IADB Pension Indicators for Latin America and the Caribbean

By

Rodrigo Cerda[1], Consultant

December 30th, 2017

[1] Rodrigo Cerda: email rcerdan@uc.cl, address: Alameda 440, Piso 13, Santiago, Chile. I am thankful for the research assistance from Ramon Delpiano and the helpful and detailed comments from Nicholas Barr, Solange Berstein, Mariano Bosch, Carolina Felix, Manuel García Huitrón, Richard Jackson, Lucia Madrigal, Waldo Tapia and Tapen Sinha. Any remaining errors are my responsibility.

1. Introduction

Reliable pension statistics are needed in Latin America and the Caribbean. While many pension statistics are already available for the region, they are sometimes difficult to access and, more importantly, are often not comparable due to differences in methodology or sources of data. At least for the moment, comparisons among pension systems in Latin America and the Caribbean are difficult to make.

In this project, we plan to fill this gap by constructing a comprehensive set of comparable pension systems indicators for 15 Latin American and Caribbean countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Haiti, Honduras, Jamaica, Mexico, Panama, Paraguay, Peru, and Uruguay.[2] These indicators will address different aspects of pension system and will also consider the broader demographic, economic, and social environment in which pension systems operate.

There are two main stages in the project. The first stage involves designing the overall indicator framework and specifying the individual indicators. The second stage involves obtaining the necessary data and calculating the indicator results. The data sources we use will depend on the type of indicators we are constructing. For instance, for demographic indicators we will rely heavily on historical data and projections from ECLAC. On the other hand, in constructing indicators on labor-market behavior or pension replacement rates, we will rely on household surveys. For some countries we will use the Longitudinal Social Protection Survey (LSPS) database, which has harmonized micro data for Chile, Colombia, El Salvador, Paraguay, and Uruguay. For other countries, we will use national surveys.

This paper represents the first initial step in the project. An advisory board composed of three international experts on pension systems (Dr. Nicholas Barr, Dr. Richard Jackson, and Dr. Tapen Sinha) is helping by advising and reviewing this document. In

[2] These are the member countries of the Pensions in Latin America and the Caribbean Network (PLAC Network) of the Inter-American Development Bank (IDB). For more information, please visit www.iadb.org/redplac.

addition, the input of the partner institutions of this project, namely FIAP (International Federation of Pension Fund Administrators), AIOS (International Association of Pension Fund Supervisory Organizations), OISS (Ibero-American Social Security Organization), CISS (Inter-American Social Security Conference) and CAPS (Caribbean Association of Pension Supervisors), as well as of member country representatives, is also very welcome. After receiving and incorporating comments, the pension indicators will be calculated and published, making them available for the international community.

This paper has two parts. Part I reviews some of the more important existing literature on pensions indicators, and especially attempts to create internationally comparable indicator sets, while Part II discusses our own proposed set of indicators for Latin America and the Caribbean (LAC), including our overall framework, data sources, and specific indicator definitions. In our literature review, we find that the majority of the studies have focused on developed economies, which obviously distinguishes them from our project. Although the studies usually pay most attention to pension systems outcomes like coverage, replacement rates, and fiscal cost, some of them also address the institutional design of the pension systems and the broader demographic and macroeconomic environment in which the pension systems operate. We will include all of these dimensions when constructing our pension indicators. We will also try to use data sources that allow our indicators to be regularly updated, ensuring the ongoing relevance of the project.

The indicators proposed in Part II will be organized into five "dimensions" or "categories" that attempt to answer the following five questions:

1. What is the demographic, economic, and social environment in each country—and is this environment projected to change in ways that will affect pension systems over time?
2. What are the current pension system designs in Latin America and the Caribbean?

3. How have these pension systems performed in terms of coverage, the density of contributions and effective replacement rates?
4. Are the pension systems financially and socially sustainable?
5. More broadly, are societies prepared for the aging of their populations?

We believe that the project will, for the first time, give researchers and policymakers an accessible, comprehensive, and comparable set of pension indicators for LAC countries. It is also our hope that it will shed light on the particular challenges that individual countries face, thereby facilitating timely and constructive reforms.

Chapter I: Review of pension indicators

2. Common framework: the multi-pillar approach for pensions

Pension systems come in many different types: public and private; occupational and personal; and pay-as-you-go and funded. A common approach to classifying pension systems is the multi-pillar approach described in the pension literature by Holmann and Hinz (2005) and Bovenberg, van Ewijk and Westerhout (2012), among others. The standard classification is as follows:[3]:

- Pillar 0: Non-contributory basic pension financed by general government revenues (it might be universal, means-tested, or otherwise targeted);
- Pillar 1: A mandated public pension plan, generally financed on a pay-as-you-go basis, that is publicly managed with contributions linked to earnings;
- Pillar 2: A mandated and fully funded occupational or personal pension plan;
- Pillar 3: A voluntary and fully funded occupational or personal pension plan;
- Pillar 4: Other sources of old-age income support that lie outside the formal pension system, such as non-pension personal savings, employment income, and intrafamily transfers.

Within this framework, there are three different "institutions" with roles in providing sufficient and adequate retirement income. They are (1) the public sector, by providing social insurance and social assistance, (2) the private sector, by providing private pensions and other retirement savings vehicles and (3) the private sector and the civil society, by providing other sources of income during retirement.

In each of these pillars, there are efficiency and risk diversification issues that pension indicators need to address. Sustainability questions might also arise when

[3] Alternatively, the OECD (2014) classifies pension systems into two mandatory "tiers" (a redistributive tier and a savings tier) plus a third tier, which consists of a voluntary provision (individual or employer-provided). Gillion and co-authors (2000), in a book published by the ILO, suggest a 4-tier model, including a first anti-poverty tier; a second pay-as-you-go defined benefit tier; a third mandatory defined contribution tier; and a fourth voluntary defined contribution tier.

analyzing the state of these pillars in different countries. A large "Pillar 0" might be desirable in order to guarantee a sufficient minimum level of pension benefits upon retirement. But does the government have enough revenue to assure that the pillar is permanent? If the answer is no, then we face a fiscal sustainability problem. The demographic transition plays a critical role in the sustainability of Pillar 0 and Pillar 1 pension systems, since it leads to larger fiscal expenditures as fertility rates fall, life expectancy rises, and the aged dependency ratio grows. Thus, as we will see below, most approaches to designing pension indicators pay close attention to demographic trends and their impact on government budgets.

While measuring the sustainability of pension systems is a major concern in most of the approaches to designing pension indicators discussed below, the adequacy of those systems is a major concern in all. Most studies include indicators for average replacement rates, both theoretical and effective. Some also calculate replacement rates for median earners or by deciles of income to get a sense of the distributional impact of the pension system. Finally, in assessing adequacy, some of the studies look beyond the contribution of pension benefits and include indicators that capture trends in other sources of income that might also be used during retirement.

We now turn to a more detailed discussion of studies that have developed pension indicators that are comparable across countries and which, in some cases, rank countries according to the sustainability and adequacy of the retirement systems.

3. Global aging preparedness index

The objective of the Global Aging Preparedness Index (GAP) is to measure how prepared participant countries are to the global aging process coming up soon. There was a first edition of this index in 2010 while the second edition was published in 2013. The GAP Index covers 20 countries - including three Latin American countries: Brazil, Chile, and Mexico). To capture the impact of the demographic transition, it includes projections extending through 2040. The GAP Index considers two different and independent indexes, which are not aggregated into an overall index: (i) the fiscal sustainability index and (ii) the income adequacy index. The fiscal sustainability index resumes information of projections on public old-age benefit spending (both on pensions and health), the fiscal room to accommodate future increases in old-age government spending through raising taxes, increasing debt or cutting other expenditures, and the level of dependence of the elderly on public benefits, which is presumed to be an indicator of how easy or difficult it may be to enact cost savings reforms. The income adequacy index provides information on living standards of elderly vis-à-vis non-elderly, as well as safety nets and family support for the elderly.

One of the results reported by the GAP index is that both indices show a negative correlation between them, indicating a trade-off between fiscal sustainability and income adequacy, suggesting that, in general, countries with a more fiscally sustainable situation are those with a lower income adequacy and transfers to their elders, and vice versa.

The GAP report also discusses seven possible reforms that could affect pension systems and found that two of them (extending working lives and increasing funded pension savings) may have positive impacts in both fiscal sustainability and income adequacy. We next discuss the two indices of the GAP report in more detail.

a. Fiscal sustainability

The fiscal sustainability index is calculated by considering indicators in three categories: (1) public burden, (2) fiscal room and (3) benefit dependence.

The first category, i.e. Public burden, includes two indicators on the relevance of old-age benefits in the economy total resources. The indicators used for that purpose are (i) the benefits levels (total public spending on the elderly in 2040 as a fraction of GDP) and (ii) the increase in that variable between 2010 and 2040. Note that the benefit levels correspond to its 2040 figure. The idea is to measure the fiscal burden in the future if there are no parametric law changes and thus, provides a view of future economic risks. However, the projections do incorporate the impact of reforms that have already been enacted and are currently being phased in. The inclusion of the increase on that variable shows the future fiscal pressures that should eventually be funded. As explained in the report, the purpose of the "benefit growth" indicator is to recognize that some political economies may be better equipped to cope with large increases in government spending than others.

Then, the study refers to the second indicatory category, i.e. the concept of the fiscal room that corresponds to the fiscal space that countries might have to accommodate the projected old-age fiscal burden. In this case, three different indicators are used: (i) tax room (total government revenue as a fraction of GDP in 2040), (ii) budget room (total public benefits to the elderly as a fraction of total government spending in 2040) and (iii) borrowing room (the net public debt in 2040 as a fraction of GDP). The first indicator shows by how much taxes might be raised to finance the increase in old-age benefits by 2040 if taxes were the single financing source. The second indicator supposes that the funding is done by cutting other government spending, while the third indicator assumes that financing occurs by public debt emission only. When calculating the fiscal room index, the three indexes are weighted equally.

The final indicator category in the fiscal sustainability index is the benefit dependence, which measures the degree of dependence of elderly on public benefits. This measure

is useful to have an idea of political feasibility for reforming the pension system by cutting public pension benefits when the fiscal situation becomes unsustainable. Two indicators compose this indicator category, (i) benefit share (total government benefits as a percentage of the cash income of the median income elderly, average 2010-2040) and (ii) benefits cut (the percentage of older households that would be currently pushed into poverty by a 10 percent reduction in public benefits). In calculating the fiscal sustainability index, the benefit share receives a weight equal to 2/3, while the benefit cut has a 1/3 weight.

The overall fiscal sustainability index is an aggregation of the results for the three categories – weights are 40% for fiscal burden, and fiscal room and benefit dependence have a 30% weight each. Table 3.1 summarizes the indicators on the fiscal sustainability index.

Table 3.1: Indicators on the fiscal sustainability index

Fiscal sustainability index
Category I: Public burden
Benefit level
Benefit growth
Category II: Fiscal room
Tax room
Budget room
Borrowing room
Category III: Benefit dependence
Benefit share
Benefit cut

b. Income adequacy

The second income adequacy index measures the future adequacy of elderly income under current-law projections. The GAP Index defines income adequacy in a broad sense and considers total economic resources available to the elderly. It thus includes public and private pensions, earnings, asset income and assistance from family

members. Its main goal is to measure and track the relative living standards of the old. The income adequacy index has three indicator categories: (i) total income, (ii) income vulnerability, and (iii) family support.

Two indicators compose the first category: (i) total income level and (ii) total income trend. The indicator "total income level" is the per capita ratio of the average after-tax total income of the elderly, including health benefits, to the average after-tax total income of the non-elderly in 2040. Quite interestingly, when computed for different economies, this ratio is larger than one in 13 out of 20 countries, indicating that the elderly should be better off than non-elderly in many countries. The indicator "total income trend" is the percentage change in the ratio of the per capita after-tax total income of the elderly to the after-tax total income of the non-elderly between 2010 and 2040. Rather than the difference in living standards between the elderly and nonelderly, it focuses on the projected change in relative living standards. Both indicators are equally weighted.

Three indicators comprise the second category (income vulnerability): (i) median income level, (ii) median income trend and (iii) poverty level. This category, rather than focusing on comparing the overall living standards of elderly and non-elderly, provides diagnostics about the situation of middle-income elders and the extent of elderly poverty. Following that idea, the "median income level" indicator is the ratio of the per capita median after-tax income of the elderly to the median after-tax income of the non-elderly in 2040. The median income trend indicator measures the change in this ratio between 2010 and 2040. The poverty level indicator is the percentage of elderly with income levels below 50 percent of the country median, which provides an idea of how widespread is poverty among the elderly. The three indicators that are equally weighted.

The third indicator category (family support) has two indicators: (i) family ties and (ii) family size. The first indicator (family ties) measures the percentage of elderly living in households with their adult children in 2010. It is a measure of proximity to their relatives, who could provide economic support or personal caregiving. The

second indicator (family size) provides a projection of the change in the number of surviving children of the elderly between 2010 and 2040. Obviously, the larger the number of surviving children is, the more likely it is for the elderly to receive economic or personal support. In calculating the category result, family ties receive a 2/3 weight while family size has a 1/3 weight.

Finally, to calculate the GAP income adequacy index the three sub-indices (i) total income, (ii) income vulnerability and (iii) family support receive weights of 40%, 40%, and 20% respectively. Table 3.2 resumes the indicators used in the GAP income adequacy index.

Table 3.2: Indicators on the GAP income adequacy index

Income adequacy index
Category I: Total Income
Total income level
Total income trend
Category II: Income vulnerability
Median income level
Median income trend
Poverty level
Category III: Family support
Family ties
Family size

Note that the approach in the GAP report uses some assumptions. The first is to assume that there will be no further changes to pension laws. It does not mean no parametric changes as in many countries, current law involves parametric changes. In words of the study, the intention is to know what direction countries are heading.

Concerning fiscal expenditure in areas different than pensions, there are two assumptions. The first is that non-benefit spending will not grow as a share of GDP and that taxes will be raised to cover the growth in old-age benefits (except in the budget and borrowing room indicators, where the assumption is relaxed). In addition, it is imposed a debt neutrality constraint after a transition period, which is both standard and necessary because in the GAP index is not a general equilibrium model.

4. World bank pension database

The World Bank has a pension database available since 1990. The database was updated in 2000 and 2010, and it was published as a Pension Report that provides three different groups of indicators classified as (i) the environment, (ii) the system design and (iii) performance.[4] We next resume those indicators.

a. Environment

The group of environmental indicators considers information on economic, financial and demographic variables related to pensions. Demographics are important for the retirement system as determinants of potential contributors and potential beneficiaries of the pension system. Key demographic drivers used as indicators are the fertility rate, life expectancy and the old age dependency ratio. The old age dependency ratio delivers statistics on current, future and potential beneficiaries, while the fertility rate provides information on possible future contributors and life expectancy is an indicator of future beneficiaries.

The report on the environmental group of indicators also includes economic indicators, which correspond to labor force participation, plus public debt and public sector deficits; both measured as a fraction of GDP. Labor force participation is an indicator of current potential contributors to the pension system while public debt and public sector deficits provide information on fiscal space to finance pensions. Table 4.1 resumes the Environment Indicators proposed in the World Bank Report.

Table 4.1: World Bank Environment Indicators

Environment indicators
Demographic indicators
Fertility rate
Life expectancy

[4] See Paralles-Miralles, Romero, and Whitehouse (2012).

at birth
at ages 60 and 65
Number of elders as percentage of population
Labor market indicators
Labor force participation rates of working age population
Labor force participation rates among older than 65
Share of labor force in agriculture
Fiscal indicators
Public debt as share of GDP
Government expenditure as share of GDP
Public deficit as share of GDP

b. System design

The group of indicators related to pension system design describes the taxonomy of the pension system. It addresses the design and the operating characteristics of the pension system, by looking at parameters and rules of different kinds of schemes of the pension system. The report has two parts in this group of indicators:

i. Overall architecture of the pension system
ii. Operating parameters of the system that can be divided in:
    i. Qualifying criteria to receive benefits
    ii. Operating characteristics, such as contribution rates, replacement rate rules and indexation rules
    iii. Key design indicators, which provide information on relevant expected outcomes of the pension system

Concerning the overall structure of the pension system, the report has indicators related to information on (1) whether a pillar exists, (2) the type of scheme and (3) the financing of the system (funded or pay-as-you-go). Besides, it includes information on civil service pension design (whether they are integrated into the national system or have a separate scheme).

On the operating characteristics of the system, the report suggests indicators on (1) the age of eligibility to obtain a pension, (2) contribution rates, (3) benefit formulas and (4) indexation.

Also, the third set of indicators included in the pension design group relates to the expected outcomes for individuals when we consider all the relevant parameters jointly. In fact, those parameters should be associated with targeted objectives of the pension system. A usually important purpose of the pension system is the replacement rate. Note that if we simulate a worker history by using those parameters, we should obtain the pension system targeted replacement rates. In Paralles-Miralles, Romero, and Whitehouse (2012), the authors used a simulation methodology available at the OECD that captures all their interactions for a hypothetical worker. In their simulation, they assume a full career of contributions and retirement at the normal retirement age. The result is the target replacement rate, reported as a pension indicator. Another similar indicator is the change in pension wealth for early/late retirement. That indicator is relevant as it provides an idea of the incentives to delay retirement, calculated as the change in the pension wealth (the present value of pension benefits) from an additional year of work. Finally, two other key indicators are (i) the source of retirement income (either private or public) and (ii) the fraction of pension income financed through a minimum pension or non-contributory pension income.

Table 4.2: Pension system design indicators

Pension system design
Overall Architecture of the system
Classification of pension system
Modalities of pension system (multi-pillar)
Civil servants and other special mechanism
Operating Parameters of the System
Pension eligibility ages
Contribution rates
Benefit formulas

Indexation
Key design indicators
Target replacement rates
Change in net pension wealth for early/ late retirement
Public versus private pension income
Benefit from non-contributory or minimum pension as share of income per capita

c. Performance indicators

Finally, the performance indicators identify variables such as coverage, adequacy of benefits, financial sustainability, economic efficiency (economic distortions), and administrative efficiency. One significant advantage of this framework is the chance to test for potential trade-offs between the different dimensions of the system and its economic consequences. Specifically, Paralles-Miralles, Romero, and Whitehouse (2012) incorporate indicators on (i) coverage of workers, reflecting contributions to the pension system, (ii) coverage of elderly, reflecting pension recipients as a fraction of the relevant population. The World Bank report includes five indicators: (i) the empirical replacement rates[5], (ii) the ratio of pensions to income/expenditure of the elderly, (iii) the poverty rate for the elderly, (iv) the relative consumption to income ratio and (v) the fraction of the poverty gap reduced by pensions. The poverty rate for the elderly is not a direct indicator of pensions but provides an idea of the urgency of increased retirement benefits and old coverage. Similarly, the relative consumption to income ratio does not directly depend on pensions but gives an idea of the savings capacity of the elderly.

The Performance indicator group also provides information on the financial sustainability of the pension system. There are three indicators available in this topic: (i) public pension spending as a fraction of the GDP to get a measure of the size of the program, (ii) public pension spending as a fraction of tax revenues to get an idea of the

[5] The empirical replacement rate is measured from administrative data. According to Paillares et al (2012), "These show the benefits actually received by recent retirees. These empirical replacement rates are backward-looking, in the sense that they reflect past parameters and rules of the pension system and historical economic performance."

relevance of the pension expenditure on the government budget and (iii) the unfunded pension liabilities.

The economic efficiency dimension includes as indicators: (i) the effective retirement age, and (ii) tax wedges - social security contributions as a share of labor costs. Finally, there is a dimension on the administrative efficiency of the system, measured by the administrative cost of the public pension system. This last indicator has caveats since many programs in the public sector share administrative costs and thus it is possibly overstated.

Table 4.3: Performance Indicators

Performance Indicators
Coverage
Coverage of workers
Coverage of elderly
Adequacy
Empirical replacement rates by gender
Ratio of pension to expenditures/income of elderly households
Relative poverty of elderly
Relative consumption/income of elderly
Fraction of poverty gap reduced by pension transfer
Financial sustainability
Pension spending to GDP ratio
Pension spending to general tax revenue ratio
Unfunded pension liability
Economic efficiency
Average effective retirement age
Tax wedge (it includes income tax plus employee, and employer social security contribution)
Administrative efficiency
Administrative cost of public scheme

5. Pension indicators by the Finnish Centre for pensions

The Finnish government and its labor market organization counterparts set up in March 2010 a working life group to accomplish the following three goals, as part of the program for sustainable growth and employment:

- To secure a sufficient level of earnings-related pension benefits;
- The financing of the earnings-related pension scheme must be secured through social security contributions that do not affect employment and growth;
- The average retirement age should increase to assure the two previous goals.

The working life group published a report in 2011 containing, among other topics, some pension indicators. The Finnish Centre for Pensions carried out part of that work in 2011, and since 2013 it has been publishing an annual review summarizing the evolution of the main pension indicators. The report has three categories of indicators:

a. Length of the working life
b. Level of pensions
c. Pension expenditures and financing

In each of these categories, there are core indicators that cover the central issues to follow-up on pension reforms, while there are also complementing indicators that provide additional information. We next review indicators in each of these categories.

a. Length of the working life

Working life length is a key determinant for contributions to the pension system. The larger the duration of the working life, the greater should be the number of contributions and the lower should be the number of benefit payments for a given life

expectancy. The first category of indicators focuses on that idea and provides a list of twelve indicators (See Table 5.1).

Table 5.1: Length of the working life indicators

Length of the working life
Core indicators
Expected effective retirement age
Duration of active working life and duration of employment
Employment rate
Working life length of new retirees
Complementing indicators
The expected effective retirement age, median and average value
Expected effective retirement age of 60- and 62-year-olds
Share of insured that have retired on an earnings-related pension
Age-standardized incidence of disability pensions
Duration of active working life in the Nordic countries and the EU
Employment rate of 55-67 year-olds
Employment rate of 20-29 year-olds
Employment rate of 55-64 year-olds, in the Nordic countries and the EU

The *expected effective retirement age* indicator corresponds to the average retirement rate for insured persons of a given age, assuming that mortality per age group does not vary. The expectancy for a 25-year-old worker is the basic indicator, which in 2012 was 60.9 years.

The *duration of active working life* indicator looks to measure the average number of years a 15-year-old is expected to take part of the working force during his/her life cycle. The workforce share of the current year is used. The implicit assumption is that the workforce share will not change in the future and the duration of active working life becomes work force multiplied by the number of expected years of life for a 15-year-old individual. Similarly, the *duration of employment* should depict the average number of years a 15-year-old would be employed (including self-employment) during his/her life cycle. The report uses the current employment rates, under the identifying assumption that current employment rates will not vary in the future.

The *employment rate* indicator is the share of employed individuals, for a given age. The data is obtained from the Finland labor force survey. An employed person is someone employed in the week of the survey and who was receiving a monetary salary at least for one hour of work.

The *working life length of new retiree* measures the average (or median) numbers of years an individual, retiring in the current year, has worked in the past. This indicator allows obtaining information concerning the trend of some working years of retiring people and therefore, it provides knowledge of whether retirees are working more or fewer years over time.

The complementing indicators provide additional information on various aspects. Firstly, on expected effective retirement age the core index is supplemented. The *expected effective retirement age* index (base) corresponds to a simulation of the expected retirement age for insured persons with a certain age, under the assumption that mortality rate remains constant for an individual aged 25 years old. Two other indicators correspond to the *expected effective retirement age for 60 and 62-year-old* people. Besides, other complementing indicators, rather than calculating expected retirement age, provide data on the *effective median and average values of retirement age* in the earnings-related pension scheme. Finally, another complementary indicator providing information on retirement age is the *share of insured that have retired on an earnings-related pension*. That indicator depicts the percentage share of new retirees among same age individuals protected but not retired, which is a measure of risk of retirement for a given age.

The *incidence of disability pensions* corresponds to the share of the non-retired population receiving pension disability benefits. While usually this population is not large, per capita benefits might be non-negligible and might generate fiscal pressures.

The rest of complementary indicators in this category are similar to those described above but compared to other Nordic countries and the European Union or age specific.

b. Level of pensions

The idea of focusing on this dimension is that it gives us information about the standard of living of the elderly. Obviously, in the case of small pensions, there is a risk that citizens will pressure governments to increase public spending on pensions. See Table 5.2.

Table 5.2: Pension level indicators

Level of pensions
Core indicators
Average total pension in one´s right
Average total pension in one´s own right about relative earnings
Average total pension concerning average income in 2012-2080
Pension replacement rate
Theoretical replacement rate
Complementary indicators
Average total pension in one´s right and share of pension income per decile
Pension replacement rate distribution
Income of pensioner households
Low-income pensioners

The first core indicator is the *average total pension in one's right* that corresponds to total retirement benefits (including disability, unemployment pension, payment from insurance or surviving spouse pension) received by the elderly in Finland either from the earnings-related or national pension scheme. This indicator provides figures in euros per month. The second is similar (the *average total pension in one´s own right concerning relative earnings*), but it is measured as a fraction of average income based on average wages and self-employed income. It is similar to the "total income level" indicator reported in the GAP income adequacy index, which is computed as the per capita ratio of the total after-tax income of elderly vis-à-vis the non-elderly and it is

informative of the distributional shares of income between those two groups[6]. The third indicator is equal to the second but projected from 2012 to 2080. Similarly, average wages and income are computed until 2080. The projections depend on a long-term projection model of the Finnish Centre for Pensions.

The fourth and fifth core indicators provide information on the replacement rate of the pension system. The replacement rate indicator uses information from recently retired individuals and calculates the replacement rate as the ratio of pension benefits received in the current year to the average of the two preceding years of labor income. Administrative data is required in this step and individuals with no income in the two previous years, or part-time pension recipients are not included in the calculation. The cost-of-living index updates earnings values and makes them comparable across years. By contrast, the fifth indicator also calculates replacement rates, but at a theoretical level. In that case, by using simulation models, they project earnings while working and pensions when retired by using the parameters and rules indicated in the pension law plus life expectancy projections, for a hypothetical individual that begins working at 25 years old and continues with no interruption upon retirement. It is calculated a *theoretical pension replacement rate*.

The complementary indicators provide *average total pension* indicators by income deciles and the full distribution of *act*ual *replacement rates*, by percentile. Additionally, there are two other indicators: (i) the *income of pensioner households*, which includes all the monetary income in the pensioner household (pension plus other financial income) and (ii) the *low-income retiree*, which corresponds to the fraction of families experiencing a situation of poverty. Those last two indicators are interesting because the first highlights that there might be other monetary income different from the pension for the elderly that should be counted for when evaluating the standard of living of the elderly. That is somehow also captured in the poverty indicator, as the poverty rate depends on total income and not only on the pension income.

[6] The GAP measure includes all income, including health benefits, of the elderly and nonelderly.

c. Pension expenditures and financing

The last category reported in the Finnish Pension Report concerns the projection of pension spending (public or private) and their funding sources, in order to generate information regarding the sustainability of the Finnish pension system. Table 5.3 summarizes the indicators in this category.

Table 5.3: Pension expenditure and financing indicators

Pension expenses and financing
Core indicators
Statutory pension expenditure, % GDP
Earnings-related pension spending concerning the sum of earnings
Expenses and contribution rates under the Employees' Pension Act
Accrued pension rights and the funding ratio
Complementary indicators
Earnings-related and national pension expenditure
Earnings-related pension contribution rates
Earnings-related pension funds about the sum of earnings
Investment returns

The first core indicator (*statutory pension expenditure, a fraction of GDP*) provides projections of pension spending as a fraction of GDP until 2080, using simulation models according to the parameters and rules stated in the Finnish Act on pensions. It is conceptually similar to the public burden indicator in the GAP fiscal sustainability index. The second core indicator also provides projections to 2080 but rather than comparing vis-à-vis the GDP, which is the total size of the economy, it compares pension expenditure to the sum of earnings, which is the size of the financial basis of contributions for pensions. The third indicator (spending and contribution rates under the Employees' Pension Act) projects expenditures and contributions for

pensions directly, allowing for information on the future fiscal deficit under the current parameters and current demographic projections. The fifth and final core indicator compares accrued pension rights with assets in pension funds and calculates a funding ratio, which is the ratio of the value of pension funds over accrued pensions.

The complementary indicators provide similar measures to the ones provided in the core indicators, but they show information by the type of pension system. In fact, in Finland there is a special pension for farmers, there is a survivor pension, a disability pension, a state employees' pension act, a local pension act and others. The last complementary indicator shows the average historical rate of return on the pension funds (1997-2012), both in the public and the private sector.

6. Melbourne Mercer Global Pension Index (MMGP index)

The primary objective of the Mercer study is to benchmark pension systems across countries and across time by comparing retirement income. It is an annual report that started in 2009, and it is now available in its eighth version (corresponding to 2016), where 27 countries are compared. The report depends on surveys answered by pension experts in each of the countries.

The basic framework corresponds to the World Bank multi-pillar categorization. As in some other indices, the MMGP index has three sub-indices: adequacy, sustainability, and integrity, whose weights are 40%, 35%, and 25%, respectively, to calculate the MMGP index.

The adequacy sub-index characterizes the adequacy of benefits. To do so, it gathers information on benefits, savings, tax support, benefit design and growth of assets in the pension system. In the core of the sub-index, it considers the base level of income and the net replacement rate for a median-income earner. It realizes that the median income earner does not represent the welfare of many workers, and it provides information on minimum pensions. However, the focus is not the distribution of

pensions but rather the determinants of the level of pensions. In that context, the design of the private pension system (pillars 2 and 3) is critical, since that might improve the likelihood of adequate retirement pensions upon retirement. Table 6.1 summarizes the questions asked in this sub-index. There are 11 dimensions, with different weights. The index has information on minimum pensions, replacement rates, savings, and tax treatment differences between pensions and typical bank savings accounts, minimum access age for benefits, treatment of accrued assets in case of divorce or separation, treatment of voluntary pension savings and importance of asset return on global retirement benefits.

Table 6.1: Adequacy indicators

	Question	Weight
	What is the minimum pension, as the percentage of the average wage?	
A1	How is the minimum pension adjusted over time?	17.50%
A2	What is the net replacement rate for a median-income earner?	25%
A3	What is the net household saving rate in the country?	10%
	Are voluntary contributions made by a median-income earner to a funded plan treated by the tax system more favorably than similar savings in a bank account?	
A4	Is the investment income earned by a pension plan exempt from tax in the pre-retirement and/or post-retirement period?	5%
	Is there a minimum access age to receive benefits from private plans?	
A5	If so, what is the current age?	10%
	What proportion, if any, of the retirement benefit from the private pension arrangement, is required to be taken as an income stream?	
A6	Are there any tax incentives to encourage taking up of income streams?	10%
A7	On resignation from employment, are plan members entitled to the full vesting of their accrued benefits?	
	After resignation, is the value of the member's accrued benefit maintained in real terms?	
	Can a member's benefit entitlements be transferred to another private pension plan on the member's resignation from an employer?	7.50%
A8	Upon a couple's divorce or separation, are the individual's accrued pension assets normally taken into account in the overall division of assets?	4%
A9	What is the level of home ownership in the country?	5%

A10	What is the proportion of total pension assets invested in growth assets?	5%
A11	Are contributions to funded pension schemes required to be paid if a worker receives income support when they are temporarily out of the workforce?	1%
	Adequacy Sub-Index	40%

The second category is the sustainability index. On fiscal sustainability, there is information on coverage of the pension system (both about pensioners and contributors), demography, government debt and contributions to the system. Table 7.2 shows the questions and weights involved in that indicator. That information is relevant because while some variables, such as the old-age ratio, are complicated to change, others related to the design of the pension system, such as the state pension age, can be adjusted. Still others, such as the labor force participation, can be indirectly influenced by government policy.

Table 6.2: Sustainability indicators

	Question	weight
S1	What proportion of the working age population are members of private pension plans?	20%
S2	What is the level of pension assets (% GDP), held in private pension arrangements, public pension reserve funds, protected book reserves and pension insurance contracts?	20%
S3	What is the current gap between life expectancy at birth and the state pension age?	20%
	Projected gap: life expectancy at birth vis-a-vis the state pension age in 2035	
	What is the projected old-age dependency ratio in 2035?	
	What is the total fertility rate averaged over the last seven years?	

S4	What is the level of mandatory contributions that are set aside for retirement benefits (i.e. funded) as a fraction of wages?	15%
	What is the labor force participation rate for those aged 55-64?	
S5	What is the labor force participation rate for those aged 65+?	10%
S6	What is the level of adjusted government debt (gross public debt fewer sovereign funds that are not set aside for future pension liabilities) as % GDP?	10%
	In respect of private pension arrangements, are older employees able to access part of their retirement savings or pension and continue working (Part-time)?	5%
S7	If yes, can employees continue to contribute and accrue benefits at an appropriate rate?	
Sustainability-index		35%

Finally, the integrity dimension has objective information on the integrity of the overall pension system, and since the private sector plays a significant role in the pension system, this dimension focuses on the confidence in the civil society's and private sector's ability to provide adequate retirement in future years. It includes the role of regulation and governance in the private pension providers, the protection granted to participants for different risks and the level of communication between members. The questions and the weights used in the regulation and governance dimensions are in Table 6.3. Besides, the integrity index uses the Worldwide Governance Indicators published by the World Bank to get another comparison on governance between countries.

Finally, the integrity index includes two questions that look for measuring administrative costs in the pension management industry. The reason costs are included is that keeping costs at low and reasonable levels maintain confidence in the system and the pension providers in the long-run. While there is no direct measure of value, the index uses two proxies related to the industry concentration on types of funds and number of resources (See Table 6.4).

The MMPG index ends with a brief report for all countries considered in the index. The report discusses the overall index plus all sub-indices, and a broad recommendation for each country to improve the overall pension system situation.

Table 6.3: Regulation and Governance Indicators

		Question	Weight
Regulation and Governance	R1	Do private-sector pension plans need regulatory approval or supervision to operate?	7.50%
		Is a private pension plan required to be a separate legal entity from the employer?	
	R2	Are private sector pension plans required to submit a written report in a prescribed format to a regulator each year?	10%
		Does the regulator make industry data available from the submitted forms on a regular basis?	
		How actively does the regulator discharge its supervisory responsibilities?	
	R3	Where asset exists, are the private pension plan's trustees/executives/fiduciaries required to prepare an investment policy?	12.50%
		Are the private pension plan's trustees/executives/fiduciaries required to prepare a risk management policy?	
		Are the private pension plan's trustees/administrators/guardians needed to make a conflict of interests policy?	
		Are the private pension plan's trustees/executives/guardians required to have: (1) one or more independent members included in the government body? And (2) equal member and employer representation on the government body?	
	R4	Do the private pension plan's trustees/executives/fiduciaries have to satisfy any personal requirement set by the regulator?	5%
		Are the financial accounts of private pension plans (or equivalent) required to be audited annually by a recognized professional?	
	R5	What is the government's capacity to formulate and implement quality policies and to promote private sector developments?	15%
		What confidence do citizens have in the rule of society and the institutions that exercise power?	
		How free are the country's citizens to express their views? What is the likelihood of political instability or politically-motivated violence?	

Table 6.4: Protection and Communication for members, plus costs indicators

Questions			Weight
Protection and communication for members	P1	For defined benefit schemes, are their minimum funding requirements? What is the period of which any deficit or shortfall is regularly funded?	10%
		For defined contribution schemes, are the assets required to meet the member's accounts fully?	
	P2	Are there any limits on the level of an in-house asset held by private sector pension plan? If yes, what are they?	5%
	P3	Are the member's accrued benefits provided with any protection or reimbursement from an act of fraud or mismanagement within the fund?	5%
		In the case of employer insolvency (or bankruptcy), do any outstanding employer contribution receive priority over payments to other creditors?	
		Are members' accrued benefits protected against claims of creditors?	
	P4	When joining the pension plan, are new members required to receive information about the pension plan?	5%
	P5	Are plan members required to receive or have access to an annual report about the pension plan?	5%
		Is the annual report required to show the allocation of the plan's assets to major asset classes?	
		Is the annual report required to show the significant investment of the scheme?	
	P6	Are plan members required to receive an annual statement of their current personal benefits from the program?	7.50%
		Is this annual statement to individual members required to show any projections of the member's possible retirement benefits?	
	P7	Do plan members have access to a complaints tribunal which is independent of the pension plan?	2.50%
Costs	Costs	What percentage of total pension assets is held in various types of pension funds?	10%
		What percentage of total pension assets is held by the largest ten pension funds (providers)?	
Integrity sub-index			25%

7. OECD pension indicators

The OECD also has indicators available that allow comparisons between pension systems. In this case, the focus is on member countries and a few non-member countries.

The indicators developed by this institution can be classified into four categories. The first is the demographic and economic context. In this case, they include demographic indicators such as the dependency rate of older adults and the expected number of years that an individual might be retired. In the economic context, market labor variables such as the labor participation rate of the elderly are included.

A second category leads into to the design of the pension system. Here the OECD provides information about current and future retirement ages for both women and men. The third category is the level of pensions paid to pensioners. Replacement rates (both before and after taxes and contributions to the pension system) are shown as well as the present value of these replacement rates. Finally, in the fourth category, there is information about the income of the elderly. The information is broken into the source of income (occupational, transfers from the public sector, income from capital). Also, the poverty rate of the elderly also is provided.

8. Summary of pension indicators

The pension indicators discussed in the above sections differ, at least, in three aspects: (1) their focus, (2) the set of countries involved in the indicators and (3) the availability of the pension indicators.

The focus and the topics covered by the pension indicators are similar, but some differences emerge. In general, the four studies are concerned about the level of pensions (adequacy of pensions), coverage of the pension system and fiscal sustainability. The main difference is that some of them include institutional and governance indicators while others do not. In this line, the MMGP index provides information on the pension regulator while other studies do not (See Table 8.1).

Table 8.1: Topics covered

Global Aging Preparedness Index	World Bank Pension Database	Finnish Center for Pensions	Melbourne Mercer Global Pension Index	OECD pension indicators
	Environment			Demographic and economic context
	System design			System design
Income adequacy		Level of pensions	Income adequacy	Level of pensions
Fiscal Sustainability		Pension expenditures and financing	Sustainability	
	Performance indicators			
		Length of working life		
				Income of the Elderly
			Regulation and governance indicators	

			Protection and communication for members	

The studies on pension indicators also differ in the set of countries involved in the analysis. In contrast to our study and except for the World Bank pension database, the rest of the studies focus on a limited number of countries. The World Bank pension database contains the maximum possible number of countries in the world, as shown in Table 8.2.

Table 8.2: Countries included in pension indicators

Global Aging Preparedness Index	World Bank Pension database	Finnish Center for Pensions	Melbourne Mercer Global Pension Index	OECD pension indicators
Australia	High Income OECD	Finland	Australia	OECD countries
Brazil	East Asia and Pacific	Nordic countries	Austria	Argentina
Chile	Eastern Europe and Central Asia		Brazil	Brazil
China	The Middle East & North Africa		Canada	China
France	Sub-Saharan Africa		Chile	India
Germany	South Asia		China	Indonesia
India	Latin America and The Caribbean		Denmark	Russia
Italy			Finland	Saudi Arabia
Japan			France	South Africa
Korea			Germany	
Mexico			India	
Netherlands			Indonesia	
Poland			Ireland	
Russia			Italy	
Spain			Japan	
Sweden			Korea	
Switzerland			Mexico	
UK			Netherlands	

USA			Poland	
			Singapore	
			South Africa	
			Sweden	
			Switzerland	
			UK	
			USA	

The GAP Index was published in 2010, and there was a second updated edition in 2013.The recent report from the Finnish Centre for Pensions was in July 2016, with data updated to 2015. Similarly, the last version of the MMGP index was in October 2016, with 2015 data. The OECD data was updated in the report "OECD Pensions at a Glance 2015: OECD and G20 indicators" published on December 2015. The World Bank database is online, and it has been recently renamed as "The Atlas of Social Protection: Indicators of Resilience and Equity." The periodicity is annual, and it is updated biannually. Currently, t has data covering 1998 to 2015[7].

In the next chapter of the report, we will explain our approach for pension indicators in Latin America and the Caribbean. Our goal is to provide indicators that cover the important environment for pension design, the level of pensions, coverage of the pension system, fiscal sustainability and institutional aspects. Also, we look for sources of data that allow indicators to be regularly updated.

Part II: Pension Indicators for Latin America and the Caribbean

9. The pension indicators framework

We next describe the pension indicators that will characterize the pension systems in fifteen (15) countries of Latin America and the Caribbean, which are all members of the Pensions in Latin America and the Caribbean (PLAC) Network of the Inter-

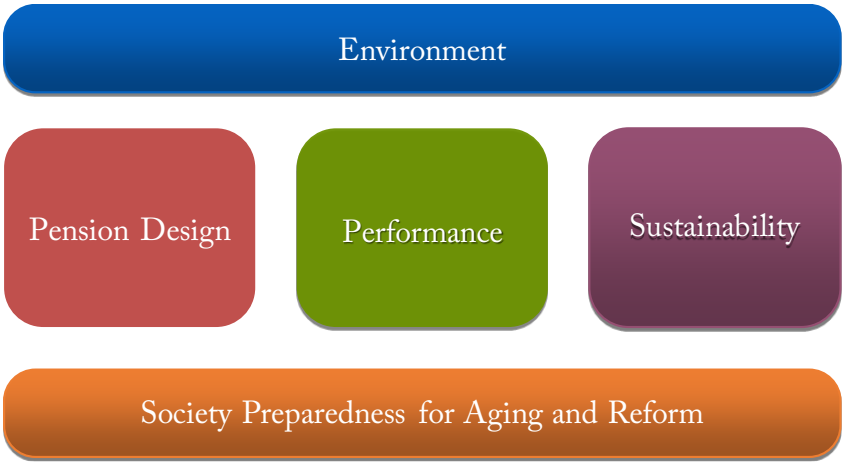
[7] The World Bank data can be download at http://data.worldbank.org/data-catalog/atlas_social_protection.

American Development Bank. The list of countries participating in this study is the following:

- Argentina
- Brazil
- Chile
- Colombia
- Costa Rica
- Dominican Republic
- El Salvador
- Haiti
- Honduras
- Jamaica
- Mexico
- Panama
- Paraguay
- Peru
- Uruguay

We group our indicators in five dimensions or categories: (i) Environment; (ii) Pension system design; (iii) Performance; (iv) Sustainability and (v) Society preparedness for aging and reform (See Figure 9.1). In these dimensions, we have two categories classified as "horizontals," as they correspond to dimensions that do not depend directly on the pension system design. Those categories are "Environment" and "Society Preparedness for Aging and Reform." We also have three “vertical” categories: "Pension system design," "Performance" and "Sustainability," which provide information on different aspects of the pension schemes.

Figure 9.1: Classification of indicators



The aim of the "Environment" indicators is to provide a comprehensive perspective on (a) the macroeconomic performance of each country (b) the demographic situation and outlook for each country, (c) the labor market situation and the (d) capital market situation in each country. In all of these areas, the indicators will provide information on key variables and trends affecting the pension system.

The three vertical dimensions will provide different information on the design and performance of the pension system in each country. The pension scheme design dimension will describe the structure of the pension system, as well as provide information on relevant parameters established in the national legislation, such as contribution rates, legal retirement age and the required years of contributions to obtain a full pension.

In the performance dimension, we will provide information on the effective results of the pension system. There will be three areas of focus: (i) coverage for both active and retired individuals, (ii) density of contributions and (iii) replacement rates for full career workers, both by a density of contributions and income.

In the sustainability dimension, we plan to provide two types of indicators. Firstly, we will have indicators on the fiscal viability of the pension system a, assuming current

legal parameters of the pension scheme (or future parameters if already legislated) and given current demographic trends. Secondly, we plan to provide indicators on social sustainability. In this case, rather than focusing on the financial viability of the pension system, our interest is whether future replacement rates are adequate. We will provide two types of replacement rates. First, we will calculate future replacement rates in a scenario in which we adjust future benefits to avoid any addition to fiscal deficits. Second, we will calculate future replacement rates in a scenario in which we maintain benefits, but we change contribution rates to avoid any addition to fiscal deficits. Both scenarios will be based on the same demographic assumptions (e.g., projections for future life expectancy) and economic assumptions (e.g., projections for future wage growth).

Finally, the second horizontal dimension is the "Society Preparedness for Aging and Reform," which includes indicators with information about how well society is prepared for the challenges of aging and pensions. In this category, there will be two sections: the first with indicators on financial literacy and knowledge of retirement systems and the second with a set of some broader indicators of elderly welfare that look beyond the pension system.

10. Sources of data

The data to construct the indicators will come from a variety of primary sources, which we briefly describe in the following two sub-sections.

10.1 The horizontal dimensions

The World Economic Outlook Database from the IMF provides macroeconomic data and projections that can be used in the Environment category. That database has an annual frequency starting in 1980 and with projections currently extending through 2021. For most variables, the base year for the projections is now 2015. The

demographic data will be obtained from CEPAL-CELADE, which is the population division of the Economic Commission for Latin America and the Caribbean (its acronym in English is ECLAC and in Spanish CEPAL). CELADE provides consistent demographic data for 20 Latin American and Caribbean countries starting in 1950 with projections extending through 2100. The population estimates might be at annual or at a quinquennial frequency. Estimates refer for annual data since 1950 to 2016 (last year available). These are estimates as they correspond to data estimated at CELADE. In another hand, projections correspond to forecasts in the future by CELADE. There are data on fertility and life expectancy, as well as population projections by age and gender available. CELADE does not provide data for Jamaica, but the United Nations population division provides that demographic information.

In the case of the "Society Preparedness for Aging and Reform" dimension, we will gather information on financial literacy and knowledge of the pension system from household surveys, and especially from the Longitudinal Social Protection Survey, which is available for five out of the fifteen countries included in the study.[8] Data on the socio-economic characteristics of the elderly, such as labor market participation, educational attainment, living arrangements, and non-pension income sources, will also come from household surveys.

10.2 The vertical dimensions

The vertical indicator dimensions, which cover pension system design, performance, and sustainability, will require data from a variety of sources. To construct design indicators, it will be necessary to obtain access to accurate and up-to-date information about system parameters, either from the current pension law in each country or from official documents explaining the design of the pension system. To measure the performance of pension systems, we will require administrative data to calculate contribution density, while to calculate coverage, both for active and retired workers,

[8] Chile, Colombia, El Salvador, Paraguay, and Uruguay have all at least one wave of the Longitudinal Social Protection Survey.

we will rely on household economic surveys. When possible, we will use the Longitudinal Social Protection Survey (LSPS) This study, which collects data on households and how social protection public policy impacts them, is publicly available at www.observatorioregional.net. There is currently available data on Chile (2006, 2009), Colombia (2012), El Salvador (2013), Paraguay (2015) and Uruguay (2013). For the rest of the countries, we list the individual household surveys in Table 10.1. [9]

Table 10.1: Household surveys

Country	Survey
Argentina	Encuesta Permanente de Hogares (2015)
Brazil	PNAD – Pesquisa Nacional por Amostra de Domicilios (1990-2013)
Costa Rica	ENAHO – Encuesta Nacional de Hogares (2010-2013)
Dominican Republic	ENFT – Encuesta Nacional de Fuerza de Trabajo (1995-2013)
Honduras	EPHMP – Encuesta permanente de hogares propósitos múltiples (1990-2013)
Jamaica	LFS - Labor Force Survey (1990-2012)
Mexico	ENIGH - Encuesta Nacional de Ingresos y Gastos de los Hogares (1990-2012)
Panama	EHMP – Encuesta de hogares propósitos múltiples (2011-2013)
Peru	ENAHO – Encuesta Nacional de Hogares (1995-2013)

In the following sections, we further discuss the role and scope of the five indicator dimensions, as well as describe the specific indictors in each of them.

11. Pension indicators: the environment dimension

[9] See the information about Latin American household surveys in http://www.iadb.org/en/databases/sims/home,20137.html

This module includes information on relevant macroeconomic and demographic trends that might affect the pension system. We will provide indicators classified into four categories:

- Demography: Demographic trends have always been one of the most fundamental environmental factors affecting pension systems. Moreover, given the magnitude and speed of the demographic transformation now unfolding in Latin America and the Caribbean, they may be even more important in the future than they have been in the past. The demographic indicators we include in the study will make it possible to determine which countries and pension systems will be most affected by demographic change, and in particular population aging.

- Macroeconomic Performance: Conditions in the broader economy, from GDP growth rates to national savings rates, can over time have a powerful affect on the adequacy and sustainability of pension systems. This section includes some of the most critical macroeconomic indicators for each country.

- Labor market and human development: Developments in the labor market affect pension systems even more directly, as they help to determine everything from coverage rates and retirement ages to total contributions collected and total benefits disbursed.,. In this section therefore includes a wide range of labor-market indicators. We begin with information on the overall labor force, then turn to more specific issues of particular importance to LAC countries, such as the size of the formal sector and the division of the workforce into employed and independent workers.

- Capital market: Capital market developments are also critical for the performance of pension systems, and particularly the benefits that can be generated by fully funded ones. In this section, we include a variety of indicators that measure the breadth and depth of capital markets in each

country. These indicators may give some idea of the future scope for the further development of funded retirement savings.

We next describe those categories in further detail.

11.1 Demographic indicators

We will present demographic indicators for different age groups. The population indicators will take as appropriate thresholds ages 15, 60 and 80. Age 15 is the age for an individual to be considered part of the labor force. That threshold might vary in different countries, but it seems that age 15 is typical for many Latin American and Caribbean countries. The demographic indicators, which will be projected to 2100, are the followings:

- Global fertility rate (Fertility rate): The average number of children that a woman in a hypothetical cohort of women would have during their fertile life had their children according to the fertility rates by age of the study period and were not subjected to mortality risks from birth to the end of the fertile period. (Source: https://www.cepal.org/sites/default/files/def_ind.pdf). The data correspond to the projection for the 2015-2020 quinquennium. Source: CEPAL-CELADE database.

- Life expectancy at birth (Male/Female): Represents the average length of life of individuals, who make up a hypothetical cohort of births, subjected at all ages to the mortality risks of the study period. It is a key indicator affecting both the cost of pay-as-you-go pension systems and savings requirements in funded pension systems. We will report this indicator for both females and males. Source: It is available at the CEPAL-CELADE database.

- Life expectancy at age 60 (Male /Female): It is the average number of years that, on average, remain for survivors of a cohort of exact age 60 years, subject in all the remaining ages to the mortality risks of the period in study. That age is relevant as in many countries people retire at that age. We will report the indicator for both females and males. Source: It is available in the WHO database,

- Life expectancy at age 80 (Male /Female): Age 80 is usually treated as the start of the fourth age. That period of life is characterized by a decline in biological and motor functions in elder adults, and hence a rise in the need for long-term care and other social services (Blanchard-Fields and Kalinauskas, 2009). We will report the indicator for both females and males. Source: It is available in the WHO database.

- Percentage of women over 80 years: This indicator is constructed as the ratio of women aged 80 years and older over to the total population aged 80 years and older. The indicator is important because the impact of differential life expectancy on the gender balance becomes progressively larger at the oldest ages. Source: Obtained from the ECLAC-CELADE database.

- Old-age dependency ratio: The number of people who are inactive relative to those who are active is very relevant to the pension system. When the ratio of retied workers to active workers grows due to the aging of the population, fiscal pressures will increase since fewer individuals need to finance larger benefits to retirees. The old-age dependency ratio, which is calculated at the ratio of people aged 60 and older over to people aged 15 to 59, is a useful proxy for the ratio of retired beneficiaries to active workers. Source: CEPAL-CELADE database

11.2 Economic Indicators

The indicators used to describe the state of the economy are the following:

- GDP per capita, US $: GDP per capita calculated on the basis of current dollars. It provides a measure of differences in living standards across countries. We include the projection for 2017. Source: World Economic Outlook database, International Monetary Fund.

- GDP per capita, US $, PPP: GDP per capita calculated on the basis of purchasing power parity (PPP). It provides a measure of differences in living standards across countries adjusted for the different costs on consumption baskets. Projection for 2017. Source: World Economic Outlook database, International Monetary Fund.

- GDP as a fraction of world GDP: GDP calculated on a PPP basis divided by world GDP on a PPP basis. This indicator allows us to get an idea of the size of the economy vis-à-vis the world economy. We include the projection for 2017. Source: World Economic Outlook database, International Monetary Fund.

- Real GDP growth rate: Annual average for the period 2013-2017. It provides an idea of the future size of the economy. It is calculated as a moving average of the growth rate of GDP in real domestic currency in the last five years to get a sense of long-run growth. The limitation of this variable is that the demographically led slowdown in labor-force growth in LAC countries might decrease long-term GDP growth and thus, recent GDP growth may be a poor predictor of the latter variable. Source: World Economic Outlook database, International Monetary Fund.

- Inflation rate: Annual average for the period 2013-2017. It is calculated as a moving average of the last five years to get an idea of long-run inflation. Source: World Economic Outlook database, International Monetary Fund.

- Gross national savings (% of GDP): Gross disposable income less final consumption expenditure. The indicator is the ratio between current national gross national currency savings and current local currency GDP. Average period 2013-2017. Source: World Economic Outlook database, International Monetary Fund.

- Social Protection Public Spending, percent of GDP: Public expenditure on disbursements for services and transfers to individuals and families that cover sickness and disability benefits, old age pensions, survivor's pensions, benefits for families and children, unemployment benefits, and housing and social exclusion benefits. Source: United Nations, ECLAC, Database on Social Investment in Latin America and the Caribbean, latest year available. (http://observatoriosocial.cepal.org/inversion/en/indicator/expenditure-social-protection).

11.3 Labor Market Indicators

When building pension system indicators, the performance of the labor market should be taken into account, as it determines salaries and hence pension contributions. In fully developed economies, it might be enough to look at broad measures of labor-force participation. But in Latin American and Caribbean countries, with their large informal sectors, additional consideration needs to be given to the number of informal and independent workers, as those workers usually do not contribute to the pension system.

Labor Force Participation

We will provide several measures related to labor force participation. Those measures are:

- Total Labor Force Participation rate (TLFP): Ratio of individuals who are employed or actively looking for a job over the working age population. Calculated for people aged 20 or older. Source: ILO statistical database (Repository: ILO-STATISTICS - Micro data processing).

- Prime Age – Labor Force Participation: Ratio of individuals who are employed or actively looking for a job over the working age population. Calculated for people aged 20 or 59 years old. Source: ILO statistical database (Repository: ILO-STATISTICS - Micro data processing).

- Youth – Labor Force Participation: Ratio of individuals who are employed or actively looking for a job over the working age population. Calculated for individuals aged 15 or 24 years old. Source: Source: ILO statistical database (Repository: ILO-STATISTICS - Micro data processing).

- Old Age – Labor Force Participation: Ratio of individuals who are employed or actively looking for a job over the working age population. Calculated for individuals aged 60 and older. Source: Source: ILO statistical database (Repository: ILO-STATISTICS - Micro data processing).

- Informal Labor: Percentage that results from dividing the salaried workers without a contract and the total number of salaried workers. Source: SIMS database (workers 16 to 64).

- Self-employment: Self-employed workers are also less likely to contribute to the pension system, and in some LAC countries are explicitly exempted from contributing. This makes it important to have information regarding the size of that group. Percentage that results from dividing the self-employed workers and the total number of employed workers. 'self-employed workers' are those who work in their own. Source: SIMS database (workers 16 to 64).

Other characteristics of the labor market

In addition, we plan to incorporate data on other aspects of the labor market that might impact the pension system. We start by including distortions introduced by regulations of the labor market. The indicators are:

- Notice period: notice period at 2 years of tenure, in months. Source: ILO (http://www.ilo.org/travail/areasofwork/WCMS_435450/lang--en/index.htm).

- Severance payment: severance pay at 2 years of tenure, in months. Source: ILO (http://www.ilo.org/travail/areasofwork/WCMS_435450/lang--en/index.htm).

- Employment Protection Legislation Index (EPLex): It corresponds to the ILO EPLex database provides information on the employment protection legislation and does not, generally, cover case law or collective agreements on the subject. The database deals only with employees in the private sector. All resulting indicators are distributed on a 0-1 scale. Lower values of EPLex indicators represent lower level of de jure employment protection in a given country and a given year, while higher values of EPLex indicators represent higher level of de jure employment protection. Source: ILO

(http://www.ilo.org/travail/areasofwork/WCMS_435450/lang--en/index.htm).

As a complement for informality indexes, we will also include:

(i) a measure of the fraction of workers employed in small businesses, as those firms usually face more liquidity and capital constraints that affect their possibility to pay taxes or make pension contributions;

(ii) a measure of the fraction of workers with salaries below the minimum wage, who might be or might become informal workers in the future and;

(iii) a measure of the fraction of rural workers, who might also be more likely to behave as informal workers.

These indicators are:

- Small business employment (SMB): the share of the aggregate stock of permanent, full-time employment in small firms (less than 20 workers). The data consider services and industry. Source: WorldBank Enterprise Surveys, available at http://www.enterprisesurveys.org/employment-indicators.

- Workers under minimum wage: Employed workers with labor income less than or equal to the minimum wage in the main occupation, percentage. Source: SIMS database.

- Rural employment: Percentage of individuals working in the rural sector. Source: ILO, (2017) "Trabajar en el campo en el siglo XXI", pp. 82 -83.

11.4. Capital Market Indicators

An efficient and broad capital market contributes to smoothing consumption and allowing better investment opportunities to reduce risk and potentially increase expected returns. All of this is critically important for future retirement security since it affects the profitability of assets in funded pension systems, which have grown in importance in most LAC countries, and therefore the future level of retirement income. In this section, we incorporate indicators that deliver information on the principal components of the capital markets. The indicators are in this case:

- Domestic credit to the private sector by banks (% of GDP): Financial resources provided to the private sector by depository corporations (except central banks), through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. (World Bank definition) Source: World Bank Development Indicators.

- Financial system deposits (% of GDP): Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP. (World Bank definition). Source: Global Financial Development Database, the World Bank.

- Insurance company assets (% GDP): Ratio of assets of insurance companies to GDP. Source: Global Financial Development Database, the World Bank.

- Pension fund assets (% GDP): Ratio of assets of pension funds to GDP. A pension fund is any plan, fund, or scheme that provides retirement income. (World Bank definition) Source: Global Financial Development Database, the World Bank.

- Stock Market Capitalization (%GDP): Total value of all traded shares in a stock market exchange as a percentage of GDP (World Bank definition). Source: Global Financial Development Database, the World Bank.

- Gross Public Debt (%GDP): It is a measure of "all liabilities that require payment or payments of interest and principal by the public sector. According to the GFSM, 2001 system liabilities are debt, except for equity and investment fund shares and financial derivatives and employee stock options" (IMF definition). Source: IMF World Economic Outlook Database.

- Net Public Debt (as a fraction of GDP): "General government gross debt minus financial assets corresponding to debt instruments. These financial assets are monetary gold and SDRs, currency and deposits, debt securities, loans, insurance, pension, and standardized guarantee schemes, and other accounts receivable" (IMF definition). Source: IMF World Economic Outlook Database.

- Market capitalization excluding top 10 companies to total market capitalization (%): Value of listed shares outside of the top ten largest companies to total value of all listed shares. We include this indicator as a measure of concentration in equity markets. If concentration is high, there may not be enough domestic investment opportunities to allow adequate diversification

for funded pension systems. Source: Global Financial Development Database, the World Bank.

We next include two indicators that look for providing proxy measures for long-term investment culture. Those indicators are:

- Saved any money in the past year (% age 15+): The percentage of individuals reporting saving or setting aside any money in the past 12 months (% age 15+). Source: Global Financial Inclusion (Global Findex) Database, World Bank

- Financial system deposits to GDP (%): Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP. Source: International Financial Statistics (IFS), International Monetary Fund (IMF)

12. Pension indicators: the pension system design dimension

This dimension describes the design of pension systems as stated in current pension law. It is divided into three parts. The first part describes the general characteristics of the pension design. The second part provides information on relevant parameters of the pension system such as contribution rates and retirement age. Finally, the third part describes the institutions and governance of the pension scheme by providing information about the regulatory agencies and the companies that administer the pension funds, including both public and private bodies. Additionally, it includes information about the commissions paid to the pension system and about the type of products available for retirement.

12.1 General description

We start by describing the main features of pension system design, such as the existence of non-contributory pensions, the types of mandatory contributory pension systems and the provision for voluntary pension savings. The indicators are the followings:

- Non-contributory basic pension: Indicator function equals one if the government provides a non-contributory basic pension and zero otherwise. Source: Social Security Administration (Social Security Programs Throughout the World: The Americas, 2015)

- Beneficiaries of non-contributory basic pensions: It corresponds to the targeted population in the non-contributory basic pension system. Source: Social Security Administration (Social Security Programs Throughout the World: The Americas, 2015)

- Mandatory defined benefit System: Indicator function equals one if at least a part of the mandatory contributory pension system offers a defined benefit financed on a PAYG basis. Source: Social Security Administration (Social Security Programs Throughout the World: The Americas, 2015)

- Beneficiaries of mandatory defined benefit system: It corresponds to the targeted population in the compulsory PAYG system. Source: Social Security Administration (Social Security Programs Throughout the World: The Americas, 2015)

- Mandatory Fully Funded Pension System: Indicator function equals one if at least a part of the mandatory contributory pension system is a fully funded system. Source: Social Security Administration (Social Security Programs Throughout the World: The Americas, 2015)

- Beneficiaries of mandatory fully funded pension system: It corresponds to the targeted population in the mandatory fully funded system. Source: Social Security Administration (Social Security Programs Throughout the World: The Americas, 2015)

- Voluntary savings for retirement – additional contributions: Indicator function equals one if there exists the possibility of voluntary and additional contributions for funded pension system and zero otherwise. Source: Next Generation of Individual Account Pension Reforms in Latin America, Social Security Bulletin, Vol. 71, No. 1, 2011 and FIAP annual reports.

- Voluntary savings for retirement – Separate account: Indicator function equals one if there exists a separate account for voluntary contributions. Source: Next Generation of Individual Account Pension Reforms in Latin America, Social Security Bulletin, Vol. 71, No. 1, 2011 and FIAP annual reports.

- Voluntary savings for retirement – employer's contribution: Indicator function equals one if the employer are allowed to make additional contributions to employee's accounts. Source: Next Generation of Individual Account Pension Reforms in Latin America, Social Security Bulletin, Vol. 71, No. 1, 2011 and FIAP annual reports.

- Voluntary savings for retirement – tax incentives: Indicator function equals one if there are tax incentives for additional contributions for funded pension system. Source: Next Generation of Individual Account Pension Reforms in Latin America, Social Security Bulletin, Vol. 71, No. 1, 2011 and FIAP annual reports.

- Special Pension System: Indicator function equals one if there exists one or more parallel government pension systems for particular groups of individuals

(the army forces, public employees or others). Source: Social Security Administration (Social Security Programs Throughout the World: The Americas, 2015)

- Beneficiaries of special pension systems: It corresponds to the targeted population(s) in the special pension system(s). Source: Social Security Administration (Social Security Programs Throughout the World: The Americas, 2015

12.2 Parameters (of the pension system)

The next set of indicators provides information concerning parameters of the pension scheme, which usually appear in the pension law and determine the design of the pension system. Those parameters are:

- Employee Contribution Rate: fraction of the monthly payroll contributed to the pension system by the employee in the country's main mandatory pension system. Source: Social Security Administration (Social Security Programs Throughout the World: The Americas, 2015)

- Employer Contribution Rate: fraction of the monthly payroll contributed to the country's main mandatory pension system by the employer. Source: Social Security Administration (as above).

- Government Contribution Rate: fraction of the monthly payroll contributed to the country's main mandatory pension system by the government. It does not include government contribution as an employer. Source: Social Security Administration (as above).

- Self-employed contribution rate: Corresponds to the fraction of monthly earnings that the self-employed are required by law to contribute to the country's main mandatory pension system. Source: Social Security Administration (as above).

- Retirement age: the "normal retirement age" at which (i) an individual is required to retire and/or would be entitled to full benefits in a mandatory PAYG system or (ii) the retirement age at which an individual is allowed to retire and might withdraw account balances in a fully funded pension scheme. Source: Social Security Administration (as above).

- Early retirement rule: indicator function equals to one if individuals could retire at earlier age in mandatory systems and zero otherwise. Source: Social Security Administration (as above).

- Wage Ceilings on Contributions: It is the salary cap used to calculate contributions to the pension scheme measured as a multiple of the average earnings of the employees in each country. Source: The data on wage ceilings is from the Social Security Administration (as above) while the data on average earnings of the employees is from the ILO.

- Requirements for contribution years: Some countries require a minimum number of years of contributions to obtain benefits when the individual retires under the mandatory pension system. This indicator will provide that information. Source: Social Security Administration (as above).

- Indexation rules for benefits: This indicator describes the indexation rules designed to offset the adverse effect of inflation on a pension's purchasing power. Source: Social Security Administration (as above).

Gender equality

We have taken considerable care to provide a gender perspective in this project by providing statistics for many indicators for both for women and men. Notwithstanding this, three additional indicators are proposed below, which seek to illustrate differences in the design of the pension system for men and females. The indicators are:

- Time-off compensation mechanism for women: Indicator function that equals one if the pension system includes some mechanism for crediting or otherwise compensating women for time not spent contributing to the mandatory pension system because they have taken a temporary maternity job leave. The indicator is zero otherwise. Source: Information to be obtained from country's pension authorities.

- Unisex mortality tables: Mortality tables are relevant to calculating pension benefits upon retirement, especially in defined contribution systems that require annuitization or phased withdrawals. This indicator equals one if mortality tables vary between males and females to adjust for different life expectancy. The indicator is zero otherwise. Source: Information to be obtained from country's officers.

12.3 Pension governance

In this sub-section, we include indicators related to the management of the pension system. We divide it into three parts. First, we have information on the administrative organization of the pension scheme. Second, the design of investment policies and fees

for management of funds are discussed Third, there are indicators on retirement plans/products available upon retirement.

Administrative organization

The set of indicators related to the management structure of the pension system is the following:

- Superintendency of Pensions: Indicator function that equals one if there is a Superintendency that provides general supervision of the pension system. The indicator function is zero if there is no Superintendency or other institution playing that role. Source: Social Security Administration (as above).

- Private pension fund management companies: Indicator function that equals one if there are pension fund management companies that administer individual accounts and zero otherwise. Source: AIOS bulletin.

- Public pension fund manager: Indicator function that equals one if there is a public institution that administers pension funds and zero otherwise. Source: Social Security Administration (as above).

Investment Policies, fees and industry concentration

- Multi-Funds: Indicator function equal to one if individuals have the possibility of choosing investment funds with varying risk profiles in investing their mandatory pension contributions and zero otherwise. There is also a third NA (not applicable) value if a country with a mandatory funded DC system does not have multi-funds. Source: AIOs bulletin.

- Equity: Fraction of portfolio invested in local equities in mandatory defined contribution pension systems. There is also a third NA (not applicable) value if a country has no mandatory funded DC system. Source: AIOS statistical bulletin.

- Investment abroad: Fraction of portfolio invested in foreign assets in mandatory defined contribution pension systems. There is also a third NA (not applicable) value if a country has no mandatory funded DC system. Source: AIOS statistical bulletin.

- Equity portfolio ceilings: It contains portfolio ceilings on pension fund investment in equities. Source: OECD Annual Survey of Investment Regulation of Pension Funds, 2017 or latest available.

- Real estate portfolio ceilings: It contains portfolio ceilings on pension fund investment in real estates. Source: OECD Annual Survey of Investment Regulation of Pension Funds, 2017 or latest available.

- Bonds portfolio ceilings: It contains portfolio ceilings on pension fund investment in bonds. Source: OECD Annual Survey of Investment Regulation of Pension Funds, 2017 or latest available.

- Restrictions on foreign investment: it corresponds to quantitative restrictions on foreign investment, along with the geographical areas or markets these restrictions apply to. Source: OECD Annual Survey of Investment Regulation of Pension Funds, 2017 or latest available

- Fees for the management of pension funds: Net fees charged to participants in mandatory defined contribution pension systems as a fraction of net contribution collection. There is also a third NA (not applicable) value if a country has no mandatory funded DC system. Source: AIOS, Statistical Bulletin.

- Profitability: Annualized real profitability of funds (net of inflation) during the last 12 months. Source: AIOS, Statistical Bulletin.

- Number of fund managers: Total number of pension fund managers in operations. Source: AIOS, Statistical Bulletin.

- Funds managed by 2 major administrators: Fraction of total funds managed by the two largest pension fund managers. Source: AIOS, Statistical Bulletin.

- Accounts managed by 2 major administrators: Fraction of total accounts managed by the two largest pension fund managers. Source: AIOS, Statistical Bulletin.

Retirement products

The set of indicators on retirement products is the following:

- Lump sum retirement income: Indicator function equal to one if pensioners might receive pension income as a lump sum. Source: Social Security Administration (as above).

- Programmed Withdrawals: Indicator function equal to one if pensioners could receive pension income through programmed withdrawals. Source: Social Security Administration (as above).

- Annuities: Indicator function equal to one if pensioners can receive pension income through annuities. Source: Social Security Administration (as above).

13. Pension indicators: the performance dimension

Section 12 included indicators on the design of the pension system as specified in current pension law. In this section, we complement them by providing information on pension system outcomes. We focus on performance in terms of coverage, the density of contributions and replacement rates. The indicators proposed are detailed next.

13.1 Coverage

- Total Pension Contributors Rate (TPCR): Percentage that results from dividing the economically active population who contribute to the old-age pension scheme and the economically active population. Affiliates are used in the case that contributors not available in the survey. (Individuals aged 15 to 59 years old). Source: SIMS database.

- Total Pension Recipients Rate (TPRR): ratio of the total number of pension beneficiaries over the total population. Both the pension beneficiaries and the total population correspond to individuals aged 60 and more. Pension beneficiaries correspond to individuals receiving any type of pension benefits (old age, disability, widows) Source: SIMS database

13.2 Density of Contributions

- Total Rate of Contribution Density (TRCD): It corresponds to the percentage of months contributed during an individual's working life over the total number of potential months of contributions (months since the individual turned 18 years old). Source: LSPS database.

13.3 Adequacy and redistribution

In this sub-section, we propose indicators that provide information on the adequacy of pension benefits and the capacity for redistribution of the pension system. Our indicators try to answer some core questions (see Table 13.1) that allow us to measure pension income relative to preretirement income. Ordinarily, such replacement rate calculations are either stylized or, at best, simple averages of actual outcomes for all retirees. In our study, we plan to also provide an idea of the dispersion of replacement rates by both income quantiles and density of contributions. Additionally, we may try to measure the size of net transfers to the elderly population by calculating implicit subsidies in the pension system. The indicators in this section refer to workers retiring today under currently applicable parameters.

Table 13.1. Core questions on Adequacy

1) Are pensions adequate (replacement rate relative to (a) preretirement income), assuming a full contributions record, by income quintile?
2) Does the answer differ by number of contribution years, including zero?
3) What is the extent to which lifetime benefits ultimately received by some groups are not proportional to their lifetime contributions, meaning that they are either giving or getting a subsidy?]
    a. For full-contribution records
    b. For different numbers of contribution years, including zero

The indicators are the following:

- Replacement rate: It is a measure of an individual pension entitlement divided by net pre-retirement earnings, taking into account social security contributions paid by workers. That calculation corresponds to a simulation of

a single working life, conditional on the current pension law. It might vary by income quintiles and by the density of contributions. The indicator is calculated as in:

$$RR_t{}^i = \frac{p_t^i}{w_{t-1}^i(1-\tau_{t-1}^c)d_{t-1}^c}$$

Where RR^i is the replacement rate, τ_t^c is contribution rate, d_t^c is contribution density, w_t^i is the individual's salary, and p_t^i is the promised pension benefits as defined in the pension law. The person's salary grows at an exogenous growth rate. We will calculate the replacement rate for different income quintiles, for different contribution densities, and for males and females. Source: IADB calculation based on the parameters of the pension system.

- Implicit rate of return (Male / Female): It equals the interest rate that a worker would have to hypothetically earn on his/her contributions to pay for the benefits he/she will receive when retired. This indicator is provided for different income quintiles and density of contributions. The implicit rate of return, r, corresponds to

$$\sum_{t=18}^{R-1} \tau_t^c \frac{d_t^c w_t^i}{(1+r)^t} = \sum_{t=R}^{T} \frac{p_t^i}{(1+r)^t}$$

Where R is retirement age, and T is the expected life span. In the above formulae, the sub-index t indicates the year during the individuals' lifecycle while the i^{th} supra-index corresponds to the income quintile. That indicator will vary across income quintile, the density of contribution and sex. Source: IADB calculation, using information on the parameters of the pension system.

- Implicit subsidy at retirement age: It corresponds to the difference between the capitalized value of the contributions and the present value of retirement benefits. This indicator is provided for different income quintiles, density of

contributions and gender. To calculate the implicit subsidy, we use the following formulae:

$$S_t^i = \sum_{t=R}^{T} \frac{p_t^i}{(1+r^m)^{(t-R-1)}} - \sum_{t=18}^{R-1} \tau_t^c \, d_t^c w_t^i (1+r^m)^{(t-18)}$$

Where the notation is similar to above but r^m corresponds to the average effective interest rate of the pension fund. Source: IADB calculation, using information on the parameters of the pension system.

14. Pension Indicators: The Sustainability Dimension

We turn next to focus on the sustainability of the pension system, under its current design. Initially, we focus on its fiscal sustainability by projecting future pension expenditure. Later we focus on its social sustainability by providing estimates of future replacement rates, which gives us information on the adequacy of retirement income in the future. The central questions we plan to answer are in Table 14.1.

Table 14.1 Core questions on Sustainability

1) Financial sustainability:
    a. What is the time path of any pension system deficit, holding benefit and contribution regimes constant?
2) Social sustainability:
    a. What is the time path of benefits necessary to avoid a deficit, holding the contribution regime constant?
    b. What is the time path of contributions necessary to prevent a deficit, holding the benefits regime constant?

The indicators to answer those questions are discussed below.

14.1 Fiscal Sustainability

- Projected PAYGO pension spending in 2030: This indicator should include total PAYG expenditures, including non-contributory programs, contributory PAYG programs and recognition bonds (e.g., transition costs associated with system switching from PAYG to fully funded capitalized systems) by 2030. It will be presented as fraction of base year GDP. Source: Own estimations using actuarial projections models from IADB when available.

- Projected PAYGO pension spending in 2060: This indicator should include total PAYG expenditures, including non-contributory programs, contributory PAYG programs and recognition bonds (e.g., transition costs associated with system switching from PAYG to fully funded capitalized systems) by 2060. It will be presented as fraction of base year GDP. Source: Own estimations using actuarial projections models from IADB when available.

- Projected PAYGO pension contributions in 2030: This indicator shows the projections of expected revenues in the pension system, dependent on the rates of contributions stated in the current pension law and the protected demographic path in 2030. It will be presented as fraction of base year GDP. Source: Own estimations using actuarial projections models from IADB when available.

- Projected PAYGO pension contributions in 2060: This indicator shows the projections of expected revenues in the pension system, dependent on the rates of contributions stated in the current pension law and the protected demographic path in 2030. It will be presented as fraction of base year GDP. Source: Own estimations using actuarial projections models from IADB when available.

- Projected PAYGO pension deficit in 2030: This indicator shows the difference between the value of expected contributions and the value of expected expenditures in PAYG systems by 2030. Source: Own estimations using actuarial projections models from IADB when available.

- Projected PAYGO pension deficit in 2060: This indicator shows the difference between the value of expected contributions and the value of expected expenditures in PAYG systems by 2060. Source: Own estimations using actuarial projections models from IADB when available.

- Total old-age benefit spending in 2030: This indicator includes projections of total government old-age benefit expenditures, including pensions, health care, and long-term care as a share of GDP. Source: Official projections when available.

- Total Pension Assets as a fraction of GDP: This indicator shows total current pension assets, (both in mandatory and voluntary savings) as a fraction of GDP. Source: AIOS bulletin or official information obtained from government pension authorities and statistical agencies.

14.2 Social sustainability

- Projected Replacement Rate in 2030: This indicator shows projected effective replacement rates and is calculated as follows:

$$RR_t{}^i = \frac{p_t^i}{w_{t-1}^i(1-\tau_{t-1}^c)d_{t-1}^c}$$

Although this replacement rate indicator is similar to the one in section 12.3, it differs in that it takes into account future demographic changes (for instance, in life expectancy), future economic changes (for instance, in real wage growth), and future

changes in pension rules (for instance, due to parametric reforms that have already been enacted but have not yet been fully phased in. Source: Own calculations.

In addition to these current law future replacement rates, we will also calculate future replacement rates fewer than two different policy change scenarios:

- Adjusted Replacement Rate Type 1 in 2030 and 2060: This indicator will calculate the projected effective replacement rate in 2030 and 2060, similarly to the previous indicator, but will adjust projected benefits so that total pension system expenditures do not exceed projected current-law revenues. In effect, the cost of avoiding future pension deficits in this scenario falls entirely on future retirees. Source: Own calculations using the IADB simulation models to calculate the benefit path required to avoid a pension deficit. If the simulation models are not available for some countries, we will report a missing observation.

- Adjusted Replacement Rate Type 2 in 2030 and 2060: This indicator will also calculate projected effective replacement rate in 2030 and 2060, but in this case contribution rates will be adjusted so that projected current-law benefits can be paid without incurring any deficit. In effect, the cost of avoiding future pension deficits in this scenario falls entirely on future workers. Source: Own calculations, using the IADB simulation models to calculate the contribution path required to avoid a pension deficit. If the simulation models are not available for some countries, we will report a missing observation.

15. Pension indicators: the society preparedness for aging and reform dimension

This last dimension does not refer directly to the pension system. Rather, it attempts to gauge the capacity of the economy and society to adapt to a rapidly

aging population in which the labor force as a fraction of the population will decrease and the old-age dependency burden will rise. We split the indicators into two categories. The first looks at the financial literacy or, more precisely, the pension system literacy of the population. The degree of pension's literacy in a country may provide an important indication of how likely people are y to prepare for emerging gaps in pension income by saving more voluntarily or by planning to postpone retirement and work longer. The second group looks at A variety of social and economic indicators, from elderly poverty rates to elderly living arrangements, that promise to affect their overall welfare. The purpose to gain some idea of the trend in overall retirement income and retirement security, which cannot be fully captured by studying pensions indicators in isolation.

15.1 Awareness

We start by providing indicators on pension literacy. Our primary source of information is the LSPS. The indicators are the following:

- Statutory retirement age awareness (Male/Female): It is the fraction of individuals indicating they know the statutory retirement age. It is calculated for people aged 15 to 59 years. Source: LSPS database.

- Contribution rate awareness (Male/Female): It is the fraction of individuals indicating they know the portion of their monthly earnings contributed for pensions. Indicator for people aged 15 to 59 years. Source: LSPS database.

- Pension formulae awareness (Male/Female): It is the fraction of individuals indicating they have knowledge about how their pensions are calculated. The indicator is calculated for people aged 15 to 59 years. Source: LSPS database.

- Fee charged by pension managers awareness (Male/Female): Fraction of individuals with knowledge of the pension fee charged by fund managers. The indicator is calculated for people aged 15 to 59 years. Source: LSPS database.

15.2 Preparedness

- The poverty rate of elderly population (Male/Female): Fraction of the old with per capita income below the poverty line. We set poverty line as half the median household income of the total population. Population aged 60 or plus. Source: own calculations from LSPS or household surveys.

- Educational attainment of the elderly (Male/Female): Average years of education of individuals aged 60 and more. This indicator is important because educational attainment affects the potential labor income of the elderly. Source: World Bank database.

- Co-residency: Fraction of the population aged 60 years or older living with their children. It is a measure of family ties, and thus, of family support for the elderly. Source: Own calculations from the LSPS or national household surveys.

- Family size: We would like to approximate the average number of surviving children of the elderly as this indicator provides an idea of how much family ties will change in the future. We use the global fertility rate for women 35 years ago. The global fertility rate is the number of children that an average woman would have from a hypothetical cohort of women who during their fertile life had their children according to the fertility rates by age of the study period and were not exposed to mortality risks from birth to the term of the fertile period (see https://celade.cepal.org/redatam/PRYESP/SISPPI/Webhelp/fecundidad.htm). Source: CEPAL-CELADE.

- Financial wealth: It corresponds to the value of assets and housing expressed as a ratio to annual earnings of people aged 60 and older. Source: Own calculations from the LSPS or national household surveys.

- Homeownership: Fraction of the population aged 60 or more, that owns their residence (no debt). Source: Own calculations from the LSPS or national household surveys.

- Health care costs: Out-of-pocket health expenditure as a fraction of total income, for the population aged 60 or older. Source: Own calculations using national expenditure surveys.

References

Blanchard-Fields, F., and Kalinauskas, A.S. (2009). Challenges for the current status of adult development theories; A new century of progress. In M.C. Smith & N. Defrates-Densch (Eds.), Handbook of research on adult learning and development (pp. 3-33). New York: Routledge

Bovenberg, A. L., C. van Ewijk and E. Westerhout (2012), The Future of Multi-Pillar Pensions, Cambridge University Press, Cambridge.

Gillion, C., Turner, J., Bailey, C. and Latulippe, D. (eds) (2000), Social Security Pensions – Development and Reform, International Labour Office, Geneva

Hazan, M. (2011) "Informal Workers across Europe: Evidence from 30 countries", Discussion Paper No. 5871, IZA.

Holzmann, R. and R. Hinz (2005), "Old Age Income Support in the 21st Century: An International Perspective on Pension Systems and Reform", World Bank, Washington D.C.

Jackson, R.; Howe, N. and Nakashima, K. (2010), "The Global Aging Preparedness Index", Center For Strategic and International Studies, October.

Knox, D. (2016) "Melbourne Mercer Global Pension Index", Australian Center for Financial Studies.

Muñoz Blanco, A. and Oliveri, M.L. (2015) "Adecuación de beneficios y mecanismos de redistribución presentes en los sistemas de cobertura a la vejez en América Latina y el Caribe", Technical Note, Inter-American Development Bank.

OECD. (2015), Pensions at a Glance 2015: OECD and G20 Indicators, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/pension_glance-2015-en"

Pallares-Miralles, M.; Romero, C. and Whitehouse, E. (2012) "International Patterns of Pension Provision II: A Worldwide Overview of Facts and Figures", Social Protection and Labor, Discussion Paper, N°1211, June, The WorldBank.

Finnish Center for Pensions (2016) "Pension Indicators".