the questions asks) in quintile 5 is around 80%, while in the case of quintiles 1 and 2 it is 57% and 63%, respectively. This is not the case with the third wellbeing indicators available in the Gallup World Poll, freedom to choose upon one’s life. A plausible explanation is that this is a non-monetary dimension of wellbeing, more dependent on factors such as the political regime of the country and repressive actions from various groups, than on personal income. This pattern holds as well at the country level.

**Figure 12. Wellbeing indicators in Gallup Survey**



Source: Gallup World Poll 2007.

**Figure 13. Wellbeing indicators in Gallup Survey by income quintiles**



Source: Gallup World Poll 2007.

## V. Understanding educational quality perceptions and their effect on wellbeing

Breen and Goldthorpe (1997) develop a model of educational decision making, where families make rational choices on their children's quality of education based on the concordance of the quality of education they observe they children are obtaining and the expected results of that education in terms of social mobility.<sup>9</sup> Among many other factors, such as socioeconomic level and the education attainment of the parents, an important element that may affect these subjective opinions of both actual educational quality and future expected returns is the country's performance in international standardized tests, such as the ones described in the previous section.

An initial exploration of how educational quality perceptions found in the 2006 wave of the Gallup World Poll change with an actual indicator of educational quality, the PISA 2003 scores in three areas –reading, math and science– is depicted in Figure 14. Each point in the plot represents the country average of both variables and the line is a locally weighted OLS regression<sup>10</sup>, which indicates the strength and direction of the relationship. In the three cases, there seems to be a non-linear relationship between the two dimensions: higher education output increases education quality perceptions until a point. After a threshold, higher scores do not necessarily translate into a higher opinion of the education system. However, as will be seen subsequently, when controlling for other

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<sup>9</sup> We thank Carolina Florez and Maria Soledad Herrera for introducing us to this literature.

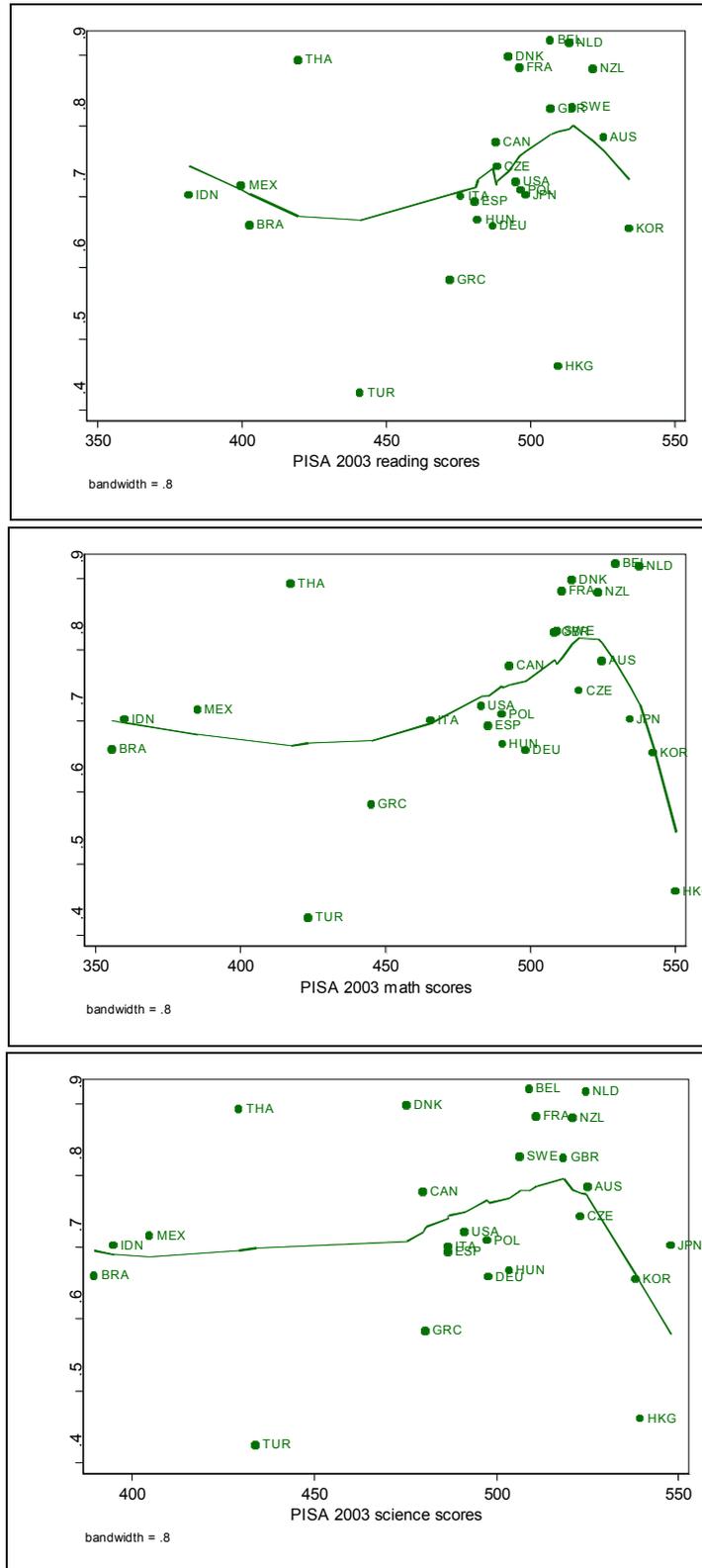
<sup>10</sup> Locally weighted OLS is a non-parametric estimation that obtains smoothed values for each  $y_i$  by locally regressing each point  $(x_i, y_i)$  and a small set of data near that point. The regression is weighted so that the central point gets the highest weight and points farther away receive less weight. The estimated regression line is then used to predict the smoothed value  $\hat{y}_i$  for  $y$  only. The procedure is repeated to obtain the remaining smoothed values, which means that a separate regression is performed for every point in the data.

potential determinants of educational quality perceptions, mainly socioeconomic characteristics at the individual and national level, this non-linearity disappears.

Similarly, as mentioned above, perceptions are an important component of wellbeing together with other circumstances such as income, unemployment, inequality and family status. Moreover, it is well established now that education is a key element for economic success, both at the personal and national level. Consequently, better perceptions on the quality of the educational system of their country, city or area, should increase people's overall satisfaction with life. Education, particularly high quality education, represents social mobility and opportunities, which can be interpreted as higher future income, social status, or simply, satisfaction with new knowledge.

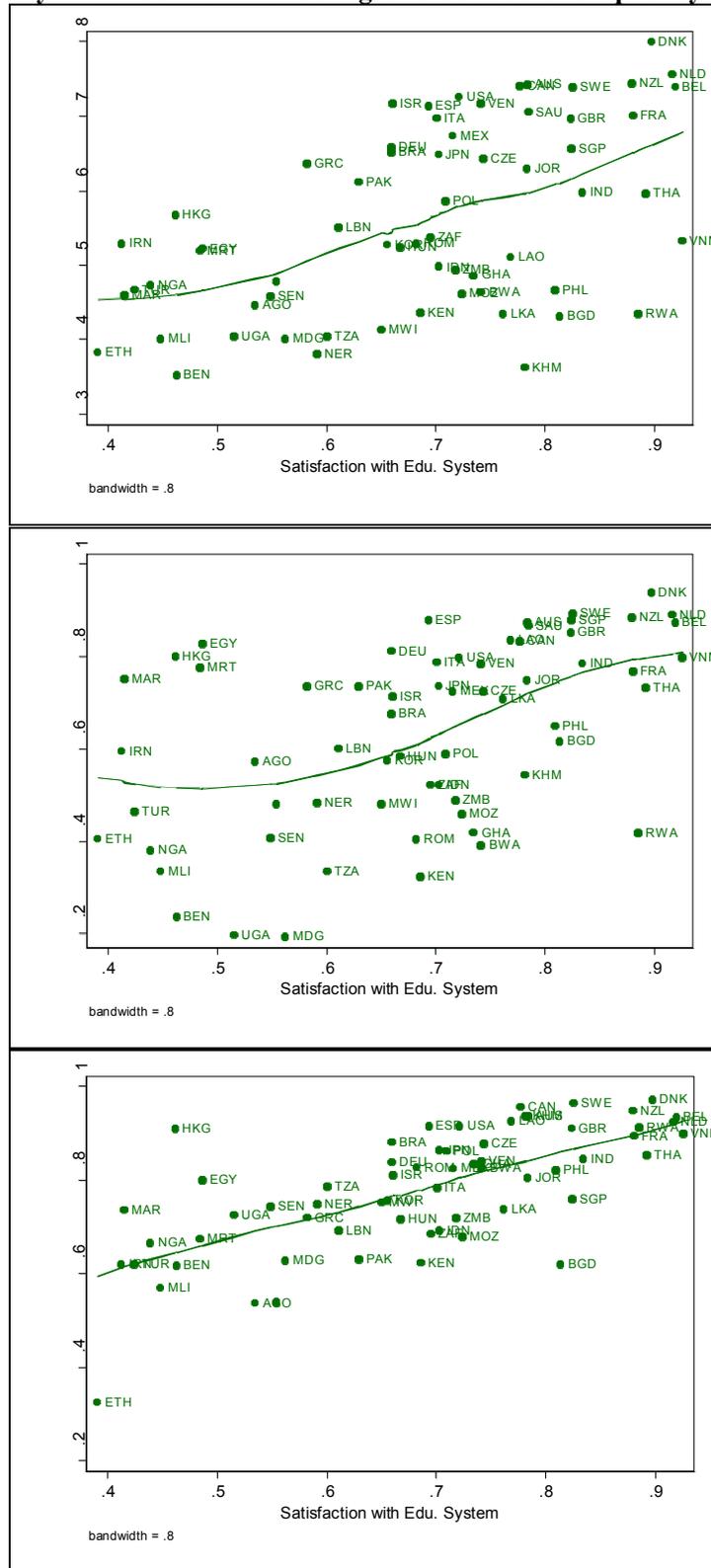
Figure 15 explores the relationship between self reported wellbeing and educational quality perceptions using the 2006 wave of the Gallup World Poll. We use the three wellbeing indicators aforementioned and the variable describing satisfaction with the educational system. In all three cases, wellbeing is associated with better educational quality perceptions. However, the relation seems stronger (and linear) with overall satisfaction (ladder variable) and satisfaction with freedom to choose, as will be confirmed by the subsequent econometric exercises.

Figure 14. Stylized facts on educational quality perceptions and education output



Source: Authors' calculations using 2006 Gallup Survey.

Figure 15. Stylized facts on wellbeing and educational quality perceptions



Source: Authors' calculations using 2006 Gallup Survey.

### a) Determinants of educational quality perceptions

The first task to be addressed is to understand how are educational quality perceptions (EQP) formed. In particular, it is relevant to establish if people's EQPs are based on education outputs or if they are independent of objective measurements of education outcomes, such as aptitude tests and individual education attainment.

It must be noted that educational quality is a broad concept, including other dimensions different from standardized tests. This is particularly true within the context of a household, where factors such as location, facilities, integral education, and reputation may also be important. Aware that educational quality might not be entirely captured by standardized tests, we use this information because it is comparable across countries. Also, there is wide recognition of standardized test scores as accurate proxies of educational quality.

The econometric analysis is based on the estimation of the following model with individual level data:

$$EQP_{(i,j)} = \alpha_0 + \alpha_1 EO_{(i,j)} + \alpha_2 S_{i,j} + \alpha_3 SC_{i,j} + \alpha_4 C_{i,j} + \alpha_5 OP_{i,j} + \alpha_6 W_{i,j}^t + \alpha_7 CC_j + \varepsilon_{i,j} \quad (\text{Eq. 1})$$

Where  $i$  indexes individuals and  $j$  denotes countries,

- $EQP_{(i,j)}$  is the satisfaction of with the school system (1,0) [Source: Gallup World Poll]. Alternatively, we use the managers' average perception on the educational system in country  $j$  measured in a scale from 1 to 7 (in this case the subscript  $i$  is dropped) [Source: GCR from the WEF]<sup>11</sup>.
- $EO_{(i,j)}$  represents country  $j$  average scores for the PISA 2003/2006 and PIRLS 2001 tests (reading, math, science and problem solving) or the highest level of education of individual  $i$  in country  $j$  (measured as a categorical variable ranging from 1 to 10 or by 9 dummy variables for each educational category, excluding the category no education). Source: PISA, PIRLS and Gallup World Poll.
- $S_{i,j}$  (*socioeconomic controls set*) are socioeconomic characteristics: zone (urban or rural, 1,0), male (1,0), age, age squared, married (1,0), employed (1,0), monthly household income (PPP dollars), number of adults in the household, and access to electricity (1,0), clean water (1,0) and telephone (1,0). Source: Gallup World Poll.
- $SC_{i,j}$  (*social capital controls set*) measures social capital with dummy variables from the Gallup World Poll. Specifically, if the respondents trust family and friends in difficult times, if one can progress in life with hard work, if the individual trusts the national government and the police, and if the individual thinks corruption is widespread in business and the government.
- $C_{i,j}$  (*city and country perceptions controls set*) contains variables capturing individual's satisfaction with other dimension of life. These are binary variables indicating whether the person is satisfied with the city where he/she lives and whether the person considers that the country's current economic conditions are good. A categorical variable (in a 0 to 10 scale) that captures the individual's perception on the country's current situation is also used.

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<sup>11</sup> Naturally, in this case all the individuals of country  $j$  are assigned the same value of the variable.

- $OP_{i,j}$  (*other perceptions controls set*) includes binary variables relating to other perceptions of the respondent, in concrete if the respondent is satisfied with his current housing and with its personal health status, again from the Gallup World Poll.
- $W_{i,j}^t$  (*emotional status controls set*) are wellbeing perceptions by the individual referring to other time periods (past and future). In particular, we use overall satisfaction with life five years before the survey as perceived by the respondent at the moment of the survey (categorical variable ranging from 0 to 10) and overall satisfaction with life in the future (five years ahead) as perceived by the respondent at the moment of the survey (categorical variable ranging from 0 to 10). These variables are critical since they allow us to control for the emotional state of the respondent at the moment of the survey and, partially, for the respondent's inherent psychological traits (i.e. structural optimism or pessimism). Source: Gallup World Poll.
- $CC_j$  (*country controls set*) includes log of 2005 GDP per capita (in PPP dollars,  $\ln gdp05$ ), 2006 inflation rate ( $\ln f$ ), GINI coefficient (more recent available,  $gini$ ), education  $gini$ <sup>12</sup> ( $egini$ ) and dummies for world income group -low, middle, upper middle, developing, high OECD, high non-OECD-. Source: IDB Research Department Database and Thomas, Wang and Fan (2001).
- Finally,  $\varepsilon_{i,j}$  is an error term, which is assumed to be clustered at the country level.

We estimate equation 1 using a probit model on the EQP variable that takes the value of one if the respondent is satisfied with the educational system of the area/city of residence. We use a standard OLS when EQP is measured as the country average of the managers' perception on the competitiveness of the educational system. In both cases (and in all empirical exercises from now on), we restrict the sample to individuals reporting having children younger than 16 years old, and thus, closer to the actual quality of the education system, and used robust standard errors to correct for any heteroskedasticity.

Before we focus on the interplay between educational output and perceptions, it is relevant to discuss the relationship between various socioeconomic variables and educational quality perceptions. Satisfaction with the educational systems decreases with age and with the number of household members. Also employed individuals seem to be less satisfied with the educational system. On the other hand, married individuals, as well as those in households with higher income and better household characteristics (such as having access to running water and electricity) report better educational perceptions. As can be seen from the table, results vary slightly depending on the data used and also, although not shown, on the indicators of educational quality perceptions and educational output included in the exercise.

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<sup>12</sup> As calculated by Thomas, Wang and Fan (2001).

**Table 1. Satisfaction with educational system (1 is satisfied, 0 if not)  
Probit estimation - marginal effects - errors clustered by country**

	2006†	2007‡
PISA 2003 mean reading scores	0.0033 [5.83]***	0.0047 [3.47]***
l(urban)	0.0636 [0.95]	-0.0146 [0.30]
l(male)	-0.0052 [0.32]	
Age	-0.0049 [1.26]	-0.0079 [7.10]***
Age2	0.0001 [1.14]	0.0001 [3.38]***
l(married)	0.0568 [5.53]***	0.0282 [3.98]***
l(employed)	-0.0157 [0.38]	-0.0169 [1.85]*
Number of household members over 15	-0.0189 [6.20]***	
Household income US\$ PPP (monthly)	0.0001 [2.57]**	0.0001 [1.52]
l(running water)	0.1447 [6.83]***	
l(electricity)	0.1118 [2.04]**	
l(telephone)	-0.0102 [0.25]	
Observations	1,981	1,119
Pseudo R-squared	0.142	0.082

Robust z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

† Controls: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls.

‡ Controls: zone, age, age2, married, employed, income, social capital, city and country perceptions, other perceptions, welfare, lngdp05, gini and egini.

Table 2 presents the marginal coefficients of the probit estimation of  $\alpha_1$  throughout the different specifications, using the information from the 2006 and 2007 waves of the Gallup World Poll. Although the number of observations is significantly reduced due to limited availability of the standardized test scores and some country controls, the estimation shows that educational output at the national level positively affects individual educational quality perceptions. This is true for the scores of all the fields of the PISA 2003 and 2006 tests (except for the latter using the 2007 Gallup data), but not for the reading scores of the PIRLS 2001 test. In short, an additional point in the country average score of PISA (ranging from 200 to 600), increases the probability that a person living in that country is satisfied with the local educational system by 0.3% (range goes from 0.2% to 0.5%).

As mentioned in Section II, a major concern when assessing subjective satisfaction responses is the presence of unobserved characteristics, such as optimism and pessimism (trait factors), that may bias the results, constraining generalizations from the empirical exercises. In order to overcome this obstacle, Van Praag and Ferrer-i-Arbonell (2008) suggest a methodology to control for this

element<sup>13</sup>. It basically consists of extracting the individual personality trait factor from different questions related to distinct satisfaction domains posed to the same respondent. The intuition is that individual personality factor would bias the answers to these questions in the same direction; say for example an optimist will overrate both his satisfaction with life and his perception of the country's situation.

In brief, the procedure is to individually regress each satisfaction dimension or question against the same set of explanatory variables, estimate the predicted residual of each regression, and obtain the common factor of these residuals using the principal component method. The underlying assumption is that the most important omitted variable in the regression is the personality trait element, and that it should be the common factor of the residuals.

**Table 2. Satisfaction with educational system (1 is satisfied, 0 if not)**  
**Probit estimation of  $\alpha_1$  - marginal effects - errors clustered by country**

	2006			2007		
	Coefficient	Obs.	Pseudo squared	Coefficient	Obs.	Pseudo squared
<b>PISA 2003</b>						
Reading scores (mean)	0.0033 [5.83]***	1,981	0.142	0.0047 [3.47]***	1,119	0.082
Math scores (mean)	0.003 [5.83]***	1,981	0.141	0.0034 [3.47]***	1,119	0.081
Science scores (mean)	0.0028 [5.83]***	1,981	0.143	0.0041 [3.47]***	1,119	0.080
Problem solving scores (mean)	0.0025 [5.83]***	1,981	0.142	0.0052 [3.47]***	1,119	0.081
<b>PISA 2006</b>						
Reading scores (mean)	0.003 [2.49]**	5,652	0.071	-0.00002 [0.04]	2,109	0.076
Math scores (mean)	0.0033 [3.29]***	5,951	0.073	-0.0003 [0.42]	2,109	0.077
Science scores (mean)	0.002 [1.83]*	5,951	0.067	0.0007 [0.89]	2,109	0.078
<b>PIRLS 2001</b>						
Reading scores (mean)	0.0029 [0.39]	1,123	0.110	0.0673 [3.19]***	639	0.093

Robust z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

† Controls for PISA 2003 and PIRLS 2001: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls. Controls for PISA 2006: socioeconomic, famfri, hardwork, cuposcou, other perceptions, welfare, lngdp05, gini, egini and income dummies.

‡ Controls for PISA 2003 and 2006: zone, age, age2, married, employed, income, social capital, city and country perceptions, other perceptions, welfare, lngdp05, gini and egini. Controls for PIRLS 2001: socioeconomic, social capital, city and country perceptions, other perceptions, welfare, lngdp05, gini and egini.

As the different satisfaction dimensions, we use the following six variables: current, past and future life satisfaction ladder questions and current, past and future perception of country situation (also categorical variables ranging from 0 to 10). Table 3 presents the correlation matrix of these dimensions, showing that they are good candidates, in addition the fact that they are phrased similarly and have the same range. As common regressors, we use the set of socioeconomic, social capital and country controls variables described previously.

<sup>13</sup> Ideally, one would like to account for it, via individual fixed effects using panel data. Unfortunately, the World Gallup Poll is no a panel survey.

As shown in Table 4, the effect of education output on the satisfaction remains unchanged when controlling for personality traits using the 2006 Gallup data, but is lost when the Latin American data (2007 data) is used.

**Table 3. Correlation matrix of satisfaction variables†**

	Current satisfaction with life (1-10, ladder question)		Satisfaction with life five years ago (1-10)		Satisfaction with life five years ahead (1-10)		Current satisfaction with country (1-10)		Satisfaction with country five years ago (1-10)		Satisfaction with country five years ahead (1-10)	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Current satisfaction with life (1-10, ladder question)	1	1										
Satisfaction with life five years ago (1-10)	0.081	0.087	1	1								
Satisfaction with life five years ahead (1-10)	-0.051	-0.067	0.064	0.242	1	1						
Current satisfaction with country (1-10)	0.033	0.002	0.045	0.196	0.455	0.149	1	1				
Satisfaction with country five years ago (1-10)	0.061	-0.025	0.063	0.243	0.289	0.161	0.771	0.639	1	1		
Satisfaction with country five years ahead (1-10)	0.032	-0.075	0.066	0.135	0.358	0.385	0.367	0.351	0.446	0.371	1	1

†All correlations significant at 90% level

**Table 4. Satisfaction with educational system (1 is satisfied, 0 if not)**

**Probit estimation of  $\alpha_1$  - marginal effects - errors clustered by country – controlling for personality**

	2006			2007		
	Coefficient	Obs.	Pseudo R squared	Coefficient	Obs.	Pseudo R squared
<b>PISA 2003</b>						
Reading scores (mean)	0.0029 [2.53]**	4,294	0.095	-0.0191 [1.28]	1,005	0.046
Math scores (mean)	0.0031 [5.09]***	4,294	0.100	0.0017 [1.28]	1,005	0.046
Science scores (mean)	0.0023 [3.37]***	4,294	0.095	0.0033 [1.28]	1,005	0.046
Problem solving scores (mean)	0.0026 [4.02]***	4,294	0.098	0.0037 [1.28]	1,005	0.046
<b>PISA 2006</b>						
Reading scores (mean)	0.0022 [1.46]	4,442	0.058	0.00020 [0.98]	1,991	0.053
Math scores (mean)	0.0032 [3.04]***	4,724	0.062	0.0003 [0.98]	1,991	0.053
Science scores (mean)	0.0016 [1.45]	4,724	0.056	0.0004 [0.98]	1,991	0.053
<b>PIRLS 2001</b>						
Reading scores (mean)	0.0003 [0.10]	3,084	0.089	0.0559 [3.57]**	639	0.072

Robust z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

† Controls for PISA 2003 and PIRLS 2001: socioeconomic, social capital, personality and country controls.

Controls for PISA 2006: socioeconomic, famfri, hardwork, personality, lngdp05, gini, egini and income dummies.

‡ Controls for PISA 2003 and 2006: zone, age, age2, married, employed, income, social capital, personality, lngdp05, gini and egini.

Controls for PIRLS 2001: socioeconomic, social capital, personality, lngdp05, gini and egini.

In the case of individual educational outcomes, i.e. the highest level of education attained in its categorical version, the marginal effect is negative and significant, as shows the first column of Table 5. The result suggests that as individuals become more educated, their standards to evaluate the quality of education are raised, and therefore their assessment is less favorable. This finding is confirmed by the result shown in the second column, where it is clear that the higher the educational

level attained, the larger the negative impact over educational quality perceptions. For example, having completed postgraduate studies diminishes the probability of satisfaction in 32% while having completed technical studies in 10%. The general idea is that higher education creates more awareness about the limitations of the schooling system. Interesting, the effect is nonlinear as it tends to increase more than proportionally with educational attainment. Columns three and four show that results are robust when controlling for estimated personality traits.

The findings remain constant if the educational quality perceptions indicator from the 2006 Competiveness Report is used as the dependent variable (see Table 6). A 1% increase in the mean score of the PISA standardized tests, regardless of the field and year of the test, is associated with a 2.5% increase in the businessmen perception of education quality (ranging from 1 to 7). As before, it seems that individual perceptions reflect the PISA tests but not the PIRLS 2001 tests, although this does not imply that the latter are not an accurate proxy of the quality of education across the world. Once more, the right hand panel shows that results remain unchanged using Van Praag and Ferrer-i-Carbonell (2008) methodology to control for unobservable personality traits.

**Table 5. Satisfaction with educational system (1 is satisfied, 0 if not)**  
**Probit estimation of  $\alpha_1$  - marginal effects - errors clustered by country**

	2007		2007	
	(1)	(2)	(3)	(4)
Highest level of education completed† (categorical)	-0.0248 [7.22]***		-0.0246 [6.04]***	
l(Incomplete primary)		0.027 [0.71]		0.0385 [1.02]
l(Complete primary)		0.04 [0.93]		0.0488 [1.22]
l(Incomplete secondary)		0.0476 [1.12]		0.0575 [1.43]
l(Complete secondary)		-0.0267 [0.54]		-0.0111 [0.24]
l(Incomplete technical school)		-0.069 [1.32]		-0.0679 [1.17]
l(Complete technical school)		-0.0962 [1.65]*		-0.0923 [1.79]*
l(Incomplete university studies)		-0.0909 [1.75]*		-0.0743 [1.51]
l(Complete university studies)		-0.1109 [2.31]**		-0.0958 [1.91]*
l(Postgraduate studies)		-0.3281 [3.38]***		-0.3249 [3.64]***
Obs.	4,945	4,956	4,961	4,972
Pseudo R-squared	0.101	0.104	0.088	0.091

Robust z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

† Controls: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls.

‡ Controls: socioeconomic, social capital, personality and country controls.

To test for robustness, we also estimated the model using country averages instead of individual values (considering that the units of observation for the standardized test scores are countries). The results are unchanged except for the effect of the math and science PISA 2003 test scores on educational quality perceptions, which lost significance. In another set of exercises we used as indicators of educational quality the assessment of college education in the country compared to other countries and the accessibility of education. However, the results were neither significant nor robust. Finally, we did not find that the relationship between educational output and educational

quality perceptions changes with gender, age and income. That is, the interaction between the educational output variables and some individual's key characteristics did not come out significant.

**Table 6. Perception on the quality of the educational system (GCR 2006), logs  
OLS estimation of  $\alpha_1$  - errors clustered by country**

	2006			2006		
	Coefficient	Obs.	R-square	Coefficient	Obs.	R-square
<b>PISA 2003</b>						
Reading scores (log of mean)	2.3546 [2.19]*	2,190	0.778	2.082 [2.71]**	4,427	0.521
Math scores (log of mean)	2.5064 [4.06]***	2,190	0.906	2.0337 [3.22]***	4,427	0.672
Science scores (log of mean)	2.4638 [3.82]**	2,190	0.900	1.7944 [2.34]**	4,427	0.560
Problem solving scores (log of mean)	2.2496 [3.18]**	2,190	0.879	1.7288 [2.63]**	4,427	0.594
<b>PISA 2006</b>						
Reading scores (log of mean)	2.989 [2.51]**	2,410	0.667	2.0383 [2.20]**	4,592	0.536
Math scores (log of mean)	3.2927 [3.89]***	2,410	0.807	1.9972 [2.88]***	4,876	0.637
Science scores (log of mean)	3.0493 [3.70]**	2,410	0.741	1.8266 [2.29]**	4,876	0.538
<b>PIRLS 2001</b>						
Reading scores (log of mean)	-1.6274 [1.15]	1,171	0.545	-1.1592 [1.95]*	3,206	0.479

Robust t statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

† Controls: socioeconomic, social capital, city and country perceptions, other perceptions, welfare, lngdp05 and egini.

‡ Controls: socioeconomic, social capital, personality, lngdp05 and egini.

## b) Effect of educational quality perceptions on reported wellbeing

The next question to be addressed is if educational quality perceptions affect wellbeing once we control for the standard determinants of life satisfaction mentioned in Section II. For the econometric analysis we use the three indicators of wellbeing described in section IV (ladder question, satisfaction with living standards and satisfaction with freedom to decide upon one's life) plus three measures of EQP (satisfaction with educational system, college education relative to other countries, and accessibility of education). We also use the question of the Global Competitiveness Report on the quality of the educational system as perceived by the business community.

The reduced model for the econometric analysis capturing the effect of EQP on wellbeing is described by Equation 2:

$$W_{i,j} = \beta_0 + \beta_1 EQP_{i,j} + \beta_2 S_{i,j} + \beta_3 SC_{i,j} + \beta_4 C_{i,j} + \beta_5 OP_{i,j} + \beta_6 W_{i,j}^t + \beta_7 CC_j + \varepsilon_{i,j} \quad (\text{Eq. 2})$$

Where, as before,  $i$  indexes individuals and  $j$  denotes countries. All variables are as defined in Equation 1 and errors are clustered by countries.

As before, we start by discussing some the results related to the set of socioeconomic controls, before we engage in a more detailed analysis of the effects of EQP on wellbeing, which is our main focus. The results reported in Table 7 confirm the findings of previous studies reviewed in Section II. For

example, wellbeing decreases with age and with the number of household members, but increases with marriage, employment and, importantly, with household income. Similarly, men report to be less satisfied with life. For the most part, these results hold through the analysis with the other wellbeing and educational quality perception measurements. Nonetheless, results do not hold when we control for estimated individual personality traits.

**Table 7. Overall satisfaction with life (0-10, ladder question)  
OLS estimation - errors clustered by country**

	2006†	2007‡
Satisfaction with educational systems in area/city (1 if satisfied)	0.1491 [2.55]**	0.1326 [1.82]*
l(urban)	-0.0914 [1.17]	-0.0926 [1.10]
l(male)	-0.1443 [1.88]*	-0.0138 [0.28]
Age	-0.0305 [2.69]**	-0.0216 [1.93]*
Age2	0.0004 [2.49]**	0.0002 [1.64]
l(married)	0.198 [3.27]**	0.0873 [1.39]
l(employed)	0.1244 [1.95]*	0.0904 [1.44]
Number of household members over 15	-0.0254 [1.67]	-0.0566 [1.45]
Household income US\$ PPP (monthly)	0.0002 [2.83]**	0.0001 [4.58]***
l(running water)	-0.0479 [0.29]	0.2878 [2.82]**
l(electricity)	0.0696 [0.87]	0.4931 [3.36]***
l(telephone)	0.2613 [1.82]	0.2274 [2.97]***
Observations	3,633	5,678
R-squared	0.569	0.428

Robust t statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

†Controls: socioeconomic, social capital, satcity, ecoconcou, ecoconbet, other perceptions, welfare and country controls.

‡Controls: socioeconomic, famfri, hardwork, gvmt, police, other perceptions, welfare and country controls.

We now move to the relationship between educational quality perceptions and wellbeing in detail, that is the estimate of  $\beta_1$ , with different indicators. Results from the OLS estimation for the ladder question using the different educational quality perceptions are shown in Table 8. As expected, favorable education quality perceptions enhances individual's wellbeing. Satisfaction with local educational system increases reported wellbeing by 0.13-0.14, in a 0 to 10 scale. Accessibility to education also has a positive impact on wellbeing (by 0.20 in the 2007 exercise). Finally, college education and the variable from the Global Competitiveness Report are not significant.

**Table 8. Overall satisfaction with life (0-10, ladder question)  
OLS estimation of  $\beta_1$  - errors clustered by country**

	2006†			2007‡		
	Coefficient	Obs.	R-squared	Coefficient	Obs.	R-squared
Satisfaction with educational systems in area/city (1 if satisfied)	0.1491 [2.55]**	3,633	0.569	0.1326 [1.82]*	5,678	0.428
College education is superior (1 if satisfied)	-0.1602 [1.40]	1,173	0.348			
Education is accessible (1 if yes)	0.2234 [1.14]	1,200	0.347	0.2035 [3.66]***	5,707	0.428
Quality of educational system, 2006 (Competitiveness report, 1 - 7, logs)	-0.1645 [0.26]	3,693	0.565	0.5078 [1.65]	5,797	0.430

Robust t statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

†Controls: socioeconomic, social capital, satcity, ecoconcou, ecoconbet, other perceptions, welfare and country controls.

‡Controls: socioeconomic, famfri, hardwork, gvmt, police, other perceptions, welfare and country controls.

Another point raised by Van Praag and Ferrer i Carbonell (2008) is that questions like the ladder question may neglect the cardinal information of the responses. For instance, even if the possible answers to this question are only integers, a response 7 can refer to any number between 6.55 and 7.45. To overcome this limitation, he proposes the COLS procedure, which basically consists in the cardinalization of the original ladder question. More specifically, it first assumes that any of the responses can correspond to an interval of range 1 (for example, answer 5 corresponds to the interval [4.5,5.5], answer 6 to [5.5,6.5] and so on; extreme values are treated as follows: 1 correspond to [0,0.5] and 10 to [9.5,10]). Then it is possible to construct a variable ZCOLS as follows:  $ZCOLS = E[Z|u_{i-1} < Z < u_i]$ , where Z is N(0,1) distributed and the  $u_i$  term come from the interval values as defined above.

Instead of the original values, we estimated the regressions using the transformed variable as dependent variable. In practice, ZCOLS is the original life satisfaction variable standardized (mean and standard deviation by country), with this to be kept in mind when interpreting the coefficients of the COLS estimation. Table 9 shows that the results from the previous exercise are robust to the COLS transformation. Nonetheless, when we control for individual personality traits, the relationship between educational quality perceptions and overall life satisfaction does not longer hold.

**Table 9. Overall satisfaction with life (0-10, ladder question transformed)**

**COLS estimation of  $\beta_1$  - errors clustered by country**

	2006			2007		
	Coefficient	Obs.	R-squared	Coefficient	Obs.	R-squared
Satisfaction with educational systems in area/city (1 if satisfied)	0.0606 [2.48]**	3,633	0.572	0.0532 [1.80]*	5,678	0.432
College education is superior (1 if satisfied)	-0.0674 [1.45]	1,173	0.35			
Education is accessible (1 if yes)	0.0943 [1.22]	1,200	0.35	0.0822 [3.65]***	5,707	0.431
Quality of educational system, 2006 (Competitiveness report, 1 - 7, logs)	-0.0521 [0.20]	3,693	0.569	0.2045 [1.63]	5,797	0.433

Robust t statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

†Controls: socioeconomic, social capital, satcity, ecoconcou, ecoconbet, other perceptions, welfare and country controls.

‡Controls: socioeconomic, famfri, hardwork, gvmt, police, other perceptions, welfare and country controls.

The probit estimations for the other two indicators of wellbeing (satisfaction with living standards and with freedom to choose over life) are presented in Table 10 and Table 11, respectively<sup>14</sup>. The key results remain unchanged: satisfaction with local educational system raises the probability of reporting satisfaction in both dimensions in a range from 3.2% to 15%. As before, college education does not come out significant, while the Global Competitiveness Report variable presents contradictory results, confirming that the opinion of business leaders does not coincide with the opinion of individuals surveyed by Gallup.

Additionally, we also estimate the model using country average variables, to check for the robustness of the results. The sign, magnitude and significance of the coefficients remain unchanged. Moreover, contrary to the exercise pursued at the individual level, the coefficient on the variable that measures educational accessibility comes out positive and significant.

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<sup>14</sup> Results remain unaffected when using the personality traits estimating using Van Praag (2008) methodology as controls, except for the relationship between the CGR 2008 indicator of educational quality and satisfaction with freedom to choose.

**Table 10. Satisfaction with living standards (1 if satisfied)**  
**Probit estimation of  $\beta_1$  - marginal effects - errors clustered by country**

	2006†			2007‡		
	Coefficient	Obs.	Pseudo R squared	Coefficient	Obs.	Pseudo R squared
Satisfaction with educational systems in area/city (1 if satisfied)	0.0472 [1.68]*	3,963	0.168	0.0633 [3.58]***	4,920	0.226
College education is superior (1 if satisfied)	-0.0152 [0.37]	1,175	0.164			
Education is accessible (1 if yes)	0.0002 [0.00]	1,200	0.165	0.0315 [1.95]*	4,956	0.224
Quality of educational system, 2006 (Competitiveness report, 1 - 7)	0.259 [12.82]***	4,021	0.231	0.0203 [0.93]	5,010	0.220

Robust z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

†Controls Gallup variables: socioeconomic, social capital, city and country perceptions, health, welfare, and country controls.

Controls GCR: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls.

‡ Controls: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls.

**Table 11. Satisfaction with freedom to choose over life (1 if satisfied)**  
**Probit estimation estimation of  $\beta_1$  - marginal effects - errors clustered by country**

	2006†			2007†		
	Coefficient	Obs.	Pseudo R squared	Coefficient	Obs.	Pseudo R squared
Satisfaction with educational systems in area/city (1 if satisfied)	0.0323 [1.79]*	3,936	0.141	0.082 [5.10]***	4,914	0.104
College education is superior (1 if satisfied)	0.0181 [0.72]	1,173	0.145			
Education is accessible (1 if yes)	0.0695 [2.26]**	1,197	0.156	0.1015 [6.01]***	4,944	0.106
Quality of educational system, 2006 (Competitiveness report, 1 - 7)	-0.1663 [10.13]***	4,003	0.141	-0.0321 [0.96]	4,997	0.096

Robust z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

†Controls: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls.

With the purpose of analyzing possible non-linearities in the relation between wellbeing and educational quality perceptions, we constructed dummy variables that aggregate the EQP indicators (only for the 2006 data, given data availability). In this way *EQP1* takes the value of one if at least one of the three EQP indicators<sup>15</sup> takes the value of one (zero otherwise), *EQP2* takes the value of one if any two EQP indicators take the value of one (zero otherwise), and *EQP3* takes the value of one if *all of three* of them take the value of one. Therefore, the reference category is when all the indicators equal zero (*EQP0*).

Of the 2006 sample, 17.3% of the respondents were satisfied with the educational system according to all three dimensions (*EQP3*=1) and only 12.4% were not satisfied at all (*EQP0*=1). Most of the respondents, 39.2%, were satisfied in two dimensions and 31.1% with at least one.

<sup>15</sup> Satisfaction with the educational system of the area/city where you live, considers college education in the country superior and considers that the education system is accessible regardless of socioeconomic extraction.

The specification when the EQP index dummies are used is the same as Equation 2:

$$W_{i,j} = \delta_0 + \delta_1 EQP1_{i,j} + \delta_2 EQP2_{i,j} + \delta_3 EQP3_{i,j} + \delta_4 S_{i,j} + \delta_5 SC_{i,j} + \delta_6 C_{i,j} + \delta_7 OP_{i,j} + \delta_7 W'_{i,j} + \delta_9 CC_j + \varepsilon_{i,j} \quad (\text{Eq. 3})$$

As before,  $i$  indexes individuals and  $j$  denotes countries. All control variables are as defined in Equation 1 and errors are clustered by countries.

Table 12 presents the results for each of the three wellbeing indicators considered throughout the paper. In the specification using the ladder question, there is no increasing effect of the educational quality indicators on overall wellbeing, meaning that being satisfied with the educational system in three dimensions does not necessarily increase wellbeing more than being satisfied in two of them. Nonetheless, the non-linearity is present when satisfaction with living standards and, to a lesser extent, when satisfaction with freedom to choose over life, are used as dependent variables.

In other words, in the former case, when two of the three dimensions in which individuals express their perception about educational quality are favorable, the effect on wellbeing is larger relative to what occurs when individuals consider as favorable only one dimension. Nonetheless, a third dimension of positive perceptions does not add much in terms of satisfaction with living standards, raising the point that there might be limits to the effect of education perceptions on life satisfaction. Regarding the last indicator of wellbeing (satisfaction with freedom to choose), having a favorable perception of the three dimensions of EQP (satisfaction with the educational system, positive view about college education in the country, and accessibility) renders higher welfare, than when only two dimensions of EQP are met. Interestingly, satisfaction in just one dimension of EQP is not associated with perceived freedom.

As occurred before, for the ladder question, results remain robust when using the COLS transformation of this specific question (see Table 13), but become non-significant when estimates of non-observable individual personality traits are included as controls. On the other hand, when personality controls are used in the other two cases (satisfaction with living standards and freedom to choose), our findings do not change.

**Table 12. Non-linearities in the relationship between wellbeing and EQP, estimation of  $\delta_1$**

	2006		
	Overall satisfaction with life question)	Satisfaction with living standards satisfied)	Satisfaction with freedom to choose life (1 if satisfied)
	OLS - errors clustered by country	Probit estimation - marginal errors clustered by country	Probit estimation - marginal errors clustered by country
I(EQP 1)	0.1869 [8.87]**	0.0882 [3.02]***	0.0248 [0.65]
I(EQP 2)	0.3708 [3.23]*	0.1252 [3.25]***	0.0824 [1.74]*
I(EQP 3)	0.2553 [5.66]**	0.069 [1.19]	0.0891 [1.81]*
Obs.	1,140	1,143	1,141
R-squared / Pseudo R-squared	0.349	0.172	0.159

Robust t/z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

†Controls: socioeconomic, social capital, satcity, ecoconcou, ecoconbet, other perceptions, welfare and country controls.

‡Controls: socioeconomic, social capital, city and country perceptions, health, welfare and country controls.

ψControls: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls.

**Table 13. Non-linearities in the relationship between wellbeing and EQP, COLS estimation of  $\delta_1$**

	2006
	Overall satisfaction with (1-10, ladder question)
	COLS - errors clustered country†
I(EQ 1)	0.0791 [6.16]**
I(EQ 2)	0.1562 [3.66]*
I(EQ 3)	0.1053 [4.81]**
Obs.	1,140
R-squared	0.352

Robust t/z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

†Controls: socioeconomic, social capital, satcity, ecoconcou, ecoconbet, other perceptions, welfare and country controls.

### c) Including educational output in the analysis of determining wellbeing

As mentioned beforehand, more education is a synonym of higher income and social status and therefore, it should be associated with higher overall life satisfaction. More educated individuals may also obtain jobs that suit their preferences better and other factors that may enhance wellbeing, such as refined culture. Notwithstanding, as discussed in Section II, results on this matter point to opposite directions. In order to contribute to the debate, we use the 2007 Gallup World Poll, which allow us to explore the relationship between life satisfaction and education at the individual level data, using the highest level of education completed variable.

The reduced model used in the analysis resembles Equation 2, except for the fact that EQP indicators are replaced by individual education output in its two versions: categorical variable and the set of dummies. The specification follows Equation 4.

$$W_{i,j} = \phi_0 + \phi_1 EO_{i,j} + \phi_2 S_{i,j} + \phi_3 SC_{i,j} + \phi_4 C_{i,j} + \phi_5 OP_{i,j} + \phi_6 W_{i,j}^t + \phi_7 CC_j + \varepsilon_{i,j} \quad (\text{Eq. 4})$$

Where, as before,  $i$  indexes individuals and  $j$  denotes countries. All variables are as defined in Equation 1 and errors are clustered by countries.

As Table 14 shows, results on the relationship of educational attainment and wellbeing are contradictory. In the first two specifications, when the ladder question is used as dependent variable, a higher educational level increases overall satisfaction with life. In fact, having completed postgraduate studies increases wellbeing by almost 0.8 (in a 0 to 10 range), while having completed secondary by 0.4. On the contrary, when the wellbeing indicator employed is satisfaction with living

standards, the relationship is negative and of lower magnitude, even though the dummy variables specification does not confirm this result. Finally, the exercises using satisfaction with freedom to choose did not turn out significant.

The main message here is the educational outcomes at the individual level (actual educational attainment) do not have a crystal clear relationship with wellbeing, in the line with previous mixed findings. Although in some cases it is positive and increasing, as in the case of the ladder question, in others has a negative sign or is not statistically significant. This contrasts with the relationship between EQP and wellbeing, where we found much stronger results.

When we estimate the relationship controlling for individual personality traits obtained through the procedure suggested by Van Praag and Ferrer-i-Carbonell (2008), differentials in the education level attained do no longer translate into higher overall life satisfaction (ladder question), but higher levels still present a negative correlation with material satisfaction or satisfaction with living standards.

**Table 14. Relationship between wellbeing and individual educational attainment, estimation of  $\phi_1$**

	2007					
	Overall satisfaction with ladder question)		Satisfaction with living standards satisfied)		Satisfaction with freedom to over life (1 if satisfied)	
	OLS - errors clustered by country		Probit estimation - marginal errors clustered by country		Probit estimation - marginal errors clustered by country	
	(1)	(2)	(1)	(2)	(1)	(2)
Highest level of education completed (categorical)	0.074 [4.57]***		-0.0057 [2.56]**		-0.0007 [0.25]	
I(Incomplete primary)		0.071 [0.54]		-0.0032 [0.10]		0.0417 [1.22]
I(Complete primary)		0.1874 [1.37]		0.0169 [0.60]		0.0397 [1.07]
I(Incomplete secondary)		0.3023 [2.15]**		-0.0142 [0.47]		0.0531 [1.34]
I(Complete secondary)		0.3844 [3.76]***		-0.0079 [0.31]		0.0279 [0.73]
I(Incomplete technical school)		0.5118 [1.90]*		-0.0901 [2.73]***		-0.0667 [1.17]
I(Complete technical school)		0.6182 [3.87]***		-0.0511 [0.98]		0.0425 [0.79]
I(Incomplete university studies)		0.5028 [3.28]***		-0.0302 [1.12]		0.057 [1.97]**
I(Complete university studies)		0.6053 [3.51]***		-0.0317 [0.89]		0.0239 [0.55]
I(Postgraduate studies)		0.6914 [2.56]**		0.0208 [0.30]		0.0466 [0.73]
Obs.	8,640	8,659	7,875	7,891	7,842	7,860
Pseudo R-squared	0.254	0.254	0.211	0.211	0.103	0.101

Robust t/z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

†Controls: socioeconomic, social capital, city and country perceptions, other perceptions and country controls.

‡Controls: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls.

Naturally, it is also relevant to enquire whether educational quality perceptions still influence wellbeing after controlling for educational outputs. This would suggest that educational quality perceptions matter in their own right, regardless of educational outputs. In order to explore if this is the case, we include individual educational attainment as an additional covariate in the original wellbeing equation (Equation 2), to obtain Equation 5:

$$W_{i,j} = \phi_0 + \phi_1 EO_{i,j} + \phi_2 EQP_{i,j} + \phi_3 S_{i,j} + \phi_4 SC_{i,j} + \phi_5 C_{i,j} + \phi_6 OP_{i,j} + \phi_7 W_{i,j}^t + \phi_8 CC_j + \varepsilon_{i,j} \quad (\text{Eq. 5})$$

We use the same three wellbeing indicators (overall satisfaction with life, satisfaction with living standards and satisfaction with freedom to choose over life) and the EQP measures that turned out significant in the empirical exercises using the 2007 Gallup World Poll data (i.e., satisfaction with educational system and considering education accessible).

Table 15 presents the estimation results for the ladder question (overall satisfaction with life). In three out of four cases, the effect of educational quality perceptions on welfare holds, in sign and significance, after controlling for educational output. Moreover, the magnitude of the effect is slightly larger when using accessibility of education. Thus, the relationship of educational quality perceptions and wellbeing is independent of educational output at the individual level. An interesting result is that educational output no longer explains overall wellbeing, in both its versions. Perceptions are what matter for wellbeing. Reality may matter as well, but only inasmuch as it affects perceptions.

Table 16 and Table 17 present the probit estimation of the model for satisfaction with living standards and satisfaction to choose upon life, respectively. As before, the relation between wellbeing and educational quality perceptions remains unchanged. In the case of the former indicator of wellbeing, the effect is slightly diminished in around 2 percentage points, while in the case of the latter there is no change in magnitude.

As before, when controlling for individual personality traits, the relationship between educational quality perceptions and life satisfaction measured through the ladder question is no longer significant. In the case of the other two wellbeing indicators, our findings on the positive effect of education quality perceptions and on the negative effect of educational attainment on wellbeing are unaffected. In both cases (satisfaction with living standards and satisfaction with freedom to choose), the effects are approximately 2.5 percentage points larger.

**Table 15. Overall satisfaction with life (1-10, ladder question)**  
**OLS estimation of  $\phi_1$  and  $\phi_2$  - errors clustered by country**

	2007†			
	(1)	(2)	(3)	(4)
Satisfaction with educational system area/city (1 if satisfied)	0.1256 [1.75]	0.1272 [1.79]*		
Education is accessible (1 if yes)			0.2123 [3.12]***	0.2105 [3.16]**
Highest level of education completed (categorical)	-0.0175 [1.21]		-0.0145 [0.87]	
I(Incomplete primary)		-0.1117 [1.04]		-0.1158 [0.84]
I(Complete primary)		0.0144 [0.15]		0.0695 [0.57]
I(Incomplete secondary)		-0.1711 [1.76]*		-0.1007 [1.05]
I(Complete secondary)		-0.1521 [1.40]		-0.0782 [0.64]
I(Incomplete technical school)		-0.2156 [0.86]		-0.2557 [1.14]
I(Complete technical school)		-0.1552 [0.79]		0.014 [0.06]
I(Incomplete university studies)		-0.226 [1.15]		-0.1976 [0.85]
I(Complete university studies)		-0.1355 [1.05]		-0.0842 [0.58]
I(Postgraduate studies)		-0.048 [0.17]		-0.0668 [0.21]
Obs.	5,665	5,678	5,739	5,754
Pseudo R-squared	0.428	0.429	0.423	0.424

Robust t statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

†Controls: socioeconomic, famfri harwork, gvmt, police, other perceptions, welfare and country controls.

**Table 16. Satisfaction with living standards (1 if satisfied)**  
**Probit estimation of  $\phi_1$  and  $\phi_2$  - marginal effects - errors clustered by country**

	2007†			
	(1)	(2)	(3)	(4)
Satisfaction with educational system area/city (1 if satisfied)	0.0618 [3.53]***	0.0611 [3.40]***		
Education is accessible (1 if yes)			0.0312 [1.88]*	0.0308 [1.88]*
Highest level of education completed (categorical)	-0.0057 [1.79]*		-0.0076 [2.48]**	
I(Incomplete primary)		0.0055 [0.12]		0.0029 [0.06]
I(Complete primary)		0.0653 [1.72]*		0.0656 [1.63]
I(Incomplete secondary)		0.0179 [0.41]		0.0106 [0.23]
I(Complete secondary)		0.0257 [0.58]		0.016 [0.35]
I(Incomplete technical school)		-0.0055 [0.09]		-0.003 [0.05]
I(Complete technical school)		0.0006 [0.01]		-0.0058 [0.07]
I(Incomplete university studies)		-0.0189 [0.41]		-0.0374 [0.82]
I(Complete university studies)		0 [0.00]		-0.0147 [0.29]
I(Postgraduate studies)		0.1081 [1.16]		0.0806 [0.81]
Obs.	4,910	4,920	4,947	4,956
Pseudo R-squared	0.227	0.228	0.225	0.226

Robust z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

†Controls: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls.

**Table 17. Satisfaction with freedom to choose over life (1 if satisfied)  
Probit estimation of  $\phi_1$  and  $\phi_2$  - marginal effects - errors clustered by country**

	2007†			
	(1)	(2)	(3)	(4)
Satisfaction with educational system area/city (1 if satisfied)	0.085 [5.24]***	0.0824 [5.15]***		
Education is accessible (1 if yes)			0.1025 [6.02]***	0.1004 [5.99]**
Highest level of education completed (categorical)	0.003 [0.74]		0.0009 [0.26]	
(Incomplete primary)		0.0157 [0.52]		0.0088 [0.33]
(Complete primary)		0.0426 [1.25]		0.0391 [1.12]
(Incomplete secondary)		0.0457 [1.39]		0.0381 [1.00]
(Complete secondary)		0.0313 [1.00]		0.0219 [0.63]
(Incomplete technical school)		-0.0715 [1.90]*		-0.0749 [1.74]*
(Complete technical school)		0.0527 [0.91]		0.0441 [0.79]
(Incomplete university studies)		0.088 [3.61]***		0.073 [2.43]**
(Complete university studies)		0.0281 [0.54]		0.0109 [0.23]
(Postgraduate studies)		0.0599 [0.93]		0.0165 [0.25]
Obs.	4,903	4,914	4,934	4,944
Pseudo R-squared	0.105	0.106	0.107	0.109

Robust z statistics in brackets

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

†Controls: socioeconomic, social capital, city and country perceptions, other perceptions, welfare and country controls.

## VI. Conclusions

This paper analyses the determinants of educational quality perceptions and their effect on self-reported wellbeing, an unexplored dimension in the welfare literature. Using a multi-country approach (based on the Gallup World Poll for 2006 and 2007) we find that educational quality perceptions are based on objective measures of educational quality, such as scores from international standardized tests. Therefore, individuals in countries whose students perform better are more satisfied with the existing educational system.

An interesting result is that individuals with higher levels of education are less satisfied with the quality of the education provided, suggesting that higher educational attainment raises a person's expectations on the quality of education to be provided. Interestingly, higher educational outcomes could result in lower satisfaction with the educational system and, possibly, more political pressure to raise standards in the sector. This is a non-obvious mechanism that results in better educational outcomes.

Similarly, we find robust evidence indicating that educational quality perceptions are one of the determinants of self-reported wellbeing, measured by overall satisfaction with life, satisfaction with current living standards, and freedom to choose what to do with one's life. Even after controlling for educational output at the individual level, perceptions remain a significant factor at explaining wellbeing indicators. The latter result suggests that mere perceptions are an important factor for reported wellbeing. Finally, a puzzling result obtained in the paper is that relation between individual educational attainment and wellbeing is ambiguous, depending on the indicator of wellbeing used. In the exercises performed with our data base, actual educational outcomes matter for wellbeing, but

mostly because they affect perceptions. Moreover, there is no robust evidence of a direct and positive effect of educational attainment on wellbeing. However, we consider that further research is needed to test the robustness of these results.

To sum, this paper shows that educational quality perceptions matter for the wellbeing of individuals. In turn, in this case perceptions are aligned with objective indicators of education quality, such as standardized test scores. In this sense, improving the quality of education improves the perception of the education system, and through this channel, positively affects overall wellbeing. Latin American policy makers should then focus on how to improve the quality of education at all levels.

Governments should make explicit their efforts to improve the quality of education. Material and non-material wellbeing increases when the quality of education is enhanced. This, of course, requires the involvement of key players in the provision of educations (parents, teachers, teacher union and school managers).

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