Mariano Rojas   *Editor*

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Handbook of Happiness Research in Latin America

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A Perceived Human Development Index

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Marcelo Neri

31.1 Overview

The three main explanatory variables of life satisfaction addressed in this study – namely income, health and education – correspond to the three components of the Human Development Index (HDI). The pioneering report from the United Nations Development Programme published in 1954 put forward the idea that per capita income should not be the single indicator used to measure standard of living. This was followed by an extensive array of literature that converged to form the Human Development Index (UN 1990), which assembles other components related to well-being besides income. This paper proposes incorporating perceptions on income, health and education into HDI methodology, which will lead us to the Perceived Human Development Index (PHDI). One advantage of this approach is the comparability of results such as HDI rankings, which are a benchmark in the multidimensional social indicators toolbox used in practice. Each of these three dimensions corresponds to well-established groups of social policies. The qualitative data at hand may help to throw light on how current or potential beneficiaries perceive the processes and outcomes associated with education, health and income policies. We will also add the working conditions dimension to the analysis. Access to work and its perceived quality (i) are also subject to direct governmental policies, (ii) occupy a central role in the 'happiness determination' literature and (iii) fit well within a life-cycle perspective, which is the basic framework of analysis used here.

We will follow the literature that assesses quality of life dimensions with the life cycle as a natural framework of analysis by using age as one of the main variables analyzed here. Each component of the HDI is closely related to a particular phase in the life cycle. The cycle begins with the bulk of formal education that is experienced in the early life cycle, when there is both a window of higher learning productivity than later and also more time ahead to recover the cost of human capital investment in terms of labor earnings – and health outcomes. The second phase is related to the income-generating period mostly accrued from work that is largely determined by previous educational decisions. This intermediary phase will also ensure the

M. Neri (✉)
Center for Social Policies/Getulio Vargas Foundation (CPS/FGV) and EPGE/FGV, Rio de Janeiro, Brazil
e-mail: marcelo.neri@fgv.br

material resources for the retirement period in terms of financial wealth, health services, etc. We will also check the importance of working conditions vis-à-vis income for non-elderly adults. Finally, the bulk of health problems observed in any given society occur mostly in the last phase of the life cycle period, and is at large determined by specific public policies (i.e. the state supply of health services) as well as income and educational decisions adopted in the past.

The impact of objective income measures on subjective indicators will also be at the center of this analysis. Despite its limitations, per capita income-based social indicators such as standard inequality and poverty measures based directly on household surveys are at the core of the social debate in Latin America and are the mainstay for economists with respect to social issues. An income unit of measurement (adjusted for PPP) is also a useful figure to compare with other costs and benefits involved in public policy and individual decision-making.

In sum, the objective of the paper is to build a Perceived Human Development Index (PHDI) framework by assembling the HDI components, namely indicators on income, health and education on their subjective version. We propose here to introduce a fourth dimension linked to perceptions on work conditions, given its role in the "happiness" literature and in social policy making. We study how perceptions on individual's satisfaction with income, education, work and health are related to their objective counterparts. We use a sample of Latin America and Caribbean (LAC) countries where we take advantage of a larger set of questions on the four groups of social variables mentioned included in the Gallup World Poll by the Inter-American Development Bank (IADB). We emphasize the impacts of objective income and age on perceptions. These two variables are particularly relevant in terms of the design of income policies. Complementarily, we also use the full sample of 132 countries where a smaller set of variables can be included, which provides a greater degree of freedom to study the impact of objective HDI components observed at

country level on the formation of individual's perception on income, education, work, health and life satisfaction. These exercises provide useful insights about the workings of beneficiaries' point of view to understand the transmission mechanism of key social policy ingredients into perceptions. In particular, the so-called PHDI may provide a complementary subjective reference to the HDI. Finally, we also study how one's satisfaction with life is established, measuring the relative importance given to income vis-à-vis health and education. Estimating these "instantaneous happiness functions" will help to assess the relative weights attributed to income, health and education in the HDI, which is a benchmark in the multidimensional social indicators toolbox used in practice.

The paper is organized as follows: in the second section we construct a PHDI across Latin American countries by extracting the principal components from a rich array of special questions added to the World Gallup Poll by the current project. The third section explores, directly from individual level observations, the relationship between PHDI components on the one side and income and age on the other. Section 31.4 explores the relationship between objective and subjective human development components using the full Gallup World Poll. In Sect. 31.5 we use life satisfaction as a metric to extract the weights attributed separately to the HDI. We implement the same strategy to the PHDI components and we find reasonably close weights between objective and subjective human development. Our main conclusions will be left to the final section of the paper.

31.2 Constructing a Perceived Human Development Index (PHDI)

31.2.1 Motivation

Latin American, in particular Brazilian, research institutions have little tradition in collecting data on social perceptions. They had been somewhat

proficuous in the elaboration of empirical studies that promote the formulation, implementation and evaluation of public policies. However, only recently has it been involved in the generation of primary data on people's perceptions. Advances are needed to bring our practices closer to the frontier of research of social perceptions.

A system of subjective indicators' main purpose is to present a panel of social indicators to promote monitoring actions of the State and society. The field of research organizes how the population perceives the quality of different public services put at their disposal by the State, also including motivations for use, difficulty to access and the degree of importance attributed to each. On the top of that end variables read satisfaction with their respective state overall measures such as happiness or more specific such as health status. This approach may aid the State to better comprehend and act in a more effective manner to citizens' demands, as well as provide instruments for society to demand actions more in line with their needs and wants from their governing body.

It is hoped that merging objective data analyses with subjective perceptions of the population, can be an important instrument to aid the formulation of public policies in our continent. The approach can be applied in a similar manner to an ample set of public policies and theoretical elements of the 'economics of happiness'. As the relation between income and well-being measured by subjective happiness is not direct, new perspectives are needed.

This text consolidates some of this research using a human development index framework. It presents social perceptions collected in the field and deals with impressions of the population regarding themes that are fundamental to the development of the country such as health, education, income and related issues such as poverty reduction and labor.

To be sure it contributes to the discussion by developing a Perceived Human Development Index (PHDI), using the components of the Human Development Index (HDI) – that is, income, health and education – in their subjective versions.

At first, the analysis of the priorities of the global population through the questionnaire My World from the United Nations show that the global priorities are "quality of education", "improvement of health services" and "quality of jobs", in that order.[1]

31.2.2 Conceptual Framework

In the framework proposed by Veenhoven (2000) and Rojas (2007) that will guide the whole IADB Quality of Life project (see Table 31.1), we should take into account the interaction between two dimensions. First, whether the indicator refers to inner or outer perceptions of the individuals and second whether it is related to life chances or life results. This framework can be applied to overall Quality of Life (QoL) Indicators such as life satisfaction or adapted to classify any qualitative indicator such as those related with the HDI components. For example, the perceived health status of an individual is a result indicator while access to health services is clearly a chance indicator. Similarly, access to health services maybe asked at the individual or inner level (i.e., if he or she has access to good quality services) or at the outer level (i.e., how is the access of people in general in the country (or city of residence) to health services).[2] As we are going to see the division between inner and outer quality are not only intuitive but do arise

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[1] The "My World" single question survey orders 16 policy priorities of the population with a view to defining the new Millennium Development Goals (MDGs) for the post-2015 period, when the term of the current goals ends. In the Brazilian case, the questionnaire in My World was incorporated in its questionnaires by IPEA. IPEA was awarded in 2013 by the United Nations (UN) for giving the main contribution among countries of Latin America and the Caribbean to the "My World" research. The results show that there is an inversion on the order of the first two priorities, with health appearing in 85.5 % of the questionnaires and education in 81.8 % of them. The third component is related to income. In any case, the three most prominent elements both in Brazil and in the world represent the three components of the HDI.

[2] An advantage of the international data set used is to allow to test the relationship between inner and outer related aspects of life at individual level and country levels.

Table 31.1 The four qualities of life

	Outer quality	Inner quality
Life chances	Livability of environment	Life-ability of person
Life results	Utility of life	Satisfaction with life

Source: Veenhoven (2000) and Rojas (2007)

naturally from the empirical exercises performed while the splitting chances from results are well grounded on the capabilities versus functioning literature proposed by Amartya Sen.

31.2.3 Principal Components Analysis: Method

Principal component analysis (PCA) is a useful methodology when you have data on a number of variables and believe that there is some redundancy in them – which means that some of the variables are correlated with one another, possibly because they are measuring the same dimension. Given this apparent redundancy, it is likely that, for example, different items in a questionnaire are not really measuring different constructs; more likely, they may be measuring a single construct. In the present case, for instance, "a high perceived health" and a "high perceived income" could largely mean both "an intrinsically optimistic view of reality as a whole".

The methodology consists in reducing the number of variables and involves the development of measures on a number of observed variables and into a smaller number of artificial variables – called principal components – that will account for most of the variance in the observed variables. In essence, a principal component analysis aims at the reduction of the observed variables into a smaller set of artificial variables, by making some redundant variables into single new variables that can be used in subsequent analyses as predictors in a multiple regression – or in any other type of analysis.

Technically, a principal component can be defined as a linear combination of optimally weighted observed variables. In performing a principal component analysis, it is possible to calculate a score for each subject on a given principal component. Each subject actually measured would have scores on each one of the new components, and the subject's actual scores on the original questionnaire items would be optimally weighted and then added up to compute their scores on a given component.

In reality, the number of components extracted through a principal component analysis is equal to the number of observed variables being analyzed. This means that an analysis of a questionnaire with many items would actually result in as many components as the number of items. However, in most analyses, only the first few non-redundant components account for meaningful amounts of variance, so only these first few components are retained, interpreted, and used in subsequent analyses. The remaining components account for only trivial amounts of variance and therefore would not be retained and further analyzed in general.

The first component extracted through a principal component analysis accounts for a maximal amount of total variance in the observed variables. Under typical conditions, this means that the first component will be correlated with at least some of the observed variables, and may be correlated with many. The second component extracted will have two important characteristics. First, this component will account for a maximal amount of variance in the data set that was not accounted for by the first component. Again under typical conditions, this means that the second component will be correlated with some of the observed variables that did not display strong correlations with the first component. The second characteristic of the second component is that it will be uncorrelated with the first component. Literally, a calculation of the correlation between components 1 and 2 would amount to zero. That is the general rule: the remaining components

that are extracted in the analysis display the same two characteristics: each component accounts for a maximal amount of variance in the observed variables that was not accounted for by the preceding components, and is uncorrelated with all of the preceding components. A principal component analysis proceeds in this fashion, with each new component accounting for progressively smaller and smaller amounts of variance – this is why only the first few components are usually retained and interpreted. When the analysis is complete, the resulting components will display varying degrees of correlation with the observed variables but will be completely uncorrelated with one another.

The observed variables are standardized in the course of the analysis, that is, each variable is transformed so that it has a mean of zero and a variance of one. What we mean by "total variance" in the data set is simply the sum of the variances of these observed variables. Since they have been standardized to have a variance of one, each observed variable contributes one unit of variance to the "total variance" in the data set. Therefore, the total variance in a principal component analysis will always be equal to the number of observed variables being analyzed, and the components that are extracted in the analysis will partition this variance. If there are six components, for instance, the first component might account for 2.9 units of total variance; perhaps the second component will account for 2.2 units, and so on, with the analysis continuing in this way until all of the variance in the data set has been accounted for.

Below is the general form for the formula to compute scores on the first component extracted (created) through a principal component analysis:

$$C_1 = b_{11}(X_1) + b_{12}(X_2) + \ldots b_{1\,p}(X_p)$$

Where

C_1 = the subject's score on principal component 1 (the first component extracted)
b_{1p} = the regression coefficient (or weight) for observed variable p, as used in creating principal component 1

X_p = the subject's score on observed variable p.

For example, assume that component 1 in the present study was the "satisfaction with health" component. You could determine each subject's score on principal component 1 by using the following fictitious formula:

$$C_1 = .44(X_1) + .40(X_2) + .47(X_3) + .32(X_4) + .02(X_5) + .01(X_6) + .03(X_7)$$

In the present case, the observed variables (the "X" variables) were subject responses to the questions about perceptions; X1 represents question 1, X2 represents question 2, and so forth. Note that different regression coefficients were assigned to the different questions in computing subject scores on component 1: to the first questions were assigned relatively large regression weights that range from .32 to .47, while the last questions were assigned very small weights ranging from .01 to .03.

Obviously, a different equation, with different regression weights, would be used to calculate subject scores on component 2 (satisfaction with income, for instance). Below is a fictitious illustration of this formula:

$$C_2 = .01(X_1) + .04(X_2) + .02(X_3) + .02(X_4) + .48(X_5) + .31(X_6) + .39(X_7)$$

The preceding shows that, in creating scores for the second component, much weight would be given to the last questions and little would be given to the first ones. As a result, component 2 should account for much of the variability in the satisfaction with income items; that is, it should be strongly correlated with those three items.

The regression weights from the preceding equations are determined by using a special type of equation called an Eigen equation. The weights produced by these Eigen equations are optimal weights in the sense that, for a given set of data, no other set of weights could produce a set of components that are more successful in accounting for variance in the observed variables. The weights are created in order to satisfy a principle of least squares similar (but

not identical) to the principle of least squares used in multiple regressions.

31.2.4 Empirical Strategy

Following Kenny (2006) and others' suggestion, we decided not to include objective variables in the PCA exercises performed in order to allow later comparisons between objective and subjective indicators. Since the HDI is the main reference used in the multidimensional social welfare literature, we decided at this point to use its proposed structure in three separate components and compare with their respective subjective version. We have also introduced the work conditions question in order to later test its relevance and whether the connection between specific PHDI components change at distinct phases of the life-cycle: education for younger individuals (children and teenagers 15 years of age and below), working conditions for non-elderly adults (between 16 and 64 years of age) and health conditions for the elderly (those with 65 or more years of age).

Monetary indicators are the most widely used reference in the empirical social welfare, inequality and poverty literature and they seem appropriate as an integrating variable of different strands of the literature (either as a figure or a weighting variable in the aggregation of perceptions across individuals). Besides adopting widely used per capita income-based and HDI components references used in practice, the four selected ingredients are in general assigned specific budgets and sector-specific policies within each country. In sum, the choice is to separate subjective and objective indicators to enable direct comparisons between them divided into four separated groups of sector-specific indicators. One could view the PHDI approach here as synthesizing the perspective of present or potential beneficiaries with respect to chances and results created by education, work, health and income policies.

We apply the PCA analysis in two ways. We extract the principal components combining all sector-specific questions for income, education,

health and work simultaneously. The other way is by separating, a priori, questions by these four different sectors in order to calculate separate PHDI components, that is, a desired output of this analysis, since this division is useful for the institutional organization of social policy.

We apply these two ways to two spatial environments: Latin America and the World. We start at the LAC level analysis using questions designed by the IADB in the Gallup World Poll. One operational advantage of this regional data set is the large number of questions, 28 in total, related to each of the PHDI components. This regional environment also offers the possibility of using the objective HDI-related variable directly, namely PPP adjusted per capita household income. The global context provides us with a less rich set of variables but it provides more degrees of freedom to estimate regressions with cross-country variables. In sum, we will use the LAC context to explore the impact of objective income and age variable calculated at a micro-level on different PHDI components. The same type of exercise between objective and subjective variables will be estimated at the world level using as explanatory variables aggregated HDI components and PHDI variables.

31.3 Results of the Principal Components Analysis (PCA)

The PCA allows choosing the appropriate weighting system for different welfare indicators used within each sector-specific exercise performed. The rationale is to allow for the optimal weights determination associated with each attribute. To achieve this, one should derive a set of new attributes called factors – which are a linear combination of the original variables – from the available perceptions. A system of weights associated with the original attributes is derived in order to reproduce their full range of variability.

We work with a total of 28 questions for Latin America. We use a Principal Components Analysis (PCA) in order to reduce the dimension of

the problem. We start by calculating its principal components and combining all these variables in a preliminary test to see what the data tell us without any sector-specific restriction.

31.3.1 PCA Latin America: Mixing All Subjective Questions

This exercise (not shown here) indicates that even without any type of restriction with just a few exceptions there is a surprisingly clear split of variables according to Inner and Outer dimensions and according to the type of sector-specific l policies (i.e. chances or results related) that we would expect. We provide a brief description in the next exercise in order to increase the depth with sector-specific splits. As we have seen in the explanation about PCA methodology, components that explain a bigger share of the variance appear first.

 (i) The first factor was the Inner Health component; it includes only inner health variables with respect to momentary perceptions such as the two questions on self-report health status and two questions on feelings of pain and anxiety.
 (ii) The second factor, Inner Income Deprivation, was labeled here with four questions. Two of them are related to income insufficiency to cover shelter and food expenses, one on hunger experience and other on feelings related to income. This type of component will present a negative sign in the correlation with life satisfaction measures.
(iii) Next component mixes five questions on outer perceptions on income and work conditions. According to our interpretation, this is the only exception to a question about the perception on the movements of individual standard of living. This is the only exception of all 28 questions in the present PCA exercise and will remain as the sole exception in the other exercises.
(iv) The following, Inner Work component, combines two similar questions on job satisfaction.

 (v) The next component mixes three disability (IADL or ADL) related questions to be labeled as Inner Permanent Health component.

Only at this point the outer perceptions started to enter more consistently the list of components, indicating a preponderant variance explanatory power of the inner questions.

 (vi) The following component may be called Outer Human Capital Access component, mixing three questions on access to education and health facilities within cities or countries.
(vii) The next is similar to the previous one but combines information on satisfaction with education and health policies and may be labeled as Outer Human Capital Satisfaction.
(viii) The eighth component combines two outer perceptions questions on income deprivation and work -related policies satisfaction.
 (ix) The final component mixes two questions on outer health and work-related chances.

31.3.2 PCA Latin America: Splitting Subjective Questions into Sector-Specific Ingredients

The next exercise splits the set 28 PHDI related variables into four groups of PHDI ingredients proposed in order to generate separate sector-specific indexes. The questions were divided as follows: 8 for income, 5 for working conditions, 12 for health and 3 for education. We start by calculating its principal components for each of these four groups of PHDI ingredients proposed:

31.3.2.1 Income and Work Ingredients
The income and work group of factors presented in the next two tables were each split in pairs of inner and outer principal components, which corroborates the conceptual framework used in the project.

Income. Questions that are significant for the first vector are related to the current or future

Table 31.2 Income. Factor construction

Rotated factor pattern

		Factor1		Factor2	
Fincome	Feelings about your household s income – living comfortably or getting by on present income	−60	*	23	
Economic4	Do you believe the current economic conditions in (response in Sa) are good or not	−11		75	*
Economic5	Right now do you think that economic conditions in (response in Sa)as a whole are getting better or the same?	−6		77	*
Poor	Are you satisfied or dissatisfied with efforts to deal with the poor?	11		61	*
Standard	Right now do you feel your standard of living is getting better or the same?	−34		44	*
Shelter	Have there been times in the past 12 months when you did not have enough money to provide adequate shelter or housing for you and your family?	66	*	6	
Hungry	Have there been times in the past 12 months when you or your family have gone hungry?	73	*	−2	
Food	Have there been times in the past 12 months when you did not have enough money to buy food that you or your family needed?	83	*	−5	

Source: Author's estimates from the Gallup World Poll 2007 microdata
Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.4 are flagged by an '*'
Factor1 – Income_dep_in
Factor2 – Income_out

level of income or deprivation faced by the individual either in the present or in the past; the second vector questions are related to the results found either presently or forward looking within the country (Table 31.2).

Work. The inner work factors are related to the questions on the individual job satisfaction and opportunities created while the second work-related outer factor captures ingredients such as prospects, timing and the quality of policy efforts to improve aggregate working conditions (Table 31.3).

31.3.2.2 Health and Education Ingredients

Education. Education should perhaps be viewed more as a chance than a result in itself. The Gallup questionnaire does not contain inner questions on individual perceptions but rather on aggregate conditions. The sole education factor among the three questions used can be perceived as an outer chance related component (Table 31.4).

Health. The 12 health variables used were split in three factors. The first is related to inner present health conditions, the second is related to a more permanent individual health results while the last factor captures aggregate health chances (Table 31.5).

31.3.3 Perceived Human Development Indexes for LAC and the World Levels

Table 31.6 presents the values for all the PCA components for the American countries in the sample for which data is available. Note that these were calculated with separate sector-specific restrictions. The next step was to standardize these indicators using the HDI methodology, which sets the worst level in the sample as 0 and the highest as 1.

The next step is to understand how the subjective factors related to income, work, health and education inner and outer conditions are correlated with objective socio-demographic conditions at a micro and aggregated levels. We use Latin American sample of countries where we took advantage of a larger set of questions on the four groups of social variables to estimate the

Table 31.3 Work. Factor construction

Rotated factor pattern

		Factor1		Factor2	
Work	Are you satisfied with your job or the work you do	96	*	5	
Work2	In your work do you have an opportunity to do what you do best every day?	96	*	3	
Work5	Can people in this country get ahead by working hard or not?	−4		61	*
Economic3	Thinking about the job situation in the city or area where you live today would you say that it is now a good time or a bad time to find a job?	13		69	*
Jobs	Are you satisfied or dissatisfied with efforts to increase the number and quality of jobs?	2		72	*

Source: Author's estimates from the Gallup World Poll 2007 microdata
Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.4 are flagged by an '*'
Factor1 – Work inn
Factor2 – Work _out

Table 31.4 Education. Factor construction

Factor pattern

		Factor1	
Education	Are you satisfied with the educational system or the schools	63	*
Education2	Is education in this country accessible to anybody who wants to study regardless of their economic situation or not?	73	*
Learn	Do most children in this country have the opportunity to learn and grow every day	76	*

Source: Author's estimates from the Gallup World Poll 2007 microdata
Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.4 are flagged by an '*'
Factor1 – Education_out

Table 31.5 Health. Factor construction

Rotated factor pattern

		Factor1		Factor2		Factor3	
Walk	Mobility (have no problems walking around)	34		72	*	−3	
Selfcare	Self care (have no problems with self-care)	7		82	*	0	
Activities	Usual activities (have no problems with performing my us – work study housework family or leisure activities)	36		74	*	−1	
Pain	Pain/discomfort (have no pain or discomfort)	69	*	29		1	
Anxiety	Anxiety/depression (not anxious or depressed)	58	*	8		6	
Healtha	How good or bad your own health is today	73	*	14		8	
Health	Are you satisfied with your personal health	71	*	8		6	
Care	In your city or area where you live are you satisfied or dissatisfied with the availability of quality health care	5		3		75	*
Healthac	Are healthcare services in this country accessible to any person who needs them regardless of their economic situation or not	3		1		66	*
Health2	Not have health problems that prevent you from doing any of the things people your age normally can do	58	*	25		−3	
Healthp2	If you had to go to a hospital because of an accident or illness who would take care of the cost of your assistance? Public or Private	5		−6		33	
Medical	Do you have confidence in each of the following or not? How about health care or medical systems?	−1		4		76	*

Source: Author's estimates from the Gallup World Poll 2007 microdata
Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.4 are flagged by an '*'
Factor1 – Health inn
Factor2 – Health_inn_permanent
Factor3 – Health_out

Table 31.6 Latin America – PHDI from principal components per country

Country	Observations	Income_dep_inn	Income_out	Work_inn	Work_out	Health_inn	Health_inn_permanent	Health_out	Education_out
Argentina	1000	0.80	0.67	0.56	0.41	0.51	0.75	0.63	0.25
Belize	502	0.80	0.34	0.60	0.38	0.78	0.38	0.53	0.66
Bolivia	1000	0.36	0.78	0.65	0.65	0.12	0.78	0.41	0.58
Brazil	1038	0.79	0.70	0.76	0.25	0.65	0.53	0.25	0.27
Canada	1010	1.00	1.00	1.00	0.97				
Chile	1000	0.77	0.58	0.46	0.54	0.66	0.60	0.50	0.52
Colombia	1000	0.47		0.33	0.37	0.66	0.78	0.45	0.30
Costa Rica	1002	0.73	0.76	0.51	0.72	0.95	0.50	0.94	0.99
Dominican Republic	1000	0.20	0.40	0.27	0.34	0.77	0.73		0.67
Ecuador	1061	0.36	0.67	0.60	0.35	0.39	0.95	0.20	0.23
El Salvador	1001	0.16	0.26	0.00	0.10	0.66	0.73	0.41	0.50
Guatemala	1000	0.83	0.46	0.32	0.47	1.00	0.55	0.29	0.36
Guyana	501	0.76	0.27	0.54	0.24	0.62	0.63	0.80	0.69
Honduras	1000	0.06	0.57	0.10		0.77	0.35	0.42	0.59
Mexico	999	0.57	0.75	0.51	0.52	0.65	0.00	0.47	0.00
Nicaragua	1000	0.00	0.45	0.29	0.50	0.22	0.63	0.59	0.70
Panama	1000	0.55	0.56	0.40	0.47	0.93	0.70	0.57	0.80
Paraguay	1000	0.66	0.00	0.62	0.00	0.61	1.00	0.00	0.00
Peru	1000	0.13	0.34	0.16	0.30	0.00	0.85	0.12	0.14
Uruguay	1004	0.66	0.69	0.40	0.33	0.53	0.83	1.00	0.68
Venezuela	1000			0.79	1.00				1.00
Max	1038	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Min	501	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Author's estimates from the Gallup World Poll 2007 microdata

correlations with objective income and age on perceptions. Complementarily, the full sample of 132 countries where a smaller set of variables can be included, which provides greater degrees of freedom to study the impact of objective HDI components observed at the country level on the formation of individual's perception on income, education, work, health and life satisfaction.

31.4 The Formation of Perceptions on Human Development in Latin America

31.4.1 The Correlation Between Objective Income and the PHDI Components

Besides the geographical dimension, we also pursue here two complementary lines of inquiry taking advantage of the microdata: the income impact on these perceptions and the life-cycle patterns of these perceptions. Starting with the former, we present the raw relationship between income percentiles (PPP adjusted – moving average of 5 percentiles) and each of the standardized principal components factors extracted, PHDI components hereafter.

Graph 31.1a–d show that inner components are generally positively correlated with objective income while outer components present more diverse and less marked patterns. Inner income perceptions start in the first 5 percentiles at a level of −0.4, which is below the level of Nicaragua, the worst perceived performance. The top 5 percentiles coincide with the inner perception levels found in Canada.

The inner working conditions follow the same path, ranging from 0 (the level found in El Salvador) in the first 5 income percentiles to 1 in the 5 top percentiles (which corresponds to the level of inner working perceptions found in Canada).

The first inner health perception index presents a positive correlation with objective income found in both income and working inner perception components. It also presents a similar range to the inner working conditions perception, going from 0.10 in the first 5 percentiles (similar to the 0.12 reached in
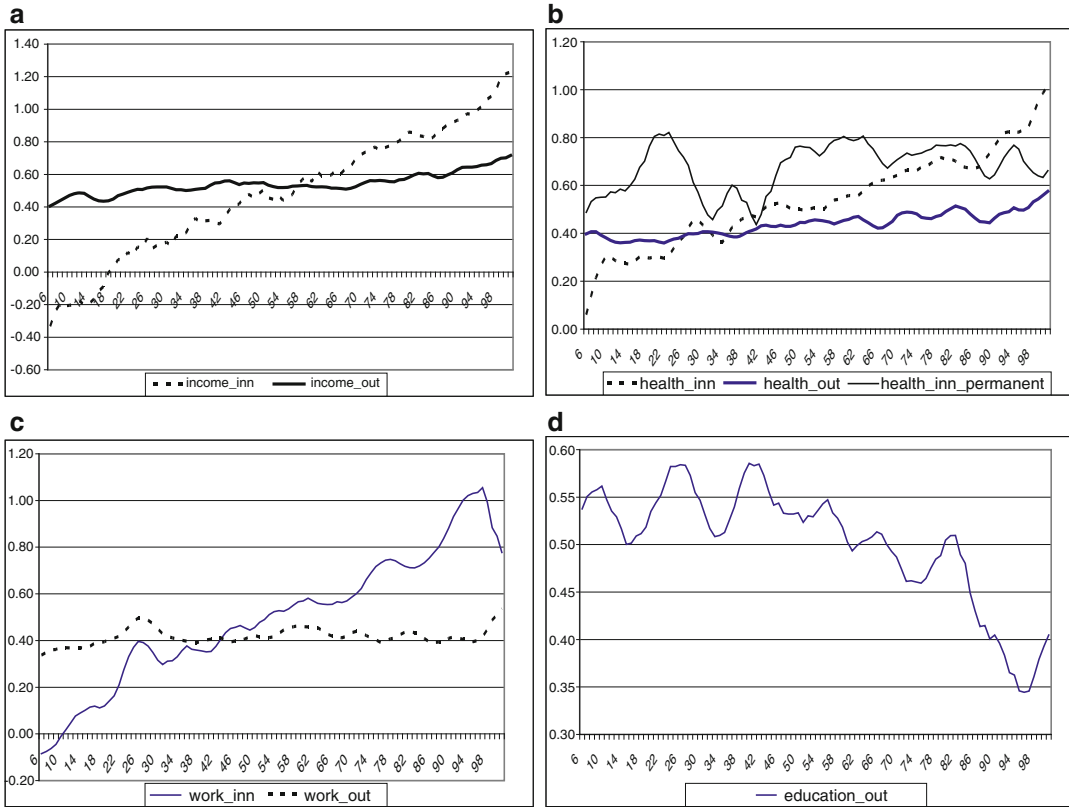
Bolivia; the minimum level 0 was reached in Peru) to 0.95 (same level as observed in Costa Rica; Canada is not in the Sample and Guatemala is in the top). The other inner health component associated with perceptions on more permanent disability related to health conditions does not present a monotonic relation with income.

The outer perceptions of the PHDI components present a less clear pattern when it comes to income. Table 31.7 presents an OLS regression correlation using these factors as endogenous variables to isolate the per capita income's impact on the principal components at the microdata level. These regressions include dummies for gender, city size, position in the household, the presence of children, elderly plus a continuous age term and fixed country effects. The individual income perception is expressed here in terms of deprivation so higher income reduces perceived deprivation and increases inner work and health components. The outer perceptions present much smaller income correlations, as in the case of outer income and education conditions, or non-significant correlations as in the case of outer work and health conditions. This smaller impact on outer perceptions is clear in the Graph 31.1a–d and Table 31.7 may be appreciated as a sign of consistency of the expectations across individuals located in different points of the very unequal LAC income distribution.[3]

31.4.2 The Life-Cycle Pattern of PHDI Components

The age effect on PHDI components is quite diverse as presented in Graph 31.2a–d. Once again outer components are less sensitive to age than inner components and even less so than in the income sensitivity discussed above. The most direct impact of age on perceptions is observed on the inner health components that can be taken as the perception of the life-cycle itself. Both inner health components move from 1 between 16 and 20 years of age to 0 in

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[3] The reader can analyze similar results for the each of the main questions related to PHDI for LAC and the questions that are available for the world in Appendix.

a

b

c

d

Graph 31.1 (**a**–**d**) Objective income and perceived human development indexes components-Latin American Countries standardized principal components and per capita household income percentile (PPP adjusted)-centered moving average 5 percentiles (Source: Microdata from the World Gallup Survey 2007)

Table 31.7 Correlation between per capita income and PHDI principal components OLS regression analyses American countries 2007

	Coefficient	P-value
Inner PHDI components		
Income_dep_inn	0.00059	<0.0001
Work_inn	0.00038	<0.0001
Health_inn	0.00032	<0.0001
Health_inn_permanent	0.00006	0.005
Outer PHDI components		
Income_out	0.00011	0.000
Work_out	0.00005	0.134
Health_out	0.00003	0.314

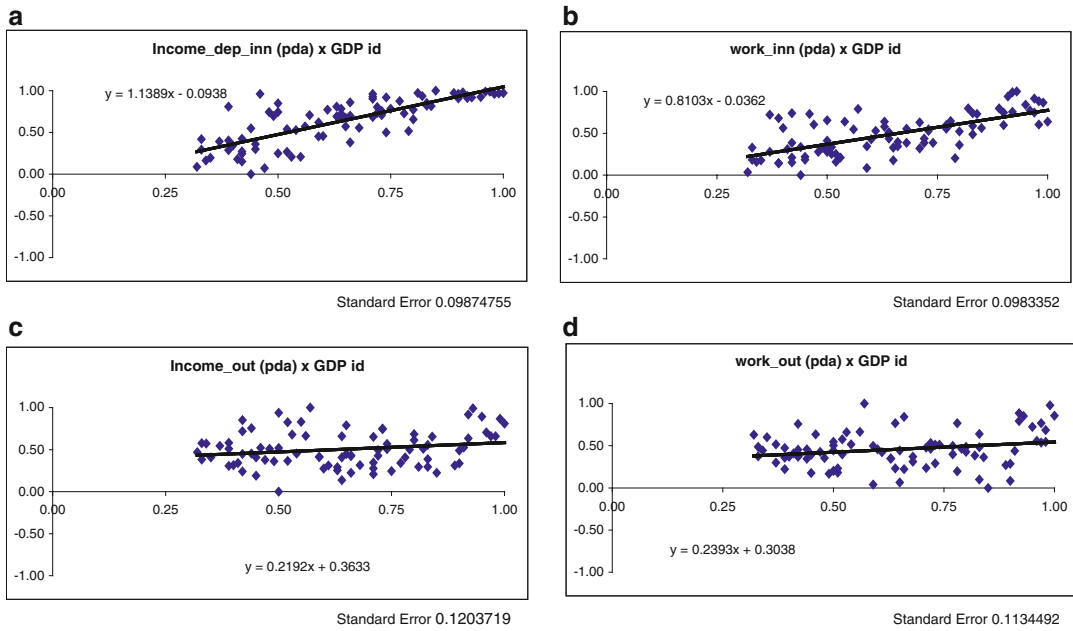Source: Author's estimates from the Gallup World Poll 2007 microdata

Income_dep_inn corresponds to an inner perception income deprivation coefficient

the so-called third age (at 60 years of age). The basic difference is that the perceptions related to more permanent health problems deteriorate more sharply after this age period, reaching -1.5 around 80 years old while the other inner health perception is around -0.27 at this age. The outer health perception component is much more stable than the inner health perception components. There is a slight improvement of outer health after 50 years of age, which may indicate that more intensive users of health services have more positive perceptions.

The inner working conditions component presents a hump-shaped life-cycle format that resembles Franco Modigliani story. It crosses the horizontal axis of null inner work PHDI – equivalent to average El Salvadorian working conditions perceptions – at the age of 21 and 68. The peak at 1 – average Canadian perceptions – is reached at the age of 41. There is a sort of plateau between the age of 30 and 55, where the index is always above 0.8.

Talking about outer perceptions on work conditions, the worst level – around 0.4 – is

a

Income_dep_inn (pda) x GDP id

y = 1.1389x - 0.0938

Standard Error 0.09874755

b

work_inn (pda) x GDP id

y = 0.8103x - 0.0362

Standard Error 0.0983352

c

Income_out (pda) x GDP id

y = 0.2192x + 0.3633

Standard Error 0.1203719

d

work_out (pda) x GDP id

y = 0.2393x + 0.3038

Standard Error 0.1134492

Graph 31.2 (**a–d**) Gross correlation between aggregated PHDI and respective HDI component (Source: Author's estimates from the Gallup World Poll 2007 microdata and Human Development Report)

Table 31.8 Relation between disaggregated PHDI PCA and respective HDI component regression analyses

	Income dep inn	Income out	Work inn	Work out	Health inn	Health out	Education out
Constant + specific HDI component	**−2.12**	**0.50**	**0.99**	**0.45**	**0.38**	**0.95**	**0.92**
	0.02	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*
Constant + HDI components	**−1.01**	**1.34**	**0.79**	**1.09**	**0.44**	**0.39**	**0.09**
	0.04	*0.04*	*0.04*	*0.04*	*0.04*	*0.04*	*0.03*
Cte + HDI component + socio-demografics[a]	**−0.91**	**2.13**	**1.18**	**1.33**	**1.90**	**2.79**	**−0.64**
	0.06	*0.07*	*0.06*	*0.06*	*0.09*	*0.09*	*0.05*

Source: Author's estimates from the Gallup World Poll 2007 microdata and Human Development Report
[a]Regressions include dummies for presence of children, for elderly, gender, position in the household and HDI components

observed in middle-aged individuals while the peak in the perceptions is reached by younger or older individuals – 0.6 around ages of 20 and 77 years. Outer education perceptions do not present a clear trend, but fluctuate between 0.45 and 0.65 until 68 years of age and increase somewhat at later ages reaching the peak of 0.68 at around 77 years of age. Contrary to outer health perceptions those with less access to the service have better outer education perceptions.

Finally, although inner income perceptions fluctuates much more than outer income perceptions, both composite variables of the life cycle profiles are quite erratic. Better inner income perceptions are observed at early and later ages.

31.5 The Formation of Perceptions on Human Development around the World

The sets of results here show the robustness of expected correlation signs between objective HDI and subjective PHDI components. In the Table 31.8 we use the non-standardized PCA. For example, we ran regressions of the inner

and outer health components against health HDI component. In the case of the work related PHDI components, where there is no HDI counterpart, we use the GDP as its corresponding objective indicator. We use different specifications with respect to controls. The first line uses a constant regression besides the respective HDI component. The second line adds the two other HDI components in the regressions. The third line adds socio-demographic characteristics at an individual level to the second line regressions.

The results show statistically significant associations between HDI and PHDI respective components with the right sign. That is, a negative sign for income deprivation and HDI income index and a positive association for all others. The only exception is the objective and subjective education index (third line of the table) that presents a negative but statistically non-significant sign.

The aggregate HDI and PHDI respective components also present a positive relationship shown results of this line is presented in the set of Graph 31.2a–d. In sum, the set of results are consistent with the expected correlation coefficients between PHDI sector-specific ingredients and its corresponding objective HDI ingredient.

31.6 Life-Satisfaction and the Subjective Weights of the Human Development Components

31.6.1 Conceptualization of the Determinants of Life Satisfaction

If one agrees, as most people would, that happiness can be considered the ultimate goal in a person's life and that what matters most for everybody is to achieve satisfaction with life, it follows that economics should be about individual happiness. The study of satisfaction with life[4] has an intrinsic interest as well as other motivations, such as the evaluation of alternative economic policies and the solution of empirical puzzles that conventional economics find difficult to explain. Concerning this last aspect, probably the most striking paradox in need of an explanation is the very weak correlation found in many studies between income, the most worshiped variable in economics, and happiness. It was a well-established finding[5] that several countries that experienced a drastic rise in real income since WWII did not see an increase in the self-report subjective well-being of the population, which has even fallen slightly. At a given point in time, higher income is positively associated with people's happiness, yet over the life cycle, across countries and over time this correlation is very weak, what is known as the Easterlin paradox. As we are going to see later this view was recently challenged by the recent empirical results presented by Deaton (2007) that also explore the Gallup World Poll used here.

This fact motivated economists to reach a step beyond the standard economic theory's "objectivist" position, based only on observable choices made by individuals. In the traditional approach, individual utility depends only on tangible goods, services and leisure, and is inferred almost exclusively from behavior (or revealed preferences). The axiomatic revealed-preference approach holds that the choices made provide *all* the information required by simply inferring the utility of individuals. According to Sen (1984) "the popularity of this view may be due to a peculiar belief that choice (...) is the only human aspect that can be observed."

Stemming from a work by Easterlin (1974), and having become substantially relevant in the late 1990s – when economists started to contribute with large-scale empirical analyses of the determinants of happiness in different countries and periods[6] – the economic interest in the assessment of individual subjective welfare grew considerably.

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[4] Subjective well-being, happiness and satisfaction can be used interchangeably and is the scientific term in psychology for an individual's evaluation of her experience about life as a whole.

[5] See Richard Easterlin (1974), Blanchflower and Oswald (2000), Diener and Oishi (2000), and Kenny (1999)

[6] For a general survey on happiness research see Kahneman (2011) and Frey and Stutzer (2002).

A subjective view of utility recognizes that everybody has his own ideas about happiness and good life and that observed behavior is an incomplete indicator for individual well-being. This methodology involves the belief that individuals' happiness can be captured and analyzed by directly asking people about how satisfied they are with their lives. Hence, the variables of interest are based on the judgment of the persons directly involved, following a premise that people are the best judges of the overall quality of their lives, and thus no strategy could be more natural and accurate than to ask them about their well-being. The main idea is that the concept of subjective happiness allows us to capture human well-being directly, instead of assessing income, or other things which are not truly what most people want but, instead, a means through which one can attain happiness.

Following Frey and Stutzer (2002), "subjective well-being is a much broader concept than decision utility, including experienced utility as well as procedural utility, and is for many people an ultimate goal." They argue that, for most purposes, happiness or reported subjective well-being are satisfactory empirical proxies for individual utility. Since people assess their level of subjective well-being in relation to circumstances and other people, past experience, and future expectations, they suggest that this measures can serve as proxies for utility. Besides, since the main purpose of measuring happiness is not to compare its levels in an absolute sense but rather to identify its determinants, as it will be done in our work, it is necessary neither to assume that reported subjective well-being is cardinally measurable nor that it is interpersonally comparable. Furthermore, according to Diener and Oishi (2000) – based on many studies which found a high correlation between reported happiness and smiling, and others that found the same correlation between unhappiness, brains and heart activity – "these subjective measures seem to contain substantial amounts of valid variance".

Angus Deaton (2007), using the Gallup data, not only challenges some more or less well established interpretations of the previous empirical literature, in particular that "money does not

bring happiness (that is, long-run life satisfaction)", but he also uses the same data set we use in this paper, namely the Gallup World Poll, which is rich in content and cover a wider number of countries than previous surveys, enabling the comparability of results. We also explore here countries fixed effects and empirical possibilities offered by microdata availability worldwide. The theoretical and empirical structures of Deaton's paper are quite useful for the purposes of this paper. The interpretation based on a standard intertemporal model incorporating explicit income and survival rates is quite appropriate for the HDI structure used where income and life expectations do occupy a central role.

Deaton (2007) paper does not make any direct reference to the HDI; nevertheless, the empirical specification of the determinants of life satisfaction uses not only the main variables of the original HDI such as per capita GDP and life expectation but the functional form used in the paper for the log of GDP is the same one used in the HDI.[7] Education HDI component that is not present in Deaton's framework may impact more directly on the budget constraint than the achieved happiness levels and will be incorporated into the empirical framework.

31.6.2 Sector-Specific Weights of the HDI and Life Satisfaction

One common criticism to the HDI is the fact that weights given to each of its income, health and education components are arbitrary. This sub-section addresses this issue taking advantage of questions on present life satisfaction extracted from the Gallup survey as endogenous variable. The estimation of a "happiness function" using aggregated HDI components as explanatory variables and restrictions summing to one in a restricted linear least square framework will

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[7] As Deaton (2007, p 30) poses "One surprising finding in figure 3, the close linear relationship between average life satisfaction and the logarithm of income per head".

Table 31.9 Sector-specific weights of the HDI and life satisfaction regression analysis, parameter estimates

Parameter estimates		Model 1		Model 2	
Variable	Label	Parameter estimate	Standard error	Parameter estimate	Standard error
Intercept	Intercept	**2.63**	*0.03*	**1.80**	*0.06*
Past life satisfaction				**0.45**	*0.00*
Gross_ed	Gross_ed	**0.022**	*0.00*	**0.01**	*0.06*
Literacy	Literacy	**0.003**	*0.00*	**0.00**	*0.00*
GDP_id	GDP_id	**0.664**	*0.06*	**0.39**	*0.05*
Life_id	Life_id	**0.310**	*0.06*	**0.15**	*0.05*
Restrict		**3429**	*66.2*	**2193**	*57.0*

Source: Author's estimates from the Gallup World Poll 2007 microdata

enable the estimation of the relative weights attributed to income, health and education in subjective welfare. We do that in two ways by taking and not taking into account the presence of the lagged variable of life satisfaction, which generates a common multiplier effect on the long run impact of each variable. The question of current and past life satisfaction involves an 11-point scale ranging from 0 to 10 and it will be described in detail in the next section of the paper.

The results of the regression in Table 31.9 without the lagged variable show a weight of 66 % attributed to GDP, 31 % to life expectation, 2.2 % to gross enrollment rates and 0.3 % to the literacy indicator. This means that according to the current life satisfaction criteria the weight should be two thirds for income, 31 % for health and less than 3 % for both education components weights taken together. One may argue that education is an investment in the future. The next step is to throw light in this issue by running a similar exercise but considering a future life-satisfaction instead of current levels.

31.6.3 Sector-Specific Weights of the PHDI and Current Life Satisfaction

Similarly, we investigate the weights given to each of the three components in the PHDI framework that are common to the HDI sector-specific indicators (income, health and education) in relation to the present life satisfaction criteria mentioned in the previous subsection. To be sure, first we estimate a restricted linear least square regression at the micro-level in both endogenous and explanatory variables taking into account perceived components on income, health and education described in the previous section of the paper.

The results of the regression without the lagged variable presented on Table 31.10 show a weight attributed to inner income perceptions of 64 %, outer income perceptions 17.6 %, inner health 8.9 %, outer health 9.1 %; and outer education had a null weight. These results suggest that the sum of weights given to each of them is not so distant in order of magnitude from the ones estimated from the objective HDI indicators: the weights given to income was 66 % there against 82 % here; health was 31 % there and 18 % here; and education less than 3 % there and 0 % here. One must have in mind that the income component is not related only to mean income but also to income deprivation perception, which may intuitively explain the higher weight, while conversely by the same token education perceptions considered in the questionnaire are only outer ones, while in general inner coefficients tend to be more strongly associated with inner life satisfaction, which may explain the smaller weight.

As we argued in the introduction, since work perceptions issues play a central part in the happiness literature, we replicate the same exercise with the two additional labor variables. The results of the restricted linear square regression again without lagged variable presented in Table 31.11 show a weight of 4.1 % attributed to inner work, virtually 0 % to outer work, 60 % to inner income perceptions, 18.4 % to outer income perceptions, 7.7 % to inner health, 8.3 % to outer health 8.3 % and again a null weight for outer education.

Table 31.10 Sector-specific weights of the HDI and life satisfaction

Variable	Model 1		Model 2	
	Parameter estimate	Standard error	Parameter estimate	Standard error
Intercept	**4.66**	*0.01*	**2.58**	*0.02*
Past life satisfaction			**0.46**	*0.00*
Pincome_dep2	**0.64**	*0.01*	**0.52**	*0.01*
Income_out	**0.18**	*0.01*	**0.34**	*0.01*
Health_inn	**0.09**	*0.01*	**0.12**	*0.01*
Health_out	**0.09**	*0.01*	**0.04**	*0.01*
Cp_education	**0.00**	*0.01*	**−0.01**	*0.01*
Restrict	**14,402**	*229*	**6592**	*187*

Source: Author's estimates from the Gallup World Poll 2007 microdata

Table 31.11 Sector-specific weights of the PHDI and life satisfaction

Variable	Model 1		Model 2	
	Parameter estimate	Standard error	Parameter estimate	Standard error
Intercept	**4.67**	*0.01*	**2.65**	*0.02*
Past life satisfaction			**0.45**	*0.00*
Pincome_dep2	**0.60**	*0.01*	**0.46**	*0.01*
Income_out	**0.18**	*0.01*	**0.32**	*0.01*
Work_inn	**0.04**	*0.01*	**0.06**	*0.01*
Work_out	**0.01**	*0.01*	**0.04**	*0.01*
Health_inn	**0.08**	*0.01*	**0.10**	*0.01*
Health_out	**0.08**	*0.01*	**0.03**	*0.01*
Cp_education	**0.01**	*0.01*	**−0.02**	*0.01*
Restrict	**12,428**	*204*	**6166**	*168*

Source: Author's estimates from the Gallup World Poll 2007 microdata

31.7 Conclusion

31.7.1 Overview

The knowledge of people's perceptions allied with objective data traditionally observed by most of the research conducted, allows policy makers to enhance and qualify its assessments on policies adopted by the State, integrating in a more balanced manner, the elements of effectiveness, efficiency and efficacy of the results obtained.

Household surveys such as the Demographic Census and the National Household Surveys from the national institutes of statistics across the continent, capture different aspects of Latin American society, such as the distribution of income, education and employment. However, they do not provide a direct notion of national differences compared to other countries, nor do they cover subjective aspects of people's lives. In order to each country aspirations *vis-à-vis* those of other nations, it is necessary to view people's perspectives through international lenses, as in the emerging literature of happiness economics. These approaches are not yet part of the honorable traditions of Latin American household surveys.

A recent innovation, presented in this book, was to incorporate to LAC field research, questions that are acknowledged internationally on social perceptions studies. The combined processing of this information allows for direct comparison of global, national and regional results.

The complex mosaic of data and analyses presented in this publication allows for a comprehensive reading of the perception of Latin Americans on their lives and the impacts emanating from public policies, and, furthermore, promote international comparisons. The

results were used in several cross-readings, which indicated a trend of dissatisfaction with some public services such as education, health, issues that dominated the agenda of popular Brazilian demonstrations during June of 2013. The results may indicate that the way to solve some of the challenges presented in popular manifestations depends on higher and not lower involvement of the State and that the sources for funding these actions are related to a more progressive tax structure. Moreover, perceptions indicate that population well-being passes through the working world and that people believe teachers hold the greatest possibility of transformation and can provide solutions to problems, such as overcoming poverty and even the low quality of education.

In this manner, the results presented demonstrate great potential for the generation of information and analyses and opens several lines of work and partnerships, showing that the prominent role to be occupy within the State on measuring the perceptions of the population on public policies.

31.7.2 Main Results

It is believed in common sense that happiness can be considered as the ultimate objective in a person's life. Thus, the study of satisfaction with life has an intrinsic interest as well as other motivations, such as the evaluation of alternative economic policies and the solution of empirical puzzles of the economy. The Gallup World Poll, covering more than 132 countries, has expanded the geographical horizon of the discussion and also allows us to gauge people's perception with respect to different sectorial social policies. The first objective of the paper is to build a Perceived Human Development Index (PHDI) framework by assembling the HDI components, namely indicators on income, health and education on their subjective version.

The principal component analysis (PCA) applied to more than two dozen subjective questions allowed for eliminating the redundancy among similar queries, revealing a convergence of topics in two fronts, chance versus outcome indicators, as well as the existing dichotomy between internal indicators on the status of the individual and external perceptions about the society and associated policies. The relation between the respective components of the HDI and PHDI is also explored and the results indicate that the perceptions of individuals with income, education, health and work are relatively adherent to their counterparts' goals. Particularly, when we deal with internal perceptions about the status of the individual and less with external perceptions. A ranking of the PHDI is presented for 109 countries in the Appendix, with Singapore in the first place and Haiti in the last. Brazil was in position 62.

Similarly, we investigate the weights given to each of the three components in the PHDI framework that are common to the HDI sector-specific indicators, namely income, health and education, applying to the present life satisfaction criteria mentioned in the previous subsection. From the estimation of a "happiness function", weights were established and first assigned to each component of the Human Development Index (HDI) concerning satisfaction with current life. The results indicate that income explains about 66 % of the variation in life satisfaction against 31 % of life expectancy, leaving less than 3 % explained by components of education. Similar exercise for the subjective components of the PHDI shows that the weight attributed to inner income perceptions is 64 %, outer income perceptions 17.6 %, inner health 8.9 %, outer health 9.1 % and outer education with a null weight. These results suggest that the sum of weights given to each of them is not distant in order of magnitude from the ones estimated from a similar equation of life satisfaction against objective HDI indicators, but rather different in relation to the equal weights assumed by the standard HDI (one third for each component). On the other hand, the hypothesis that different age groups confer different weights to the components of the HDI is rejected. In general, the construction of the PHDI allows, by means of a summarizing indicator of subjective nature, for complementary analyses to those undertaken with the traditional HDI.
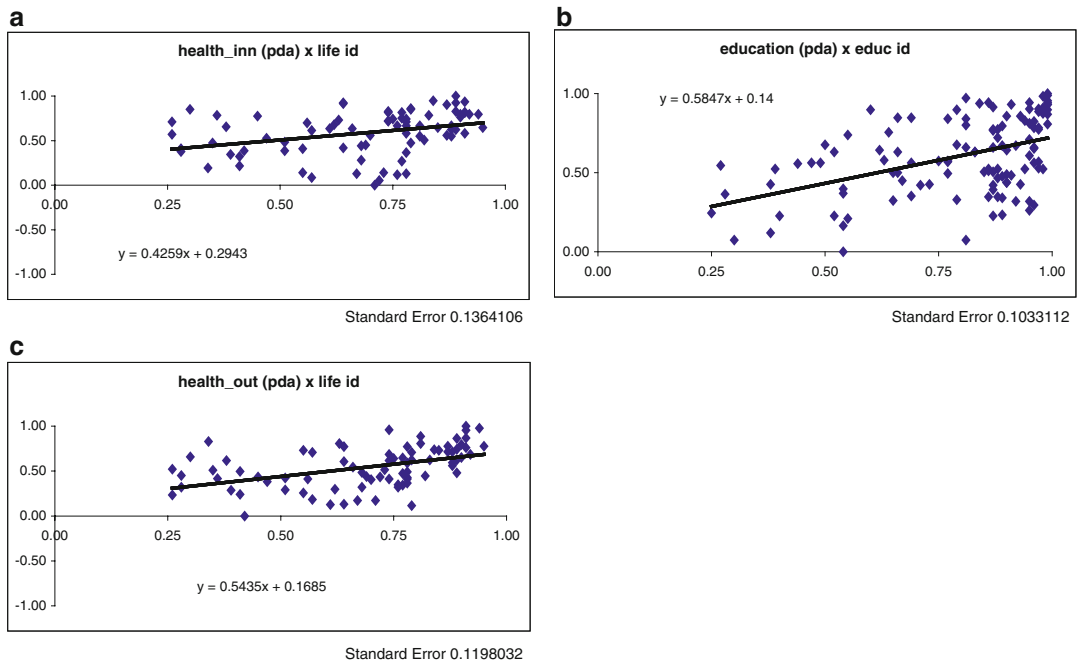
Appendix

Table 31.12 PHDI – ranking of 109 selected countries (2006)

Position	Country	PHDI	Position	Country	PHDI
1	Singapore	0.96	56	Dominican Republic	0.63
2	Finlândia	0.94	57	Senegal	0.63
3	Ireland	0.94	58	Mauritania	0.63
4	United Arab Emirates	0.94	59	Iran	0.62
5	Austria	0.92	60	Hungary	0.62
6	Kuwait	0.92	61	Chile	0.62
7	Belgium	0.90	62	Brazil	0.61
8	Switzerland	0.90	63	Zambia	0.61
9	New Zealand	0.90	64	Mozambique	0.61
10	Thailand	0.90	65	Philippines	0.59
11	France	0.90	66	Polopny	0.59
12	Denmark	0.88	67	Greece	0.58
13	Laos	0.88	68	Pakistan	0.58
14	Chipre	0.87	69	Ecuador	0.57
15	Netherlands	0.87	70	Nicaragua	0.56
16	Australia	0.87	71	Bolivia	0.56
17	Sweden	0.87	72	Lithuania	0.56
18	Norway	0.86	73	Bielorussia	0.55
19	Italy	0.85	74	Kenya	0.54
20	United Kingdom	0.85	75	Madagascar	0.53
21	Saudi Arabic	0.84	76	Tanzania	0.53
22	Spain	0.84	77	Kazakhstan	0.53
23	Taiwan	0.84	78	Rwanda	0.51
24	Portugal	0.82	79	Malawi	0.50
25	Jordania	0.82	80	Azerbaijan	0.50
26	Costa Rica	0.82	81	Palestine	0.50
27	Panama	0.82	82	Nigeria	0.49
28	Nepal	0.80	83	Ethiopia	0.49
29	Japan	0.79	84	Afghanistan	0.48
30	Vietnam	0.79	85	Yemen	0.47
31	Jamaica	0.79	86	Niger	0.47
32	Slovenia	0.78	87	Peru	0.47
33	Germany	0.75	88	Zimbabwe	0.46
34	Botswana	0.75	89	Romania	0.46
35	Trinidad Tobago	0.75	90	Tajikistan	0.45
36	Czech Republic	0.75	91	Quirguistan	0.44
37	Indonesia	0.71	92	Burkina Faso	0.44
38	Slovakia	0.71	93	Morocco	0.44
39	Sri Lanka	0.70	94	Cameroon	043
40	El Salvador	0.70	95	Turkey	0.42
41	Libanus	0.68	96	Mali	0.42
42	Uruguay	0.68	97	Armenia	0.40
43	Honduras	0.68	98	Togo	0.40
44	Colombia	0.68	99	Cambodia	0.38
45	Venezuela	0.67	100	Sierra Leone	0.38
46	Ghana	0.67	101	Uganda	0.37

Table 31.12 (continued)

Position	Country	PHDI	Position	Country	PHDI
47	Algerie	0.67	102	Angola	0.36
48	India	0.66	103	Russia	0.34
49	South Korea	0.65	104	Moldova	0.34
50	Paraguay	0.65	105	Burundi	0.32
51	Argentina	0.65	106	Benin	0.29
52	Letonia	0.64	107	Ukraine	0.27
53	Mexico	0.64	108	Chade	0.15
54	Guatemala	0.63	109	Haiti	0.09
55	Bangladesh	0.63			

a

health_inn (pda) x life id

$y = 0.4259x + 0.2943$

Standard Error 0.1364106

b

education (pda) x educ id

$y = 0.5847x + 0.14$

Standard Error 0.1033112

c

health_out (pda) x life id

$y = 0.5435x + 0.1685$

Standard Error 0.1198032

Graph 31.3 (**a–c**) Gross correlation between aggregated PHDI and respective HDI component

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