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THE  
AMERICAS  
SOCIAL  
SECURITY  
REPORT

2012

Fairness, Work, Retirement, and Social Protection



Inter-American Conference on Social Security

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SOCIAL  
SECURITY  
REPORT

2012

Fairness, Work, Retirement, and Social Protection



Inter-American Conference on Social Security



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# FAIRNESS, WORK, RETIREMENT, AND SOCIAL PROTECTION

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## FOREWORD

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The Americas Social Security Report is a tool to improve the understanding of social security programs in the region. It is addressed to the social security community, including government agencies, social groups, workers, employers, unions, users, and anyone interested in the improvement of social protection in contemporary society.

The main objective of the 2012 Report is to support a constructive debate over questions that have become preeminent in virtually all countries. What is the right age for retirement? How do people around 60 or 70 years old live? How do they work? When and why do they decide to retire? What can be done to balance work and retirement age? What are the collective problems that impact decision making about retirement age? How to measure whether benefits delivered by social security in a country are adequate in comparison to the rest of the regional community? All these questions involve complex analysis because there is uncertainty about current events and, over all a substantial degree of risk surrounding the future of work, medicine, and finance.

This Report contributes to the debate over how regulations on work and retirement should be reformed, and how social security should evolve so as to make retirement a benefit and not an injury. The events that lead to the current situation are good: we are living longer, healthier lives, with more healthcare and employment options which allow older adults to work until much later in life. Within the complexity of these issues, we can see the reform movements as responses to this improved environment, not as corrections to errors made in decades past. Social security has been a remarkable institution in terms of its ability to transform, and ongoing debates will lead to improved frameworks for individual and collective lives. Under this view, there is little space for a cryptic and prescriptive model of financial reform. Instead this is a call to deepen the proactive efforts to adapt the social security institutions facing a highly favorable long-term social dynamic.

**Gabriel Martínez**  
**Secretary-General**

**CHAPTER 1**  
**INTRODUCTION**



## CHAPTER 1 INTRODUCTION

---

**T**his Report analyzes how women and men work and decide on retirement around "normal" or "statutory" retirement ages and how social bodies make decisions on that significant social and political issue. It presents a set of standardized calculations of benefits of the pension systems of the region under current regulations that can be used to compare policies across countries. The Report is a combination of literature review and empirical analysis of important topics regarding retirement. The empirical analysis, be it the description of data or the calculation of replacement rates, is presented homogeneously for most countries of the continent.

The demographic changes witnessed by all countries in past decades have spurred reforms in pensions system across the globe. Some examples are the rise in the statutory retirement age, the increase in the contribution rates for social insurance schemes, and the implementation of mandatory complementary retirement savings accounts. The Americas are relatively young, and within the large variety of models tried during the reform wave that swept through the region—from Canada to the Southern Cone—in the eighties and nineties, the national pension systems began to prepare earlier than the rest of the globe for the challenge. Still, what has happened in other continents may be just an advance indicator of the fate our region will face in the future. Life expectancy continues to increase

beyond the most optimistic projections of only a couple of decades ago, and so does the possibility of delaying the deleterious effects of aging. This is extraordinarily good news. Yet, policy makers, workers and the general public should be prepared to make the best decisions to cope with the age-related challenges to come. It is an adjustment to a good thing, but nevertheless one that demands major political agreements. To succeed, it is crucial to understand the economic conditions under which persons are retiring, when and under what conditions, and how they respond to incentives embedded in social security schemes.

The question about the "right age for retirement" looms large in the life of individuals, in the planning and management of social security agencies, and in the definition of labor and social policies for national governments. While the topic has been subject to substantial national and international debates, the issues are far from settled. The decision to work is eminently individual, but regulations on labor contracts and social security regimes substantially affect such decision.

In a direct way, social security agencies and governments are concerned today with the regulation of age of retirement, and sometimes the debates center on the financial implications of aging. Certainly, financing is a significant issue, but other primary considerations have to be researched. To begin with,

we need to deal with defining "retirement age". There are "statutory retirement ages", namely, those defined parametrically by social security laws for the reception of benefits, but there is also the actual age at which the individual retires from the labor market, which can be lower or higher than the statutory age. Moreover, the decision to retire is very often determined jointly with continuing success in the labor market, with enjoying health and with keeping personal motivations to stay active. We use the term retirement age loosely, but in some parts of the document a more precise definition will be required.

### 1.1 Basic Demographics

To establish the context, Figures 1.1a and 1.1b show basic demographic information for the Americas, and Figures 1.2a and 1.2b for the world. Data show the share of the national population aged between 50 and 69 years. These are usually the age groups a few years before or after retirement. National figures range from 8 to 12% in the area between Mexico to the top half of South America, to 20% in North America, in the South Cone, and in the Caribbean. It is expected that by 2050 the figures will be in the 20 to 30% range in all countries.

We can say that the region is still one of the youngest of the world, and while by 2050 it will still be significantly younger than Europe, one in four people in the Americas will be "around retirement age". In Figures 1.2a and 1.2b, we see that the average age of Europe and Japan will remain higher than in the Americas. In our region, two features are noticed. First, the rankings of countries by an age indicator or by national income level are not the same because of the very large migratory flows within the region that send many young workers from the low-income to the high-income areas, and because the fertility levels of wealthier countries in the Americas have not reduced to average European or Japanese levels. Second, there is convergence in the value of this aging indicator by 2050, but this may be a combination of

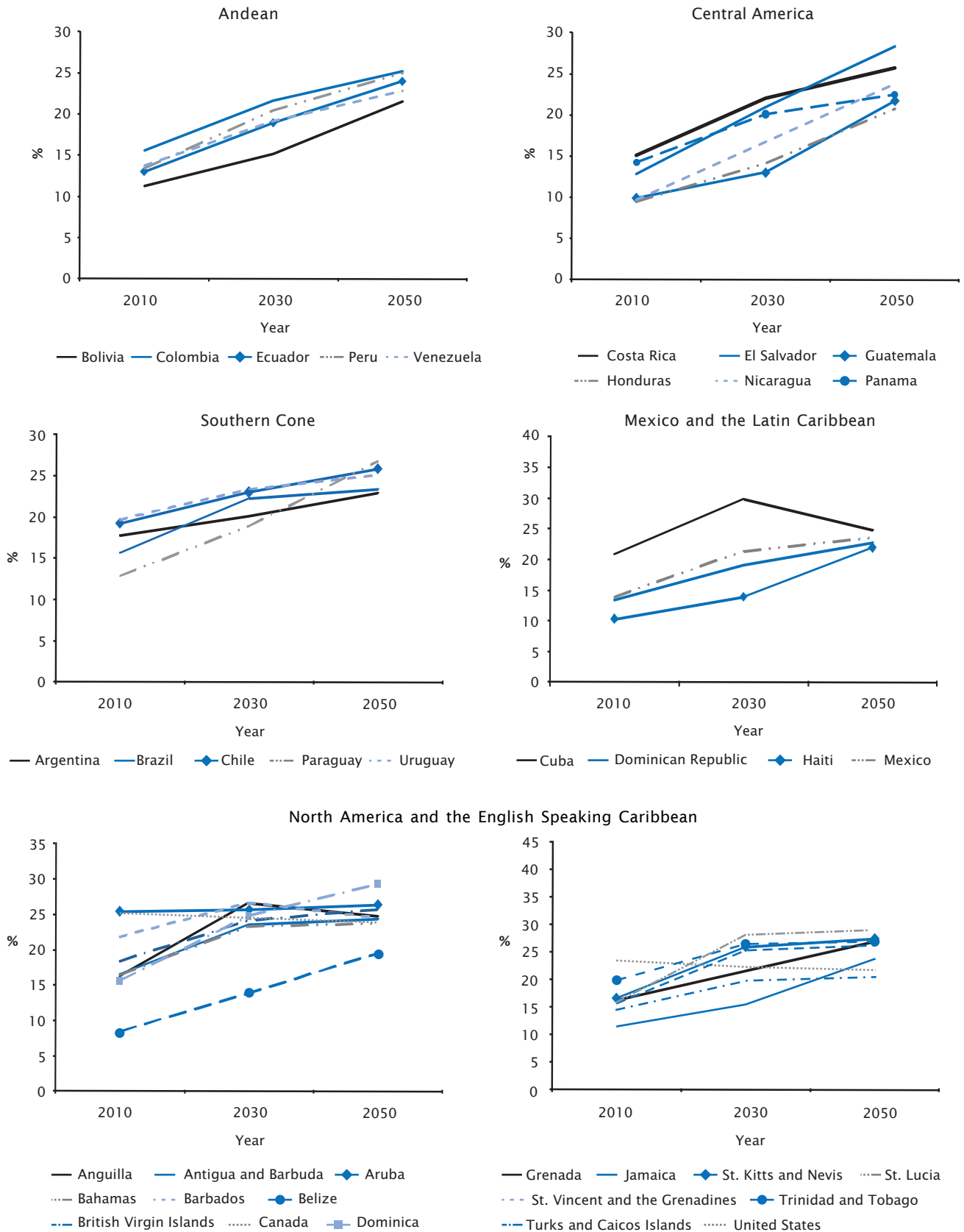
true convergence after all countries receive the benefits of improved health technologies and improved human capital levels, but also of demographic assumptions of convergence of fertility levels, an issue on which little scientific support can be found. This will not be a senile society, and it is possible that current policy definitions can be very important in the coming decades to activate this large group of persons in a way that will benefit the societal collective.

To this brief analysis of demographics we can associate three issues of special significance to social security. First, in the years to come there will be a fast increasing number of affiliates of social security schemes retiring from labor market, claiming benefits and stressing the weak financial balance of social security funds; second, policy options, such as increasing the retirement age, should be analyzed carefully on a country-by-country basis, and we can not assume that people are able or willing to work longer; and third, we should understand the labor market behavior of workers, how workers and social groups make decisions on benefits considering their fairness and cost. These are the topics studied in the following chapters.

The debates on pension reform have been refueled by the economic crisis, and the IMF (2010) has issued recommendations on the topic. The IMF believes the first pillar to reform public expenditure is to stabilize age-related spending relative to GDP. However, the data compiled by the IMF show that Latin America is far from facing the more difficult adjustment problems. In the data presented by IMF researchers, neither Mexico, Brazil and Argentina faces an increase in pension expenditure of more than 2 per cent of GDP for the next twenty years, compared with an average of 8.5 percent for advanced economies. Thus, the three policy options (increasing statutory retirement age, reducing benefits or increasing contributions) are perhaps less critical than in other parts of the world. However, as will be seen in Chapters 6 and 7 while many countries have

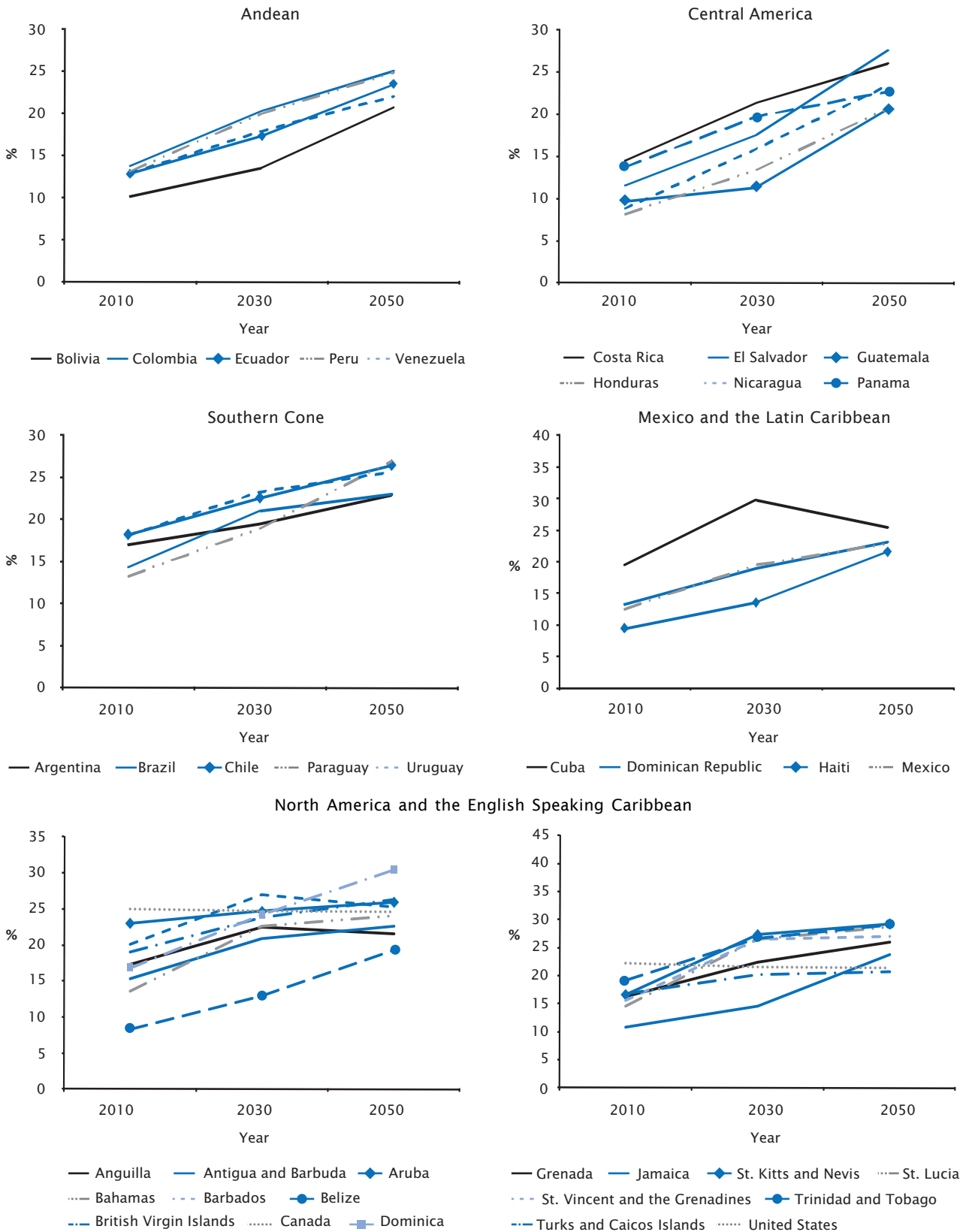
Figure 1.1a

Share of Female Population 50 to 69 Years Old in Total Female Population, 2010, 2030, and 2050



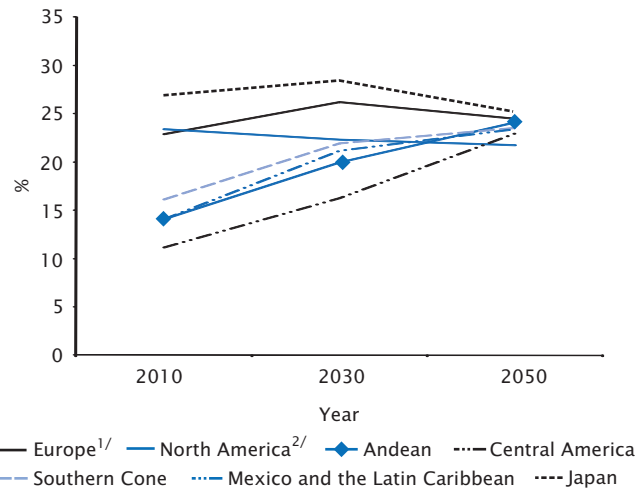
Source: U.S. Census Bureau (2011).

**Figure 1.1b**  
Share of Male Population 50 to 69 Years Old in Total Male Population, 2010, 2030, and 2050



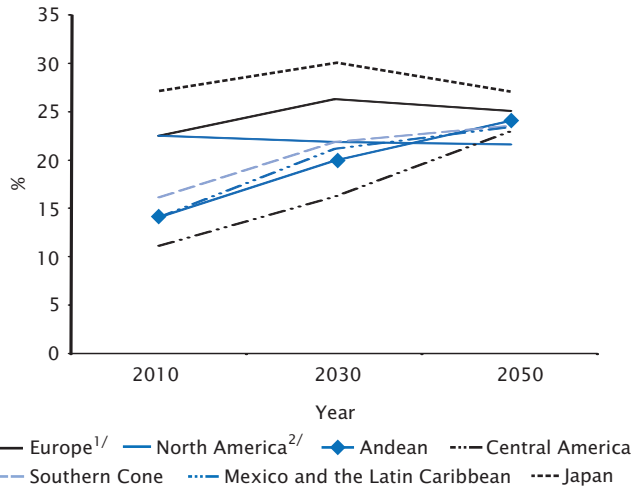
Source: U.S. Census Bureau (2011).

**Figure 1.2a**  
**Share of Female Population 50 to 69 Years Old in Total Female Population in Regions of the World, 2010, 2030, and 2050**



Notes: 1/ OECD European countries, 2/ Canada and United States.  
 Source: U.S. Census Bureau (2011).

**Figure 1.2b**  
**Share of Male Population 50 to 69 Years Old in Total Male Population in Regions of the World, 2010, 2030, and 2050**



Notes: 1/ OECD European countries, 2/ Canada and United States.  
 Source: U.S. Census Bureau (2011).

advanced towards increasing sustainability of the pensions system, this is not a uniform case. The discussion in this Report is related to the IMF recommendations in a couple of ways. First, there are significant behavioral issues that may subvert the listed policy options. For example, increasing statutory retirement ages does not guarantee that workers will retire later. Second, there are "non-fiscal" options that can mean a difference in the long-run: longer working careers, improved programs for reintegration to the labor market, renewal of careers at middle age, improved management of disability programs, changes in coverage in countries with high informality and others.

## 1.2 Summary

This Report is divided into two parts. The first is more descriptive and generic, while the second reflects a detailed compilation of information and a significant actuarial analysis to obtain simple measurements for each country that can be compared between systems. The first part is based on statistical analysis and review of the principal hypothesis provided by the social sciences on the phenomenon of the retirement age. The second required a detailed review of national legislation, in consultation with regional experts and detailed actuarial work, and arises as an element which will serve to substantiate an evolution towards continuous assessments.

Chapter 2 presents data on labor market variables along the life cycle but with special emphasis on workers between ages 50 and 69. The main findings can be summarized as follows: taking age 20 as reference, individuals increase their time at work until ages 40 to 50 and then retire gradually until age 60, when withdrawal from the labor force accelerates. The pattern is similar between men and women, although labor force participation is higher for men than for women at all ages, despite increasing rates for women in recent decades. Wage careers follow a similar concave pattern. It is worth mentioning that,

regionally, people in Latin America work the longest among the compared regions.

Older persons remaining in the labor force (roughly after age 60) show two compensating behaviors when we look at the intensity of their work effort. On one hand, they are unemployed less often; on the other they work fewer hours.

We also have that as the age of retirement approaches, the predominant behavior is a decline in the rate at which workers pay social security contributions, and the decline becomes more pronounced after age 60. The general declining trend is related to the increased incidence of self-employment with age, and the large decline after 60 is likely due to the eligibility to collect a pension benefit, which incentives those older adults still working to do so without contributing.

Chapters 3 and 4 deal with the economics of retirement ages, both from individual and societal points of view. These chapters stress the idea that the realization of a retirement event does not depend only, and often not even mainly, upon the parameters of a retirement scheme. Individuals may decide to withdraw from the labor market before the statutory retirement age or to work several years more for reasons of need, family conditions, health, or personal motivation; indeed, the economics of the retirement age involve private and collective decisions. Both perspectives are required to fully discuss the problem. In general terms, governments have little power to affect work and leisure decisions by individuals unless they are willing to impose large costs through taxation or through regulation of the workplace. On the other hand, pension systems inextricably and extensively link the members of different generations and social groups, creating collective interactions that cannot possibly be perceived or managed in the individualized and decentralized market framework.

Chapter 3 discusses in detail the effects of work careers, consumption over the life cycle and financial markets on retirement decisions, while Chapter 4 discusses the political reasons that explain modifications to social security and in particular to statutory retirement ages. The evidence shows that public pension programs worldwide tend to induce retirement and that demographic trends cannot account for this situation. An alternative explanation seems to be the political empowerment of the elderly: every citizen expects to become old at a certain point in life and the elderly have more disposable time, which means they can devote more time and resources to politically related activities such as lobbying and persuasion.

Chapter 5 states a question that should figure much more prominently on the retirement-age agenda: How much can the "older adult" really work? True, life expectancy has increased, but many of the scourges of the post-sixty human life have not been solved, and the variability of the health/age-related incidence across individuals of cancer, heart disease, and other illnesses increases with age. Thus, statutory retirement ages cannot simply be increased by an average amount without inducing pain to a large proportion of the citizens. On the other hand, for those who can work and are willing to do so, governments and social security systems should evolve to allow them to re-train and provide the opportunity of a productive job. Technology makes this possible in many ways, and its applicability should be generalized. The chapter argues against framing the debate as one of a trade-off between shorter pleasant retirement and more job efforts and contributions at the expense of personal well being; instead, we have to think that for many people the option of continuing to work after age 60 or even 70 will become a feasible and rewarding life option. Yet, major institutional changes will be required to achieve a new environment, including the possibility of launching new careers after middle age.

Chapter 6 summarizes the legislation on old age retirement following a standardized approach of comparison of systems in American countries and shows the basic variables that will be used in Chapter 7. The chapter also discusses the different typologies used to classify pension schemes and analyzes in detail the most relevant variables that define the calculation of old-age pension in various countries. We see this as part of an evolutionary approach to the evaluation of national pension systems, one in which the classification of systems is less important and the evaluation of actual benefits delivered becomes the touchstone. The chapter is not a comprehensive description of pension systems, but only of the variables entering the analysis in Chapter 7.

Chapter 7 aims to compare indicators of general retirement systems in the region. It examines replacement rates, defined as relative values of pensions as a proportion of individual wages before retirement, and pension wealth, defined as the present value of benefits provided at the date of retirement. We find that replacement rates for women are similar to those of men except when women have significantly lower wages, a condition that increases their rate of replacement. In countries with mixed and defined contribution schemes replacement rates are on average higher than in defined benefit systems. Another result is that, on average for all countries studied, the wealth of the pension is about 8.4 times the annual salary of an individual.

Two scenarios are presented. One follows the assumptions applied by OECD researchers (see *OECD Pensions at a Glance* 2005, 2007, 2009, and 2011). The other applies historical information on inflation rates. Results differ significantly across scenarios, highlighting the difficulties in reaching simple standardized results. The comparison with the existing literature says that the field is wide open for further research. There is a need of much improved data, but also a more systematic approach by the academic and policy-making communities.

While many questions remain open, the field is fascinating, as it prevents an epochal change in our societies. The initial reaction of some governments and international agencies to the issue of pension reform was financial.<sup>1</sup> A main difference between those approaches and this Report is the view that retirement decisions are the final result of individual

and collective decisions, and that these decisions have some basic structures that can be studied to improve them, but there are significant elements of risk and uncertainty at the individual and the collective levels that determine the need for an evolutionary approach to public policy.

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<sup>1</sup> For example, the Independent Evaluation Group-World Bank (2006), describes how the influential World Bank strategy was, explained mainly (p. xxiv) in terms of reducing fiscal deficits, as well as reducing investment risk. Little space was dedicated to the main issue addressed here: What is the best mix of individual effort and benefits for the individual older adult and the society?.



**CHAPTER 2**  
**LABOR MARKET BEHAVIOR AND RETIREMENT**  
**IN THE AMERICAS**

## CHAPTER 2

# LABOR MARKET BEHAVIOR AND RETIREMENT IN THE AMERICAS

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### 2.1 Introduction

**T**his chapter describes the main regional trends in labor variables around statutory retirement ages. The behavior of earnings and employment during that stage of life is part of the life cycle, and we look at the whole to understand the behavior of those near "older adulthood". The information in this chapter is relevant to put into perspective the calculations of replacement rates in the national pension systems presented in Chapter 7.

While the topic has been analyzed per country or per group of countries (see for example Murrugarra 2011), this study includes 20 countries of the continent.<sup>2</sup> A substantial share of the information presented in this chapter was calculated using the latest available national employment surveys; the information was processed by the ILO System of Labor Information for Latin America and the Caribbean (SIALC), based in Panama. Most medium-sized and large countries produced surveys during 2008-2010, but very few small countries have them, with the Caribbean being in particular need of investment in this area. The chapter also uses data around 2010 and 1970 that comes from census data or other sources. Very few countries had employment surveys in 1970, so the information can provide only a general picture.

### 2.2 Work along the Life Cycle

#### *Labor Force Participation*

When we observe individuals starting around age 20, we find that they increase their time at work until age 40 to 50 and then retire gradually until age 60, when withdrawal from the labor force accelerates. Figure 2.1a shows the labor force participation rate (LFP) of women along the life cycle. As we can see, in most countries there is a pattern of increase until middle age, a continuous decrease that begins approximately between 40 and 50 years of age, and an accentuated decrease around official retirement ages (approximated with the shaded area). Interestingly, even at age 70-74 the women's LFP is still very high in most countries shown, being noticeably higher in lower income countries such as Peru, Honduras, El Salvador, and Paraguay. The story for men is more or less the same (see Figure 2.1b): the LFP increases at young ages and starts decreasing around ages 40 to 50.

In Figure 2.2a, three relatively wealthy countries had begun the transition to higher levels of female work-near-retirement-ages by 1970 (the USA, Canada, and Antigua and Barbuda). By 2010 they had been joined by Argentina, Paraguay and Uruguay, Ecuador and two Central America countries, Guatemala and Honduras. By 2010, Cuba and Peru had reached one of the highest levels after having one of the lowest in 1970. All cases, except one, show a higher incidence

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<sup>2</sup> In some figures less than 20 countries are presented due to availability of information.

of female work between ages 60 and 64 in 2010 than in 1970. Trends for men aged 60-64 are less marked, but there is nevertheless a clear pattern of increase. Only in a handful of Caribbean countries were men between age 60 to 64 working less in 2010 than in 1970; in the largest countries of the region, this indicator has remained at roughly the same level as in 1970 (USA, Canada, Mexico, and Brazil); and in countries of the Southern Cone, Argentina, Uruguay, Chile, other countries of Central America and the Andean region, LFPs of older men today are higher in 2010 than in 1970.

We can mark significant differences in the behavior of work around retirement ages between the Americas, Asia, and Europe. Japan and South Korea are closer to the Americas. In Figure 2.3a we can observe a great variation across countries in the LFP for females at ages 40 to 50 mainly because several Latin American regions have relatively low rates. By age 50, there is a significant change because European women abandon the market sharply and only 7% work by age 65-69 (in Belgium, France, and Italy values are near zero). In Japan, North America, and the Southern Cone, women also leave the market in vast numbers approximately 10 years after European women, at age 60. For the rest of Latin America and Korea, LFP declines are less steep, and in some regions are above 25% even at ages 70 to 74. For males (Figure 2.3b), we see that between 40 and 50 years of age, all regions have similarly high LFP values meaning that the vast majority of men work at those ages, but at around age 50 there is a separation into roughly three groups: Europeans begin to work much less than the rest, Japan, North American and the Southern Cone men have intermediate values, and the less wealthy and more unequal Latin American regions work the most. Differences are not small and, by ages 65-69 only 13% of the European males work, while 30% of North Americans and over 60% of Mexicans, Latin Caribbeans, Central Americans, and Andeans work.

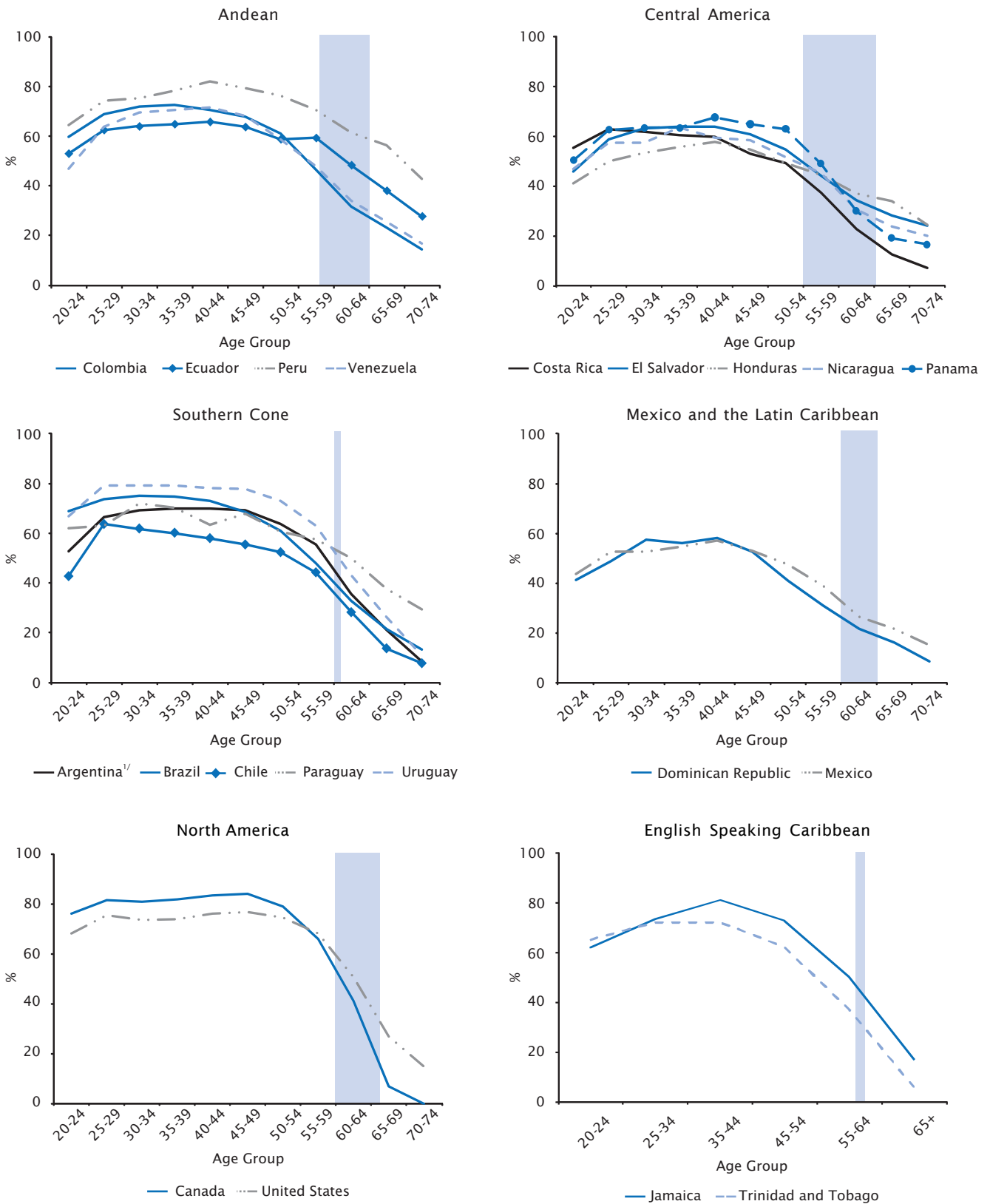
### ***Intensity of Work by Older Adults***

We just reviewed that after age 60, work measured through LFPs declines. However, the older adults remaining in the labor force show two compensating behaviors when we look at the intensity of their work effort. On one hand, they face a lower incidence of unemployment, and on the other, they work fewer hours.

Older adults remaining in the labor force are relatively busy people with the highest rates of occupation across all age groups. As we can see in Figures 2.4a and 2.4b, the percentage of the labor force occupied increases with age for women and men in basically all countries analyzed, including those aged 70-74. This suggests that those staying in the labor market are those with higher likelihood of remaining employed. Nonetheless, the decline in hours worked that begins around middle-aged groups continues after age 60. Figures 2.5a and 2.5b show weekly hours worked along the life cycle. Across the countries evaluated, there is a pattern of decline in hours worked for men after peaking at ages 40 to 44. For women, the more common pattern is a flatter profile than men at younger ages, and then a continuous decline in the average over life. Very likely, this pattern is related to the division of labor at home, to the role of women as caregivers to the family, including children, husbands, and the elderly.

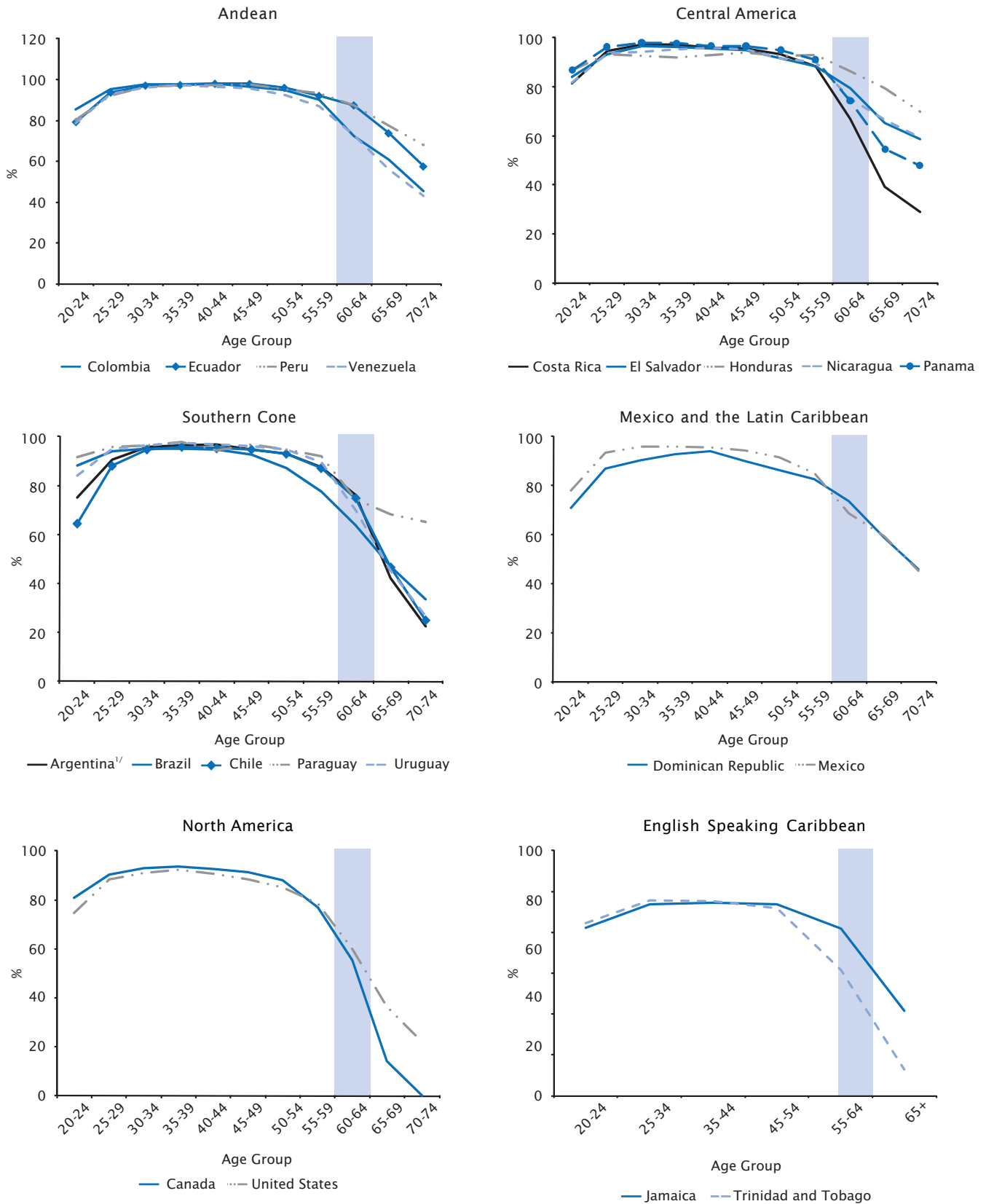
A major question of interest to social insurance programs is to what degree individuals keep working in old age because their income is very close to or below subsistence levels. How much the figures in this section would be affected by the introduction of more generous universal pension programs?

Figure 2.1a  
Labor Force Participation Rates by Age Group, Women



Note: 1/ Urban population.  
Source: ILO-SIALC (see text for explanation).

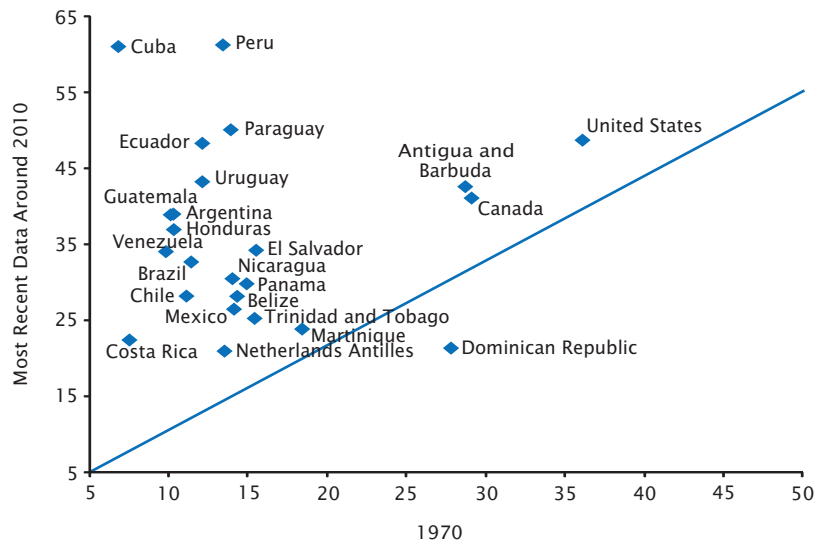
**Figure 2.1b**  
**Labor Force Participation Rates by Age Group, Men**



Note: 1/ Urban population.

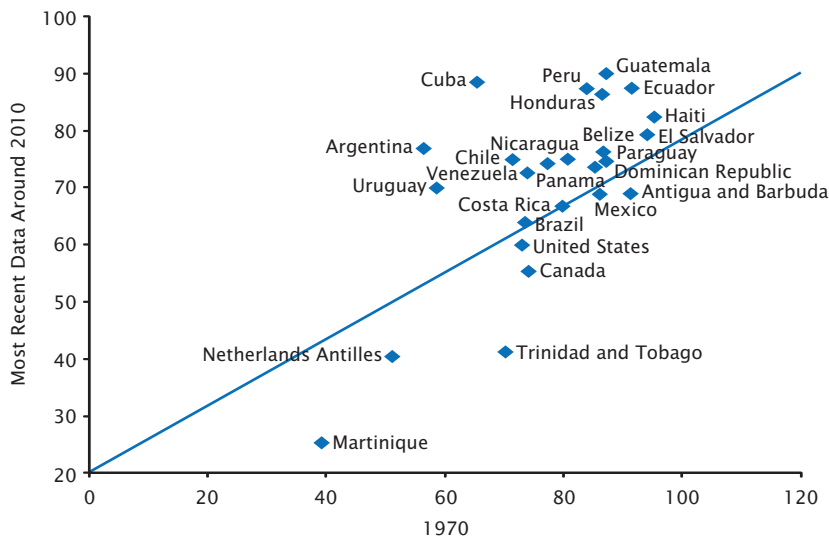
Source: ILO-SIALC (see text for explanation).

**Figure 2.2a**  
**Labor Force Participation of Women Aged 60-64 in the Americas,**  
**1970 and Most Recent Data Around 2010**



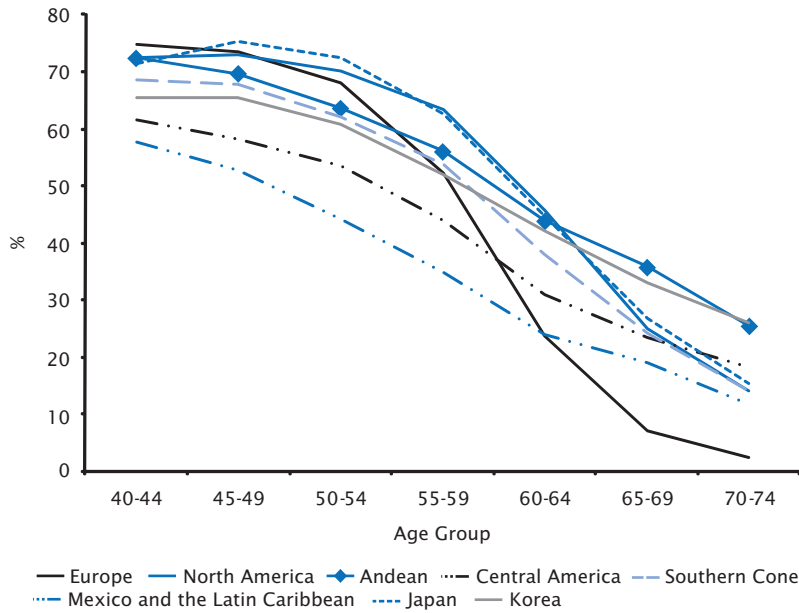
*Note:* Data is for various years.  
*Source:* Own calculation using data of LABORSTA and household surveys.

**Figure 2.2b**  
**Labor Force Participation of Men Aged 60-64 in the Americas,**  
**1970 and Most Recent Data Around 2010**



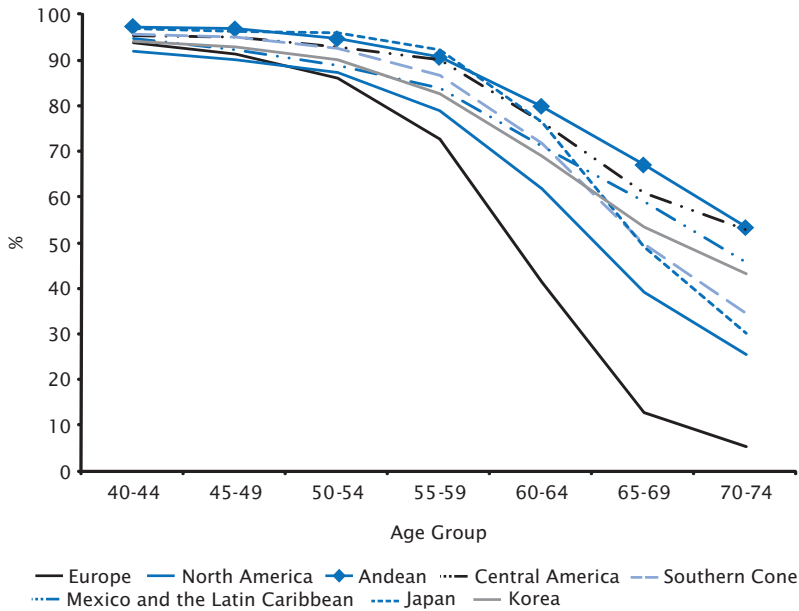
*Note:* Data is for various years.  
*Source:* Own calculation using data of LABORSTA and household surveys.

**Figure 2.3a**  
**Labor Force Participation Rates by Age Group in Regions of the World, Women**



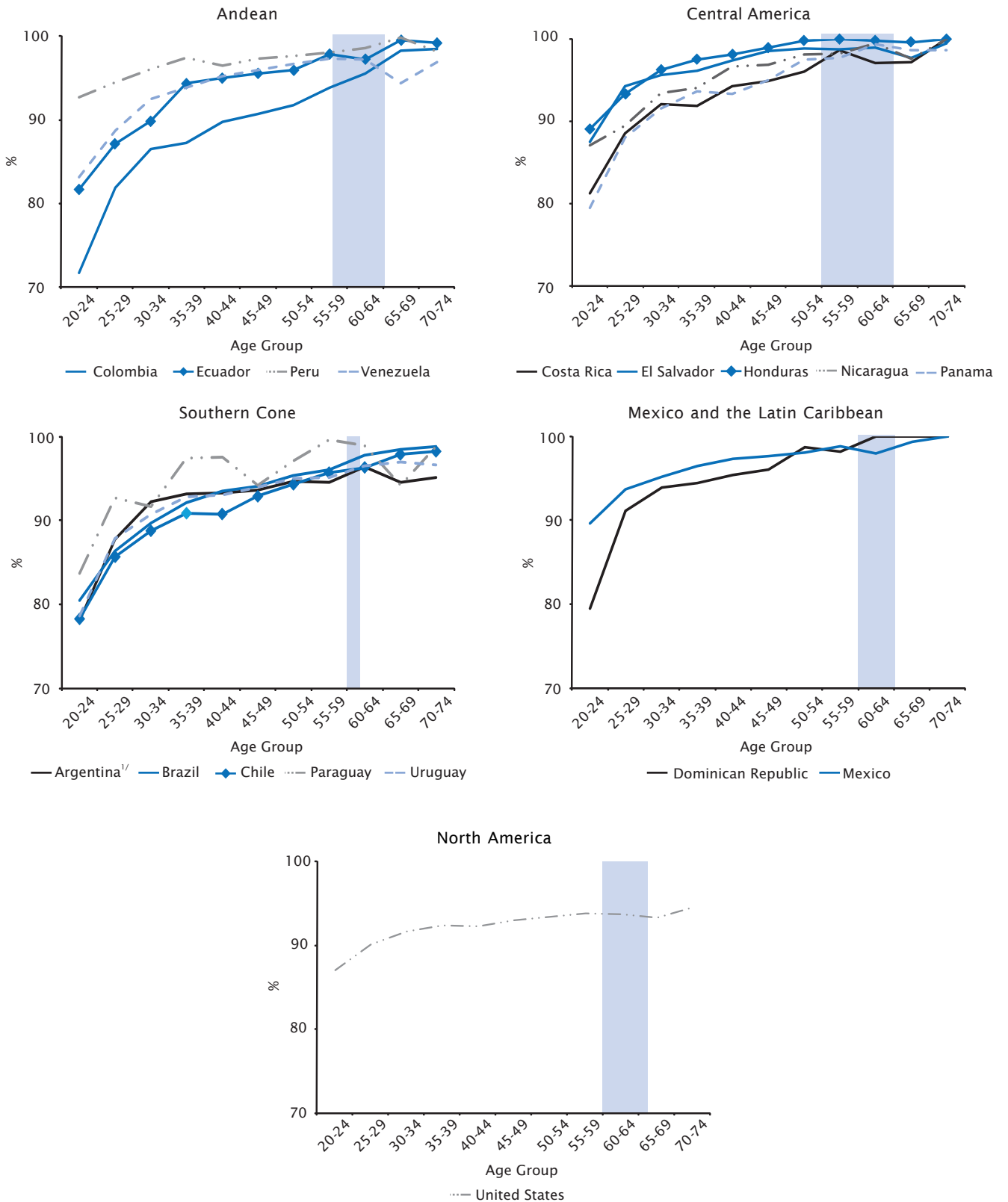
*Note:* Data is for various years.  
*Source:* Own calculation using data of LABORSTA and household surveys.

**Figure 2.3b**  
**Labor Force Participation Rates by Age Group in Regions of the World, Men**



*Note:* Data is for various years.  
*Source:* Own calculation using data of LABORSTA and household surveys.

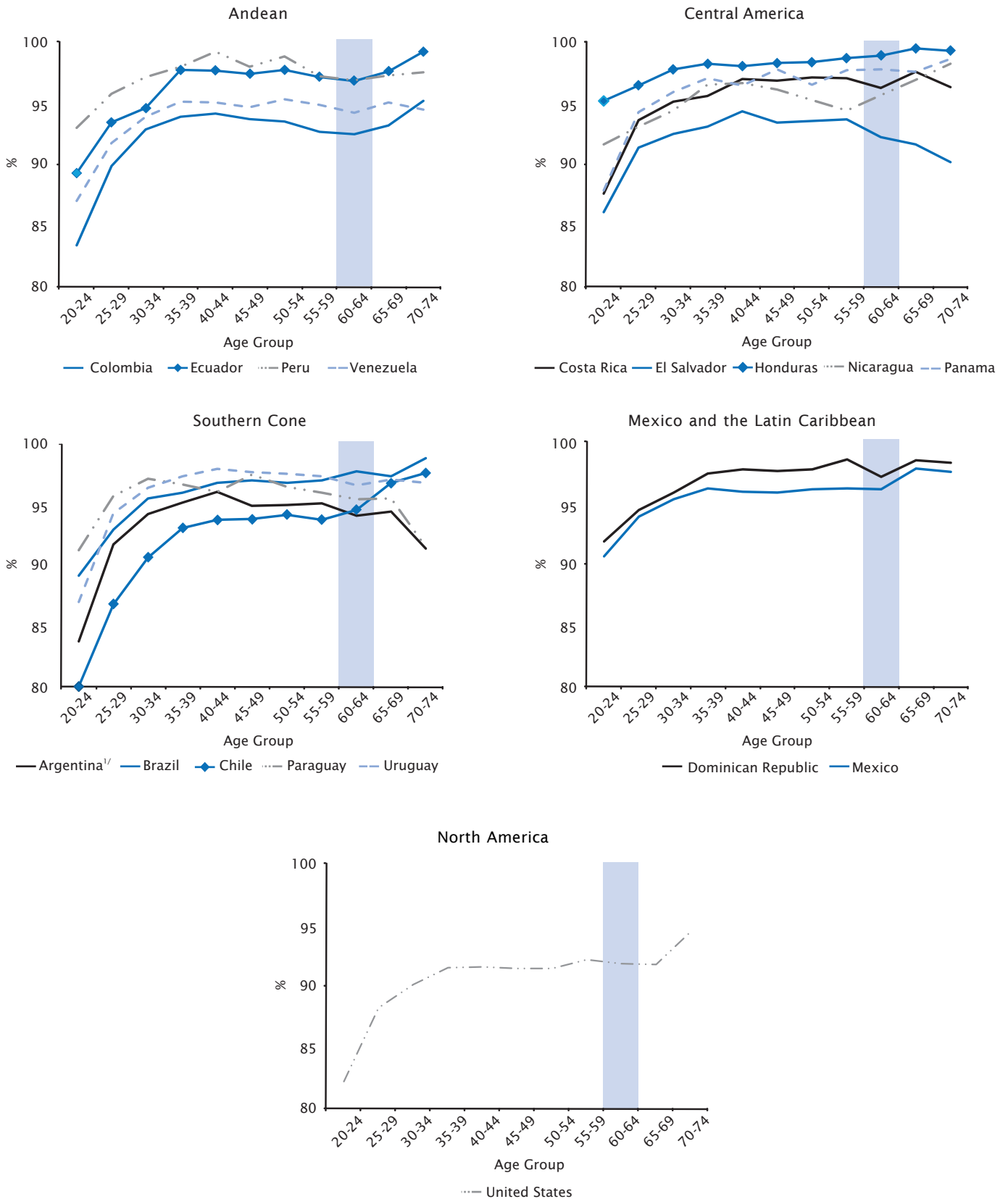
**Figure 2.4a**  
**Occupied Women as a Percentage of Women in Labor Force by Age Group**



Note: 1/ Urban population.  
 Source: ILO-SIACL (see text for explanation).

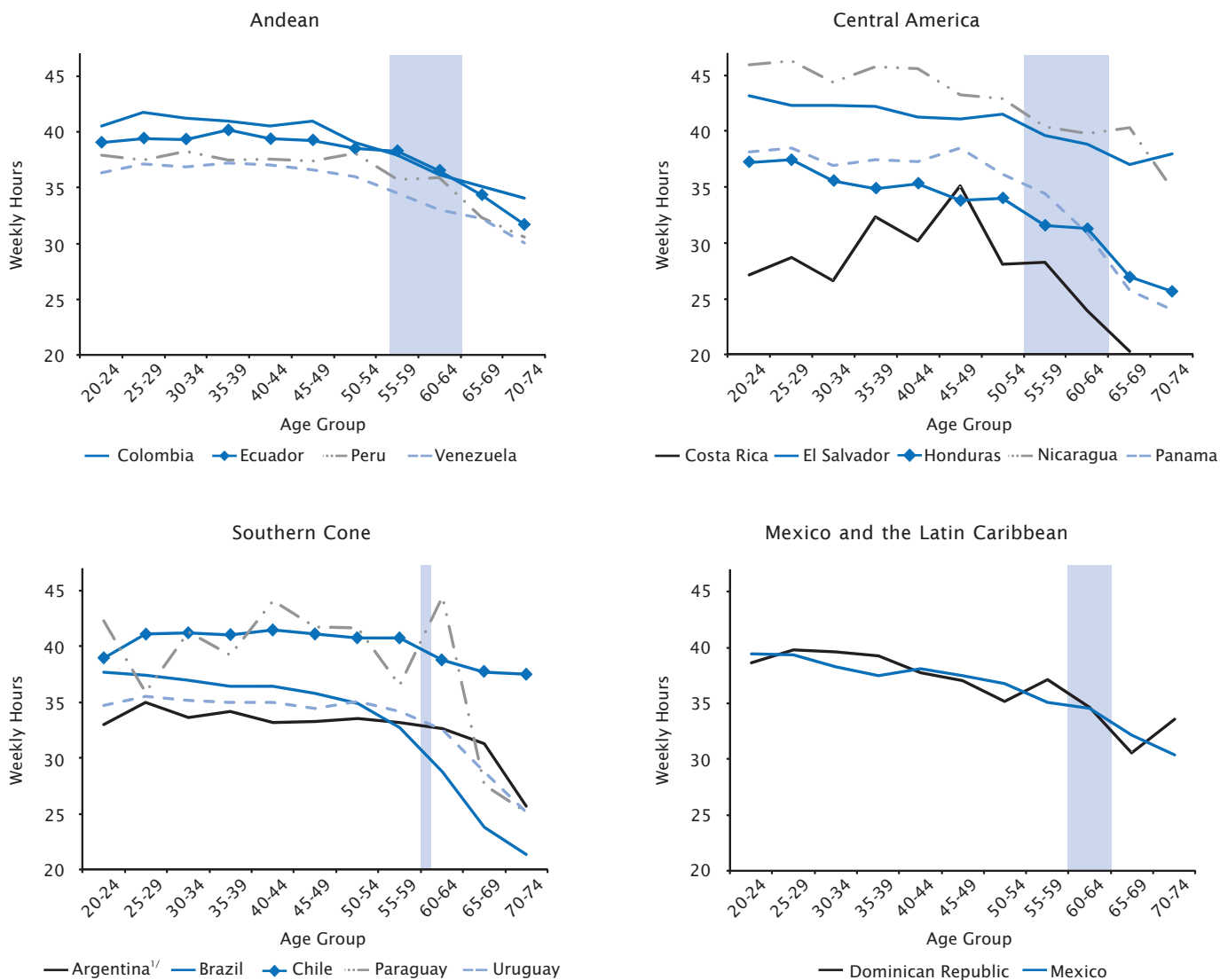


**Figure 2.4b**  
**Occupied Men as a Percentage of Men in Labor Force by Age Group**



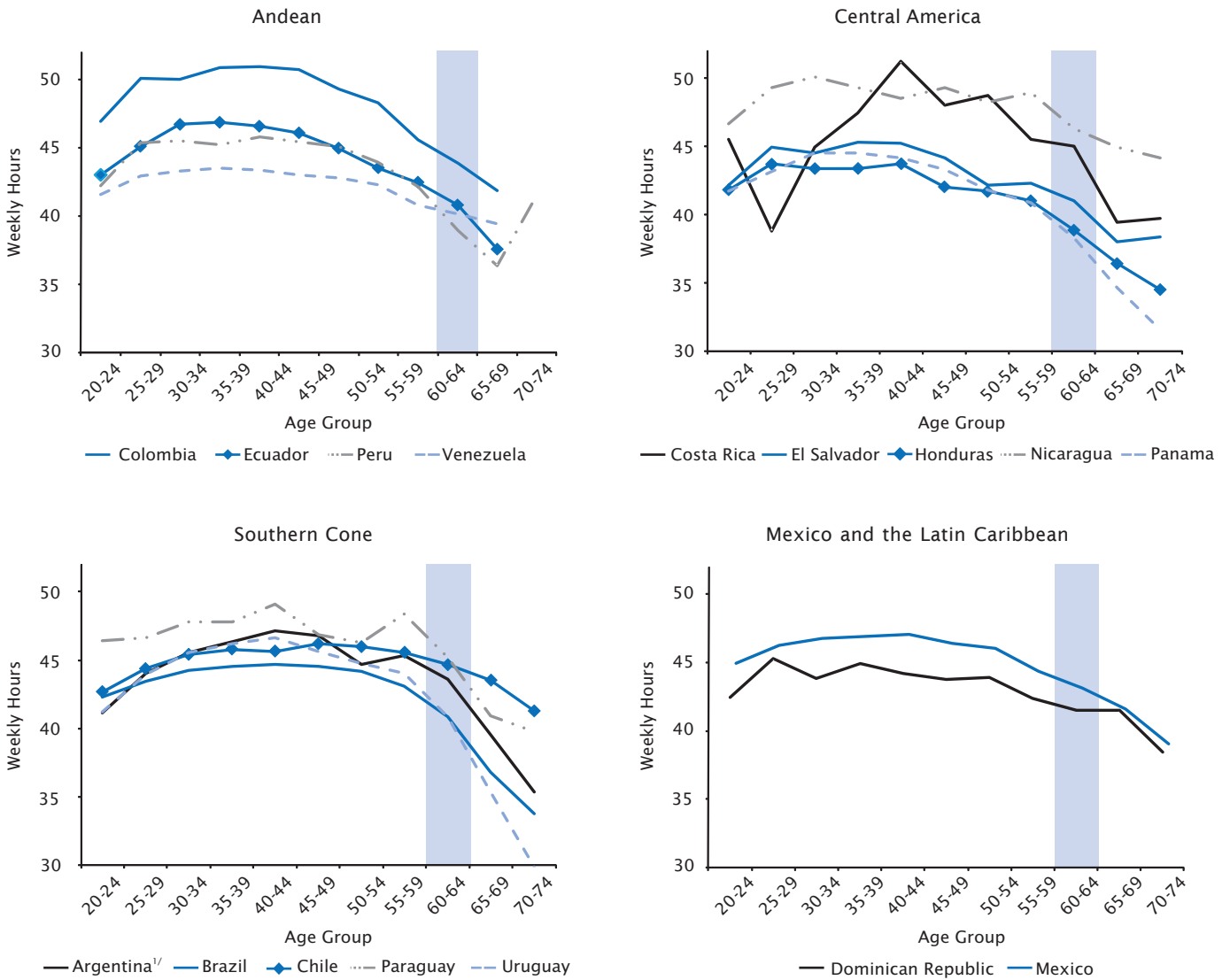
Note: 1/ Urban population.  
 Source: ILO-SIALC (see text for explanation).

**Figure 2.5a**  
**Weekly Hours Worked by Age Group, Women**



Note: 1 / Urban population.  
Source: ILO-SIALC (see text for explanation).

**Figure 2.5b**  
Weekly Hours Worked by Age Group, Men



Note: 1/ Urban population.  
Source: ILO-SIALC (see text for explanation).

### ***Earnings of Working Older Adults***

After first entering the labor market, workers earn more as they gain experience, and earnings peak between ages 40 and 50, stabilizing thereafter or perhaps declining. In the Latin American region the pattern has been accentuated, with earnings growing quickly until age 40 to 50 and declining strongly in the years before retirement.

Figures 2.6a and 2.6b show average earnings in the main job in Latin American countries for women and men respectively. And Figure 2.6c shows annual earnings by gender in the United States. It can be observed that average earnings often double or more between ages 20-24 and approximately age 50, but are cut in half or more between ages 50 and 60. In Colombia between ages 50 and 65, average earnings of women are cut by two-thirds. For a few countries, the age-earnings profile of women and men is flat (Venezuela and Costa Rica), but in general, it is marked by a decline as retirement ages approach. Occupied persons around statutory retirement ages earn on average approximately the same as workers in their twenties. The age-earnings profile is usually a very important determinant of the value of a person's pension, and thus it is a factor that active workers may consider when deciding their retirement.

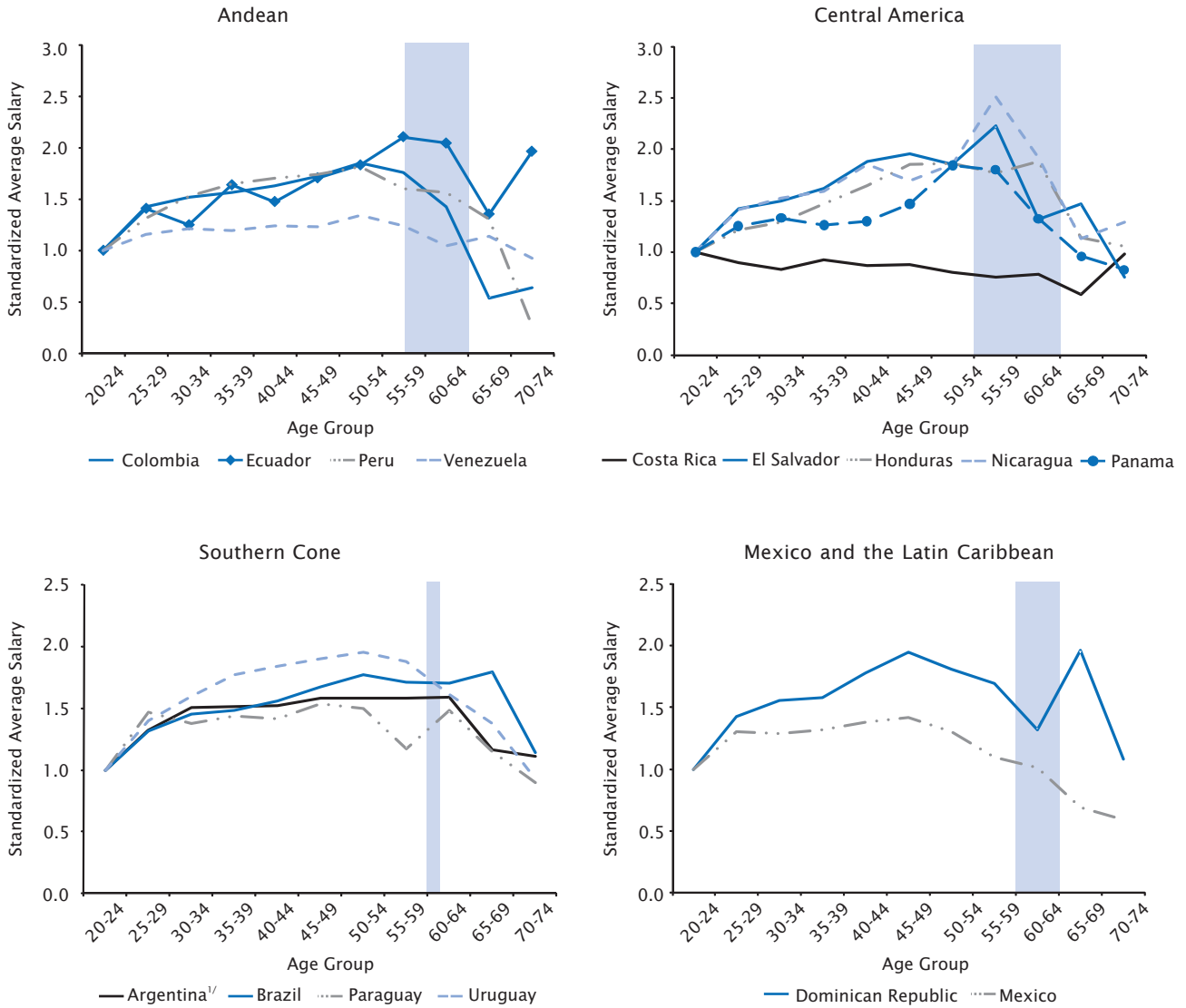
It is useful to describe two phenomena ignored to draw these graphs for so many countries in this short space. First, notice that these are cross-sectional profiles, and describe earnings of individuals of different ages at a point in time (the date of the most recent survey for each country). Latin Americans who in 2010 were of ages 50 to 70, entered the labor market or were young during the eighties (the "lost decade") and, thus, experienced historically low wages for a significant share of their careers. There are, possibly, "cohort effects" or "fossil remnants" of those low wages in older adult populations shown in Figure 2.6a and 2.6b. If so, the fall in earnings is probably not going to be as large in the future as suggested in these graphs. The second phenomenon

in the region is the large advance in education and productivity across generations. Educational levels and the quality of education have improved noticeably over the last 20 years, and it is not unreasonable to expect even larger improvements in the coming decades. But still, much of the improvement in human capital is taking place on-the-job. The large growth in earnings between ages 20 and 40 can be attributed to a learning process in which young workers are willing to receive lower earnings in exchange for training. It is possible that the maturation of the educational systems in the region will shift the learning process from workplaces to schools, thereby approaching the patterns observed in wealthier countries. If so, we will see some flattening of the age-earnings profiles in coming decades.

### ***Characteristics of Occupied Labor***

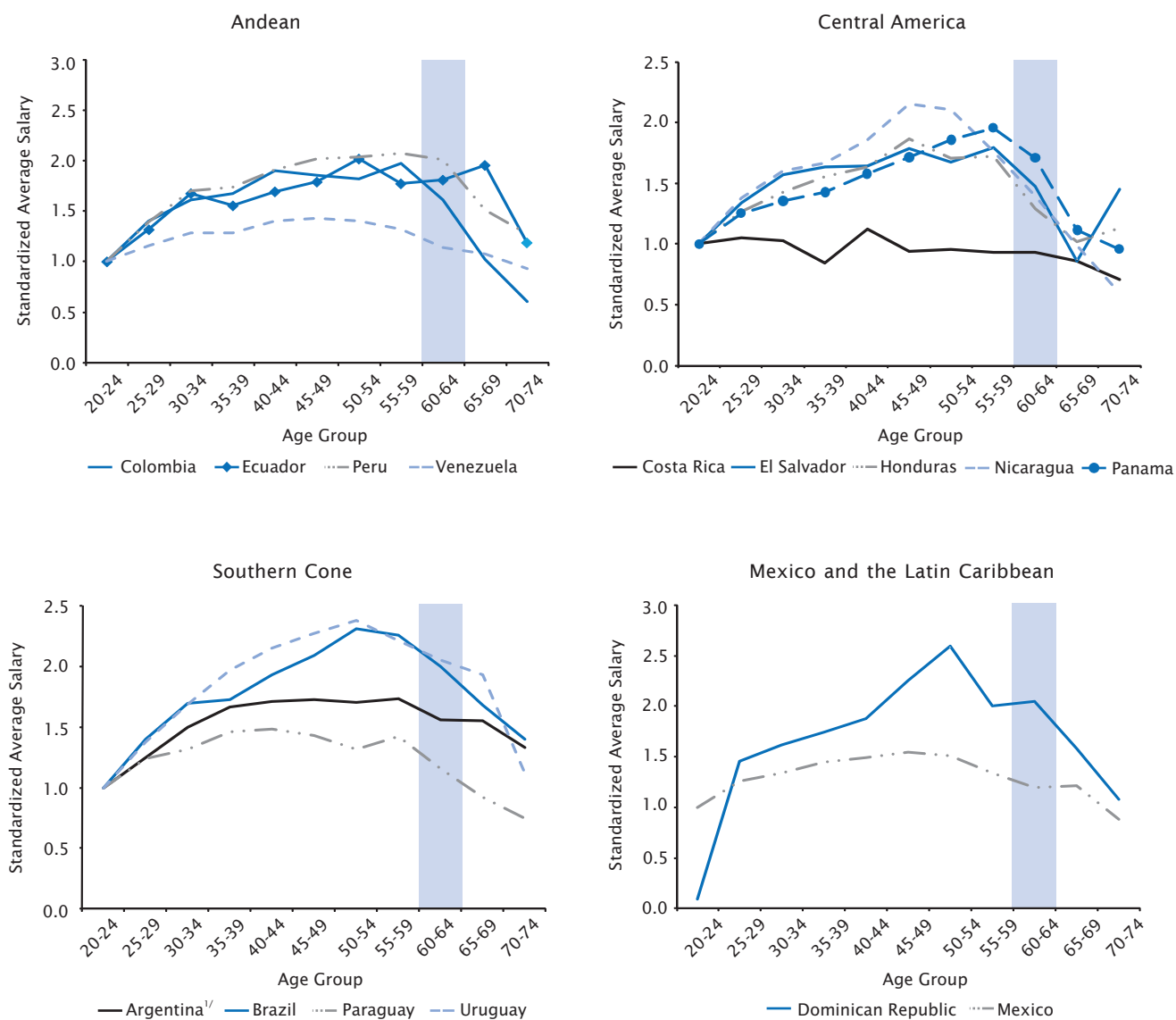
What are the characteristics of the jobs of older adults? This section explores the coverage by social security and the type of job performed by them. It is well known that the coverage of social security is less than universal in a vast majority of the countries in the American continent. As the age of retirement approaches, the predominant behavior is a decline in the rate at which workers pay social security contributions. A caveat with graphs is that employment surveys (or almost any other surveys that can be compared across the region) really do not explore in detail the different contours of participation in social insurance: contributing and receiving benefits. Yet, we can state that there is a general trend towards declining participation with age, and the decline becomes more pronounced after age 60. The general declining trend is related to the increasing incidence of self-employment with age (documented in CISS 2005 and in Figure 2.7a and 2.7b), and the large decline after 60 is likely due to the eligibility to collect a pension benefit, that incentives those older adults still working to do so without contributing.

**Figure 2.6a**  
Standardized Average Salary by Age Group, Women



Note: 1/ Urban population.  
Source: ILO-SIALC (see text for explanation).

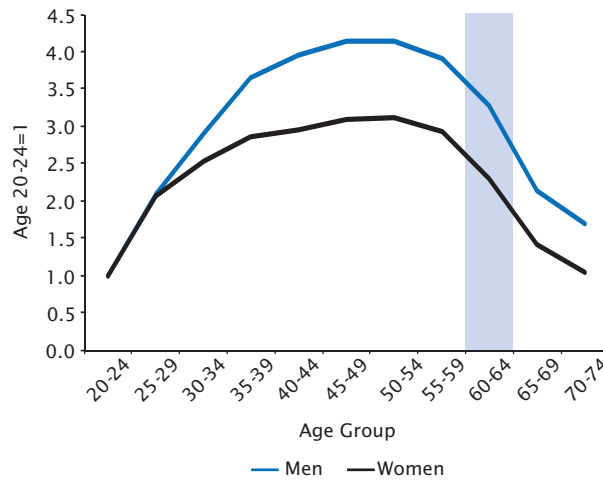
**Figure 2.6b**  
Standardized Average Salary by Age Group, Men



Note: 1/ Urban population.

Source: ILO-SIACL (see text for explanation).

**Figure 2.6c**  
**Standardized Annual Earnings by Gender in the USA, 2008**



Source: American Community Survey (2008).

Still, these graphs may confound institutional definitions because participation in social security by the employed may increase because many older adults begin receiving benefits while still working or individuals after 50 become reaffiliated to achieve the minimum requirements for an old-age pension.

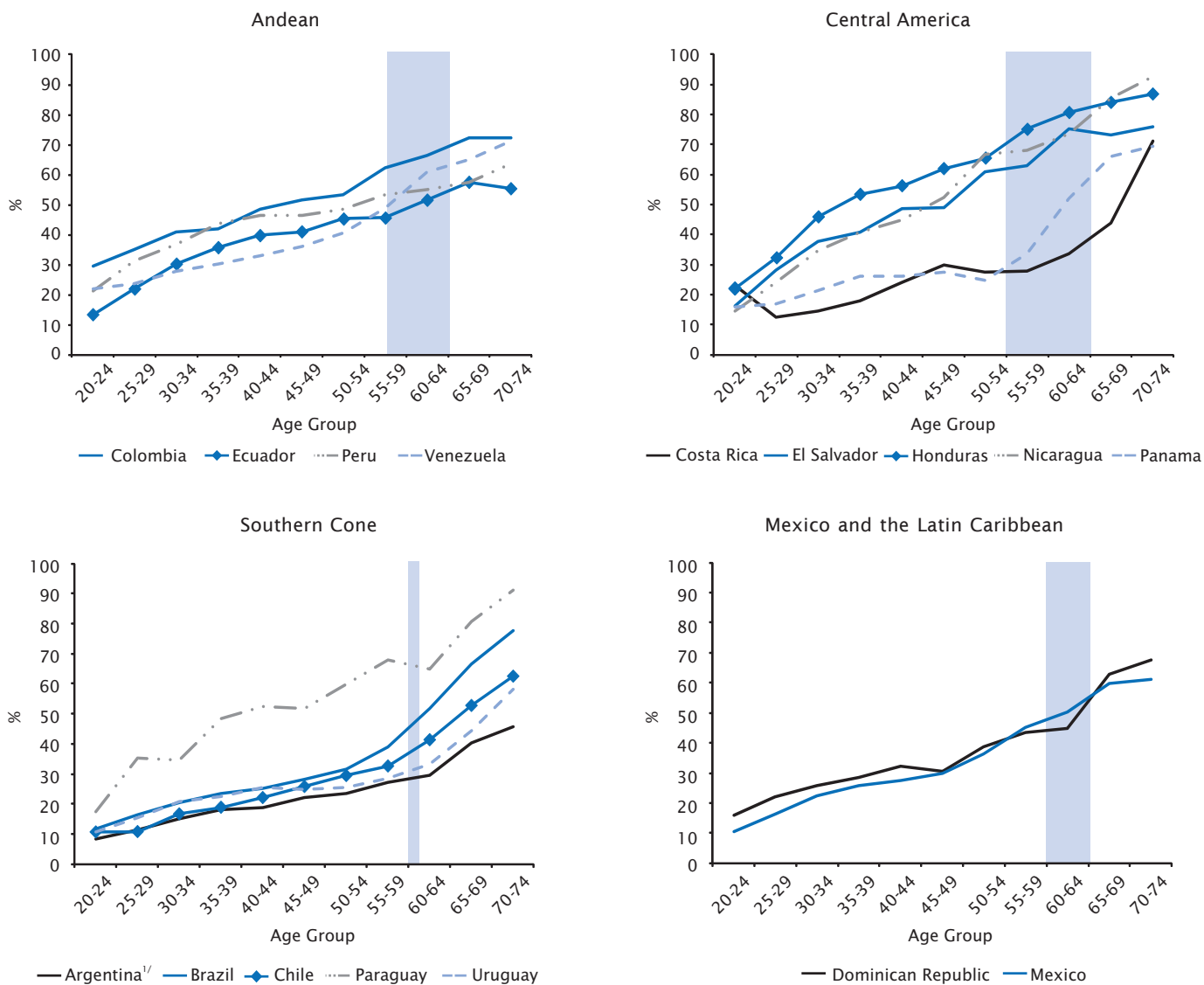
In these graphs, occupied persons can belong to any of the following categories: salaried workers, self-employed, employer, and "other". For the purpose of defining the benefits provided by pension plans, a main event is the continuous decline in the share of salaried workers in the labor force for all Latin American countries. By age 60, the value of the share approaches 60% in very few countries; indeed, in many it is below 30%. A complementary statistic shown in Figures 2.7a and 2.7b, is that the share of self-employed (and employers) in the labor force increases continuously over the life cycle above a value of 30% for females in most cases, and is even higher for males. High levels of self-employment are coupled with statutes that make contributions to social security mandatory only for salaried workers, and that may impose large penalties on benefits for those not employed when

reaching the statutory retirement age. For example, benefits may be defined in relation to nominal average earnings (non-adjusted for inflation), which means that those not contributing in recent years receive very low pensions. In some cases, all entitlements may be lost if there is no history of recent contribution.

### **Urban/Rural Comparisons**

A critical dimension of the legacy of pension systems is that rural workers often have not contributed to social security for most of their lives. Yet, aging is modifying their lives just as much as it is for urban families. Young women in rural areas work less than urban women, have lower wages and often do not have any cash earnings. Figures 2.8a, 2.8b, and 2.8d show that after age 50, rural women work more often, have higher occupation rates, and experience declining earnings in comparison to urban women. The evidence on average hours worked is mixed, perhaps with rural women working slightly more hours than urban in some cases (Figure 2.8c). The evidence for men, in Figures 2.9 is roughly similar.

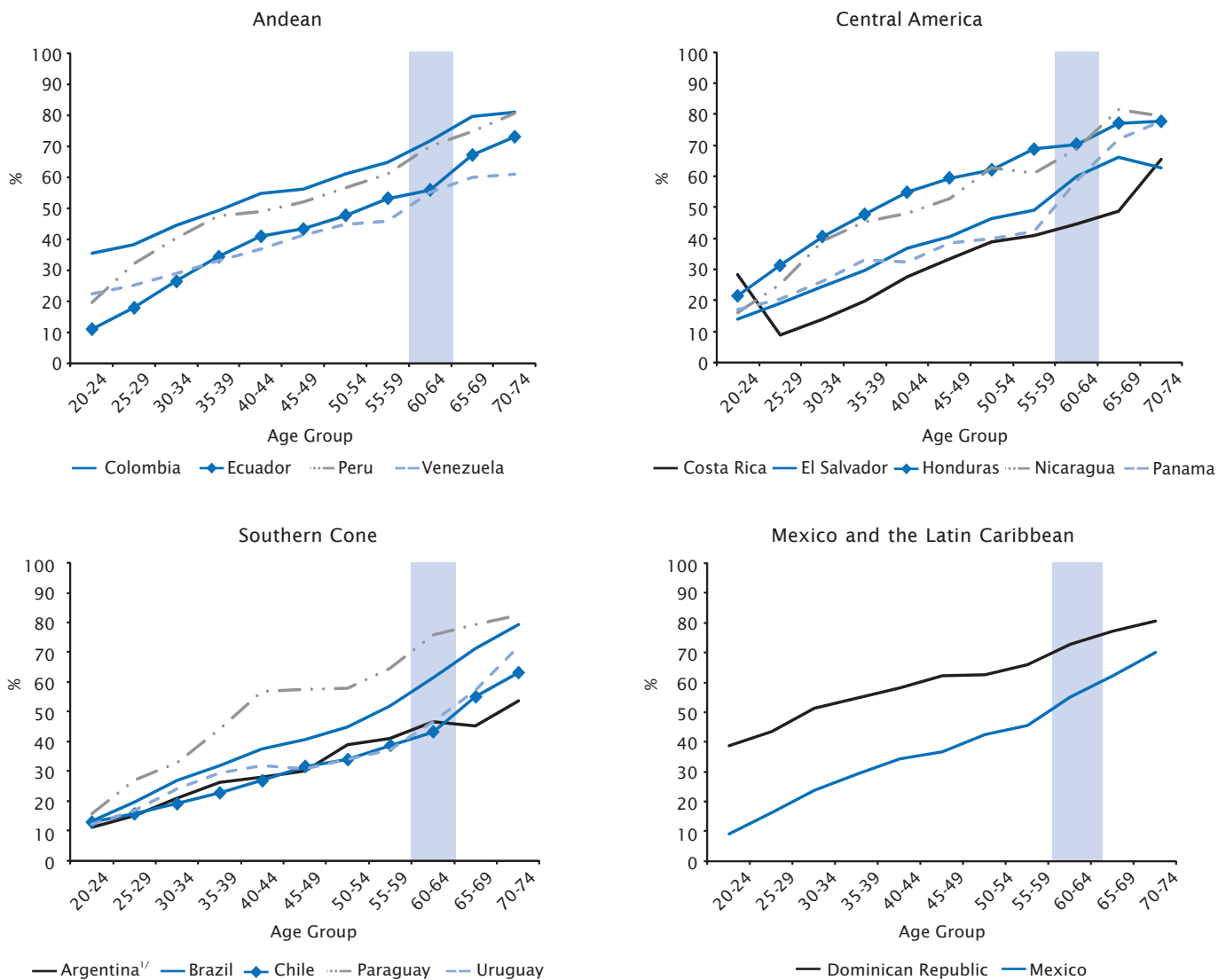
**Figure 2.7a**  
**Self-employed and Employer Women as a Percentage of Occupied Women by Age Group**



Note: 1/ Urban population.  
 Source: ILO-SIALC (see text for explanation).

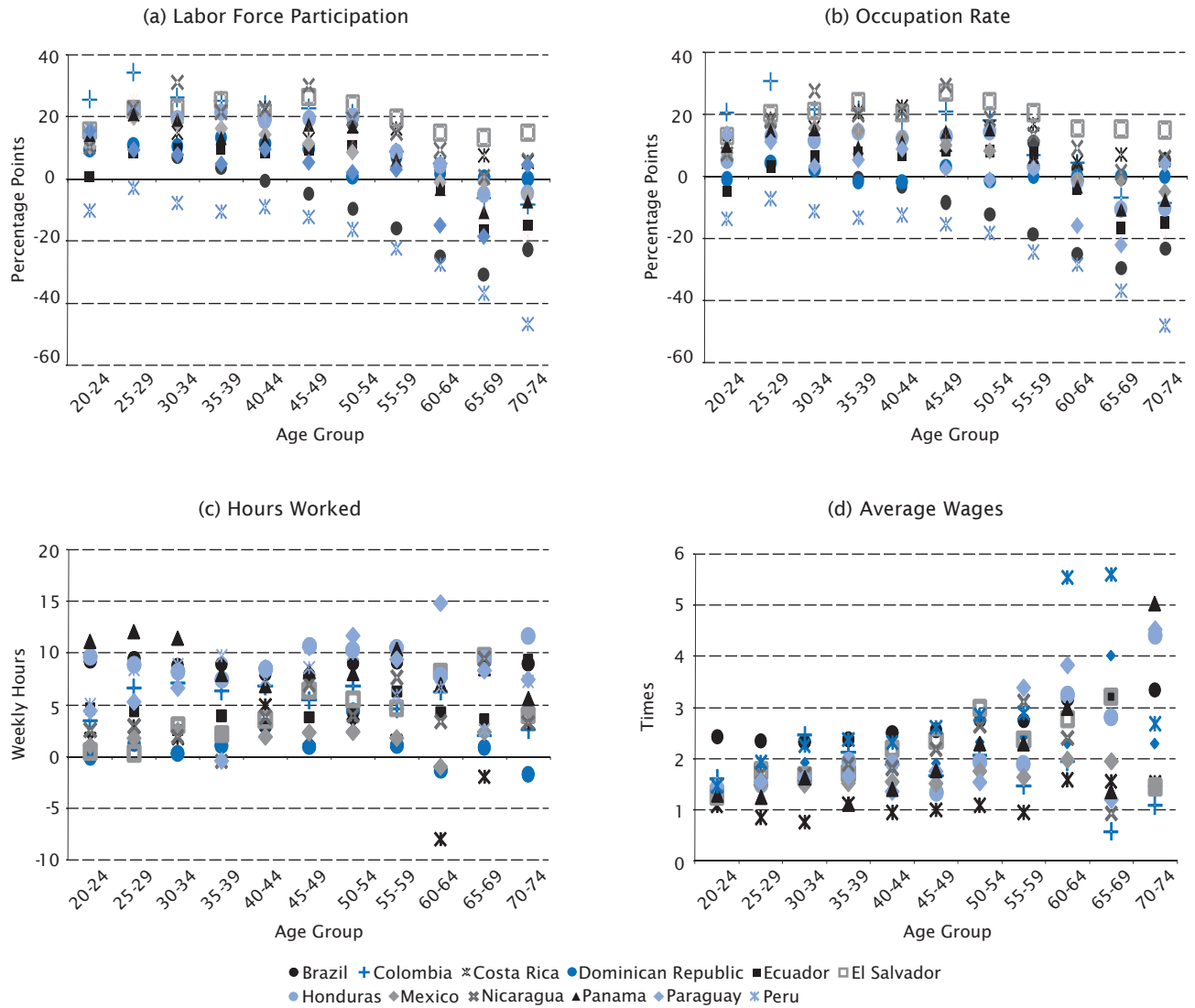


**Figure 2.7b**  
Self-employed and Employer Men as a Percentage of Occupied Men by Age Group



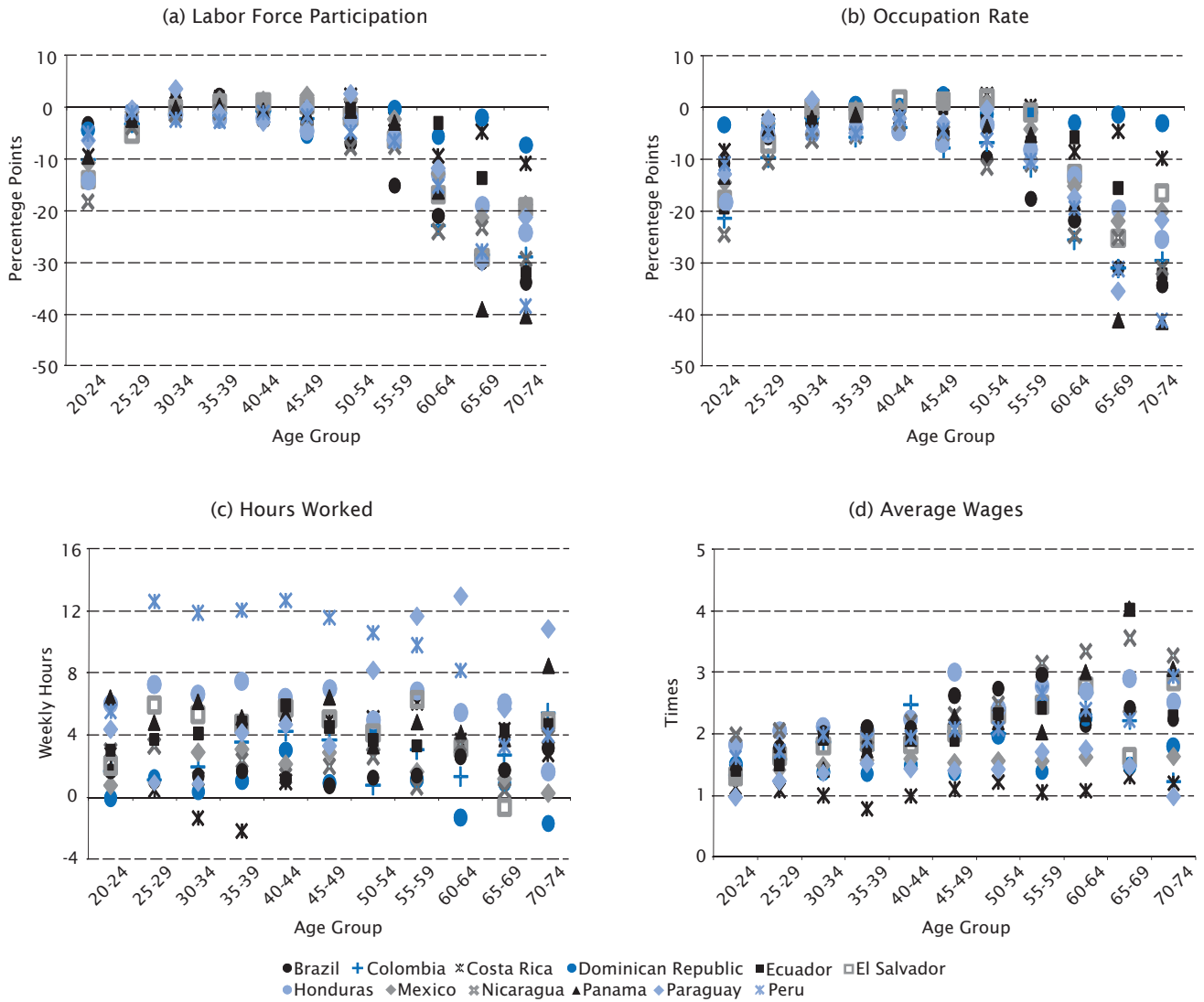
Note: 1/ Urban population.  
Source: ILO-SIALC (see text for explanation).

**Figure 2.8**  
**Percent Differences or Ratio between Urban and Rural Female Workers by Age Group**



Source: ILO-SIALC (see text for explanation).

**Figure 2.9**  
**Percent Differences or Ratio between Urban and Rural Male Workers by Age Group**



Source: ILO-SIALC (see text for explanation).

## 2.3 Summary

Information provided in this chapter allows the identification of the following patterns:

1. Individuals around retirement ages are working more in the Americas when we compare 2010 with 1970, with few exceptions. This is true for males, but even more for females.
2. There remains, however, a decline in participation in the labor force that usually begins around age 50 and accelerates at age 60.
3. Those staying in the market after age 50 have low unemployment (or alternatively, the unemployed retire earlier), but they work gradually less hours per week.
4. There is a very sharp decline in average earnings after age 50 in Latin America, a phenomenon not shared by the United States. This may be partly due to the aging of the cohorts that were young during the major recession of the eighties, and to the large human capital gap between the current young and old.

5. By age 60, a minority of workers is salaried, and they have become self-employed or employers, with significant implications for pension values.

6. Young women work more in the urban sector, whereas adult women have higher participation in rural areas. In contrast, men in the rural sector have higher participation rates, except for the age groups between 30 and 59 years old when rates are similar. Hours worked and wages are always higher in urban areas, suggesting people accumulate more human capital.

7. Near statutory retirement ages we observe a decreased rate of participation and in some countries a drop in LFP around 55 years of age. Moreover, persons who continue to work, do so more often in a job without protection of social security.

Although evidence is mostly descriptive, these are important patterns followed by the average statistics related to workers around retirement ages. In the next chapters, social and economic factors will be analyzed.

**CHAPTER 3**  
**INDIVIDUAL DECISIONS ON RETIREMENT**

## CHAPTER 3

# INDIVIDUAL DECISIONS ON RETIREMENT

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### 3.1 Introduction

This chapter analyzes how "social security wealth" or "pension entitlements" are generated, and how retirees spend their money. While debates on pension policy usually relate to replacement rates and retirement age as key parameters, society is formed by individuals that are quite heterogeneous in the way they work and generate savings or entitlements over their adult life, and in the way they consume goods and services in old age. This chapter has a section on "earnings" to discuss how wealth is generated to sustain pension plans, and a section on "consumption" to study the special patterns associated with retirement and old age. A final section discusses "finance and age at retirement" to underlie the role of financial volatility on retirement decisions.

To define a statutory retirement age is a controversial issue for any retirement plan, but even further national social security schemes. It cannot be any other way, because the cutoff between work and retirement is a crucial parameter in defining the benefit-cost ratio faced by individuals. The offer of benefits by social security may be in other aspects, but individuals do care significantly about this particular issue, and a variety of social and political coalitions are bound to be on the look out for

opportunities to negotiate around it. Moreover, the realization of a retirement event does not depend only, and often not even mainly, upon the parameters of a retirement scheme. Individuals may decide to withdraw from the labor market before the statutory retirement age or decide to work several years more for reasons of need, family conditions, health, or personal motivation.

The economics of retirement age involve private and collective decisions. There are stable features of individual behavior that affect retirement in any society. On the other hand, there are also collective and strategic issues that change across nations and are affected by the institutional and historical frameworks. This chapter discusses the economics of retirement ages mainly from the point of view of the individual, while Chapter 4 deals with the collective issues involved. Both perspectives are required to fully discuss the problem. In general terms, governments have little power to affect individuals' work and leisure decisions unless they impose penalties through taxation or through regulation of the workplace. On the other hand, pension systems inextricably and extensively link the members of different generations and social groups, creating collective interactions that cannot possibly be perceived or managed in the individualized and decentralized market framework.

The economics of retirement ages propose that for each worker there is a preferred retirement age, and that the best age to retire is affected by the labor career, the expectations of length and quality of life, the financial environment and taxes and regulations on economic and social activities. Individuals respond to changes in the regulations on the statutory retirement age by altering their patterns of work and saving in ways that affect the productivity of the economy and the form in which a pension scheme performs its duties. While a "mandated" or "official" retirement age is usually defined in a legal statute, in practice, workers usually keep significant liberty to decide when to retire. Workers can retire earlier (perhaps applying for disability benefits), they can retire partially, or they can enter and exit the labor market around the statutory retirement age to reach their preferred level of benefits and work. It would also be misleading to assume that government actions are totally exogenous, defined as part of an optimal planning exercise. Governments often react to economic downturns by easing the requirements to reach a pension entitlement, and sometimes fiscal constraints force them to advance reform proposals to delay or reduce benefits.

Certainly, few countries, if any, have a general social security system that reaches true universality. More commonly, there is some degree of segmentation and there are gaps in coverage, and sometimes the segmentation and the gaps are extensive. Nevertheless, the discussion ensues using as a benchmark the assumption that there is a general framework to define pension entitlements and the contributions to the system. In the absence of such general framework the discussion in this chapter still applies, but there are added complications that will be discussed later.

The next are main questions pertinent to any debate on retirement ages:

- Does the level of mandatory contributions to the general pension system affect retirement ages?
- What can be done to preclude that early retirement becomes an undue cost to the system?
- Why should early retirement be allowed in a general pension system?
- To what extent can the ties of the pension system to other benefits (such as health insurance) be maintained for early retirees?
- What are the effects of various mixes of taxes and benefits and of individual capitalization and collective savings on the retirement decision and the costs of the pension system?
- When and what form of flexibility shall be allowed in both the accumulation and the withdrawal phases, and what is the effect on the cost of the system and retirement ages?

### 3.2 The Economics of Retirement Age: Earnings

A retirement age and the value of a pension are consequences of a productive process that generates the wealth to pay for the benefit, the preferences of individuals for leisure, their health status and survival expectations, and of the organization of the family. Public action can influence these variables through taxation, through the definition of monetary and health benefits, through older adult care programs, and through labor codes. Yet, the underlying forces are so strongly defined by trends in technology and social organization that governments face significant constraints to affect them in the short-run. Thus, a proper answer to the questions posed above requires understanding how individuals contribute to financing their pensions as

workers. In this regard, there are three major regularities in labor markets that relate to the discussion: the general profile of earnings over the life-cycle, the variation in the profile of earnings due to incentive considerations in labor contracts, and the decision of workers to work under organizational forms not covered by social insurance.

### ***Work Career and Age at Retirement***

**Earnings profiles.** Individuals almost invariably experience earnings growth between the first years of work and the intermediate years of the working cycle, and earnings growth continues at a slower or even a negative rate until retirement. This is a very well known result and holds for all countries of the region for which data is available. In Figures 2.6 to 2.7, we see the age-salary profile for several American countries demonstrating the consistency of the pattern.<sup>3</sup> The main explanation for this behavior is human capital accumulation: young workers are less productive because they lack on-the-job training and practical experience, and they and their employers are learning about the value of their skills. This archetypal profile of earnings over the life-cycle is a main determinant of the optimal age at retirement: individuals work more when their earnings are high and growing, and when they decline or their growth is sluggish, retirement becomes a more attractive option every year.

Another well-known pattern is that not all age-earnings profiles have the same slope, and for similar workers they often cross, a behavior known as the "Mincer hypothesis" in honor of the distinguished labor economist. Again, human capital is the explanation for that cross: some workers choose careers that

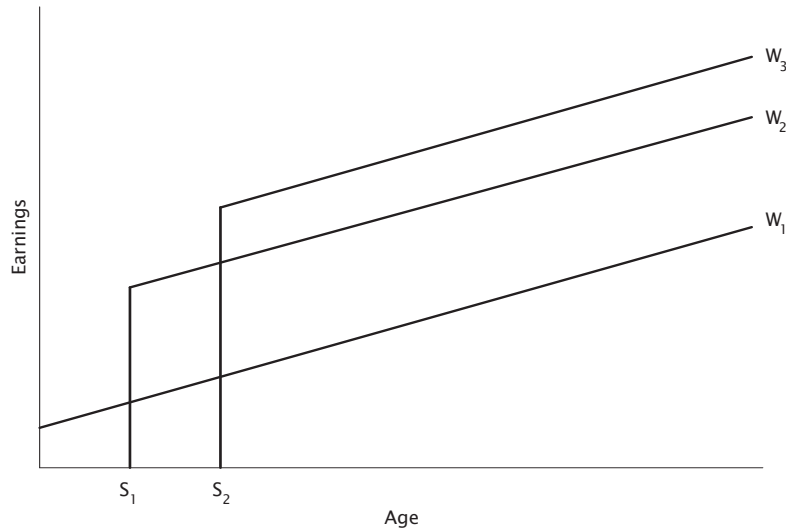
demand more specialization and more years in school during which earnings are low or zero; eventually, those more educated workers enter the market and they compensate lower earnings early in life with higher earnings later. Thus, this hypothesis says that two nearly identical persons may have the same expected value of earnings in their careers, but the more educated worker will have a steeper age-earnings profile.

Figure 3.1 illustrates the Mincer hypothesis. A worker with the minimum level of education earns  $w_1$ , a worker studying an additional  $S_1$  years earns  $w_2$ , and a worker studying until  $S_2$  earns a wage  $w_3$ . While worker #2 earns more later in life, he gave up earlier earnings to improve his skills. These different slopes of earnings profiles affect retirement ages because workers expecting steeper earnings growth late in life tend to retire later, as analyzed by Ljungqvist and Sargent (2010). Thus, a prediction can be postulated that more educated individuals tend to retire later in life because earnings growth is higher for them. We notice also that the less educated have a flatter profile of earnings in relation to experience in all countries, a result that fits well with the Mincer hypothesis. We confirm this in Figure 3.2, where the average (for 11 countries) of earnings relative to given age group by experience in the labor market is shown. This pattern is very strong in the region and is summarized as follows. The more educated receive significantly higher earnings during their first 15-25 years of work, and thereafter experience a decline. The decline is very large after 40 years of experience probably because the better paid retire. For the least educated, earnings improve much more slowly and begin a slow decline after 40 years of experience.

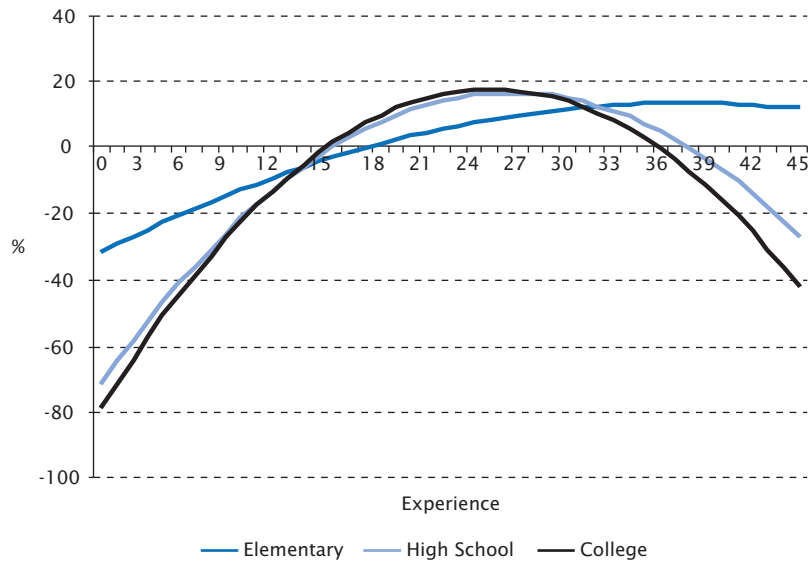
<sup>3</sup> A significant reference is the paper by Murphy and Welch (1990), who obtained average earnings profiles in the U.S. as a function of experience in the labor market, between the sixties and the eighties. A useful summary of the knowledge in the field is presented by Heckman, Lochner, and Todd (2008). These references discuss important technical issues to measuring the relation between earnings, education, and experience.



**Figure 3.1**  
**Earning Profiles of Workers with Same Skills but**  
**Different Levels of Education**  
 (Mincer hypothesis)



**Figure 3.2**  
**Percent Variation Over the Life-cycle in Average**  
**Wage by Years of Experience in the Americas**  
 (Standardized at 15-19 years of experience)



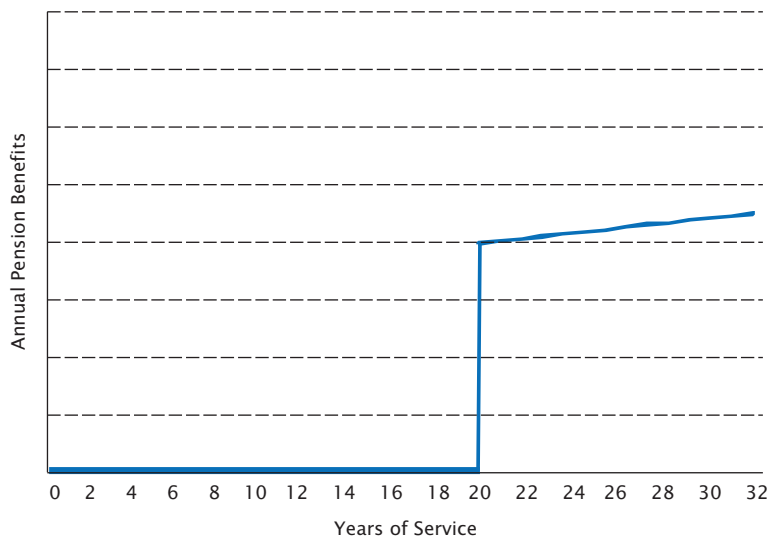
*Note:* Includes men and women of all levels of education. Values divided by average value for the 15-19 years of experience group.  
*Source:* Income-Expenditure surveys of Argentina, Brazil, Bolivia, Canada, Costa Rica, Chile, Honduras, Mexico, Panama, Peru, and Uruguay.

**Incentive-motivated variation in earnings profiles.** There is an additional reason why earnings profiles vary between otherwise similar workers: to promote effort and to prevent shirking, employers and workers often agree to contracts where wages are lower than productivity during the early years of the contract and higher than productivity later on in the life of the contract.

Some of the best known examples of this type of contract are in the military and police forces, public service, banking, and other career activities where long-term trust and effectiveness is required. In these activities, the value of the pension or of the severance packages is vested only late in the contract, so a worker that does not fill the minimum time of service may end up having worked for a long time for low pay and losing the benefits of the long-term relation. The importance of the mechanism is very large or the mentioned occupations, but this does not mean it is small in general. In almost any labor contract employers maintain the ability to retain payments until the end of the contractual relation. Often, employers provide financing and other inputs to support general human capital acquisitions by workers, and a steep earnings-tenure profile is a form to mitigate the risk of migration of the worker to another job.

The behavior described in this subsection is known in economics as a "bonding scheme", because, in fact, the worker finances the employer early in the contract, and the employer pays "too much" for the labor of individuals with long tenure. Figure 3.3 shows the value of pension wealth in a contract of this type. For social security practitioners, this sort of structure in the value of the pension is far from rare. All social security pension schemes require the worker to reach a minimum age and minimum tenure before benefits are vested, and almost all set the minimum tenure at levels well above what could be justified by administrative costs. For example, benefits are often not payable to those contributing less than ten years, or even if the threshold is lower, replacement rates are lowered considerably for short-tenure workers. A minimum level of tenure can be explained by administrative costs, but the observed levels are unlikely to be explained only by that variable. Apparently, the "social security contract" also punishes workers who do not stay in the system long enough, probably to limit shirking and the use of loopholes to obtain benefits after only a short time of contribution.

**Figure 3.3**  
**Example of Value of Pensions for Personnel**  
**Conditioned by Loyalty**



We can also note that some features seen as "privileges" in debates on social security may actually be efficient solutions to information problems. Notably, early retirement and vested benefits can be necessary to retain in public service soldiers, firemen, teachers, and other high-human capital specialized workers.

**Uncovered work.** Workers may also decide to work without the protection of social insurance, or they may be unable to find an insured job. This can be motivated by underlying social conditions that make insurance unattractive (for example, the worker is rich or does not value benefits enough), by loopholes in the social security system (workers quit a covered job once they reach a threshold to obtain benefits without additional contributions), or the social security system may lack coverage (simply, parts of the country or some cohorts of residents are not covered).<sup>4</sup>

Uncovered work can take place on two margins: an individual may leave the formal labor market altogether or he can hold simultaneously a covered and an uncovered job. In developed countries, the first type of absence is less common, but the second type of informality is not uncommon in Europe, and in some countries in that region it is a significant phenomenon (CISS 2005). In Latin America and the Caribbean, both sorts of *jobs in black* are common. Additionally, uncovered work often takes the form of entrepreneurial activities that are not considered taxable work by labor and social security laws. While such orientation has a historical origin in the idea that entrepreneurs are in control of production means, the truth is that small-sized and medium-sized capitalists are usually middle-class or low-income individuals, and the work they do is often indistinguishable from the work of their salaried workers. For example, a small capitalist may be a street vendor with some capital to hold inventory who hires two or three younger salespersons. Statistically

speaking, the vendor holding the inventory appears as a self-employed or as an employer, the others as salaried-informal workers. We may notice also that a job in the non-salaried economy is not equivalent to a low-earnings option because it includes a large part of the profession and also individuals of lower educational achievements who are high-skill, small-businesspeople. Supporting this claim is the finding that often workers move from a salaried job to the informal economy to improve their earnings levels (CISS 2005, pp. 43-55).

In many countries, social security contributions are mandatory for any money-earner, and not only for those earning a wage. However, this sort of regulation can be useful only if all earners are in the tax system. Thus, in economies with large informal economies, there is a wide margin for an implicit negotiation between individuals and the system. An individual cannot negotiate the statutory age of retirement, but whatever the parameter defined in the law, he can make a benefit-cost calculation to decide contributing at any point in time. If it is likely he will get a pension and the value of the pension brings an implicit high rate of return, he will contribute. Notice that this decision interacts with minimum tenure requirement and the experience-earnings profiles explained above. The "system" in turn reacts to the decisions by individuals by setting parameters on minimum tenure and punishing the implicit rates of return to short-tenured individuals. A high incidence of informal work has ambiguous effects on retirement ages. When the worker has a high level of certainty on obtaining a pension, he may opt-out of the formal economy after reaching the minimum requirements, and then appear as an early retiree in the statistics. Alternatively, he may return to the formal economy late in his career only to complete the minimum requirement for a pension, appearing then as a late-retiree with low benefits.

<sup>4</sup> The economics of informal work is an extensive field; the CISS 2005 Report presented a discussion and the topic, and Perry et al. (2007) summarize the research done by the World Bank.

**Redistribution.** We may notice that rules that intend to be progressive interact with the patterns of individual behavior discussed in this section. Such rules define higher rates of return from contributions to the pension system by low-wage/short-tenure individuals. Their goal is to support less fortunate workers, who may have experienced unemployment more often, or who were not able to draw more than very low wages through their full working lives. However, the informal economy may alter and even reverse the results.

Among the more common rules present in social insurance pension schemes that may generate friction and improperly influence age at retirement are:

- (i) To define pension benefits according to earnings in recent periods and not over the whole working life favors high-human capital individuals, as well as employees in occupations with higher incidence of bonding-schemes;
- (ii) To define minimum-tenure rules harms individuals who contribute few periods due to restrictions out of their control, such as women who have been mothers or disabled persons; and,
- (iii) Progressive rules benefit the low-wage/often unemployed, but also promote shirking by those with possibilities to work in the informal economy who return late in life to contribute only to reach the minimum requirements for a pension.

An additional but not secondary issue to consider is whether the pension system is the appropriate tool to redistribute income. The state has other tools to achieve that goal, among them, preeminently, the income tax and the family allowances systems. Contemporary income taxes laws include a form of "negative income tax" in many countries (also called "wage subsidies" or "earned income tax credits"), and family allowances can take the traditional form as benefits of a social security

fund or as cash transfers from other programs. The 2005 CISS Report explained the mechanism that links income taxes and social security contributions, and Kaplow (2010) has a general discussion on whether only the income tax should be used for redistribution. Briefly stating this complex issue, in a country with very low levels of informality (high coverage of social security and compliance with the tax code), the pension system could pretty much abandon all redistributive goals and leave the tax system coupled with a family allowances program to achieve them.

When the share of the informal economy is important, the income tax system is not available as a tool, and the State has to rely only on sales tax and social security contributions to redistribute income. But then, social security contributions become a significant friction on the labor market precisely because workers can move to the informal sector and the sales tax often affects the poor more because they spend a larger share of their income in short-term consumption. Thus, also in this setting the use of the pension system as a redistributive tool must be done carefully. In practice, nations with low coverage of the tax system also end up paying very low pensions, probably because they cannot sustain levels of benefits that involve large redistribution across wage groups. It is important to clarify the meaning of redistribution and social safety net in the context of this discussion. Social security provides insurance and this means that money flows from workers with jobs to workers with no jobs, including the disabled, the elderly and others. However, most of that flow of money is not considered "redistribution" but insurance payments. Certainly, the discussion in this subsection does not include these flows that relate to the insurance function that constitutes the vast majority of social security funds.

**Unemployment and retirement.** Labor market conditions affect workers' decisions on retirement. While it is sometimes proposed to favor retirement so as to open up jobs for younger workers, for many individuals the challenge is to find appropriate employment after the age of 50. What is the effect of involuntary separations near retirement age on work and retirement? Evidence from the wealthier and the less developed countries in the Americas suggests that after 50 a significant share of workers is unable to find salaried employment and has to resort to part-time or self-employment.

For the United States, Sass and Webb (2010) find that leaving a job between ages 50 and 56 increases more than 100% the likelihood of working part-time

at age 60. Also, slightly more than half of the males and 44% of the females aged 58-62 were with the same employer they had at age 50. Yet, these shares fell substantially since the nineties, signaling a less stable work contract for those approaching older-adulthood (Table 3.1). These authors also find that the type of separation (when it happens) has a very large impact on the type of job a person obtains by age 60 (Table 3.2). For example, 70% of those who do not quit a job between ages 50 and 56 are working full-time by age 60, while those forced to quit reach only 35% mark. Thus, some of the age-60 individuals who are not with their age-50 employer probably opted for early retirement or work part-time because they could not find a full-time job.

**Table 3.1**  
**Percent of Employees Aged 58-62 Still Working for Their Age 50 Employer**

Survey year	Males	Females
1992	58.8	49.2
1998	50.3	48.7
2004	51.2	44.8

Source: Sass and Webb (2010).

**Table 3.2**  
**Frequency Distribution of Employment Status at Age 60 After Separation Events Between Ages 50 and 60**

Quit type	Not working for pay	Part-time	Full-time
None	23.9	6.7	69.4
Voluntary	43.9	13.8	42.3
Pressured	31.4	13.7	54.9
Forced	49.6	14.7	35.7

Source: Sass and Webb (2010).

A major challenge to provide support to the unemployed or the hard-to-employ in the years before the statutory retirement age is related to the difficulties that exist to separate the "deserving" from others. For example, a facility for early retirement can be offered to strengthen the safety net for those who have found themselves victims of a weak labor market, particularly if near age 60. Examples of workers facing very hard labor market conditions that may not change for several years at a time and which are hard to overcome individually are miners in depressed regions or manufacturing workers displaced by technology or trade. However, individuals who know the rules can act opportunistically and target compliance of the minimum requirements to become eligible for a benefit. They can work in the informal economy, or they can simply stay at home waiting for the minimum benefits to accrue. The keyword here is private information: regardless of how effective and honest the administration of social security can be, the larger the gaps and jumps in benefits the larger the incentives of individuals to game the system. Certainly, the solution is not to eliminate safety nets, and an improved design and administration of benefits can reduce the risk of misuse of the system.

### ***Implications for Pension Systems***

The above description of the economics of pension systems has a number of policy implications. Some are based upon well-understood hypotheses; they are supported by empirical research and shall be useful for improving the design and administration of any national pension system. Some others are not so well supported and naturally lead to more controversy. Below is list a number of issues relating to the questions posed at the beginning of this section:

1. The rules to calculate the basic pension should consider the full history of earnings and contributions. Some systems define the basic pension in terms of only the more recent levels of earnings, which means

that some workers end up over-insured and others under protected. This issue becomes more concerning when the rules that relate earnings and benefits do not adequately figure in inflation, usually hurting low-human capital individuals as well as those with histories of work concentrated in younger years (such as women who marry sometime during their life).

2. The implication of the incentive-motivated variation in earnings profiles is significant for pension systems. Some systems pay benefits according to the earnings of the last active years, meaning, again, that some workers are over-insured; they receive the extra benefits by the employer and improved benefits from the general system. It is very difficult for a general social security system to include rules that solve negotiation issues between employer and worker. Thus, it is preferable to leave a space for complementary programs that adjust age of retirement through private agreements or specialized public schemes, rather than attempting to adjust the general system to cover all particular circumstances.

3. Any type of informality in the labor market generates issues about the design and operation of social insurance. The efficacy of the institution is reduced to the extent that a significant fraction of the working life is not included in the calculation of the pension, both because the pool of money available shrinks and because the door is open to opportunistic behavior.

4. Redistribution is an important goal of any social insurance system. Yet, it should be done within limits to avoid imposing large distortions on the labor market. States have to look at other tools, such as the income tax and the family allowances (included conditioned cash-transfers) systems to achieve redistribution without diminishing the efficiency of the pension system. A balanced solution is different for each country, depending upon the fluidity of worker flows between the formal and the informal economy. For countries with large informal economies, cross-subsidies towards persons with few years of contribution induce opportunistic behavior with higher

probability. In those places, family allowances can be a better support for mothers, the long-term unemployed, the disabled, and other groups with valid explanations for not being permanently in the formal labor market.

### 3.3 The Economics of Retirement Age: Consumption

Consumption and work decisions are closely linked. When retirement can induce an excessive fall in consumption, individuals may decide to put it off for a few years. This may happen if there has been a fall in the value of individual savings, if the rules in a public system have reduced the value of benefits, or if an important complementary benefit is lost (notably, health insurance, as discussed in CISS 2005).

The dominant theory to explain the behavior over time of work, consumption and savings establishes that persons seek to stabilize welfare, avoiding alternate periods of high well-being with others of a poor quality of life. The research on the topic has focused on explaining three phenomena, all having implications for social security policy. The first is that household consumption has "a hump": it is too high for homes of the middle-aged, where parents are aged 30 to 45 years, and it is too low for younger and older households. The second is that consumption responds in excess to changes in income: when a household has extra income, families tend to spend and save little, and when a person experiences a loss of income it tends to reduce their consumption in excess. Finally, at the time of retirement, people experience a decrease in consumption with respect to what they had in the years previous to retirement, which appears to be inconsistent with maintaining a stable well-being throughout the years.

If indeed the "consumption hump" and the fall in consumption after the set retirement age reflect labor and financial market inefficiency, establishing a statutory retirement age may end up affecting welfare significantly. We explore next the explanations that

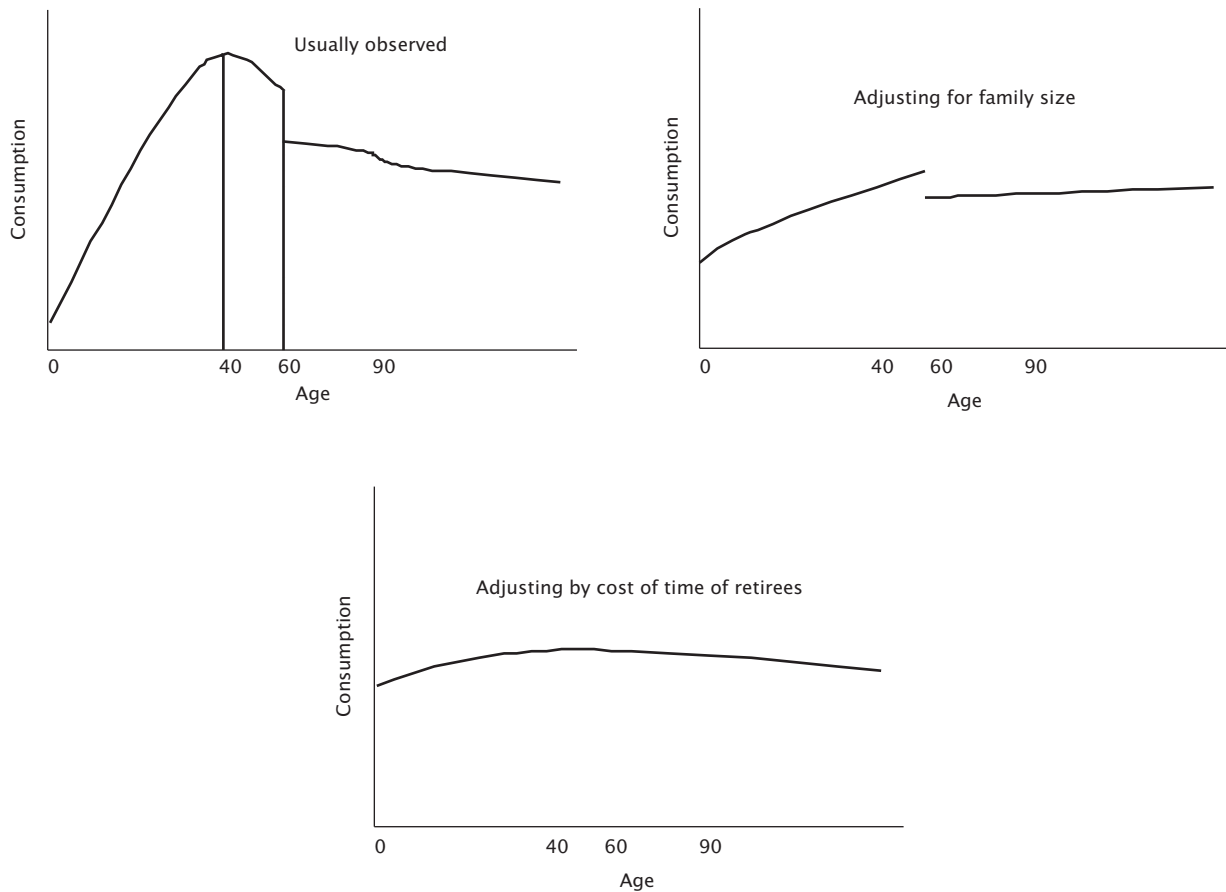
have been given to these phenomena and the implications they have for savings and pension plans.

*Are households capable of stabilizing their well-being?* If families manage to stabilize their well-being over the lifetimes of their members, the whole of the labor market, financial markets and social security meets a very important goal. To begin with, the graph of average consumption over time of households has a hump: average consumption increases for households between youth and middle age, and then from approximately 50 years of age it begins to decrease and is relatively low for households with persons over 70 years of age and more. We see this in Figure 3.4, drawn as a "stylized fact". These patterns are shown empirically for the United States by Attanasio and Weber (2010) and for five Latin American countries by Ronald Lee (2009). These observations seem to contradict the thinking that people seek to stabilize consumption through life. Research around these questions provides answers that refer to statistical problems present in the graph and to hypotheses about the economic and social sources of the deviation.

A first observation is that if we calculate the averages according to the age of the household head, but separating each cohort, the hump in the graph becomes less pronounced. This means that part of the hump is due to growth of wealth and consumption across generations (few countries have expenditure surveys spanning the several decades necessary to measure this issue adequately). For example, if the households with a head aged 30 are on average wealthier than households with a head aged 60, thirty years from now the households with a 60-year-old head will be wealthier than those of today, and the hump is really a statistical error due to comparing persons born in different decades. A second observation is that households are heterogeneous in the number and age of their members (mainly children and spouses), and when information is adjusted by this factor, the hump flattens further. In other words, part of the hump is due to grouping with reference to



Figure 3.4  
Stylized Pattern of Age-Consumption Profile in Household-Level Data



the age of the household head, which means that more children and spouses are included in households with middle-aged household heads. These two observations (illustrated in the second panel of Figure 3.4) basically say that economic growth makes young households of new generations relatively richer and it has the statistical effect of suggesting that youth consumption grows too fast, and that much of the consumption of middle-aged households is associated with the more common presence of children and spouses.

*Why does consumption fall after retirement?* One of the possible deviations from steady consumption levels is that between the last years of life as a worker and the early years of retired life, persons reduce

their consumption, a jump down which seems to contradict the assumption that people are looking for a stable consumption level.

Indeed, differences in biology and material needs of people are virtually unchanged by simply withdrawing from being an active laborer. Retirement is a highly predictable event and perhaps we should observe individuals with enough savings and other provisions to face it and thus avoiding a loss of capacity for consumption. Otherwise, we have a question about the efficiency of the pension and the financial systems.

The main explanation that has been provided for the fall in consumption right after retirement is related to the use of time: in the retired life, the



individual has more time available for making consumption decisions, to search for prices and appropriate circumstances to consume, and in some sectors such as health care, travel, or entertainment, cash spending can be highly sensitive to the time and place of consumption. In other words, retired people spend less money, but have more time to achieve their consumption of goods and services.

It is useful to point out that the consumption patterns discussed in this section are not identified with the consistency found in studies on earnings discussed in the previous section. The reason seems to be two-fold. On one hand, consumption is more difficult to measure because consumption flows mix the use of perishable and durable goods and, because within the household, a large share of consumption is common to all members. Also, the age-earnings profile is remarkably similar across all sorts of countries, while the age-consumption profile is being modified radically by aging. On the last point, it is useful to show Figure 3.5, which we have drawn also in a stylized way from the results presented by Professor Ronald Lee (2009). The graph measures the value of consumption in relation to earnings from age 30-39. There we see that the age profile of consumption in a typical poor country involves growth from birth to around age 20, and a continuous decline

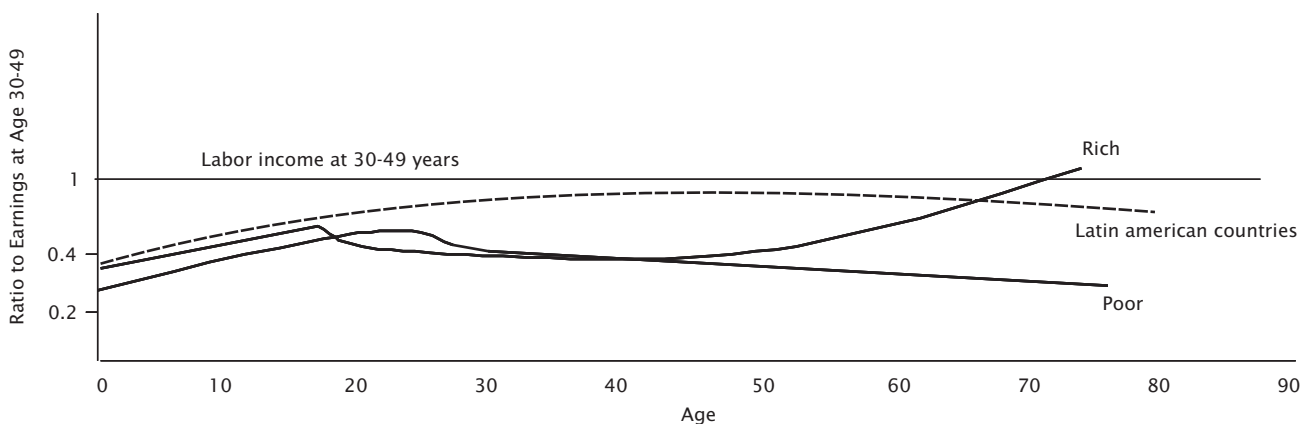
thereafter. For an archetypal rich country, there has been a fundamental change and aging kicks in a strong pattern of consumption growth after age 45. Latin American countries are, on average, in the middle, already increasing consumption by the elderly, but not yet at the levels of high-income countries.

*Why income windfalls are not saved?* A third behavior of relevance which is seen empirically is that after an extraordinary increase in income, people seem to save too little. The general explanations provided are related to liquidity constraints, attitudes towards risk or non-economic behavior.

The issue of liquidity constraints is believed to apply to a significant share of families even in rich countries: a cash-constrained family spends "too much" after receiving unexpected income flow simply because under normal conditions it does not have enough cash to make long-term purchases, and thus any extra temporal income goes to pay debts, to make purchases of durable goods, to pay for delayed medical interventions or other big ticket items.

The issue of attitudes towards risk can take several forms. It is believed that households sometimes keep buffer-stocks of precautionary savings or they may not believe that social programs will provide the promised benefits, and then do not

**Figure 3.5**  
**Age Profile of Consumption in "Rich", "Poor", and "Latin American" Countries**



respond in a steady fashion to extraordinary income windfalls. Finally, they may not understand the rules of a social security or of a financial plan, or may not be able to process all the information and calculate their implications, and thus not be able to stabilize their consumption.

The research on the stability of consumption over time is substantial and it has improved the interpretation of information (for example, on the comparison of adjusting consumption by the composition of the household). However, substantial challenges remain to understand the behavior of cash-constrained families and of cases where uncertainty and complexity makes families save in non-optimal ways.

*Is consumption in retirement the same for men and women?* A growing issue in the design of pension systems has to do with the distribution of benefits between women and men. The legacy of the legislation often defines "main" benefits for the worker and "derived" benefits for the widow; in case of death of the first, the second receives a fraction of the pension. If health care insurance, entitlement is attached to the monetary pension and the widow usually keeps receiving that benefit. Historically, more often than not, "widow" has meant "female widow", and in those cases males have not received the survivors benefit. It is also a common legacy that pensions are individual, not related to family composition. This means that when both spouses work, they are eligible for two pensions.

The legacy has been somewhat transformed through reforms since the nineties. A number of countries now allow survivors benefits given to males (or to cases of same-sex marriage for that matter), but also may put a cap on the total value of benefits that can be received by a widow.

Research on the economics of the family sheds light on the distribution of consumption in households of older-adults. The living standards of the elderly are affected by the decline in income that is typically associated with retirement, by the declines in health

status, the increases in (unanticipated/uninsured) medical expenses, and the illness or death of a spouse. Older adults sharing a household consume some goods jointly (for example, transportation in trips or home heating), and need less income per person to achieve the same level of welfare than a single person. This joint process to determine welfare implies that retirement often is not an individual, but a family decision, and it is affected by the health status or death of any of the spouses. Economists study two key parameters to describe these issues: the "scale economy" and the "resource share". The scale economy measures how much cheaper it is to live for a couple compared with singles. The resource share tells how resources are distributed between couples.

Lewbel and Seitz (2011) study the behavior of persons "around the age of retirement", using data of persons ages 50 to 80. They estimate a "scale economy" of 0.76 for couples in which the husband works and has good health; this means that a single man has to spend 1 dollar to achieve the welfare that a married man achieves spending 76 cents. When the husband is in poor health the scale economy is 0.69. Women have higher scale economies (0.61 and 0.59 for married and unmarried), which means that the consumption goods shared with the couple is higher for females than for males.

With respect to the resource share parameter, which measures the way income is distributed within the household, the same authors estimate a value of 0.33 for the female share in a household where both spouses work, have good health and are 60 years old. The resource share is very sensitive to the health status of the male, and when he is ill, the value increases to 0.48. On the other hand, when the wife becomes ill the share of the husband does not change. A related result is that women who earn more can increase their share significantly, while aging reduces the share of females. Sometimes this change in the share of consumption commanded by the female is attributed to changes in the bargaining power inside

the household: younger women, working women, and women with an ill husband command more negotiating power and benefit with a higher share. Thus, the event of retirement itself does not affect the resource shares of husband and wife, but poor health of the husband does.

We can also mention that college education reduces the scale economies, which means that more educated couples consume less jointly, but the sharing rule is unaffected by education.

Figure 3.6 illustrates these effects. We see that widowed men spend significantly more than widowed women in groceries, restaurants, gasoline and vacations (namely, on "non-common household goods"), while widowed women spend more in personal care, utilities and gardening. These results describe how older adults behave, and it is not a prescription on how pensions should be designed. Nevertheless, it is useful to note that the married do significantly better off with the same money than the lonely (either widows or singles).

This discussion is relevant for the design of pension systems to the extent that public guarantees or subsidies are involved in financing the consumption of older adults. In DB systems, exclusion rules provide thumb-rules to deal with these issues: widows receive

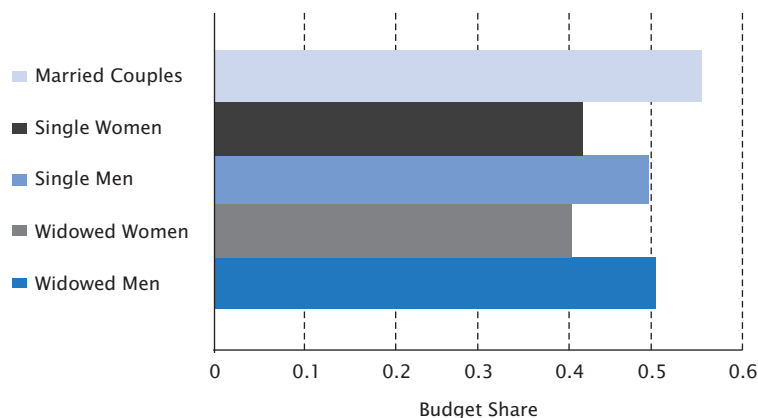
a pension somewhat smaller than the value given to the retiree, and an individual may not be eligible to receive a guaranteed pension if the spouse already has one.

### 3.4 Finance and Age at Retirement

Two issues have particular relevance relating to finance and retirement ages. First, to what extent alternative social security schemes substitute private savings decisions and, second, to what extent retirement ages are affected by financial risk. The two issues are really alternative sides of a same coin. The institutional framework may alter their relative importance in a given country, but there is no such thing as a risk-free pension system. To the extent that risk affects age at retirement, individuals alter their savings decisions to compensate for the probable loss of value coming from the public pension system, and analogously, they may alter their decisions on retirement age to adjust to unexpected variations in the value of private savings.

For workers expecting to receive a pension benefit, risk comes from either the probable changes in policy that affect public pensions, or from the variation in the value of assets that finance a private

**Figure 3.6**  
**Consumption in Groceries, Restaurants, Gasoline, and Vacations**



Source: Lewbel and Seitz (2011).

pension. In a world of very low risk, individuals would not care about whether the pension is public or private. However, public pensions are more often subject to inflation risk and to the possibility of changes in legislation that reduces the promised value. Privately funded pensions can see sharp variations in value after movements in interest rates and in stock valuations, and governments can also change tax rules or other regulations that reduce their value. Both types of risk surely have some common causes: a bad state of public finance rarely accompanies good results in private financial markets.

An event developing over the last years and that can affect the long-term welfare of retirees and the ability of pension funds to pay benefits is the low global level of interest rates. Low interest rates can affect retirement decisions if the welfare of retirees depends upon the value of their assets and the cash flow they produce to finance consumption. From 2008-2011 (and probably even further down the road), long-term bond rates have been below 2% in government debt considered safe for most large countries, meaning that a fund of \$100,000 for retirement yields less than \$2,000, and many funds are invested in bonds with short maturities, which pay even less. Many public and private pension plans have developed since the eighties assumed rates of return usually at or above 3% plus inflation. Thus, actuarial deficits of public plans and the cash flow produced by private plans are bound to deteriorate. Some believe that the low-interest rate scenario can last for at least half a decade, although the issue is highly speculative.

We see in Figure 3.7 that interest rates were historically high from the mid-seventies until the nineties. We show the same graph for the periods comprising 1919-2011 and 1970-2011 to ponder the historical perspective. We show 12-month averages to approximate more closely the targets of pension funds, which do not aim to gain in the short-term and are mainly concerned with delivering value and safety over the years. Finally, these are nominal and inflation-adjusted interest rates in U.S. bond markets. While

there are issues to discuss on the applicability of exactly these statistics to evaluate pension funds in any country, this is the best available information on the global cost of financing. The picture for the near century on the left panel of Figure 3.7 says that financial markets are much more stable now than in the past. While we have reasons to be concerned about the effect of financial stability on the welfare of families, the Inter-war years went by with very large inflation rates and eventually the Great Depression (see CISS 2009), and by the time of the Second World War, governments were pushing interest rates at very low levels to try to escape the recession and finance the war effort. Then came a period of world stability; interest rates became historically low and were usually below 5% after adjusting for inflation. By 1970—as we move to the right panel for amplification—the financial peace broke down and we see large cycles in the real interest rates as governments aimed to counter the effect of the oil crisis and the recession. Financial markets recovered some degree of stability, but real interest rates were very high, a condition that remained until the beginning of the millennium, when they declined to reach nearly zero by the times of the banking panic of 2008.

The issue of low interest rates may play differently for different countries. The global fixed-income market was actually yielding over 6% in 2010 so interest rates are not low everywhere. Investors have noticed that while developed countries have debt/GDP ratios typically above 100%, and much more in some after considering social security's debt, developing nations have ratios with an average of 33%, have expectations of faster economic growth, and have more often—specially in LAC—reformed social security to reduce the probability of future crashes. Thus, funds in wealthier countries may benefit from investing in LAC debt, and pension funds in LAC countries may not suffer a large loss in value due to low interest rates.

At the end, yields on bonds are sustained by the productivity of firms that produce goods and services.

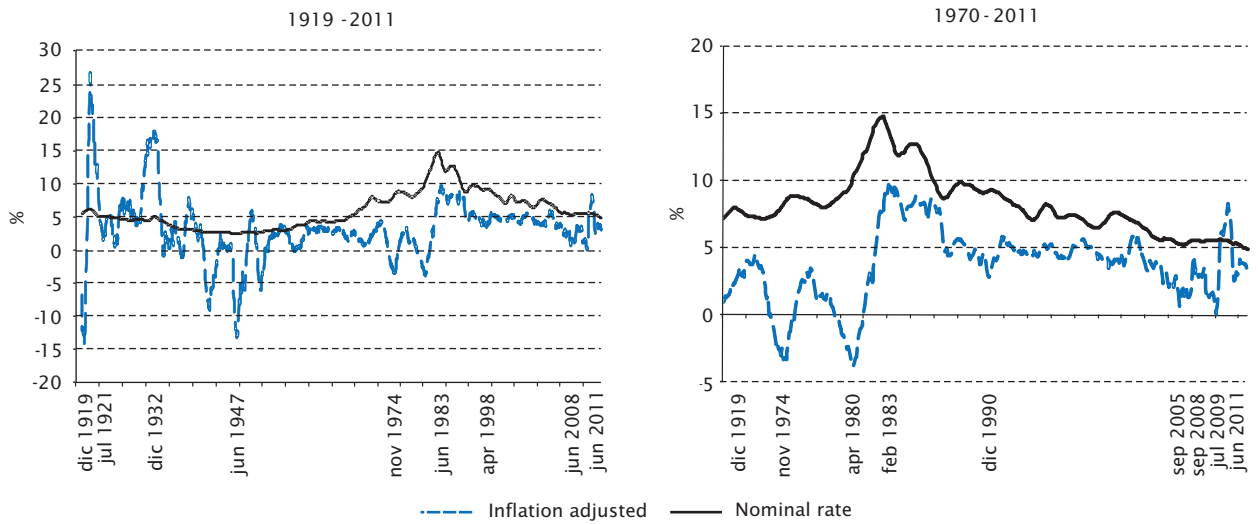
While stocks are not in general the preferred form of investing social security funds, significant reforms in LAC and Canada since the nineties have opened up that avenue, as has the move towards different sorts of capitalized pension plans and IRAs in the United States. The "Great Recession" was associated with large losses in during 2008 and 2009 in all countries where pension funds invest in stocks, but over the mid-term the values have recovered and a number of high-growth sectors have yields between 3 and 6% plus the potential for appreciation of stocks. In Figure 3.8, we see how funds in the archetypal case of Chile fell in value in 2008 and how they recovered later. The graph shows returns for all types of funds, with all fund managers, for 2007, 2008, and 2009, and since the inception of the funds until March 2011 (for the safest funds, the origin goes back to 1981; for many others it is around 2002, but such level of detail is not necessary here). We see that for the riskier funds, the 2008 fall was very large and the 2009 recovery was of a similar size, while the 2010 return is similar to the 1981-2011 return. To analyze the issue of age at retirement we are concerned about the long-term return (the thicker line in the graph) and about the potential short-term risk (the gap between the 2008 and 2009 returns). Regulations in that country and in general in all those that allow investment in stocks preclude that workers

older than 45 years of age invest in such risky endeavors (sometimes this strategy is referred to as the "multi-funds" regulations), to avoid a shortfall as big as the one observed in 2008 coinciding with retirement. Thus, in 2008, Chileans near retirement age received a rate of return on their savings represented by the rightmost points in Figure 3.7.

Summarizing, the low interest rate issue can be more of a problem to funds that invest only in government debt, particularly if they cannot diversify. Low interest rates have occurred in the past, before the eighties, but that does not mean they are not a problem because today we have an aged population and financial savings pay for a larger share of the pension benefits than in the fifties. Funds that can diversify to global debt markets and stocks can end up with yields above those assumed over the nineties to produce actuarial estimates and evaluate reforms. Nevertheless, regulations must protect workers nearing retirement age from excessive exposure to risk.

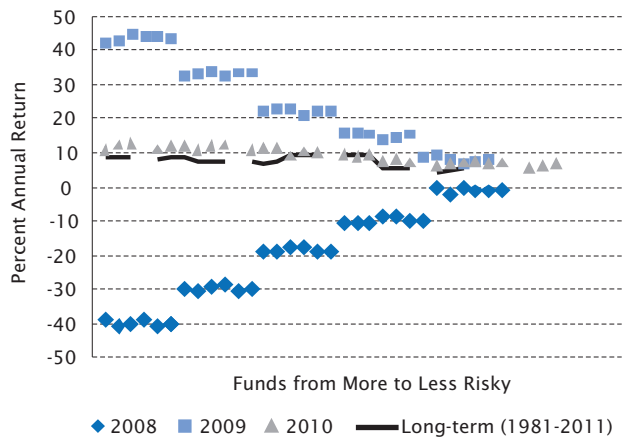
Finally, retirement funds holding stocks had very large losses at the outset of the financial crisis, a big rebound in 2010, and the "multi-fund" regulation that protects those near retirement age from cyclical losses performed well.

**Figure 3.7**  
**Centennial Interest Rates in High-grade Corporate Bonds**  
**12-month Average**



Source: Moody's Yield on Season Corporate Bonds <http://www.federalreserve.gov/releases/H15/data.htm> (2011).

**Figure 3.8**  
**Short-term and Long-term Yields in Chilean Social Security Pension Funds**



Source: [www.spensiones.cl](http://www.spensiones.cl) (2011).

**CHAPTER 4**  
**COLLECTIVE DECISIONS ON RETIREMENT**

## CHAPTER 4

# COLLECTIVE DECISIONS ON RETIREMENT

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### 4.1 Introduction

**T**he purpose of this chapter is to review the policy debates around the setting of retirement ages. Often, governments and social security agencies have to make decisions on a collection of difficult questions, namely:

- How to reach agreement on collective decisions, particularly around social security parameters? What can be done to make people agree on issues that seem to hurt some when viewed individually, but truly are a benefit to all when viewed collectively?
- Should we use a referendum, a normal legislative process, or a fast-track process to make better decisions on retirement ages? How can we start a constructive process of change? Is there a "right time" to propose a reform? Is it true that only a crisis will create the conditions for an agreement?
- What accounts for the empowerment and political success of the elderly? Are "the old" an obstacle or an ally in the reform process?
- How far is our democracy willing to go in terms of redistributing income and collecting taxes? How much responsibility has to be left in the hand of each worker to prevent economically for retirement?
- Can we measure the impacts of the reform reliably to inform the population?

These questions are relevant because they seek to address how policy decisions around retirement ages are made, and how societies support these choices. In general, life expectancies today are much higher than in the past, but countries have not always succeeded in adjusting their statutory retirement ages vis-à-vis on-going demographic trends. On the other hand, there is wide concern that living more years does not mean being able to work longer, when considering health, education, and disability issues. Thus, although increasing the statutory retirement age is often perceived as a required measure against financial insolvency, society may not always agree collectively on this. In some countries, pension reforms have been accompanied by profound political challenges, and an important degree of creativity and ability to communicate and persuade the general public has been required. In other cases, only under an environment of crisis has there been an open window to promote reforms.

This chapter is divided as follows: Section 4.2 reviews arguments on social election from a political perspective and how can these be translated into a social welfare context. Then, Section 4.3 summarizes the most important developments around social election on retirement issues, also from a political approach. Subsequently, Section 4.4 addresses the most important current debates around retirement ages, and their consequences, and, finally, Section 4.5 wraps up the most important arguments of this chapter.



## 4.2 Social Election and Social Control

Social election, or social choice, refers to how societies make collective decisions, considering that the individuals and social groups differ in the cost and benefits they will draw from them, and that the political system provides different levels of voice and vote to them. With regards to social security, governments have to make difficult and controversial decisions on the amount of taxes and benefits to be paid, the statutory retirement age, and on the conditions offered to adults in pre-retirement ages. Deciding upon retirement ages has proven to be particularly complex.

On this matter, Janowitz (1976) argues that welfare states face profound dilemmas in terms of achieving their social goals, and their evolution has been accompanied by political struggles, debates, and choices. Most contemporary societies in the Americas make collective decisions on retirement ages indirectly through the mechanism of public elections. Individuals choose national leaders and legislative bodies, and these decide on particular issues. Rarely, if ever, is the issue of the regulation of retirement ages subject to a referendum. More commonly, after gaining an election, political parties draft the details of potential reforms, and a new space to influence decisions is opened. Janowitz' social control perspective has two important implications. First, assuming that an election outcome is a manifestation of a society's relative ability to regulate itself, the absence of a political regime with a stable majority implies important limitations on effective control. Second, the electoral process *per se* is a mechanism for achieving social control.

Thus, one question is whether the kind of political regime affects social security design, and whether democracies have been more successful in advancing social security reforms. North, Wallis, and Weingast (2009) believe democracies are more successful in shaping social policy because they are built upon the values of inclusion, equality, and citizenship and because they translate these values into real social

opportunities by offering good quality public goods and services to the population. This mechanism allows sharing of the gains from economic growth and decreasing individuals' risks in bad times, which reduces the probability of a negative political reaction during difficult periods. Thus, in a way, democracies have an endogenous mechanism supporting their sustainability by ensuring equality to individuals and enforcing social control.

North and his coauthors term democracies as open access orders, and non-democracies as natural states. According to them, in natural states, the control over violence is limited and leads to the formation of elites that manipulate societies' problems. Natural states are not able to provide impersonal benefits, which means they cannot offer public goods and social insurance programs that share the benefits of the economy to the whole population. In turn, open access orders contribute to solve important collective problems in society because they emphasize important beliefs such as equality and citizenship. Thus, in democracies, citizens are able to defend these impersonal rules by withdrawing support from political officials who attempt to violate these rules. This is possible thanks to party competition and to democracy's ability to discard useless ideas, solutions, and even leaders. In fewer words, democracies may facilitate the decision-making process because citizens are able to withdraw support from those who are not either capable or willing to implement the necessary changes for a better social context.

However, Mulligan and Sala-i-Martin (1999) argue that social security programs have survived the changes in political regimes within countries, and, therefore, that a political system *per se* cannot account for the emergence, durability, or features of social security. That is, the effect of political pressures on public policy is not seen in democracies exclusively. Instead, they emphasize the importance of economic forces behind the interaction between the political power of the elderly and social security outcomes.

Therefore, it cannot be taken for granted that democracies are more effective in advancing reforms to the statutory age for retirement. It is no secret that democracies in both Europe and the Americas have had a hard time modifying their statutory retirement ages. In Janowitz' words, the complexities of the welfare state may actually contribute to the emergence of weak political regimes at the national level because electoral systems are unable to generate a significant majority for an effective coalition. Thus, a question arises on how majorities are affected by the issues of aging and retirement.

#### 4.3 A Political Approach for Retirement Choices

Are older adults more influential than other groups because they are becoming more numerous, or is it because they have more time for politics and lobbying? How can policy design affect the distribution of gains and losses across generations?

Zaidi, Gasior, and Sidorenko (2010) state that social sustainability requires a balance between the distribution of resources across different generations at a single point in time, and the guarantee that future generations of old and young receive the same or even more social resources than those receiving benefits today. This issue, sometimes labeled "intergenerational solidarity", is framed in practice against the need to alter expectations of specific cohorts and groups about their entitlements. A related empirical question is whether social security schemes favor spending on the elderly and early retirement; or, in other words, whether they induce retirement instead of promoting intergenerational solidarity. On this issue, Mulligan and Sala-i-Martin (2003) find that social security programs often tend to promote early retirement.

The next question is why is early retirement promoted? One reason could be that the elderly are such a large group that they have the power and the number of votes to obtain an electoral result. In other words, the process of population ageing may be

empowering the elderly. Still, the proposition has been questioned because the elderly do not constitute a voting majority in any society. Mulligan and Sala-i-Martin (1999) believe that spending on the elderly cannot be attributed necessarily to demographic trends. If this were the case, then the amount of resources devoted to the elderly should increase according to their weight in the total population in a one-for-one proportion, probably less due to the cost and risk inherent to the program. Evidence shows that the fraction of GDP associated to spending on the elderly has grown disproportionately, contradicting the idea that demographics are the only factor that explains the preference for pro-retirement policy. A related conclusion is reached by Tepe and Vanhuyse (2010), who investigate 21 OECD democracies between 1980 and 2003 to find that population ageing does not necessarily account for a pro-elderly bias. Therefore, the evolution of demographics does not explain why most social security schemes, even in long-lived countries, tend to induce retirement.

In Mulligan's (2000) estimates, 75% of the national social security systems for which there is information on this issue—a total of 88 countries—discourage work by the elderly. In most cases, the procedure is very simple: only retirees can collect a pension benefit, and are not allowed to stay employed and obtain pension payments. In the remaining cases, discouraging work can take the form of a sharp decline in the actuarial value of benefits obtained for additional work. In this analysis, the effect of the size of the social security systems is very strong: countries where the expenditure in pensions is large (measured as a share of GDP) have stricter rules to induce retirement by the elderly (higher tax rates for those who keep working and stricter mandates to retire). Thus, less developed countries that have relatively low expenditures in pensions are less inclined to force the retirement of the elderly. Does this mean that in the future we will see a growing incidence of rules to promote and force early retirement in Latin America and the Caribbean (assuming national economies can

keep the favorable growth rates and growth of coverage of social insurance observed since the nineties)?

On the other hand, the wealthier countries in the region, the United States and Canada, operate systems with lower guaranteed replacement rates than European nations, and apply lower taxes on the work by the old. Hand-in-hand with that comes the higher rates of labor force participation by the over-60 Americans and Canadians, when compared with Europeans. In Latin America and the Caribbean, the movement towards pension schemes that relate more closely contributions to benefits was very strong in the nineties; additionally, the relative youth of the region means that the issue of forcing retirement of massive numbers of elderly was not important in the past. Thus, the region may be headed towards an equilibrium with higher retirement ages than Europe. It is opportune to mention also that the economic crisis that exploded in 2008 has motivated reforms to European systems, and that a significant feature in them is to reduce obstacles for work by older adults. Thus, in a few years we may see that Europe is improving the incentives for the work of older adults, but it is still early to know where the current wave of reforms will end.

Another potential explanation of pro-elderly bias may be that the elderly are a politically influential group for reasons different than their size. This argument usually follows one of two approaches. First, every generation expects to become old at some point in life. This means that the young may be willing to provide the elderly with an important degree of support regarding elderly oriented policies. As pointed out by Mulligan and Sala-i-Martin (1999), the poor typically receive transfers from the rich, but no low-income group is as politically successful as the old. The reason is that low-income groups may differ from other pressure groups in terms of their social, racial, and gender characteristics, but they share a critical aspect with the old: they expect to fight politically for the same matters than the current-old

in the future when they become old themselves. In addition, a decrease in the statutory retirement age may be interpreted by the young as an increase in their likelihood to belong to the elderly group sooner than expected. Thus, other population groups may be willing to support the elderly today because they expect to switch groups in the future.

It has also been argued that the elderly may be an influential group because they have more leisure at their disposal vis-à-vis other groups. Having a lower opportunity cost of leisure implies that they can devote more time and resources to lobby, morally persuade, do politics, and fight for their interests, in contrast, for example, to the young employed. Mulligan and Sala-i-Martin (1999) explain the logic behind this political process: when individuals allocate more resources to a single issue, even if they could allocate these among many other issues, this issue becomes politically more successful. They term this political force as "gerontocracy". They go further and conceptualize this phenomenon as the *single-mindedness* of the elderly, a term that emphasizes their willingness and ability to concentrate their political capital on one single important issue (Mulligan and Sala-i-Martin 2003). This outcome is an example of the "Paradox of Power", which states that those who are relatively unproductive in the market sector find it profitable to devote relatively more of their time and effort to the political sector (Hirshleifer 1991). Therefore, while the elderly do not represent a majority in any society, they may become a powerful and active political group.

The different hypothesis related to the above suggests that the political context may be more helpful in explaining social security choices and the willingness or ability to change than a simple financial explanation. Certainly, social security deals with problems that have not been alleviated by market forces alone, such as funding income flows for the old. On the other hand, as populations become healthier and long-lived, the efficiency argument in favor of adjusting retirement ages gains weight. If

individuals are healthier, they can work longer and are in less need of societal support. The financial balance arguments may be clear and convincing, but succeeding in forming a political coalition and persuading pressure groups is hard. A main caveat is that the arguments about why there is increased political participation around the topic of retirement ages do not lead to conclusions of inefficiency or undesirability of such debates. In economic models of pressure groups, the key to efficiency is democratic competition, which allows the organization of coalitions around issues that are regulated inefficiently. This is, for example, the mechanism in the pressure groups model of Nobel Prize-winning economist Gary Becker (1983): interest groups are coalitions that allow society to find collective solutions in environments where private markets or old regulations are producing inefficient results. While we do not know of direct evidence, it seems hard to find support to the argument that "the elderly" form cartels or some other form of monopoly to exploit the rest of the population. Thus, probably, the acrid debates surrounding reforms to retirement ages in social security regimes have to do more with finding new effective solutions to changing conditions than with one group extracting rents from the rest of the population.

Having discussed the theories around what motivates reform on retirement ages, we can describe the environment in which reforms take place. Tompson and Dang (2010) identify political economy variables in twenty OECD countries, either in retirement, labor markets or product markets. They develop an indicator of reform outcomes, based on three criteria: adoption, implementation, and follow-up. They classify reform lessons in four main groups: exogenous factors, timing, communication, and key actors. Their main conclusions are that governments may be more successful in advancing reforms when the architects of reform can claim an *electoral mandate*, which means that they fully commit to driving reforms instead of making vague promises. However,

the Latin American experience shows that many of the pension reforms in the region resulted from severe economic crises that weakened fiscal budgets and forced policy-makers to adopt urgent remedies. Perhaps the European experience after the 2008 banking panic is in a class similar to 1980's Latin America, at least for some countries.

The second category of key lessons drawn by the authors has to do with the timing, scope and sequencing of reforms.

The third element deals with communication, consultation, and leadership because reform processes were more successful when governments made considerable efforts from an early stage to explain the benefits of reform to the general public. Not communicating the benefits increases uncertainty in favor of opponent groups that may reframe the scope of the reform at their convenience. The importance of dissemination and marketing for reform outcomes is also underlined by Pinheiro (2005), who explains why Brazil's pension reform was more successful during President Lula's administration. Lastly, leadership has to do with the government's ability to maintain its cohesion and unity, becoming the "owner" of the reform initiative and process.

Finally, the fourth group of key lessons involves identifying actual or potential opponents of reform, or simply reform spoilers, because potential losers are much more likely to mobilize than winners, jeopardizing the reform's approval and implementation. Developing a clear actor mapping may be particularly useful for the lobbying of the reform.

#### 4.4 Retirement Ages in the Political Agenda

How are life expectancy and retirement age related? Both the life expectancy when entering the labor market and the life expectancy after retirement are much higher today in all countries than during the foundational years before the middle of the 20<sup>th</sup> century, but the effective retirement age has changed

only in a smaller proportion. A minority of countries increased retirement ages in 2 or 3 years over the eighties and nineties, against an increase of usually 15 years or more in life expectancy. Furthermore, many countries experience lower effective retirement ages. As a response, we see policies increasingly aimed at changing current incentives to retire, such as penalizing early retirement, increasing the number of years of contributions required to obtain a full pension, or providing extra bonuses to people retiring after the statutory age (Martin and Whitehouse 2008). Still, Brussig and Knuth (2007) argue that the true debate is whether raising the statutory pension age will result in longer professional careers or rather greater unemployment of the elderly.

Changing the retirement age is not only complex in terms of the relations between governments and the general population, but also with respect to special regulations. In particular, it is difficult to reform the retirement conditions of workers in public sector unions. Another crucial issue has to do with disability and work risks insurance, and the way these may affect retirement decisions. For example, facing a higher retirement age, some workers may opt for the pathway of disability insurance to achieve early retirement, an event that may not be amenable to simple controls by social insurance funds. Finally, governments need to consider how existing fiscal laws can influence reform efforts, for example, whether pensions are exempt from taxes, or whether older adults need to pay contributions if they are already entitled to a pension.

The debate around increasing the statutory retirement age centers mainly around legislators who are forced to deal with decreased tax revenues, increasing costs, and budgetary deficits while increasing the statutory retirement age is not perceived as a panacea to social security problems (Brussig and Knuth 2007). Reform proponents argue that increasing the statutory retirement age could offset the increase in life expectancies, while opponents claim that reforms could severely affect

certain population subgroups that have shorter life expectancies. The main pros and cons of increasing retirement ages can be summarized as shown by Table 4.1, following Templin's (2010) analysis.

In the Americas, there have been two major varieties of reform to affect retirement ages: parametrically through the increase in the minimum age to receive benefits and the minimum number of periods required to receive a pension, and through the transfer of the decision to retire to the worker in the framework of a capitalized system. In the first case, the mechanism is explicit: The worker has to reach an older age to be entitled to collect benefits. In the capitalized framework, the mechanism is indirect: The statutory retirement age is not directly relevant, but the worker has to accumulate a minimum amount of savings to retire at any given age which in turn is a function of mortality tables and financial assumptions. When the level of benefits depends upon individual savings early retirement means receiving a lower replacement rate. Only for low-income or low-savings workers is the statutory retirement age a relevant parameter because they can receive public money to finance a guaranteed minimum pension. The statutory retirement age plays in any case the role of a backstop to reduce the risk on the public cost of the system. Chapter 7 will describe the evolution of pensionable ages in the Americas.

As far as we can tell, the earliest reform took place during the mid-eighties in the United States. For those born in 1937 or before, the statutory retirement age is 65, and there have been gradual increases until reaching 67 for those born in 1960 or later (and so the transition ends in 2022).

Canada went through an overhaul of the pension system during the nineties. Regarding pensionable age reform, Canada actually decreased retirement ages, from 70 to 65. On the other hand, the reform introduced a significant individual savings element as well as capitalization restrictions on the collective Canada/Quebec Pension Plans. Thus, the decrease in



**Table 4.1**  
**Arguments in Favor and Against Increasing the Retirement Age**

Pro	Against
Longer life expectancies and improved health status.	Life expectancy is an average, and improvements are led by the economically better-off. Reducing benefits will increase the poverty rate because there are significant groups at risk, such as the poor, the uneducated, those with poor health or physically demanding jobs.
Older adults are better off working longer and can use their skills and abilities in a more rewarding way in retirement. Working at an older age promotes mental acuity and a sense of usefulness.	A large share of those passing age 65 are in poor health with significant disabilities. Some disabilities, such as mental disease, are hard to measure clinically.
Improved financial security due to relatively favorable expansion of the economy since the nineties.	Older workers have more difficulties finding employment, and if they succeed they often end up earning less than in previous jobs. There is a recession in many countries since 2007.
A decrease in physically demanding jobs also allows people to work longer.	In many occupations, such as mining and agriculture, jobs will remain physically demanding.
Education levels have improved and there is a correlation between higher education and ability to work longer.	The more-educated will still have time to enjoy their pension, not so the humbler families.
The demand for skilled older adults will remain high given that there are not as many younger workers to replace them.	The substitution of younger workers for older adults is a long-term trend, and evidence shows that it is hard for an older adult to get a job.

*Source:* own construction based on arguments exposed by Templin (2010).

the statutory retirement age was not a plain relaxation, but was part of a redefinition that includes significant elements to avoid discouraging work after age 60.

Bloom and his coauthors (2009) analyze panel data for over 40 countries for the period 1970-2000 to measure the effect of social security reforms on the labor supply of older men. They find that the average retirement age increases when the normal eligibility age rises. In addition, they conclude that shifting from a defined benefit scheme to a defined contribution scheme leads to a substantial increase in the retirement age.

#### 4.5 Summary

This chapter aimed to review the most important approaches and findings of the politics behind retirement decisions. An important question is whether the kind of political regime facilitates the decision-making process regarding social security. Democracies are built upon the values of inclusion, equality, and citizenship, and facilitate political competition towards improved solutions.

Spending on the elderly is important in terms of the balance reached by a society between the distribution of resources across generations and the

guarantee that future generations of old and young receive the same or even more social resources as those who are receiving these benefits today.

The evidence shows that public pension programs worldwide tend to induce retirement. Demographic trends cannot account for this situation, even though the ratio of older adults to total population has grown considerably over the last few decades. Indeed, spending on the elderly has grown more than proportionally with respect to the evolution of this ratio. Researchers agree in that demographics does not explain the growth in expenditures on the elderly, but there is no generally accepted explanation to this important phenomenon.

Certainly, the political context may be useful in explaining social security choices; yet, the efficiency explanation gains weight as populations become healthier and live longer. If individuals are healthier, they can work for longer periods of time, without societal support. Still, beyond the financial balance

argument, political persuasion, and participation are not always enough to achieve collective efficient solutions. Indeed, finding new pathways to change current conditions is related to democratic competition, which is crucial for the efficiency argument. Governments may be more successful in advancing social reforms when they fully commit to driving them. Although many Latin American countries reformed their pension systems as the result of subsequent economic crises, the evidence suggests that some crucial aspects for the success of reforms are timing, scope and sequencing, communication and dissemination, and leadership.

In the Americas, the setting of statutory retirement ages has evolved since the eighties. Yet, Mesa-Lago and Márquez (2007) are of the opinion that there is a pending agenda regarding pension reform in the region to adjust retirement ages vis-à-vis life expectancy increases, as well as standardizing retirement ages across sexes.

**CHAPTER 5**  
**WORK FOR OLDER ADULTS, TECHNOLOGY**  
**AND HEALTH**



## CHAPTER 5

# WORK FOR OLDER ADULTS, TECHNOLOGY AND HEALTH

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### 5.1 Introduction

**T**his chapter discusses the extent to which older adults are able to find decent and dignified work after the age of 60, balancing technological, medical, and preventive advantages, but recognizing that illness and fragility are a reality for a large portion of the population.

Great information and communication technology advances seem to anticipate an era of reevaluation of the work performed by individuals who possess experience and knowledge. Great engineering advances seem to anticipate an era of solutions to older adult mobility issues. Great medical advances seem to anticipate an era of reduced ability issues that limit individuals aged 60 and over to continue with their working life. On the other hand, pension plans, working risk insurance, and health insurance are facing current challenges where a great number of individuals still reach the "normal" retirement age suffering significant deterioration in their health or in their ability to work. Proposals to increase the minimum retirement age should not be based simply on the number of years longer we live on average because even though the ability of some improves significantly after the age of 60, for others longevity is achieved when the number of years receiving disability benefits is extended.

Can technology help older adults to continue working? This question makes sense under the assumption that individuals voluntarily consider that they will have a better quality of life if they continue working than if they do not and that the pension system and other social benefits are reasonably fair (there are no excess subsidies and older adults are not punished for having decided to retire). In view of the above, in this discussion we assume that the decision to work after the age of 60 is a voluntary decision, that the individual has access to a pension that adequately recognizes his/her contributions and that the system does not punish him/her if he/she decides to continue working.

When individuals expect to live longer, we can expect them to save differently because they will require more money in the future, but they could also work for a longer period of time. On the other hand, as workers age, their skills are somehow diminished that is why we usually see productivity decline after 40 or 50 years of age. For example, when reviewing literature on age and individual productivity, Skirbekk (2003) indicates that there is evidence that a number of skills (numerical, verbal, clerical, finger skills, and general intelligence) reach their peak around the age of 25-34, and generally start to decline after this age, especially after the age of 45-54. These measurements are not easy because they are not the result of purely physical elements, but depend on the type of job held, the individual's education, and a variety of different

factors. However, the discussion about measuring a particular skill does not contradict the general conclusion that skills diminish with age. To what extent will better health conditions and technology curb this process?

Could the relative productivity of older workers have been decreasing relatively more over the last few years than what was usual in the last decades? If this happens, it could be attributable to a technology-induced generational change in that it has been difficult for older workers to learn the skills required by the information economy so the "usual" decline due to the loss of physical strength has been accentuated by a rapid depreciation of the value of experience. However, this conclusion is not generally accepted and unlike what is stated in the above paragraph, it does not refer to the absolute level of individual skills possessed by an individual, but to a quotient between the skills of the old and the young.

## 5.2 How Much Longer Can Older Adults Really Work?

Having more time available after the age of 60 represents more work opportunities, but this is dampened by the incidence of disability among older adults. To understand what society can expect from older adults' work, it is necessary to understand their health limitations. To date, the leading illnesses on the planet are still infectious diseases: diarrhea and respiratory disorders. However, the older adult population is select; they are the survivors. For them, as we shall see in Figures 5.1 to 5.2, heart problems and cancer are the two most frequently encountered and terrifying enemies, followed by sensory organ disorders, diabetes and respiratory disorders as well as by cases of diabetes-related disorders.

Figures 5.1a and 5.1b show statistics of the number of "years of healthy life lost" calculated using World Health Organization data. Analysts frequently refer to these figures as DALYs (disability-adjusted life years). These are the sum of years lost due to

death and years lost due to disability and in these figures each disease included in the DALY computation is expressed as a percentage, separately for men and women. The first message of Figures 5.1 is that 70 to 90% of life years lost from the 60 is given due to non-contagious diseases, and with the range being similar for men and women. This gap of 20 percentage points is not small and means that for some decades, for countries like Haiti, Peru, Guatemala, Bolivia, El Salvador, St. Kitts, and Belize (and others with lower rates of non-contagious diseases), there is an important path to cover to prevent people reaching age 60 without injuries or diseases.

One of the causes of underdevelopment in many countries is that people still reach the age of 60 with major injuries. In general, men over sixty, lost quality years for injuries at approximately twice the rate than women; in low income countries, the ratio of men to women in lost DALYs per injury is greater than three, while in richer countries is 1.5 or less. Additionally, there remains a hard core of poverty, with countries that still have more than 7 and up to 18% of lost DALYs after 60 of communicable diseases or nutritional deficiencies; it is hard to believe that these populations have great capacity for work despite they have a greater life expectancy.

In Figures 5.2 we can see the incidence of three major classes of diseases over the years lost in each country. These are cancer, diabetes, and cardiovascular disease. As a whole, they sum more than 50% of lost DALYs after 60 years of age in the region, for both genders. However, differences between countries are also large, because in low-income countries the figure is just over 35%, while in others it fluctuates around 60%.

How has the evolution of disabilities in older adults affected their ability to work? In the United States, between 1970 and 2000, disability-free life expectancy increased by approximately three years (66 to 63 years old). This increase is mainly attributable to growth in the proportion of population with higher

education because within educational groups the number of disability-free years is almost zero. There are significant levels of dispersion in disability-free life expectancy across educational and racial groups (Munnell, Soto, and Golub-Sass 2008). The negative relationship between poor health and the likelihood of being in the labor force and the retirement age, as well as between hours worked and wages earned is widely recognized. Extending the retirement age is feasible only if older adults are healthy enough to work. In the United States, the proportion of the population with limitation of activity actually grows between 1970 and 2000 for the group between 50 and 60 years of age and only decreases slightly for those between the ages of 60 and 64. As a result, while life expectancy increases by 4.2 years, only 2.7 years are disability-free. In addition, and only for the group of white males between the ages of 50 and 64 with college education, the proportion of males with limitation of activity decreased while the figure for less-educated groups of white and African American males increased. The average for the population as a whole improved as a result of substantial improvements in general education levels between 1970 and 2000.

Health trends have been quite favorable over the last decades, with reduced smoking and improved blood pressure control as the main risk reducing factors. However, looking towards the future, it is expected that by the year 2020, almost two-thirds of the population will be overweighted or obese and this could increase mortality rates. Even though technologies exist to control high blood pressure and high cholesterol levels, it is widely known that many ill people do not always follow their treatment or even seek treatment at all. The authors also wonder about future improvements in education to reach the composition effect observed in the past. In a related study by Crimmis et al. (2009), the conclusion is optimistic in the sense that great gains have been made in terms of disability-free years, but on the other hand, the survival of the disabled leads to high

disability rates which can only be reduced through improved prevention in a process which statistics will reflect only in a few decades.

It is evident that disability is one of the reasons why individuals stop working after they reach the age of 50. However, this event is not easily measured and there are great differences among countries that cannot be explained by observable medical or functional events. In Europe, because the population is aging more rapidly than in the Americas, we can exploit existing evidence to back this assertion.

At one extreme, parts of Europe provide high disability benefits to individuals between the ages of 50 and 64. Rates in relatively rich countries such as Sweden, Denmark, and the Netherlands exceed 12%; at the other extreme, we find countries such as France with levels below 2% and the largest country in the region, Germany, averages 6.5%. There can be three reasons for these differences. The first two, age structure and health status are not "country related"; the third one is "particular to the country's system" and is constituted by regulations allowing disability pensions before the retirement age. In other words, one would expect higher general disability rates in countries with relatively older populations and poorer health status. However, according to Börsch-Supan and Jürges (2011), neither demographics nor health status seem to be very useful in explaining the differences among countries since they observe that, in every country, people who have poorer health or are older are more likely to receive disability benefits. As a whole, this observation means that the great differences in disability pension levels are due to national pension system definitions and management.

The way several European countries reached such high general disability rates was by allowing individuals who were approaching the retirement age to collect disability benefits under less strict age criteria or poorly standardized medical criteria. With respect to early retirement, particularly after the economic crisis of the seventies, the age to be eligible for a pension was lowered and additional limits were

set on actuarial adjustments affecting those who retire early. For example, in Germany, retirees receiving early retirement pensions see their benefit reduced 3.6% for each year before the normal retirement age, but if they go on disability retirement there is a 10.8% limit—in other words, those who retire three or more years before the normal retirement age always prefer the general disability option. This phenomenon repeated itself throughout the Old Continent and, currently, there is practically no relationship between general disability pension payment rates and the average health situation in these countries. Certain mental disorders such as depression have been particularly relevant because national criteria to determine disability cases vary. Probably the greatest mystery regarding society's ability to keep people active refers to their mental skills. There is no doubt that our societies are anticipating a reduction in diabetes, heart disease, and cancer over the next decades and that the new cohorts of older adults will reach old age healthier. It is not the same when we speak of mental functions: thought, memory, and reasoning.

Through processes that are generally not quite understood, people go through changes in their nervous system that make it harder to remember things, produce personality or mood changes, and make doing calculations or language usage more difficult. When these changes reach an advanced stage and are noticeable to the extent that help is required, when a sufficiently large group of symptoms is combined, we are talking about the onset of dementia. Probably only 20% of the cases of dementia are considered reversible and curable with current scientific knowledge, usually when they are the result of drug use, tumors, hematomas, vitamin deficiency or other known physical causes. In terms of improving functionality of older adults, little is known regarding what to do in different cases and as a very gross figure, it is estimated that between 5 and 8% of the

people aged 65 suffer from dementia and that this figure doubles every 5 years starting at this age.

### 5.3 Work, Social Security, and Older Adults

The usual recipes to finance aging are raising taxes, increasing the fiscal deficit and reducing social security benefits. However, currently most people between the ages of 50 and 60 enjoy the potential of spending the next 10 or 20 years of their life healthy enough to think about a new job, participate in community activities and remain productively active. It has become necessary to adopt a new vision that does not consider demographics to be a dark destiny that leads society to conflicts between generations. Work is being historically transformed and we see new life cycle patterns, new forms of employment and compensation, new forms of education, new working arrangements, and new communication networks.

Individuals work for a longer period both out of necessity and personal satisfaction. On the other hand, they will mostly work in fields and jobs different from the ones they held before they retired. Older adults who work have experience and their vision of life differs from the vision of young workers and new economic areas such as healthcare, education, and a variety of industries stemming from new technologies and social demands are experiencing growth.

It is essential to assist people to make the transition to public service with the government or to the non-profit sector (such as, for example, the 2009 US Serve America Act). Different private organizations have also created programs to help older adults launch new careers. It is essential for higher education institutions to offer flexible and affordable programs whose duration suits the horizons of older adults to enable them to receive certification and training to launch a new career.<sup>5</sup>

<sup>5</sup> For a contribution to the concept of career renovation see: <http://www.encore.org/find/resources/testimony-marc-freedman>, consulted on July 18 2011.

More than financial capital, what is required to create these programs is human capital. The collection of skills accumulated and the lifetime experiences of individuals whose careers end when they are middle aged represent an underutilized reservoir of human capital. Experienced workers can prove to be valuable assets in management, marketing, finance, operations, system integration, and report presentation as well as in operating areas.

Country legislation should recognize individuals working in their new careers are an important element in workforce plans, including provisions on health care employees. This workforce is necessary to help in chronic disease management and in the administration of health plans for people of all ages. Courses designed to develop preventive and ambulatory services provided by the new health care models are required. The basic traditional concept of "doctor-nurse-social worker" will surely remain, but the range of personalities and skills to fill these positions will broaden significantly. Doctors who have "retired" from traditional jobs will be a rich source of experience and capacity to expand health services, and workers over age 50 who used to work in a variety of activities could be retrained and become health care assistants.

In education, the need for math, science, and technology teachers is enormous and workers with new careers will become pillars to provide assistance to children and young people. Assistance is required from preschool to higher education levels, but the education system will have to adjust to receive these services, modifying programs, facilities and physical channels to allow the interaction between workers with new careers and students.

Transforming social arrangements related to work faces a challenge where less skilled workers have more problems to continue working and to renew their career because they suffer from more health problems and find less demand for their skills. As a result, the success of renovation policies essentially depends on providing special support to these workers.

The transition process will not be successful without clear State government action because the following is required: (1) designing experimental projects via scholarships, university, and institute of technology courses; (2) generating new financial vehicles allowing individual savings and investments and allowing the State to channel resources efficiently for a task that has not been performed in the past; (3) modifying student financing rules to include adult workers who are renewing their careers; (4) defining the public sector as a transformation model to hire people over 50 years of age; and, (5) using social security as an emblem to convince individuals that career renovation is convenient, explaining and creating service tools underscoring the service aspect of social security and how it can be used to continue working without losing any benefits.

Career renovation is not only "good intentions" towards those older than 50. In general, in the next few decades we will see growing pressure in the labor markets as a result of lower rates of entry of young people due to lower fertility rates in the region in the 70's and 80's, and because, even in low-income countries, more young people and women are studying. We must not confuse the problem of unemployment with this long-term tendency.

Sometimes debates on social security seem to be balancing promises of earlier and more pleasant retirement and more work and more contributions at the expense of individual well-being. The perception by the population of social security must be strengthened and should revolve around an extremely valuable program that will protect individuals in old age, that will be significantly important to those in unfortunate circumstances (widowhood or children are orphaned) and that it is an investment to decide the best available working options at every stage of life.

To achieve the above, contribution and benefit regulations must be perfectly understood by individuals, national agencies must provide timely and understandable information on different options, and program management must be efficient to make

offers more believable. Otherwise, workers tend to consider benefits as something that have to be collected before they are lost due to bureaucratic errors, a contingent subsidy affecting the government's political and financial situation on which no dependable provisions can be made because its value is not known until it is collected.

Over-50 workers who are trying to renew their professional careers must trust social security to make decisions. When they reach the mandatory retirement age, many people are not able to continue working or they simply don't want to; but others (probably most) should have the alternative to do so and be certain that they will be able to know many years in advance the pension amount they will receive to be able to make the best decisions. Needless to say, this recommendation implies reducing the relevance of the concept "retirement age". Probably the reason our social security systems include the concept of "retirement age" is that it became necessary (simply to establish a legal reference, to find a "solomonic" solution), but there is no doubt that each individual is different and that the best age to retire varies greatly in any country.

#### 5.4 Summary

A longer life expectancy will be associated for at least several decades with a significant fraction of disability, which is not realistic to expect a simple increase in the years of working activity of all people.

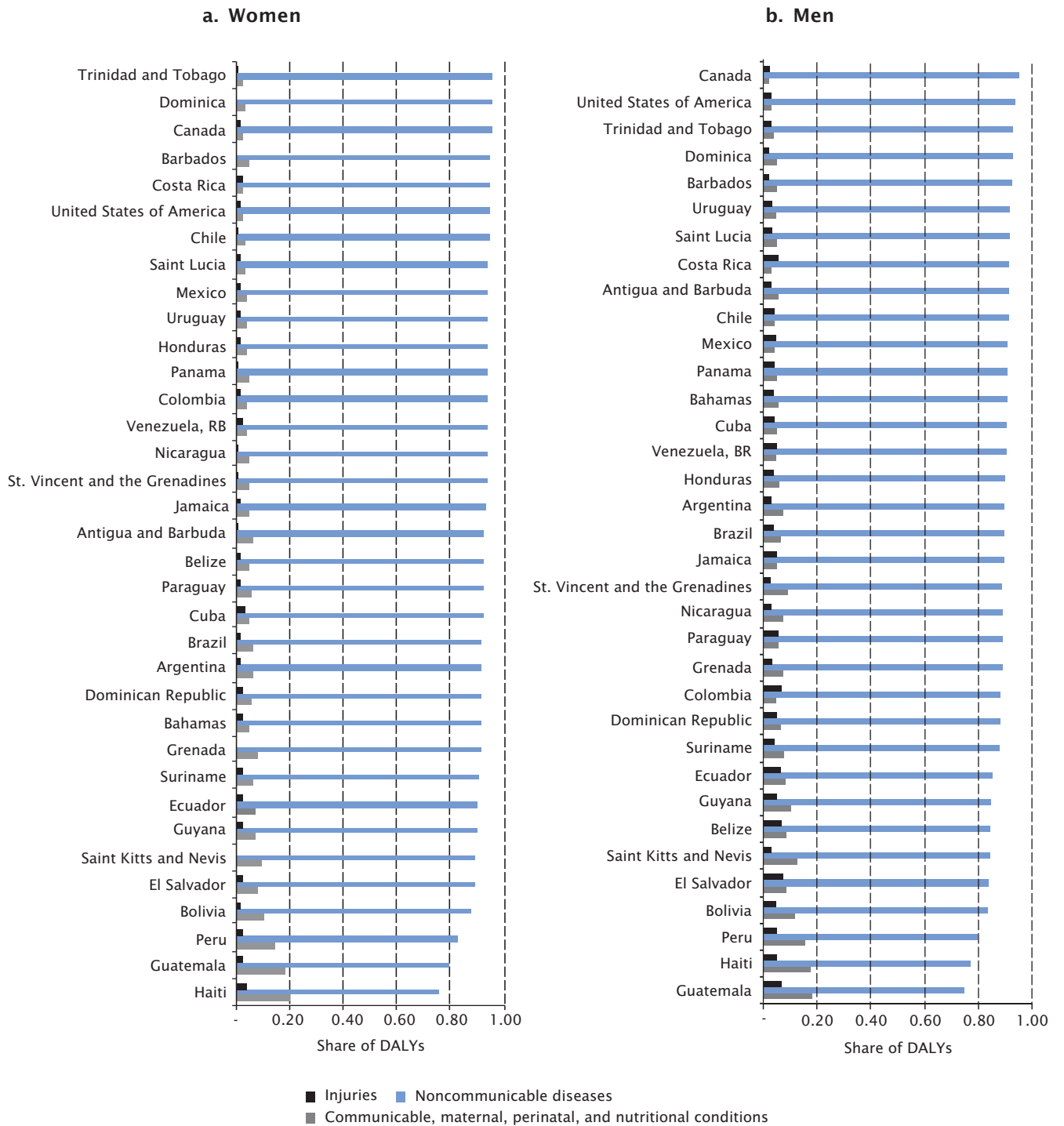
The fraction of lost DALYs by non-contagious diseases after the sixties is about 90%, it shows that in this country is getting to that age with a better functional capacity. However, in a large group the figure is still 75 to 85%, indicating that a substantive fraction of those who reach 60 does so with a substantial disability for work. Similarly, in some countries, the fraction of lost DALYs after 60 injury is great, especially for men, and remains a hard core of poverty that creates deaths from infectious diseases and nutritional even in old age.

It proposes a challenge to the regulations of disability, as the criteria adopted in each country crucially affect the fraction of people classified as disabled. Additionally, it presents a challenge for the growing incidence of mental illness and nervous system, many of which are not easily applicable criteria for social security funds for the concession of benefits.

In OECD countries, less than 5% of the people receiving old age pensions go back to work (Oxley 2009). However, little is known about programs to help reintegrate older adults to work. Under the current structure of social security schemes, individuals do not have the necessary incentives to plan renewing their professional career. To facilitate the renewal of careers is required changes in educational programs and job training, and labor laws. National governments and their agencies should play a leadership role to achieve this change.

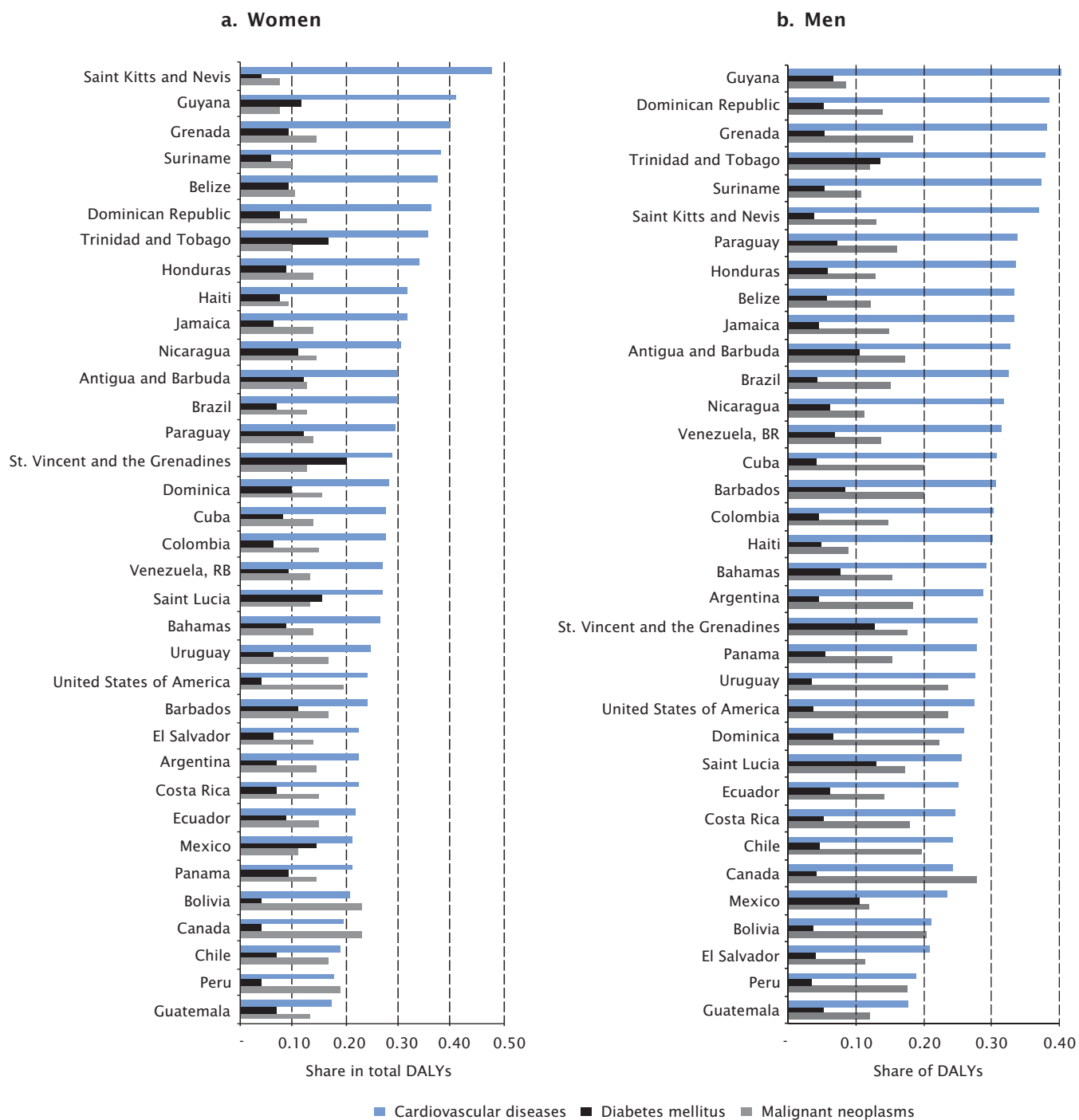


**Figure 5.1**  
**Disability Adjusted Life Years, 60 years and over in America, Percentage Distribution**



Source: World Health Organization. Department of Measurement and Health Information (2009).

**Figure 5.2**  
**Percentage of Disability Adjusted Life Years Due to Non-Contagious Diseases,**  
**60 Years and over in America**



Source: World Health Organization. Department of Measurement and Health Information (2009).



**CHAPTER 6**  
**KEY FEATURES OF GENERAL PENSION**  
**REGIMES FOR OLD AGE**

## CHAPTER 6

# KEY FEATURES OF GENERAL PENSION REGIMES FOR OLD AGE

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### 6.1 General Concepts

**T**he goal in this part of *The Americas Social Security Report 2012* is to present a standardized set of measurements for all countries of the benefits payouts of retirement schemes, which contribute to the evaluation of social security pension systems. This chapter outlines the methods used to perform the calculations, describes the common patterns found in the formulas defined by legislations to calculate old-age pensions, and discusses the more critical assumptions needed to reach a measurement. The next chapter presents results that revolve around two metrics: the replacement rate and pension wealth. While results are simple (a computation for replacement rates and a computation for pension wealth), the issues behind the calculations are not because rules change from country to country, and information on salaries and their distribution is not easily available. This section describes general concepts to pinpoint the objects to be measured. Section 6.2 comments on the classification of systems and its relevance for our problem, and Section 6.3 summarizes specific features that influence the calculations in the following chapter.

Any retirement scheme defines a link between lifetime earnings and pension values. We studied lifetime earnings in Chapter 3 of this Report; now we move on to see how they are transformed into a pension. The formulas differ extensively between

countries and, due to reform processes, even within some countries. Some relate closely the value of contributions to the value of benefits, while others provide flat benefits with near-zero correlation to the value of earnings.

The diagrams in Figure 6.1 show how to calculate an old age pension (Box 6.1 provides a glossary of terms specific to this chapter and the next). Any system uses these diagrams or a mixture of them. In a defined benefit (DB) plan, the individual labor history is measured (salaries and contributions) upon which a "basic amount" is calculated; obviously there are variables specific to each person. The earnings profiles explained in Chapter 3 are precisely the information required to calculate pension value. The amounts obtained in the previous step are inserted into formulas defined in laws and regulations to obtain the pension. Ideally, the measurement of individual variables and the legislation rules are clear enough to give a relationship free of ambiguities towards the value of the benefit, but this is not always the case. With defined contribution (DC) individual retirement account schemes, all the personal history is summarized in individual savings, and the formulas translating that value of a stock into a pension flow are based on actuarial life tables and discount factors regulated by a national pension authority. Reality is less simple than these diagrams, and even the terms "defined benefit" and "defined contribution" are not free of ambiguities.

Thus, a point that could seem simplistic to the casual observer is that within social security schemes, personal labor histories end invariably in a formula that links salaries and years of contribution with a benefit for retirement. Nevertheless, in practice there are two problems to write the formulas and calculate the benefits. These are the lack of simplicity and even the ambiguity of the regulations and the possibility of strategic behavior by workers in order to increase their benefits. A related issue is that national pension systems sometimes mix DB and DC tools in ways that are not easy to model by analysts or to understand by the general population.

Regarding the ambiguity, legal formulas are frequently not explicit and do not include all the variables that define the computation of a pension. For example, if automatic rules of adjustment for inflation are not defined, inevitably ad hoc mechanisms have to be used to respond to rigorous social pressures to maintain the value of the pensions. It is also common that a legacy of emergency adjustments and overlapping reforms to address specific events of economic recession, unemployment, and fiscal cuts defines different rules for different cohorts or social groups. Consequently, a multiplicity of formulas may be applied at a given point in time for similar or even for the same individual. These conditions are sometimes solved through granting the best benefit to the individual, but sometimes controversies are resolved by the judiciary or in practical terms by social security administrations focused on obtaining the best combination of low social conflict, public expenditure, and administrative cost.

Strategic behavior is possible due to the existence of contradictory rules, but also to rules related to "benefit preservation", "minimum contribution periods", and "minimum and maximum pensions". This sort of provision is motivated by concern regarding specific cases of deficit in social protection, redistribution goals, and even to prevent shirking. While policy-makers advance significant social policy goals with these special rules, they also

create notches that can affect behavior in undesired ways. For example, it is common to find a fixed minimum number of contribution periods as a requirement to obtain a pension, a rule that generates a cut in the behavior of individuals because those persons who have contributed only a little less than such a threshold look forward to comply with this requirement so as to be eligible to obtain pension benefits. Consequently, the distribution of retirees by number of periods of contribution concentrates in the lower extreme of eligibility, near the threshold. This type of rule seeks to protect persons with a high incidence of unemployment or disability during their labor careers, or who received low salaries and could not generate sufficient savings or the right to a decent pension. The problem with these notches is certainly not that they increase the rates of return of the system for disadvantaged workers, because this is the reason for their existence; the problem is that some persons who do not comply with the minimum requirements take advantage of the benefits without needing them. For example, those people who opt to work in the informal sector, receiving relatively high earnings, and end up as recipients of a pension which is too generous relative to their contributions, and those who manipulate contribution salaries to take advantage of the notches in the rules.

Another example of a notch arises when only the last years of earnings are taken into account to calculate a pension, a regulation that motivates some people to contribute according to an artificially high salary during the final years of their working lives. This particular notch may have been created as part of negotiations with some unions, or as a response to an inflationary environment, but as Chapter 3 explained, it tends to create capricious redistribution patterns across workers of different education and skill.

Finally, the calculation of a pension is complicated by the existence of "mixed rules" derived from partial reforms or from a legacy of segmentation of the pension system coupled with imperfect portability of labor histories and entitlements across

the different schemes to which a worker pays along his or her career. In this framework, the relationship between the labor history of persons and their benefits comes to depend upon contingencies that the worker cannot control. Even a worker with a

favorable career, who was never unemployed, and who always paid contributions properly, faces uncertainty regarding expected benefit values if any of the changes in jobs during his or her lifetime involved changing pension scheme of affiliation.

### Box 6.1 Glossary for Part II

This glossary includes terms that are generally used in literature on pension systems and which are used in specific ways in Chapter 7. For example, the replacement rate can be calculated in different ways: with respect to the last salary, with respect to the average of lifetime salaries, or with respect to the average salary in the economy. In Chapter 7, replacement rates are calculated with respect to the last salary.

**Defined benefit scheme:** a pension scheme where contributions are paid over the working life to a fund, and benefits are withdrawn according to formulas based on the history of contributions, with no direct link to interest rates.

**Defined contribution scheme:** a pension scheme where contributions are paid over the working life to a financial fund owned by the individual and benefits are paid during retirement out of the fund.

**Mixed scheme:** a pension scheme that mandates contributions to a DB scheme up to a level of earnings, and to a DC scheme for additional earnings.

**Parallel scheme:** a pension scheme that allows alternating contributions to either a DB or a DC scheme.

**Replacement rate:** estimated pension benefit divided by pre-retirement salary. In this Report, the value of the benefit during the first year of retirement divided by the last taxable salary. To avoid repetition of symbols, in what follows, all references to replacement rates are understood as percent values of the last salary.

**Pension wealth:** present value of income stream of pension benefits received from retirement until death. In this Report, measurements do not include the value of survivors' benefits.

**Discount rate:** reflects the fact that the money received in the future is less appreciated than the money received today. As used in this Report it is regulated by a pensions or an insurance authority.

**Gross indicator:** replacement rate or pension wealth calculated with gross pensions and gross salaries.

**Net indicator:** replacement rate or pension wealth net of contributions to social security pension regimes.

**Statutory retirement age:** the age at which full entitlement to a pension is achieved, in comparison with retirement at other ages that results in bonuses or penalties in the value of benefits; this age may be different from the age at which individuals decide to withdraw from the labor force.

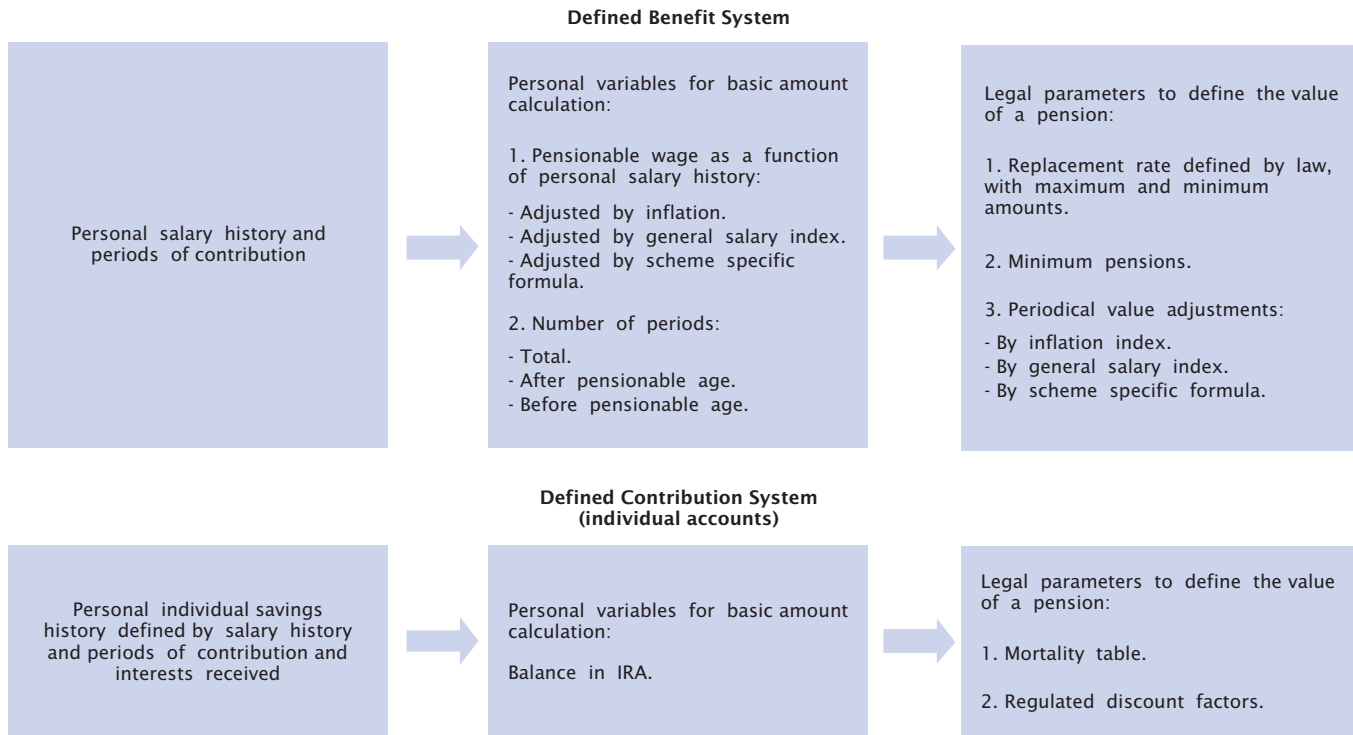
**Salary:** taxable earnings for social security purposes. Usually include wages and other cash benefits. In many countries, also includes in-kind payments. For the non-salaried, this refers to taxable income for social security purposes.

**Average salaried:** those with a salary equivalent to the mean in the relevant sample.

**Low-salaried workers:** those with a salary equivalent to one half of the average salary.

**High-salaried workers:** those with a salary of five times the average salary.

**Figure 6.1  
Pension Calculation Data and Formulas**



## 6.2 Classification of Pension Systems

When the goal is to develop systematic ways to measure pension systems, it is natural to ask about the correct way to classify them, so common formulas can be developed. The diagrams above suggest a way to do it, but then the discussion says that we may have mixed systems and even fuzzy rules, and that the more common case is one of rules that have changed over time, so the measurement of benefits can vary across generations. Mixed systems (those combining individual savings and collective pay-as-you-go elements) do not represent added conceptual complexity, although the numerical calculations become more detailed. Fuzziness is a different kettle of fish. For example, there can be a multiplicity of expected values of benefits according to the future developments of inflation and employment, and a substantial part of the active labor life of an individual

may pass under uncertainty about what legislation will apply by retirement (notice that this does not refer to changes in rules but to varied rules at each point in time).

The classification of pension systems usually employed in recent publications of international organizations allows an evolutionary view, permitting a rich understanding of pension systems. An evolutionary classification means that national pension systems are part of a genealogy and not of a strict taxonomy. They may be created following a leading model, but they evolve to include rules that have to do with saving, with redistribution, with prevention of shirking, with incentivizing work, and other goals. A useful classification is presented in *Pensions at a Glance* (OECD 2009), which starts from a first tier that is mandatory and aims for adequacy of benefits, is resource-tested, and defines minimum

pensions. A second tier is also mandatory, but has a savings approach because it is earnings-related; it is often a DB scheme, but even then it is a type of saving plan because benefits are related to contributions, and thus a rate of return can be calculated implicitly. The second tier can also be managed as an IRA (Individual Retirement Account) system, as is often the case in Latin America. The third tier refers to voluntary plans which are more commonly IRA based.

We may mention a significant antecedent in the "three pillar view" espoused by World Bank projects during the nineties (Holzmann and Stiglitz 2001). The "pillars" correlate with the "tiers" described in the previous paragraph. The main difference is that the pillar-based classification was sometimes interpreted (or misinterpreted) as being associated with specific governance solutions; for example, a pillar was associated with an agency or with state or private property of a pension fund. Yet, these issues were not written in stone, and the evolution to a "tier view" is justified simply because it is a more flexible approach.

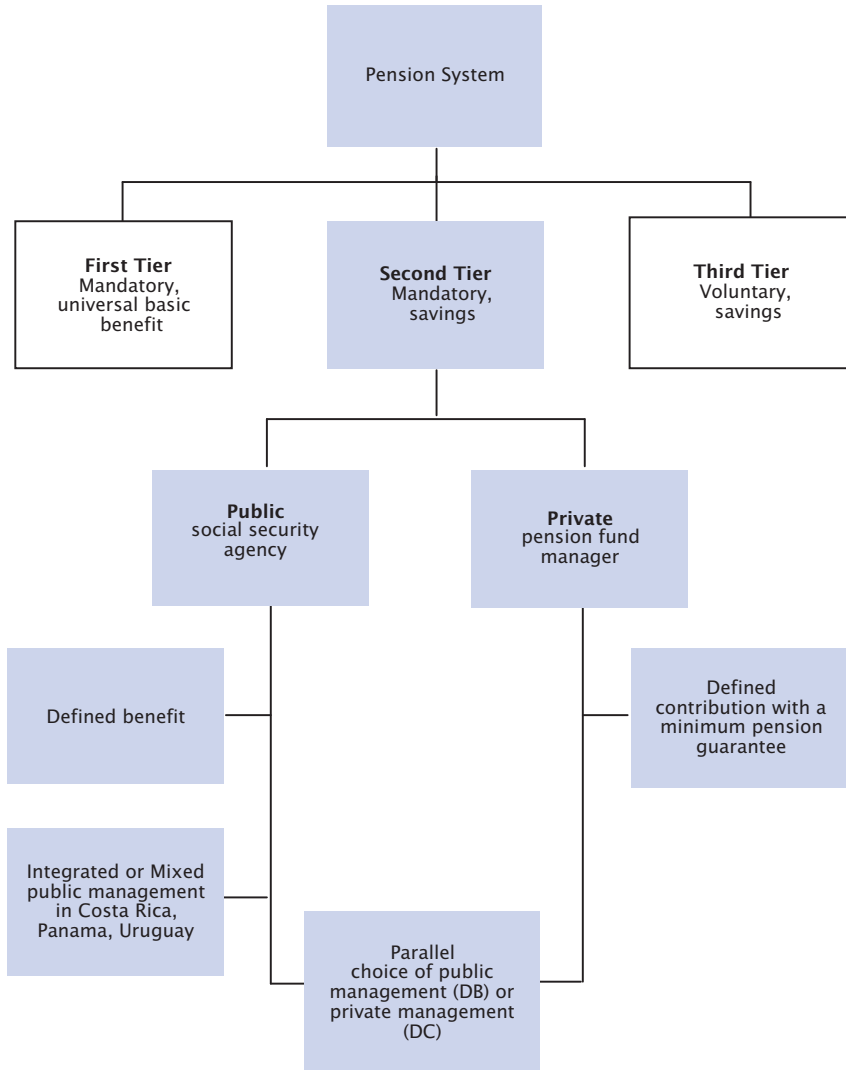
In the Americas, schemes usually have a second tier associated with payroll taxes, and often a third tier of voluntary savings to complement the mandatory part. A small but growing number of countries have a first tier to integrate basic, non-contributory pensions to the general pension system.

On the other hand, perhaps nearly all have some kind of first-tier program, but often this has not been integrated to the general pension system. Figure 6.2 describes contributory pension systems in the Americas. The three general second-tier models found in pension systems in the region are DB, DC, Mixed and Parallel. The Mixed cases usually have a general DB scheme that can be a first tier, a second tier or a combination of the two. The Parallel cases allow individuals to choose between DB and DC systems. According to these general models, Bolivia, Chile, El Salvador, Mexico and Dominican Republic are classified in the DC class; Colombia and Peru in the Parallel model; and Costa Rica, Panama and Uruguay are Mixed or Integrated. The analysis of Chapter 7 indicates that DC and Mixed systems are very similar, in particular when revising the rules for pension computation. In the DB class are Argentina, Brazil, Ecuador, Guatemala, Honduras, Nicaragua, Paraguay, Venezuela, the United States, Canada, Cuba and the English-speaking Caribbean.<sup>1</sup> Many of the second-tier DB countries have important third-tier IRA markets supported by fiscal benefits, as is the case of Brazil, Canada and the United States. The main characteristics of these general models are seen in Table 6.1 (the analysis in Section 6.3 is based on Table 6.1 classifications).

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<sup>1</sup> Argentina, Ecuador, and Nicaragua are special cases. In Argentina, between 1994 and 2008, insured persons could choose between the DB and the DC systems; nevertheless, as of January 2009, the IRA system no longer exists. All insured persons enrolled in this system at the end 2008 were transferred to the DB scheme. In 2001, Ecuador was looking to implement a mixed system; nevertheless, the provision under the 2001 law to create an IRA system to complement the social insurance program was not implemented. Nicaragua also planned to implement a substitution system in 2003, but this never came into effect.

**Figure 6.2**  
**Types of Retirement-Income Provisions<sup>1/</sup>**



*Note:* 1 / Public-Private management refers to whoever administers the program, not to the area of employment of the individual.

**Table 6.1**  
**Components of Pension Regimes in LAC Countries**

	Only DB or DC		Integration or choice of DB and DC	
	Defined benefit	Defined contribution	Mixed	Parallel
Benefit	Defined by formula in law	Derived from personal savings	DB for basic component and DC for additional component	Chosen DB or DC
Funding regime	PAYGO or partial collective capitalization	Individual capitalization and public funding for minimum pensions	For basic DB component, PAYGO or partial collective capitalization; for DC individual capitalization	According to chosen regime
Management	Public	Private or mixed	Public	Public or private depending on chosen regime

### 6.3 Design Features Affecting the Calculation of Pension Values

This section presents a discussion of design features that affect the calculations. The analysis is meaningful only against a point of reference, and there are two general criteria to define such benchmarks. One is the analysis of individual behavior as described in Chapter 3, because whether retirement is "early or late", if adjustments for retiring at different ages incentives or not work, and other features can be evaluated against the decisions preferred by the individual. The second is a simple financial evaluation of penalties and bonuses for retiring at different ages, which can be expressed as rates of return or other equivalent metrics. To keep in mind that this is an evaluation of expected benefits under existing legislation is useful to understanding why substantial restrictions on assumptions are needed: they allow consistent tracking of the sources of variation in benefits across countries. The rest of this section discusses the main issues affecting the calculations for Chapter 7. This section can be read as a complement to Whitehouse (2007), with emphasis on issues relevant for the region.

### *Minimum and Maximum Pensions*

The values of pensions for retirement are bound by minimum and maximum values established in statutes for both pension and contribution values. This is more relevant to DB and mixed plans. DC plans usually have ceilings on contributions, but the ceilings on pension values are not pertinent because these are related to the value of savings. The bounds on benefits have important effects on the structure, size, and cost of contributory pension systems. Additionally, within these upper and lower bounds, pension schemes have rules that aim to improve results of a wider group of low-salary workers, not only of those touching the minimum value. For example, gross replacement rates in the DB countries of the Americas are 64.1 for individuals earning half of the average salary, 57.2 for the average salaried, and only 38.9 for those earning the equivalent to five times the average salary. For DC countries, such progression ends quickly and average replacement rates fall little with salaries above the minimum pension (from 61.3 for those at the minimum to 57.9 at average salaries and 53.1 for the better paid). Thus, in DB schemes there is on



average more progressivity, and average replacement rates keep falling across the whole range of the salary distribution. Chapter 7 will dwell on this issue.

Gross replacement rates for 30 OECD countries show that workers with half the earnings of the economy-wide average receive replacement rates averaging 72% of individual earnings, compared with 59% for average earners (OECD 2009).

One form to cap pension values is through a ceiling on the ratio of the value of a pension to individual earnings. In 16 out of 35 LAC countries this range is between 50 and somewhat above 100%. For most English-speaking Caribbean countries, maximum pensions are 60% of the workers' average insurable salaries; in Guatemala and Honduras, these amounts are less than 80% the base salary; in Cuba all subsidies and pensions should be less than 90% the workers average salary, and in only few countries, the pension may exceed 100% of the insured's average salary (see Table 6.2).

On the issue of minimum pensions we can distinguish four cases. The first integrates with the general retirement system a basic or guaranteed pension for the whole population conditional on residency. The second is a minimum pension conditional on a minimum number of periods of participation in the social security system. The third is a supplementary pension for those not covered totally or only partially by social security but integrated formally to the general pension system. The fourth is a welfare or social assistance pension granted independently of the social security system. The methodology in Chapter 7 results in information influenced only by the first three cases, which have an established link or are indissolubly integrated into the second-tier retirement pension. For example, Aruba, Curaçao and Canada guarantee a basic pension to the whole population conditional on residency, and every social security system in the LAC region grants a minimum pension conditional of periods of participation. On the other hand, the calculations in Chapter 7 do not include the growing class of

programs that provide permanent monetary benefits to low-income individuals, often based on a means test or focused on the rural population, but not integrated into the rules of the general contributory system. When no such integration exists, the calculations of Chapter 7 are not feasible.

In the English-speaking Caribbean countries, where average insurable salaries are low, there is usually a fixed dollar minimum pension that applies. In all DC systems, a minimum guaranteed pension is paid if the accumulated capital and interest in the individual account is insufficient to provide the minimum pension set by law, conditional on certain periods of contribution (Table 6.2).

Minimum pensions as part of contributory systems are used extensively, but they are not considered a first-tier tool because they are restricted to contributors. They are a guarantee to those that perhaps lack enough savings or whose earnings resulted in low pension values. These benefits are usually not affected directly by the value of other sources of income or wealth (i.e. they are not mean-tested).

### ***Indexation***

Indexation refers to a rule to uprate the value of pensions according to the change of an exogenous index, such as the consumer price index, an average of economy-wide salaries, or a mix of these and other variables. Not all countries use indexation, and pension values may be actualized following legislative or administrative decisions. Indexation is meaningful if it is based on a variable that cannot be manipulated (at least directly and in the short run); otherwise, it becomes a discretionary decision. Table 6.3 shows how pensions are uprated in social security pension schemes in the Americas. Before the eighties, few if any pension system in the Americas was indexed, and inflation reduced the value of benefits in a way unexpected by workers. Currently, most national pension systems are at least partially indexed.

Chapter 7 will show that inflation has a very large impact on the expected benefits of retirement pension systems. There, the main difference across the analyzed scenarios is due to inflation. Thus, the way benefits adjust to this variable looms large. It is useful to separate two channels through which inflation affects pension values. One is related in Table 6.3: after a pension value has been defined, an indexation rule applies. Two, the calculation of the "basic amount", the initial value of the pension, can be affected by inflation. To deal with the second issue, some countries adjust the history of earnings by inflation or by a salary index.

Table 6.3 shows that in around half of the cases (at least 16 of 35), pension benefits are adjusted automatically by an index of consumer prices or other general index. Periodicity is usually once a year. In the other cases, pension benefits are adjusted on an ad hoc basis, generally with not specific periodicity. Most English-speaking Caribbean countries, Costa Rica, Cuba, Guatemala, Honduras, Nicaragua, Panama and Peru can be found in this last category. Uruguay, United States, Venezuela, Barbados and Dominican Republic use an indexation based on salaries. Countries with mandatory IRA systems usually index by a consumer price index.

### ***Salary Measure to Calculate Pension Values***

DB pension entitlements depend directly on the past earnings of the individual worker, but the way in which these are brought into a formula to calculate a pension differs depending on the country. There are two general extreme cases: to consider the whole history of earnings, and to consider only the most recent periods. Table 6.4 shows whether lifetime average or a limited number of best or final years of salaries are used.

Extremes are not usually observed. Countries that rely on the whole career earnings often leave out of the formula the best and the worst years to reduce the impact of outliers and fraud. Countries with DB

systems are inclined to use the best or the last years of contribution, but three large ones tend to use the whole career (United States, Canada and Brazil). For the DC countries, there is no explicit rule, but implicitly the whole career is considered because final savings are affected by all years. Countries with DC systems may define an indexation rule for salaries, although this is usually implicit in the way interests are earned and in the rules to calculate annuities. That is, at the time of retirement, the value of the annuity is defined considering future real interest rates (net of inflation), and so annuity values usually adjust with inflation.

According to *Pensions at a Glance 2009*, almost every OECD country uses the full lifetime average of earnings to calculate benefits possibly cutting the best and worst years. However, there are some exceptions: Greece, Spain, France and Norway still base their calculation in the best or final years (OECD 2009).

### ***Pensionable Ages***

Table 6.5 shows contributions and qualifying conditions in LAC social security pension schemes for the year 2011. Retirement ages are usually around 60 and 65, with only a few countries extending to 67 (United States and Barbados). On the other hand, several countries in the Americas that operate DB systems have kept values at 60 or below, and most have lower pensionable ages for women. In contrast, OECD countries in general have matched the statutory retirement ages of men and women.

The parameter of pensionable age is directly relevant for DB systems: whatever the level and length of contribution, the pensionable age usually defines eligibility for a benefit.

In DC plans, the age to become eligible to withdraw pension benefits is usually defined by a minimum amount of savings in relation to the minimum guaranteed pension. In further detail, the key parameter for DC plans is the ratio at a given age of the value of savings (that comes from the earnings,

the proportion of earnings that must be paid into the individual account, and historical interest rates), to the present value of the guaranteed minimum pension (that is defined by the regulations on life tables, discount factors and safety margins). When that ratio is above unity, the individual can begin withdrawing retirement benefits. Thus, workers with high densities of contributions and high salaries may access the regulated IRA funds at younger ages with no restrictions, while others may have to wait and meet conditions to obtain a guaranteed pension before saving enough to retire on the basis of only their individual fund.

The objective in Table 6.6 is to search for the best way to measure the payroll cost of pension regimes in countries with DC systems. This exercise is not easy given the interaction with disability and survivors insurance, and because regulations regarding administration costs change from country to country. For example, administration costs are sometimes regulated and sometimes differ between pension fund managers (PFM); in other occasions they are sometimes collected as part of social security contributions and sometimes directly from the IRA. On the other hand, it is important to notice that the relevant rows for Chapter 7 are only "IRA (capitalized contribution)" and "Administration costs", which will be applied according to the specific rules of each country. The amounts in the row "Administration costs" of Table 6.6 were calculated as the division of the quotient of PFM income between total collection, multiplied by the rate of contribution, using data from AIOS (2010). This is more or less the total value of commissions divided by the taxable salaries. The costs calculated in this way are in general similar to those presented by AIOS, with differences that can be statistically justified.

Two points are important regarding Tables 6.5 and 6.6. The first is that split or specify contributions charged to finance retirement benefits, on the one hand, and disability and survivorship on the other, is

only an approximation. The covered risks are linked in a complex and indissoluble way, and the design of pension systems recognizes this fact. Indeed, in countries with DB systems no distinction is made between insurance branches for contribution purposes; nevertheless, actuarial studies make this distinction for analytical purposes. This is a limitation that should be kept in mind. It is also worth mentioning that the separation between employer and employee contributions is considered a minor issue for the analysis of labor markets, because the effect on employment of a mandatory contribution depends only on the difference between the gross salary paid by employers and the net salary received by employees. Nevertheless, the separation among payments by employer or employee becomes important when legislation on taxable earnings gives special treatments to each side.

### ***Early and Late Retirement***

The issue of early and late retirement refers to how the rules and conditions to calculate a pension are modified when workers retire or continue working at ages different to the statutory retirement age. DB systems usually allow workers to retire before reaching pensionable age applying a decrease to the value of the pension, or allow working after the statutory age and pay a bonus in the value of the pension. In DC systems the concept of early retirement is useful only in regard to the guaranteed minimum pension. Individuals can certainly retire at any age, so early and late retirement refer to the actuarial or tax penalties and benefits that arise from retiring before or after the statutory reference age.

It is not easy to find a general pattern across countries of the value of penalties and bonuses for early or late retirement. These values may seem too low or too high to the casual observer, ranging from zero to perhaps 3 or 4% per year.

Late retirement is usually compensated with a higher pension in DB schemes. For example, in Nicaragua, the pension is increased by 1% for every 50 weeks of contribution until age 65. In the United States, an increased retirement pension is provided if the insured decides to keep working after meeting full retirement age up until 70 years. The increase factor depends on the year the insured was born, for example, if born in 1943 or later, 8% per year is added for each year the beneficiary delays signing up for social security beyond the full retirement age. In Canada Pension Plan (CPP), the benefit for a late pension increases from 0.5% to 0.7% per month; this means that, by 2013, if a beneficiary starts receiving a retirement pension at the age of 70, the pension amount will be 42% more than it would have been if the recipient had taken it at 65. In Ecuador, if the insured is affiliated to the *Régimen de Jubilación por Solidaridad Intergeneracional (RJSI)*, the increase factor is 3% for each additional year, up to a maximum of 30%. In Costa Rica, the increase factor is equal to 0.13% for every month that retirement is postponed. Finally, in Panama the late-retirement adjustment is 2% for each 12 contributions in excess after reaching pensionable age.

Analogously, DB schemes apply a decrease in the value of the pension for early retirement. In the United States, a reduction factor is applied for each month before the full retirement age (currently 66, increasing gradually up to 67 by the year 2027); when the full retirement age is 66, the reduction for starting the retirement benefits at 62 is about 25%. In CPP, starting in 2012, the beneficiary will be able to begin receiving the retirement pension by age 60 without any work interruption (the work cessation test is only in effect

until the end of 2011). From 2012 to 2016, the early pension reduction will gradually increase from 0.5 to 0.6% per month. This means that, by 2016, if the beneficiary starts receiving a CPP pension at age 60, the pension amount will be 36% less than it would have been had the pensioner taken it at age 65.

In the Quebec Pension Plan (QPP), we see a case in which early retirement is explicitly linked to a decrease in labor activity. Beneficiaries should meet one of the following conditions: i) estimated employment earnings for the first 12 months during which a pension is paid must not exceed C\$12,075 in 2011; ii) the beneficiary should not be self-employed and should have an agreement with the employer to reduce the work hours in view of retirement and reduce the salary by at least 20%.<sup>2</sup>

In some countries (Argentina, Colombia, Venezuela), the general pension system allows early retirement for workers in unhealthy environments. On the other hand, the more common way to protect these cases is through specialized work risks insurance, where the relevant concept is not early retirement, but retirement due to disability. In Peru, in the DB plan, workers dismissed after personnel reduction or collective dismissal, are entitled to an early retirement with 20 years of contributions. The pension is reduced in 4% for each year it is anticipated.

Thus, there is quite a bit of variation across DB countries in the value of the actuarial bonuses or penalties for late or early retirement. It is not easy to link this variation with real interest rates, inflation rates, indexation rules or other variables that affect real pension values. They seem to be rules of thumb that reflect the legacy of inflation as well as country-specific preferences.

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<sup>2</sup> <http://www.servicecanada.gc.ca/eng/home.shtml> and <http://www.rrq.gouv.qc.ca/en/accueil/Pages/accueil.aspx>, consulted on August 8<sup>th</sup> 2011.

In DC countries, work after the statutory retirement age results in an increase in pension values that typically will be higher than the values offered by DB systems. The reasons are that interest rates are usually higher than the rates used by DB systems to calculate bonuses for late retirement, that the DC pension applies over a shorter number of years for each period of delayed retirement, and that DC schemes provide a savings and bequest value while a "lost year" of DB pension sends the resources back to the general fund. For symmetrical arguments, DC systems usually reduce pensions more than DB schemes in cases of early retirement.<sup>3</sup> Thus, in general, DC systems provide higher economic values for late retirement than DB schemes.

### ***Additional Issues***

Three major issues that affect retirement decisions are the possibility of reintegration to work, disability, and the value of benefits to the family. Chapter 7 does not include the rules of pension schemes that relate to these. On the first two, it is nevertheless useful to mention that they may grow in importance in coming years due to the aging of the labor force. Aging will open up labor market spaces for retirees, and programs that facilitate reintegration in general or the disabled in particular will grow in importance. On the third one, in addition to the problem of identifying and modeling pensions for widows, orphans and other beneficiaries, social changes may substantially alter the map of the problem.

In most of the analyzed countries (around 70%), retirement pension is compatible with reintegration to paid work, nevertheless, a general rule is to keep mandatory contribution to the social security or health insurance system, and often there can be a reduction in the pension if other earnings are high.

In Latin America, in at least 10 countries, disability pensions migrate to become a retirement/old-age pension at the pensionable age. Usually, disability and retirement pensions cannot be received simultaneously. Nevertheless, there are some exceptions. In Guatemala and Panama, in some cases a beneficiary might simultaneously be receiving more than one pension; for example, in the case of widows and disability. In Bolivia, old-age pensioners who become disabled and meet the requirements to qualify for a disability benefit are entitled to receive both pensions simultaneously. In Uruguay, the recipient of a disability pension continues with the same pension, except in the case that the person prefers to receive old-age pension. In Argentina and Venezuela, and in most other territories, the disability pension is incompatible with any other type of pension; nevertheless, it is possible to receive the disability pension when resigning to the other pensions.

On the issue of valuing the pensions paid to beneficiaries, one strategy has been to assume a family structure that is linked to the rules to grant pensions. For example, it can be assumed that married workers are matched with a distribution of spouses of different ages. One challenge is to model demographics into the formulas and to collect rich data to feed the models. An additional challenge is that family structure changes in ways that are not easy to predict and that are not captured by demographic models. Two major phenomena are divorce and the possible convergence of life expectancies of males and females. The high incidence of divorce in contemporary societies has motivated social security to adopt rules to redistribute pension benefits between former spouses. The questions around these rules are significant to solve equity issues between the genders. The possible convergence of life expectancies of males and

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<sup>3</sup> The reader may notice that this paragraph has to be qualified by the possibility of episodes of large increase or decrease in salaries, which can interact with the rules for calculating pensions in DB systems.

females means that in the future there will be relatively less female widows than in the past, and also that marriage between older adults may become more common.

Needless to say, the modeling problems to standardize the evaluation of benefits across national pension systems are significant. Chapter 7 presents a set of results for the Americas that deal with important problems, although some others shall be left for future research. Below are some specific issues to keep in mind:

- The reader may notice that the tables in this chapter include information not used in Chapter 7. There, only the "full career" case is studied, so the rules related to short working careers are not used.
- Changes have been frequent in only the last four years, underlining the need for frequent evaluations. Between 2007 and 2011, at least 20% of the countries had major changes in legislation; essentially rendering invalid direct comparisons with calculations performed using 2007 assumptions.
- There is not always a simple correspondence between written laws and practice, because laws are fuzzy, they leave decisions to the administration and there are even cases in which laws were approved but not applied due to veto or implementation problems.



**Table 6.2**  
**Minimum and Maximum Pension Values in Old Age Social Security Pension Schemes in LAC, 2011**  
 (money values in local coin and USA dollar equivalence when applicable)

Country	Type	Minimum pension	Maximum pension
Anguilla	DB	30% of average insurable salaries.	60% of average insurable salaries.
Antigua & Barbuda	DB	25% of average insurable salaries.	50% of average insurable salaries.
Argentina (pesos)	DB	2011: \$1,227 (US\$308) per month.	2011: \$8,994 (US\$2,261) per month.
Aruba (florins)	DB	All residents are entitled to a pension at age 60. 2011: Full pension for a single person of \$1,057 (US\$597) per month; \$1,780 (US\$1,005) for a couple.	
Bahamas	DB	30% of average insurable salaries.	60% of average insurable salaries.
Barbados	DB	20% of average insurable salaries.	60% of average insurable salaries.
Belize	DB	30% of average insurable salaries.	60% of average insurable salaries.
Bolivia (bolivianos)	DC	Depends upon years of contribution; in 2011, \$1,300 (US\$185) with 35 years of contribution.	Ceiling on contributions, no maximum pension is specified.
Brazil	DB	Minimum salary.	Upper limit of the salary of contribution.
British Virgin Islands	DB	30% of average insurable salaries.	60% of average insurable salaries.
Canada (CPP/QPP; Canadian dollars)	DB	Old Age Security (OAS) is provided to anyone aged 65 who meets residence requirements. 2011: \$524 (US\$499) per month. Also a means-tested benefit for the elderly, known as guaranteed income supplement (GIS) is provided.	In 2011, the maximum monthly pension amount at age 65 is \$960 (US\$914).
Chile (pesos)	DC	Solidarity basic pension ( <i>PBS</i> ) is \$75,000 (US\$151) in 2011.	Ceiling on contributions, no maximum pension is specified.
Colombia	DB or DC	DB or DC: minimum salary.	DB: 80% of base salary or 25 minimum salaries. DC: ceiling on contributions, no maximum pension is specified.
Costa Rica (colones)	DB & DC	Minimum monthly pension equals \$110,120 (US\$214) in 2011.	DB: Maximum monthly pension equals \$1,297,677 (US\$2,518) in 2011. DC: No maximum pension is specified.
Cuba (pesos)	DB	\$200 (US\$216) in 2011.	90% of the worker's average salary.
Curaçao (florins)	DB	All residents are entitled to a pension at age 60. 2011: Full pension is \$818 (US\$459) per month.	
Dominica	DB	30% of average insurable salaries.	60% of average insurable salaries.
Dominican Republic	DC	Contributory system: 100% of the lowest minimum salary. Subsidized scheme: 60% of the minimum salary. Subsidized contributory scheme: 70% of the minimum salary.	Ceiling on contributions, no maximum pension is specified.

Table 6.2 (continued)

Country	Type	Minimum pension	Maximum pension
Ecuador	DB	US\$264 in 2011.	US\$1,500 in 2011.
El Salvador	DC	US\$143 in 2009.	Ceiling on contributions, no maximum pension is specified.
Grenada	DB	30% of average insurable salaries.	60% of average insurable salaries.
Guatemala (quetzales)	DB	\$340 (US\$43) in 2009.	\$4,800 (US\$603) for a single person, 80% the base salary or \$6,000 (US\$753) for a couple.
Honduras	DB	50% of base salary.	80% of base salary.
Mexico (pesos)	DC	1997 value of the minimum salary indexed to inflation. In 2009, the amount was \$1,934 (US\$161).	Ceiling on contributions, no maximum pension is specified.
Nicaragua	DB	Two-thirds the minimum salary. Reduced pensions at least 40% of the base salary.	Case 1: base salary is equal to or less than twice the minimum salary, then maximum pension equals 100% of the base salary. Case 2: base salary larger than twice the minimum salary, pension is smaller or equal than 80% of the base salary. Case 3: retirement pension plus family allowances are smaller or equal than 100% the base salary.
Panama (balboas)	DB & DC	\$185 (US\$185) in 2010.	DB: \$500 (US\$500) in 2011. DC: No maximum pension is specified.
Paraguay (guaranies)	DB	\$300,000 (US\$66) in 2009.	The maximum monthly old-age pension is 300 times the minimum daily salary.
Peru (soles)	DB or DC	DB: In 2009, \$415 (US\$148). DC: minimum pension set by law, \$415 in 2009.	DB: \$857 (US\$306). DC: No maximum pension is specified.
St. Kitts & Nevis	DB	30% of average insurable salaries.	60% of average insurable salaries.
St. Lucia	DB	40% of average insurable salaries.	60% of average insurable salaries.
St. Vincent & Grenadines	DB	30% of average insurable salaries.	60% of average insurable earnings.
Turks & Caicos Islands	DB	30% of average insurable salaries.	60% of average insurable salaries.
United States (dollars)	DB	If earnings are smaller than the special minimum primary insurance amount, a minimum pension that depends on lifetime total years of coverage, varying between \$35 for 11 years and \$731 for 30 years. Also a means-tested benefit for the elderly, known as supplemental security income (SSI) is provided.	For a worker retiring at age 66 in 2011, the maximum monthly social security retirement benefit equals \$2,366. This figure is based on earnings at the maximum taxable amount for every year after age 21.
Uruguay (pesos)	DB & DC	\$2,221 (US\$111); additional \$2,916 (US\$146) were paid to insured persons without any other source of income or support in 2009.	DB: 7 minimum salaries. DC: No maximum pension is specified.
Venezuela	DB	Retirement pension is larger or equal than 40% the referential salary.	Not available.

Source: Own construction based on SSA 2009 and more recent social security legislations.



**Table 6.3**  
**How Pensions are Uprated in Social Security Pension Schemes in LAC, 2011**

Country	Benefit adjustment /Pension increases	Periodicity
Anguilla	Ad hoc basis	Not specified
Antigua & Barbuda	Ad hoc basis	Not specified
Argentina	A mobility coefficient "m" is applied, resulting from budget resources, inflation, and variation in the collection of contributions by ANSES	Every 6 months
Aruba	CPI	Annually
Bahamas	CPI	Every 2 years
Barbados	Average prices or average salaries in the 3 previous calendar years, whichever is lower	Annually
Belize	Ad hoc basis	Not specified
Bolivia	Unit for Housing Promotion ( <i>Unidad de Fomento a la Vivienda, UFV</i> ), calculated by the Central Bank according to changes in the cost of living	Annually
Brazil	CPI	Annually
British Virgin Islands	CPI	Annually
Canada	CPI	Annually
Chile	Unit of Promotion ( <i>Unidad de Fomento, UF</i> ). The <i>UF</i> is adjusted according to changes in the CPI	Automatic adjustment
Colombia	CPI	Annually
Costa Rica	Ad hoc basis	Not specified
Cuba	Benefits are adjusted by decree, based on social and economic factors	Not specified
Curaçao	CPI	Annually
Dominica	CPI	Every 3 years
Dominican Republic	Changes in the public-sector minimum salary	Not specified
Ecuador	Inflation	Annually
El Salvador (annuity)	CPI (if annuity in colones) or regulation by the National Pension Institute (if annuity in USD)	Annually if annuity in colones
Grenada	Ad hoc basis	Not specified
Guatemala	Benefits are adjusted according to financial assessment of the program	Not specified
Honduras	Ad hoc basis	At least every 5 years
Mexico (annuity)	CPI	Annually
Nicaragua	Ad hoc basis	Not specified
Panama	Ad hoc basis	Not specified
Paraguay	Cost-of-Living Index issued by the Central Bank	Annually
Peru	DB: According to budget resources DC: CPI	Not specified Quarterly

Table 6.3 (continued)

Country	Benefit adjustment /Pension increases	Periodicity
St. Kitts & Nevis	Ad hoc basis	Not specified
St. Lucia	Ad hoc basis	Not specified
St. Vincent & Grenadines	Ad hoc basis	Not specified
Turks & Caicos Islands	Ad hoc basis	Not specified
United States	Changes in the cost of living (COLA)	Annually
Uruguay	Civil Servants' Average Salary Index	Not specified
Venezuela	Changes in prices and salaries	Not specified

Note: CPI: Consumer Price Index.

Source: Own construction based on SSA 2009 and more recent social security legislations.

 Table 6.4  
 Salary Measure in LAC Social Security Pension Schemes, 2011

Country	Measure of individual earnings	Country	Measure of individual earnings
<b>A. Defined Benefit (DB)</b>		<b>A. Defined Benefit (DB) continued</b>	
Anguilla	Best 3 out of 15 years.	St. Lucia	Best 5 out of 10 years.
Antigua & Barbuda	Best 5 out of 10 years.	St. Vincent & the Grenadines	Best 3 out of 15 years.
Argentina	Final 10 years.	Turks & Caicos Islands	Best 3 out of 10 years.
Aruba	Not applicable.	United States	Best 35 years.
Bahamas	Best 5 out of 10 years.	Venezuela	Highest of final 5 or 10 years.
Barbados	Best 5 years.		
Belize	Best 3 out of 10 years.	<b>B. Defined Contribution (DC)</b>	
Brazil	Lifetime average excluding worst 20% years.	Bolivia	Not applicable.
British Virgin Islands	Best 10 out of 15 years.	Chile	Not applicable.
Canada	Lifetime average excluding worst 15% years.	Dominican Republic	Not applicable.
Cuba	Best 5 out of final 15 years.	El Salvador	Not applicable.
Curaçao	Not applicable.	Mexico	Not applicable.
Dominica	Best 10 out of 15 years.	<b>C. Mixed or Integrated, DB Component</b>	
Ecuador	Best 5 years.	Costa Rica	Final 60 months.
Grenada	Best 5 out of 10 years.	Panama	Best 10 years.
Guatemala	Final 60 months.	Uruguay	Highest of final 10 years or best 20 years plus 5%.
Honduras	Highest of final 3 or 5 years.	<b>D. Parallel, DB Component</b>	
Nicaragua	Highest of final 250 weeks or previous 250 weeks, multiplied by 4.08. Different rules with more than 1,000 or 1,250 weeks of contribution.	Colombia	Highest of final 10 years or lifetime average.
Paraguay	Final 36 months.	Peru	Final 60 months.
St. Kitts & Nevis	Best 3 out of 10 years.		

Source: Own construction based on SSA 2009 and more recent social security legislations.

Table 6.5  
 Contributions and Qualifying Conditions in LAC Social Security General Pension Regimes, 2011<sup>1/2/</sup>

Country	Contributions to social security (%)			Qualifying conditions (men/women)		
	Employee	Employer	Total <sup>3/</sup>	Pensioners <sup>4/</sup>	Pensionable age	Years of contribution
Anguilla	5.00	5.00	10.00	--	65/65	10/10
Antigua & Barbuda	3.00	5.00	8.00	--	60/60	10/10
Argentina	11.00	17.00	28.00	3.00	65/60	30/30
Aruba	3.50	9.00	12.50	--	60/60	Years of residence
Bahamas	3.90	5.90	9.80	--	65/65	10/10
Barbados	10.10	11.25	21.35	--	66/66. Gradually increasing to 67 by 2018	10/10
Belize	1.5-3.0 <sup>5/</sup>	5.0-6.5 <sup>5/</sup>	8.00	--	65/65	10/10
Bolivia	12.61	None	12.61	3.00	(1): 58 (2): Any age but pension at least 60% of salary measure	120 periods --
Brazil	8-11 <sup>5/</sup>	20.00	28.0-31.0	--	65/60 Any age	15/15 35/30
British Virgin Islands	4.00	4.50	8.50	--	65/65	10/10
Canada (QPP/CPP)	4.95	4.95	9.90 <sup>6/</sup>	--	65/65	Full pension requires about 40 years of contributions but 1 valid contribution is sufficient to generate an entitlement
Chile	10.00	1.49	12.49 <sup>7/</sup>	--	(1): 65/60 (2): As of 2012: any age but: i) pension is at least 70% of earnings in the final 10 years, and ii) pension larger or equal than 80% the maximum pension with solidarity contribution (PMaS)	20/20 --
Colombia <sup>8/</sup> (parallel)	4.0-6.0 <sup>5/</sup>	12.00	16.00	12.00	DB: 60/55 changing to 62/57 by 2015 DC: At the age of their choice, as long as the accumulated capital is enough for minimum pension greater than 110% the minimum salary	20/20 changing to 25/25 by 2015 --
Costa Rica (mixed)	3.86	8.17	12.03	5.00	DB & DC: 65/65	25/25
Cuba	None	12.50 <sup>9/</sup>	12.50	--	65/60	30/30
Curaçao	6.00	7.00	13.00	--	60/60	Years of residence
Dominica	4.00	6.75	10.75	--	60/60	10/10

Table 6.5 (continued)

Country	Contributions to social security (%)			Qualifying conditions (men/women)		
	Employee	Employer	Total <sup>3/</sup>	Pensioners <sup>4/</sup>	Pensionable age	Years of contribution
Dominican Republic	2.87	7.10	9.97	--	(1): 60/60 (2): 55/55 years but pension at least 50% the minimum pension	30/30 --
Ecuador	6.64	3.10	9.74	--	(1): 60/60 (2): Any age	30/30 40/40
El Salvador	6.25	Up to 6.55	Up to 12.80	7.80	(1): 60/55 (2): Any age but pension at least 60% the salary measure, which has to be larger than or equal to 160% the minimum pension	25/25 --
Grenada	4.00	5.00	9.00	--	60/60	10/10
Guatemala	1.83	3.67	5.50	--	60/60	15/15
Honduras	1.00	2.00	3.50	--	65/60	15/15
Mexico	1.81	7.19	10.30 <sup>7/10/</sup>	0.375	(1): 65/65  (2): Any age but annuity at least 30% the minimum pension guarantee	1,250 weeks; only 750 weeks for health and maternity insurance for retirees --
Nicaragua	4.00	7.00	11.00	--	60/60	15/15
Panama <sup>1/</sup> (mixed)	8.5/9.25	4.0/4.25	12.5/13.5	6.75	DB & DC: 62/57	18/18 changing to 20/20 by 2013
Paraguay	9.00	14.00	12.50 <sup>12/</sup>	6.00	(1) 60/60 (2) 55/55	25/25 30/30
Peru <sup>13/</sup> (parallel)	13.00/12.72	None/None	13.00/12.72	DB: 4.00	DB: 65/65 DC (1): 65/65 DC (2): Any age but individual retirement account at least 50% of average indexed earnings in the last 120 months	20/20 -- --
St. Lucia	5.00	5.00	10.00	--	63/63 changing to 65 in 2015	14 changing to 15 by 2012
St. Kitts & Nevis	5.00	6.00	11.00	--	62/62	10/10
St. Vincent & Grenadines	3.50	4.50	8.00	--	60/60	10/10
Turks & Caicos Islands	3.40	4.60	8.00	--	65/65	10/10
United States	6.20	6.20	12.40	\$96.40 USD /month (2009)	66/66 changing to 67 by 2027	10/10, if born after 1929

Table 6.5 (continued)

Country	Contributions to social security (%)			Qualifying conditions (men/women)		
	Employee	Employer	Total <sup>3/</sup>	Pensioners <sup>4/</sup>	Pensionable age	Years of contribution
Uruguay <sup>4/</sup> /(mixed)	15.00; allocation may vary between BPS and the AFAP	7.50	22.50	3.00	DB & DC: 60/60 DC: Option to retire at age 65 with no coverage requirement DB & DC: Individuals may receive an old age pension (OAP) through AFAP and continue working until fulfilling the requirements to be eligible for an OAP through BPS	30/30 --
Venezuela	4.00	11.0-13.0 <sup>5/</sup>	16.5-18.5 <sup>5/</sup>	--	60/55	15/15

Notes: BPS: Banco de Previsión Social, Uruguay, AFAP: Uruguayan pension fund manager. 1/Contributions are reported as contributions to disability, old age and survivors regime (VM); Only salaried workers with low-risk jobs are considered; Small enterprises are excluded. 2/We assume individuals enter the labor market at age 20 and work without any interruption until pensionable age. 3/Some systems also receive support from the central government; therefore, "Total" amounts may be higher than the sum of columns "Employee" and "Employer". 4/Contributions paid by pensioners are for health services from social security (vertically integrated) institutions. 5/Depending on earnings level. 6/In QPP, as of 2012, gradually increasing to 10.8% in 2017. By 2018, an automatic mechanism will be implemented, allowing alignment with the Plan's steady-state rate. 7/The difference between the columns "Total" and "Employee" and "Employer" is due to administration costs. 8/Rates apply to both DB and DC cases. 9/Tax rate is 14% but only 12.5% for pensions. 10/The federal government pays a social fee which increases IRA savings in 6.4% of salaries for workers who gain the minimum salary, up to 0.3% of salaries for workers who gain 15 times the minimum salary. A 5% contribution to the National Housing Fund can be added to pension savings if housing credit not used. 11/Rates for 2011 and beginning in 2013. 12/Tax rate is 24.5% but only 12.5% is for pensions. 13/DB/DC. 14/Low salary workers enter by default the DB scheme; share going to DC scheme increases with salary level.

Source: Own construction based on SSA 2009 and more recent social security legislations.

**Table 6.6**  
**Contribution in DC Systems**  
 (% of salary)

	Bolivia	Chile	Colombia	Dominican Republic	El Salvador	Mexico	Peru
Total	12.61	12.49	16.00	9.97	12.80	10.30	12.72
IRA (capitalized contribution)	10.00	10.00	11.50 <sup>1/</sup>	8.00	10.30	6.50 <sup>2/</sup>	10.00
DSI <sup>3/</sup>	1.71	1.49	1.40	1.00	1.20	2.50	1.12
Solidarity fund	0.50	--	1.50	0.40	--	--	--
Administration cost <sup>3/</sup>	0.40	1.00	1.60	0.57	1.30	1.30	1.60

Notes: 1/Employee tax is higher when earnings are equivalent to 4 minimum wages or more (up to 2 percentage points). 2/The federal government pays a social fee which increases IRA savings in 6.4% of salaries for workers who gain the minimum salary, up to 0.3% of salaries for workers who gain 15 times the minimum salary. A 5% contribution to the National Housing Fund can be added to pension savings if housing credit not used. 3/Administrative fees and disability and survivors insurance (DSI) rates usually vary according to the provider of pension fund management services. For Chile, the amount of DSI was taken from <http://www.safp.cl>, on September 2011. For Colombia, the amount was taken from *ING Pensiones*, on September 2011.

**CHAPTER 7**  
**INDICATORS OF OLD-AGE PENSION**  
**BENEFITS IN THE AMERICAS**

## CHAPTER 7

# INDICATORS OF OLD-AGE PENSION BENEFITS IN THE AMERICAS

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### 7.1 Introduction

Old-age pension policy has a long-term perspective. To guarantee the future payment of promises, pension programs require adjustments to their parameters or a redesign due to changing social, economic and demographic conditions. The Americas is a quite heterogeneous region in terms of the structure of old-age pension programs. While many countries especially in the Caribbean and Central America have defined benefit (DB) schemes, others (Chile, Mexico, El Salvador, Dominican Republic, Bolivia, Peru) have moved to defined contribution (DC) schemes or to a combination of DB and DC elements (Costa Rica, Panama, Uruguay); in North America, while DB schemes remain the primary component of the pension system, there have been large gains in the share of capitalized options to finance retirement.

This chapter is aimed at monitoring pension benefits with a perspective of fairness and financial sustainability. The approach focuses attention on the adequacy of future benefits. By knowing the value of future pension benefits, we can also have a proxy of the debt incurred by social security institutions and governments through their social security pension programs. To the best of our knowledge, this study is one of the first efforts to monitor indicators of

social security pension benefits across countries in the Americas.

Two main indicators of pension benefits are examined: *replacement rates*, which show the value of the pension in relation to an earnings measure, and thus, says something about adequacy (do pensioners have acceptable standards of living, measured with respect to an income of reference?); and *pension wealth*, which shows the present value of expected pension benefits, and thus provides an indication of the amount of debt incurred by social security pension regimes at the moment of retirement. The two main indicators are examined by gender as well as in gross and net terms. Results follow two scenarios. In the first scenario assumptions are closer to those used in OECD (2011). In the second, inflation rates reflect mid-term national experiences.

The main questions addressed in this chapter are:

- What is the indicator of average pension benefits in Latin America and the Caribbean?
- What is the variation of expected pension benefits according to gender, the level of salary, and type of pension regime?
- What is the difference between gross and net indicators?
- Which countries have the highest and lowest replacement rates and pension wealth?



- What can be said about variation in pension benefits across and within regions?
- What is the impact of inflation on replacement rates and pension wealth?

The results show that the average gross replacement rate across LAC countries is 49%. To avoid repetition of symbols, in what follows, all references to replacement rates are understood as percent values of the last salary. Net replacement rates are on average 11% higher than gross rates. Countries with DC and mixed regimes have higher average replacement rates (57.2 and 57.7 respectively) than countries with DB regimes (47.8). In LAC, on average women have lower rates than men (47.1 against 50.5). Canada has an average net-to-gross difference in replacement rates of 23.4% and the United States of 26.6%.

Average gross pension wealth across the distribution of salaries in LAC countries is 8.4 (pension wealth is expressed as the number of times of last annual salary). When looking at it with respect to type of pension regime it is 10.9 in mixed, 9.5 in DC and 8.2 in DB regimes. Average net pension wealth is 9.4 (9 for men and 9.7 for women); this also represents a difference of about 11% between net and gross pension wealth.

The second scenario weighs the likely effects of inflation on replacement rates and pension wealth; in general, inflation reduces the value of both. The average gross replacement rate in this scenario is 46.2, for an average negative impact of 6% with respect to the baseline. The impact is similar across genders, but not across scheme type. By type of pension regime, the impact of inflation is a negative 13% in countries with mixed regimes, a negative 7% in DB regimes, and only a negative 2% in DC regimes. Thus, the moderate inflation rates of recent years affect pension values in around 5 to 6%, but the impact is much larger for DB systems. It is also found that net-to-gross differences in indicators are just slightly affected by inflation. Mixed pension regimes seem to be the most affected by increasing inflation because

there are more in-built floors and ceilings to values that have to be revalued according to prices to calculate pension benefits.

A class of studies on old-age pensions for the region has focused on institutional or legal aspects of pension regimes (for example, SSA 2009, OISS 2007, and Mesa-Lago 2000, 2004, 2010), or have attempted to evaluate pension reforms (see for example, some studies by the World Bank 1994, 2006). On the issue of the measurement of benefits the literature is more recent and has a small coverage of countries in the Americas. We follow in the baseline scenario the assumptions adopted by the OECD in the report series *Pensions at a Glance* (OECD 2005, 2007, 2009, and 2011) because this provides comparability with a wider set of countries, including four in our region that are members of that organization (Canada, Chile, Mexico, and the U.S.), plus two that have been included by OECD researchers (Argentina and Brazil). The World Bank (Whitehouse 2007) has published a study for 53 countries, including 9 DC systems from LAC. For the Caribbean, a significant reference is the Dorfman and Forteza study in World Bank (2010). Finally, An ECLAC publication by Duran and Peña (2011) has also discussed this topic. Section 7.5 delves more deeply in the analysis provided by these studies.

This study has been possible thanks to the cooperation of CISS-member institutions. Due to fragmentation of pension systems in the region (see Chapter V, CISS 2005) we only pay attention to the rules of the main general social security pension regime in each country. This means that, while OECD studies focus on countries with pension systems with almost universal coverage and three tiers (social assistance, earnings-related, and voluntary pensions) regarding pension system design, this study focuses exclusively on earnings-related, social security schemes (the second-tier). First-tier components are only included if they are fully integrated with the general pension system.

The rest of this chapter is organized as follows: Section 7.2 describes the methodology, assumptions, and data used for modeling pension benefits. Section 7.3 presents the results of our calculations of indicators of pension benefits in the baseline scenario. Section 7.4 looks at the same indicators in a scenario that models benefits using the observed inflation across countries. Section 7.5 examines our results in relation to previous literature on the measurement of pension benefits in the Americas, and Section 7.6 concludes.

## 7.2 Modeling Pension Benefits

### *Methodology*

We look at prospective individual old-age pension entitlements in the main mandatory social security pension regimes. Other types of old-age pensions such as non-contributive for the poorest poor or voluntary saving are not included in the analysis, except when the rules to grant them are fully integrated with the general contributory system.

Once we obtain individual prospective old-age pension benefits, we construct two main indicators of retirement income. The indicators are *replacement rates*, defined as the ratio of pension benefits to individual pre-retirement salaries, and *pension wealth*, defined as the present value of pension benefits from the moment the individual reaches the statutory pensionable age and for the remaining of his life. Pension wealth is a more comprehensive measure of pension entitlements than a replacement rate as it considers other variables such as pensionable age, life expectancy and indexation of pensions.

The examined indicators are presented by gender and in gross and net terms. For LA countries, due to the low coverage of income taxes and the difficulty to measure them, we only considered contributions to social security pension regimes before and after retirement (when the individual reaches the statutory pensionable age); for the English Caribbean income taxes were also considered. The convenience of including income taxes in the construction of net indicators in each country depends upon the degree of integration of the national welfare-tax systems. Not to take into account the income tax in LA countries does not significantly affect the calculations, because the income levels associated to pensions are generally too low for being taxed.

The pension benefits' indicators show how old-age pension entitlements vary across the salary distribution in a range of 50% of the average salary to 5 times the average salary. Since the modeling of old-age pension benefits for Canada and the U.S. goes beyond the analysis of the second-tier that we examine, the indicators presented for these two countries in the chapter correspond to the results found by OECD (2011), for reference purposes.

In the baseline scenario, we make the assumptions used in OECD studies to facilitate comparability with the results found for other regions of the world.<sup>4</sup> Given that Latin America and the Caribbean has been a region with observed financial volatility due to economic crises in the past, we also examine an alternative scenario that accounts for actual inflation rates in each country during recent years.

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<sup>4</sup> Notice, however, that OECD studies consider all sources of retirement income, including social assistance pensions and voluntary saving when coverage of the pension system is nearly universal.

### **Assumptions**

The calculation of pension benefits focuses on a single worker that enters the labor market in 2011 at the age of 20 and makes uninterrupted contributions to the pension regime until reaching the statutory pensionable age. This means that we consider a career length of 40 years if the pensionable age is 60, for example. We neither model benefits of dependants nor invalidity or survivorship benefits.

A single set of economic variables is assumed for the projection of salaries and the calculation of pension benefits. A standard set of assumptions allows controlling for economic conditions and focusing on differences in pension policy. The baseline assumptions are:

- Price inflation: 2.5% per year.
- Real salary growth: 2% per year (given the assumption for price inflation, this implies a nominal salary growth of 4.55%).
- Real rate of return after administrative charges on funded, defined-contribution pensions: 3.5% per year.
- Discount rate (for actuarial calculations): 2% per year.
- Mortality rates: United Nations projections and country-specific projections for the English Caribbean.

Indicators are calculated in gross and net terms, accounting for social security contributions to pension regimes in LA countries, and also by income taxes in the English Caribbean.

### **Data**

The details and background information for each old-age pension regime of CISS-member countries is explained in Chapter 6 of this Report. We assume that current rules for calculating pension benefits will be valid in the future. Parameters such as the level of ceilings in contributions or the value of basic pensions are assumed to remain at the same level in relation

to the average salary in the future, unless rules specifically indicate otherwise.

Initial salaries for projecting old-age pension benefits have been provided by social security agencies; when this information is not available salaries are approximated by information from household surveys. Given the assumption on salary growth, projected salaries are expressed as a multiple of the salary in the initial period.

### **7.3 Indicators of General Pension Regimes**

This section presents the empirical results of future old-age pension benefits of today's workers who contribute to the main general social security regime with different levels of salaries. The first indicator examined is the replacement rate, defined as the individual pension benefit as a proportion of individual pre-retirement salary when working. This indicator is useful when looking at the extent to which a pension regime maintains the standard of living.

We calculate gross and net replacement rates where net means adjusting for social security contributions. Active workers pay full social security contributions on their earnings, while retirees sometimes pay no contributions and sometimes pay some contributions. For example, retirees may be required to pay something for health insurance. In general, the contribution rate is higher for active workers than for retirees, which means that net replacement rates are higher than gross rates. This pattern also holds for the OECD countries studied by Whitehouse (2007).

We also present calculations of pension wealth. As this indicator focuses in all future pension benefits the individual will receive until death, it depends on the level of benefits, the period during which these will be received, and the assumptions about the discount rate. It is also affected by whether benefits are adjusted using the rate of growth of prices or salaries. The payment period depends on the statutory age at which benefits are claimed and on the life

expectancy at that age. For DC pension regimes, the calculations assume that when pension benefits are received at pensionable age they are paid in the form of a standard annuity calculated from mortality data.

### **Replacement Rates**

**Gross Replacement Rates.** Tables 7.1 and 7.2 show the results of gross replacement rates across the salary distribution for 35 CISS-member countries in Latin America and the Caribbean, and North America, for males and females respectively. The level of individual salaries varies from half to five times the average salary.

The average gross replacement rate across countries, salaries, and gender is 48.9 (excluding the U.S. and Canada). Replacement rates vary with respect to type of pension regime. It is 57.7 in mixed systems (Costa Rica, Panama and Uruguay), 57.2 in DC cases (Bolivia, Chile, Colombia, Dominican Republic, El Salvador, Mexico and Peru), and 47.8 in DB regimes (all remaining countries). Women have lower replacement rates because of lower wages and statutory pensionable age, otherwise the indicator is similar by gender. Women have an average gross replacement rate of 47.1 versus 50.5 of men. By type of pension regime, their replacement rate is of 47.4 versus 48.3 of men in DB, 46.1 versus 59.3 in DC, and 53.4 versus 62.1 in countries with mixed schemes. Average-salaried workers (average-earners in the OECD study) receive a gross replacement rate of 44.4 in Canada and 39.4 in the U.S (OECD 2011).

Figure 7.1 compares gross replacement rates by gender across Latin American countries. Average-salaried workers receive gross replacement rates averaging 62.1 (64.3 for males and 59.9 for females). Replacement rates have values between about 40 in Mexico and in the U.S., and about 80 in Paraguay, Nicaragua and Peru-DC (Peru has a parallel DB regime in operation). Ecuador is an outlier: the result of gross replacement rates for average-salaried workers of more than 120 is expected to be adjusted in the near

future; calculations for this country are based on a DB component only as the DC element of the mixed pension regime does not operate in practice. In Bolivia, women show a considerably higher replacement rate, however, the average wage for women is much lower than for men.

Figure 7.2 shows gross replacement rates in the English Caribbean. No difference by gender is identified there. The average-salaried worker receives a replacement rate of 43.3. For most countries in this region the indicator moves in a relatively narrow band around the mean replacement rate: about 4 percentage points below or above in Antigua and Barbuda, Dominica, British Virgin Islands, Grenada, St. Vincent and the Grenadines and Bahamas. Gross replacement rates have smaller values in some countries with DB schemes and flat benefits; such are the cases of Curaçao and Aruba which have gross replacement rates of around 12%. The highest replacement rates, of more than 50%, are found for St. Kitts & Nevis, Barbados, Belize, Turks & Caicos and St. Lucia.

**Net Replacement Rates.** The difference between gross and net indicators is that salaries and pensions are net of contributions to social security (and of income taxes in the English Caribbean). Contributions to social security pensions play a significant role before and after retirement. If the required level of contributions to a national pension regime is high, then we find a large difference between gross and net indicators; by contrast, when required contributions are low, the net-to-gross difference is small. As only a few countries make pensioners pay social security contributions (mainly to finance their health care services), in the calculation of net indicators the salary (the denominator) is more likely to be affected in net terms, which affects the indicator in a positive way (it increases). Tables 7.3 and 7.4 show the calculations of net replacement rates accounting for social security contributions paid on salaries and pensions.

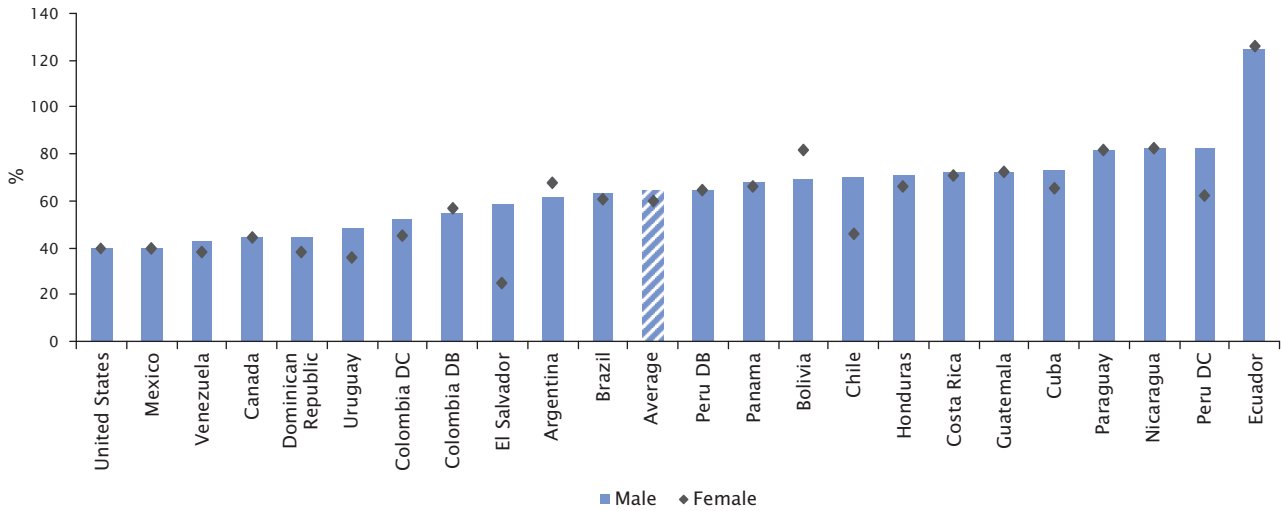
**Table 7.1**  
**Gross Replacement Rates across the Salary Distribution, Males**

	Individual salary, multiple of mean for men								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	49.8	49.8	49.8	49.8	49.8	45.7	38.1	28.5	22.8
Antigua & Barbuda	40.3	40.3	40.3	40.3	32.9	26.4	22.0	16.5	13.2
Argentina	123.6	82.4	61.8	51.9	47.1	44.1	42.2	39.8	38.3
Aruba	24.2	15.4	12.1	8.1	6.0	4.8	4.0	3.0	2.4
Bahamas	47.7	47.7	47.7	34.4	25.8	20.6	17.2	12.9	10.3
Barbados	52.7	52.7	52.7	52.7	42.5	34.0	28.3	21.3	17.0
Belize	54.6	54.6	54.6	36.7	27.5	22.0	18.4	13.8	11.0
Bolivia	114.0	76.0	69.2	69.2	69.2	69.2	69.2	69.2	69.2
Brazil	101.3	67.5	62.7	62.7	62.7	62.7	62.7	62.7	62.7
British Virgin Islands	42.9	42.9	42.9	42.9	37.7	30.2	25.1	18.9	15.1
Chile	69.9	69.9	69.9	69.9	69.6	66.9	62.7	52.4	42.3
Colombia DB	58.0	54.6	54.6	54.6	54.6	54.6	54.6	48.1	48.1
Colombia DC	60.9	45.9	52.2	52.2	52.2	52.2	52.2	52.2	52.2
Costa Rica	73.0	73.0	72.1	71.1	69.0	68.0	68.0	67.0	61.3
Cuba	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4
Curaçao	22.4	14.3	11.2	7.5	5.6	4.5	3.7	2.8	2.2
Dominica	40.4	40.4	40.4	40.4	40.4	40.4	40.4	39.2	31.4
Dominican Republic	44.7	44.7	44.7	44.7	44.7	44.7	44.7	44.6	43.4
Ecuador	161.6	136.7	124.2	111.7	105.4	85.2	71.0	53.2	42.6
El Salvador	44.1	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3
Grenada	44.9	44.9	44.9	44.9	44.9	44.9	39.9	29.9	24.0
Guatemala	72.1	72.1	72.1	72.1	72.1	61.1	50.9	38.2	30.5
Honduras	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8
Mexico	65.4	43.6	39.6	39.6	39.6	39.6	39.6	39.6	39.6
Nicaragua	82.6	82.6	82.6	66.0	50.4	50.4	50.4	50.4	50.4
Panama	68.0	71.5	67.8	62.5	60.4	59.1	58.3	57.2	56.6
Paraguay	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5
Peru DB	88.5	64.9	64.9	60.9	45.7	36.6	30.5	22.9	18.3
Peru DC	82.8	82.8	82.8	82.8	82.8	82.8	82.8	82.8	82.8
St. Kitts & Nevis	52.6	52.6	52.6	52.6	52.6	51.1	42.6	31.9	25.6
St. Lucia	55.0	55.0	55.0	55.0	55.0	55.0	55.0	42.8	34.2
St. Vincent & the Grenadines	46.9	46.9	46.9	46.9	46.9	46.9	46.9	40.3	32.3
Turks and Caicos Islands	54.6	54.6	54.6	54.6	41.3	33.0	27.5	20.6	16.5
Uruguay	77.7	43.9	48.2	52.4	54.5	55.7	56.6	57.6	58.3
Venezuela	43.0	42.8	42.6	42.5	42.5	42.4	36.5	27.4	21.9
Canada (OECD 2011)	76.6	55.2	44.4	29.6	22.2				
United States (OECD 2011)	51.7	43.5	39.4	35.3	29.7				

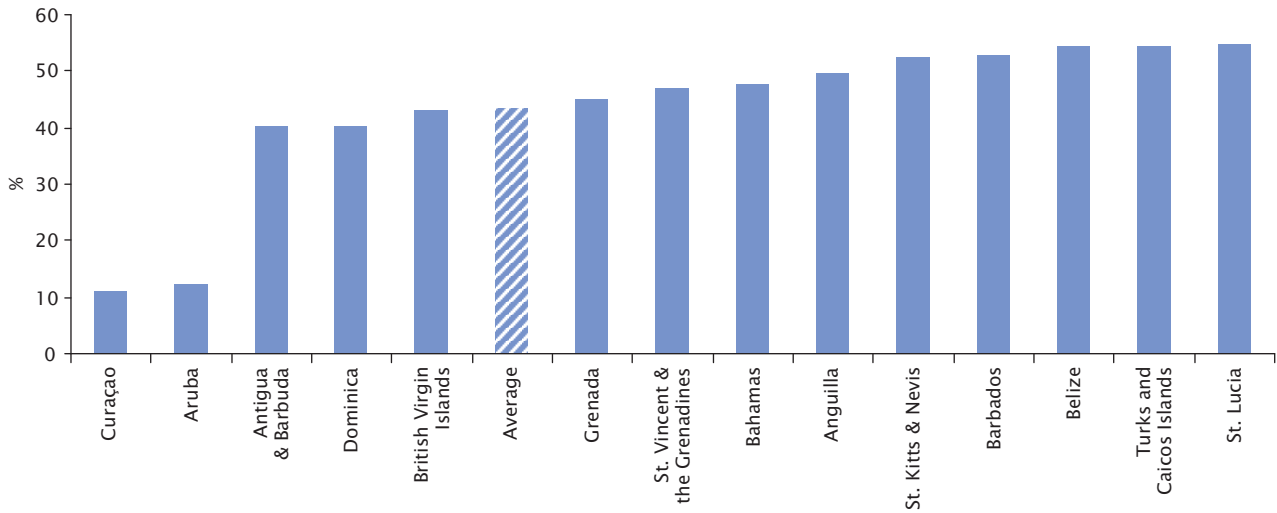
**Table 7.2**  
**Gross Replacement Rates across the Salary Distribution, Females**

	Individual salary, multiple of mean for women								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	49.8	49.8	49.8	49.8	49.8	45.7	38.1	28.5	22.8
Antigua & Barbuda	40.3	40.3	40.3	40.3	32.9	26.4	22.0	16.5	13.2
Argentina	123.6	82.4	67.6	55.9	50.0	46.5	44.2	41.2	39.5
Aruba	24.2	15.4	12.1	8.1	6.0	4.8	4.0	3.0	2.4
Bahamas	47.7	47.7	47.7	34.4	25.8	20.6	17.2	12.9	10.3
Barbados	52.7	52.7	52.7	52.7	42.5	34.0	28.3	21.3	17.0
Belize	54.6	54.6	54.6	36.7	27.5	22.0	18.4	13.8	11.0
Bolivia	162.7	108.4	81.3	60.8	63.8	60.8	54.2	46.0	46.0
Brazil	120.9	80.6	60.5	48.6	48.6	48.6	48.6	48.6	48.6
British Virgin Islands	42.9	42.9	42.9	42.9	37.7	30.2	25.1	18.9	15.1
Chile	53.6	46.6	46.2	46.2	46.2	45.8	44.2	38.8	32.3
Colombia DB	70.1	57.0	57.0	57.0	57.0	57.0	57.0	57.0	56.4
Colombia DC	60.5	40.4	44.9	44.9	44.9	44.9	44.9	44.9	44.9
Costa Rica	72.0	71.0	71.0	69.0	68.0	67.0	66.0	66.0	58.8
Cuba	65.2	65.2	65.2	65.2	65.2	65.2	65.2	65.2	65.2
Curaçao	22.4	14.3	11.2	7.5	5.6	4.5	3.7	2.8	2.2
Dominica	40.4	40.4	40.4	40.4	40.4	40.4	40.4	39.2	31.4
Dominican Republic	40.6	38.2	38.2	38.2	38.2	38.2	38.2	38.2	37.9
Ecuador	165.7	139.4	126.2	113.0	106.4	89.8	74.8	56.1	44.9
El Salvador	29.2	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
Grenada	44.9	44.9	44.9	44.9	44.9	44.9	39.9	29.9	24.0
Guatemala	72.1	72.1	72.1	72.1	72.1	72.1	61.5	46.1	36.9
Honduras	66.4	66.4	66.4	66.4	66.4	66.4	66.4	66.4	66.4
Mexico	79.9	53.3	40.0	31.7	31.7	31.7	31.7	31.7	31.7
Nicaragua	82.6	82.6	82.6	66.0	50.4	50.4	50.4	50.4	50.4
Panama	66.1	67.0	66.5	54.3	48.9	45.7	43.5	40.8	39.2
Paraguay	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5
Peru DB	111.0	74.0	64.9	64.9	57.3	45.9	38.2	28.7	22.9
Peru DC	62.3	62.3	62.3	62.3	62.3	62.3	62.3	62.3	62.3
St. Kitts & Nevis	52.6	52.6	52.6	52.6	52.6	51.1	42.6	31.9	25.6
St. Lucia	55.0	55.0	55.0	55.0	55.0	55.0	55.0	42.8	34.2
St. Vincent & the Grenadines	46.9	46.9	46.9	46.9	46.9	46.9	46.9	40.3	32.3
Turks and Caicos Islands	54.6	54.6	54.6	54.6	41.3	33.0	27.5	20.6	16.5
Uruguay	72.2	33.8	36.1	38.5	39.6	40.3	40.8	41.4	41.7
Venezuela	38.4	38.4	38.4	38.4	38.4	38.4	38.4	29.2	23.4
Canada (OECD 2011)	76.6	55.2	44.4	29.6	22.2				
United States (OECD 2011)	51.7	43.5	39.4	35.3	29.7				

**Figure 7.1**  
Gross Replacement Rates for the Average-salaried in Latin America



**Figure 7.2**  
Gross Replacement Rates for the Average-salaried in the English-Caribbean





The average net replacement rate across countries, salaries and gender is 54.3, roughly 11% higher than the gross rate. Gender or type of program do not affect the variation between gross and net replacement rates. The main source of variation across countries is the contribution rate. In countries with high contribution rates, like those in the South Cone the difference between net and gross replacement rates is higher. In the Andean region the difference is 9%, in Central America it is 7%, in the South Cone 19%; in the English Caribbean 10%, and in Mexico and the Latin Caribbean 10% (see averages in Figures 7.5 to 7.9).

Canada and the U.S. also have higher net replacement rates for low-salaried workers than for average and high-salaried workers. Average-salaried workers receive a net replacement rate of 57.3 in Canada and 50 in the U.S. Net replacement rates are about 10% higher than gross replacement rates in the U.S., and almost 13% higher in Canada.

For average-salaried workers, Figure 7.3 shows net replacement rates in LA countries. These have an average of 69.4 (72.0 for men and 66.9 for women). Countries with the highest net replacement rates also have the highest gross replacement rates. The lowest net replacement rates are found in Mexico (42.0 for males and females), the Dominican Republic (49.1 for males and 41.9 for females) and Venezuela (50.1 for males and 45.1 for females). Differences between net and gross replacement rates for the average-salaried in these countries are 6% in Mexico, 10% in the Dominican Republic and 18% in Venezuela; as it was previously mentioned, these percentages are related to the size of the payroll tax in each country.

When values of gross and net replacement rates are close together, this is an indication that the level of social security contributions paid is low. From Figures 7.5 to 7.9, across LAC there are three patterns in terms of the difference in net and gross replacement rates for low- and high-salaried workers. First, in the Andean region, Central America and Mexico there is a very similar difference between net and

gross replacement rates for both, low- and high-salary workers, and it ranges between 8 and 10%. Second, in the South Cone there is a much higher difference between net and gross replacement rates ranging between 19 and 21%. The third special case is the English Caribbean region, where the poorest workers pay less contributions (and taxes in this type of welfare system), while those with higher salaries pay more. This determines a 9% difference of net-to-gross rates for the low-salaried, and of up to 20% for the high-salaried.

With respect to the relation of gross and net replacement rates of the low- and high-salaried in relation to the rates of the average-salaried within regions; among the low-salaried (within all regions) it is common to see that most countries have replacement rates (gross and net) that are close to the regional replacement rate of the average-salaried workers; and few countries that provide replacement rates much higher than this value. Among the high-salaried, almost all countries provide lower gross and net replacement rates than the values found for the average-salaried workers, because ceilings for contributions on salaries are low for the high-salaried.

In the Andean region, for high-salaried men, the lowest gross and net replacement rates of 49 or less are among countries with DB schemes: Peru, Venezuela, Ecuador and Colombia. For low-salaried males, pension regimes of the DB type provide gross and net replacement rates of at least 42; Bolivia and Ecuador provide more than 100. For low-salaried women, gross and net replacement rates in Peru-DB, Bolivia and Ecuador are considerably higher than those for the average-salaried worker.

In Central America, for low-salaried men, all countries but El Salvador have replacement rates that are close to or above the value received by the average-salaried (which is 70.6 and 75.8 for gross and net replacement rates, respectively). El Salvador has the lowest replacement rates for both low and high female salaried workers, as well as for males with low salaries. Costa Rica and Nicaragua provide the



highest gross and net replacement rates for low-salaried workers, and Honduras for the high-salaried.

In the English Caribbean, gross replacement rates for low-salaried workers have values between 24.2 (Aruba) and 54.6 (Belize), while net replacement rates have values between 25.7 and 75.8, respectively. High-salaried workers in all countries have lower replacement rates than that of the average-salaried worker (43.3 and 47.4 for gross and net, respectively).

In the region of Mexico and the Latin Caribbean, Cuba has constant replacement rates among the salary levels under study. Cuban gross replacement rates are 73.4 for males and 65.2 for females; while net replacement rates are 82.6 for males and 73.4 for females (same results for both, low- and high-salaried). Mexico provides the highest gross and net replacement rates for low-salaried women, but the lowest for the high-salaried. The Dominican Republic provides the lowest gross and net replacement rates for the low-salaried.

Moving to the South Cone, low-salaried workers of any gender receive the highest gross and net replacement rates in Argentina and Brazil, well above the values received by the average-salaried worker (gross replacement rate of 64.8 and net replacement rate of 76.9). In Argentina, gross replacement rates for males and females are 123.6, while net replacement rates are 153.4. Brazil has male gross replacement rates of 101.3 and net replacement rates of 131.2;

gross replacement rates for females of 120.9 and net replacement rates of 156.6. The lowest gross and net replacement rates for the low- and high-salaried in the region are provided by Chile. Paraguay provides the highest gross and net replacement rates for the high-salaried (between 81 and 92%).

### ***Pension Wealth***

**Gross Pension Wealth.** The analysis of replacement rates that was presented in the previous section provides a map of the expected level of old-age pension benefits by salary levels. Now, we show the calculation of the present value of the retirement income stream that will be received from retirement until death.<sup>5</sup> This indicator is called *pension wealth*. To calculate it we need information about expected mortality at different ages and rules on pension indexation (to prices or salary growth). Unless the specifications in a national legislation are different, we index pensions to prices, annually.<sup>6</sup> For a given pension value, pension wealth will be higher in cases where pensionable age is low and life expectancy at this age is high, because pension payments will be made for the largest possible number of years. A significant issue is that the calculation herein uses the "annuity option" for mandatory IRA systems; this means that the value of savings is transformed into a monthly payment guaranteed until death.<sup>7</sup>

<sup>5</sup> By present value we mean the discounted value (money) at a specific date (pensionable age) of monetary income flows (pension benefits) at different moments, using both interest and discount rates.

<sup>6</sup> This may overstate the future value of pensions in countries that do not have automatic indexing rules. The reason is that inflation is a form of debasing public debts, including pension obligations.

<sup>7</sup> Mandatory IRA systems usually provide two options to withdraw a pension entitlement: annuity or programmed withdrawals. In the first case, the individual uses the whole amount saved and buys an annuity from an insurer; this is the option used for the calculations in this chapter. In the second, the individual keeps the money in the IRA and withdraws an amount, which in turn is regulated by the pension authority to avoid the extinction of funds before death.

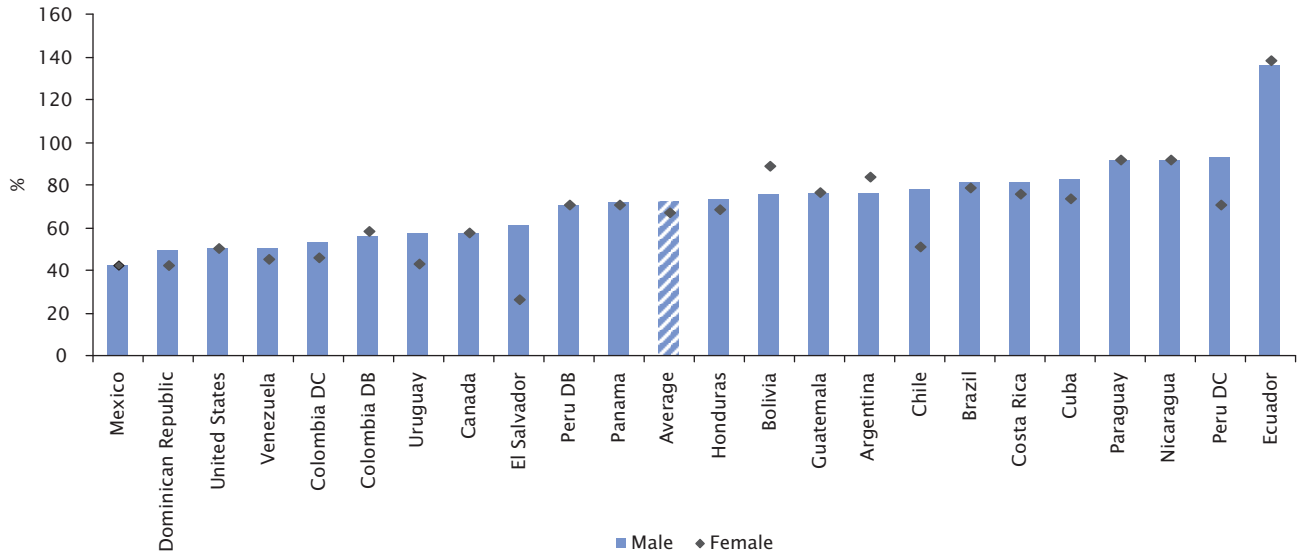
**Table 7.3**  
**Net Replacement Rates across the Salary Distribution, Males**

	Individual salary, multiple of mean for men								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	52.4	52.4	52.4	52.4	52.4	47.8	39.5	29.3	23.3
Antigua & Barbuda	41.6	41.6	41.6	43.1	35.5	28.6	23.9	18.0	14.5
Argentina	153.4	102.3	76.7	64.5	58.4	54.8	52.4	49.4	47.5
Aruba	25.7	16.8	13.4	9.2	7.1	5.8	5.0	4.0	3.3
Bahamas	49.6	49.6	49.6	35.3	26.3	21.0	17.4	13.0	10.4
Barbados	58.6	59.1	62.0	66.0	55.8	46.0	39.1	30.1	24.5
Belize	75.8	75.8	75.7	50.3	37.5	29.8	24.8	18.5	14.8
Bolivia	124.6	83.1	75.7	75.7	75.7	75.7	75.7	75.7	75.7
Brazil	131.2	87.4	81.2	81.2	81.2	81.2	81.2	81.2	81.2
British Virgin Islands	44.7	44.7	44.7	44.6	38.8	30.9	25.6	19.1	15.3
Chile	77.6	77.6	77.6	77.6	77.3	74.2	69.6	58.2	46.9
Colombia DB	59.2	55.7	55.7	55.7	55.7	55.7	55.7	49.1	49.1
Colombia DC	62.2	46.9	53.3	53.3	53.3	53.3	53.3	53.3	53.3
Costa Rica	87.3	84.1	81.5	78.8	75.9	75.3	74.8	73.1	66.7
Cuba	82.6	82.6	82.6	82.6	82.6	82.6	82.6	82.6	82.6
Curaçao	27.7	17.7	14.0	9.7	7.6	6.3	5.4	4.2	3.6
Dominica	42.1	42.1	42.9	45.0	46.7	48.5	49.7	50.7	41.9
Dominican Republic	49.1	49.1	49.1	49.1	49.1	49.1	49.1	49.1	47.7
Ecuador	177.4	150.0	136.3	122.5	115.7	93.5	77.9	58.4	46.7
El Salvador	46.0	60.8	60.8	60.8	60.8	60.8	69.3	68.8	68.6
Grenada	46.8	46.8	46.8	46.8	46.8	46.7	42.5	34.1	28.4
Guatemala	76.1	76.1	76.1	76.1	76.1	64.4	53.7	40.3	32.2
Honduras	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3	73.3
Mexico	69.4	46.3	42.0	42.0	42.0	42.0	42.0	42.0	42.0
Nicaragua	91.6	91.6	91.6	73.3	56.0	56.0	56.0	56.0	56.0
Panama	71.9	75.7	71.8	66.2	63.9	62.6	61.7	60.5	59.9
Paraguay	91.6	91.6	91.6	91.6	91.6	91.6	91.6	91.6	91.6
Peru DB	96.0	70.4	70.4	66.1	49.6	39.7	33.1	24.8	19.8
Peru DC	93.4	93.4	93.4	93.4	93.4	93.4	93.4	93.4	93.4
St. Kitts & Nevis	55.4	56.2	56.5	56.8	57.0	55.5	46.5	35.2	28.3
St. Lucia	57.9	57.9	59.7	63.0	59.6	62.3	64.0	51.0	41.4
St. Vincent & the Grenadines	48.6	48.6	48.6	49.6	52.5	55.3	57.4	51.7	42.5
Turks and Caicos Islands	56.5	56.5	56.5	56.4	42.3	33.7	28.0	20.9	16.7
Uruguay	92.3	52.2	57.2	62.2	64.7	66.2	67.2	68.5	69.3
Venezuela	50.5	50.2	50.1	50.0	49.9	49.9	42.9	32.2	25.7
Canada (OECD 2011)	88.7	68.3	57.3	39.7	31.1				
United States (OECD 2011)	63.8	54.7	50.0	46.6	40.3				

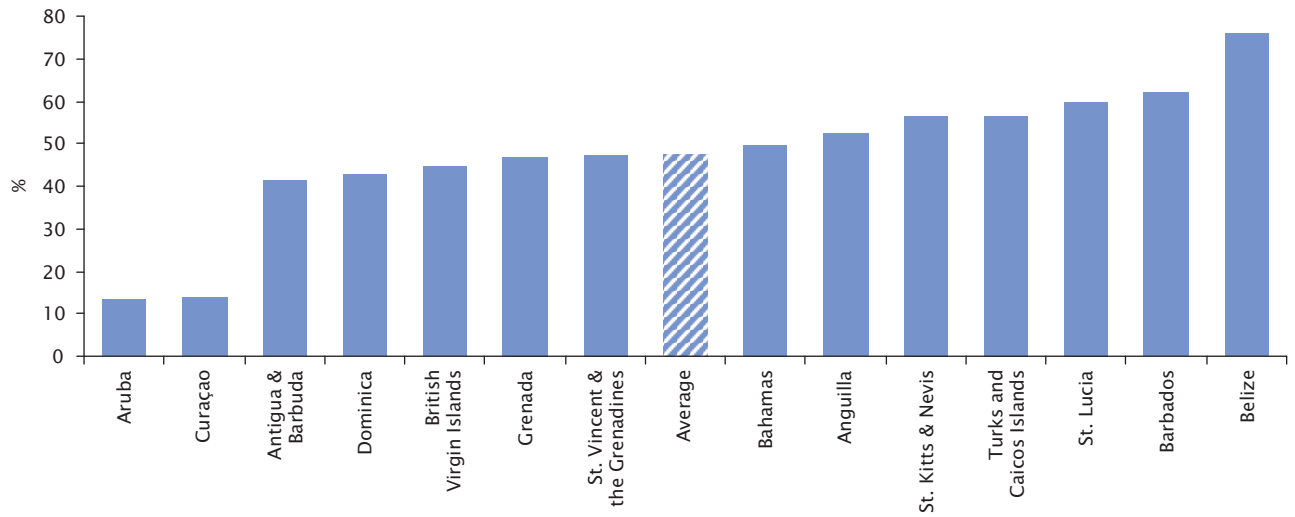
**Table 7.4**  
**Net Replacement Rates across the Salary Distribution, Females**

	Individual salary, multiple of mean for women								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	52.4	52.4	52.4	52.4	52.4	47.8	39.5	29.3	23.3
Antigua & Barbuda	41.6	41.6	41.6	43.1	35.5	28.6	23.9	18.0	14.5
Argentina	153.4	102.3	83.9	69.4	62.1	57.8	54.8	51.2	49.0
Aruba	25.7	16.8	13.4	9.2	7.1	5.8	5.0	4.0	3.3
Bahamas	49.6	49.6	49.6	35.3	26.3	21.0	17.4	13.0	10.4
Barbados	58.6	59.1	62.0	66.0	55.8	46.0	39.1	30.1	24.5
Belize	75.8	75.8	75.7	50.3	37.5	29.8	24.8	18.5	14.8
Bolivia	177.8	118.6	88.9	66.4	69.8	66.4	59.3	50.3	50.3
Brazil	156.6	104.4	78.3	63.0	63.0	63.0	63.0	63.0	63.0
British Virgin Islands	44.7	44.7	44.7	44.6	38.8	30.9	25.6	19.1	15.3
Chile	59.5	51.7	51.2	51.2	51.2	50.9	49.0	43.1	35.8
Colombia DB	71.5	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.6
Colombia DC	61.8	41.2	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Costa Rica	77.4	76.1	76.0	73.7	72.6	71.5	70.4	70.4	62.7
Cuba	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4
Curaçao	27.7	17.7	14.0	9.7	7.6	6.3	5.4	4.2	3.6
Dominica	42.1	42.1	42.9	45.0	46.7	48.5	49.7	50.7	41.9
Dominican Republic	44.6	42.0	42.0	42.0	42.0	42.0	42.0	42.0	41.7
Ecuador	181.8	152.9	138.5	124.0	116.8	98.6	82.1	61.6	49.3
El Salvador	30.4	26.1	26.1	26.1	26.1	26.1	26.1	29.6	29.5
Grenada	46.8	46.8	46.8	46.8	46.8	46.7	42.5	34.1	28.4
Guatemala	76.1	76.1	76.1	76.1	76.1	76.1	64.8	48.6	38.9
Honduras	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7
Mexico	84.8	56.5	42.4	33.6	33.6	33.6	33.6	33.6	33.6
Nicaragua	91.6	91.6	91.6	73.3	56.0	56.0	56.0	56.0	56.0
Panama	70.0	70.9	70.4	57.5	51.8	48.4	46.1	43.2	41.5
Paraguay	91.6	91.6	91.6	91.6	91.6	91.6	91.6	91.6	91.6
Peru DB	120.4	80.3	70.4	70.4	62.2	49.7	41.5	31.1	24.9
Peru DC	70.3	70.3	70.3	70.3	70.3	70.3	70.3	70.3	70.3
St. Kitts & Nevis	55.4	56.2	56.5	56.8	57.0	55.5	46.5	35.2	28.3
St. Lucia	57.9	57.9	59.7	63.0	59.6	62.3	64.0	51.0	41.4
St. Vincent & the Grenadines	48.6	48.6	48.6	49.6	52.5	55.3	57.4	51.7	42.5
Turks and Caicos Islands	56.5	56.5	56.5	56.4	42.3	33.7	28.0	20.9	16.7
Uruguay	85.8	40.2	43.0	45.7	47.1	47.9	48.5	49.2	49.6
Venezuela	45.1	45.1	45.1	45.1	45.1	45.1	45.1	34.3	27.4
Canada (OECD 2011)	88.7	68.3	57.3	39.7	31.1				
United States (OECD 2011)	63.8	54.7	50.0	46.6	40.3				

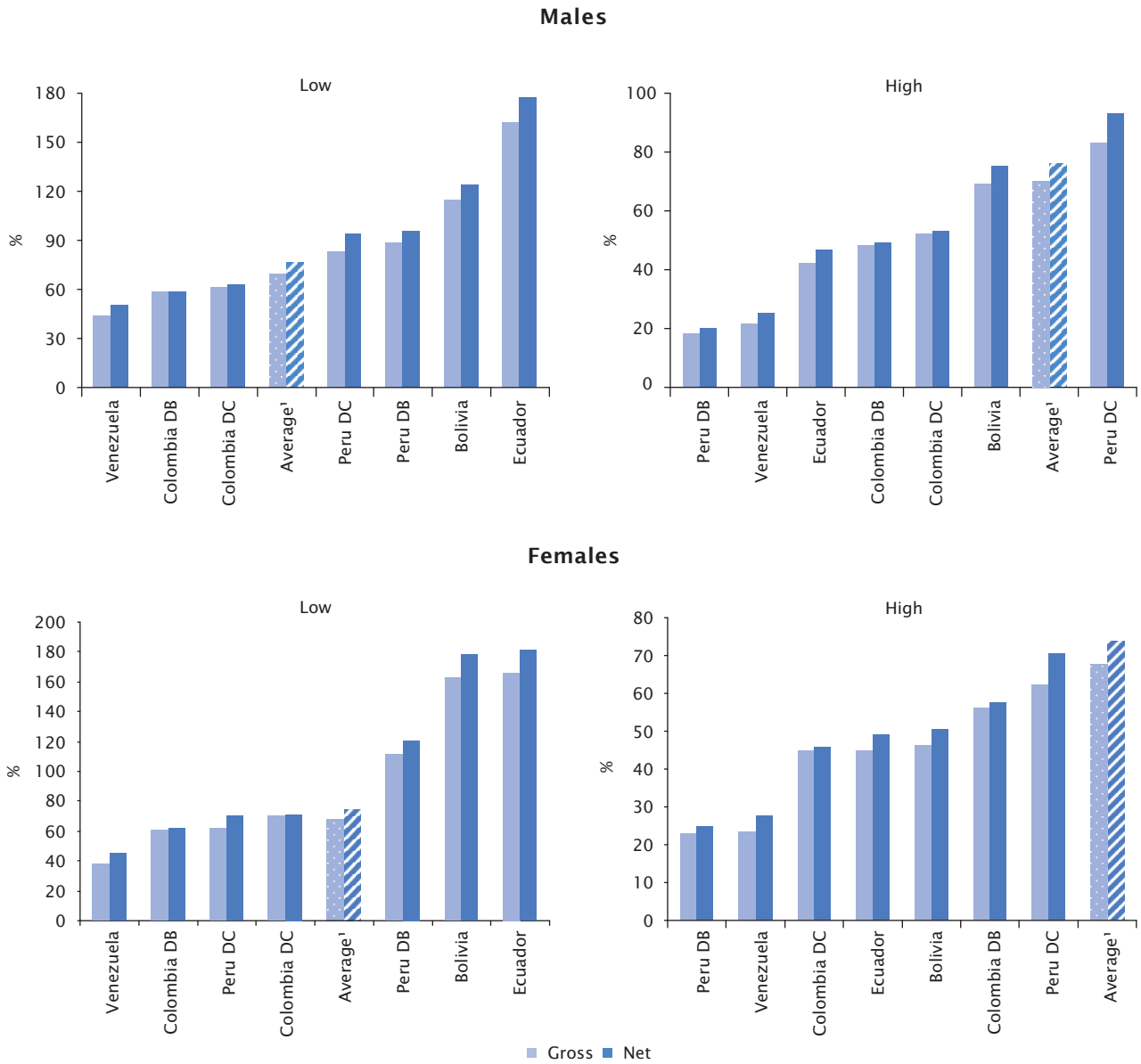
**Figure 7.3**  
**Net Replacement Rates for the Average-salaried in Latin America**



**Figure 7.4**  
**Net Replacement Rates for the Average-salaried, English Caribbean**

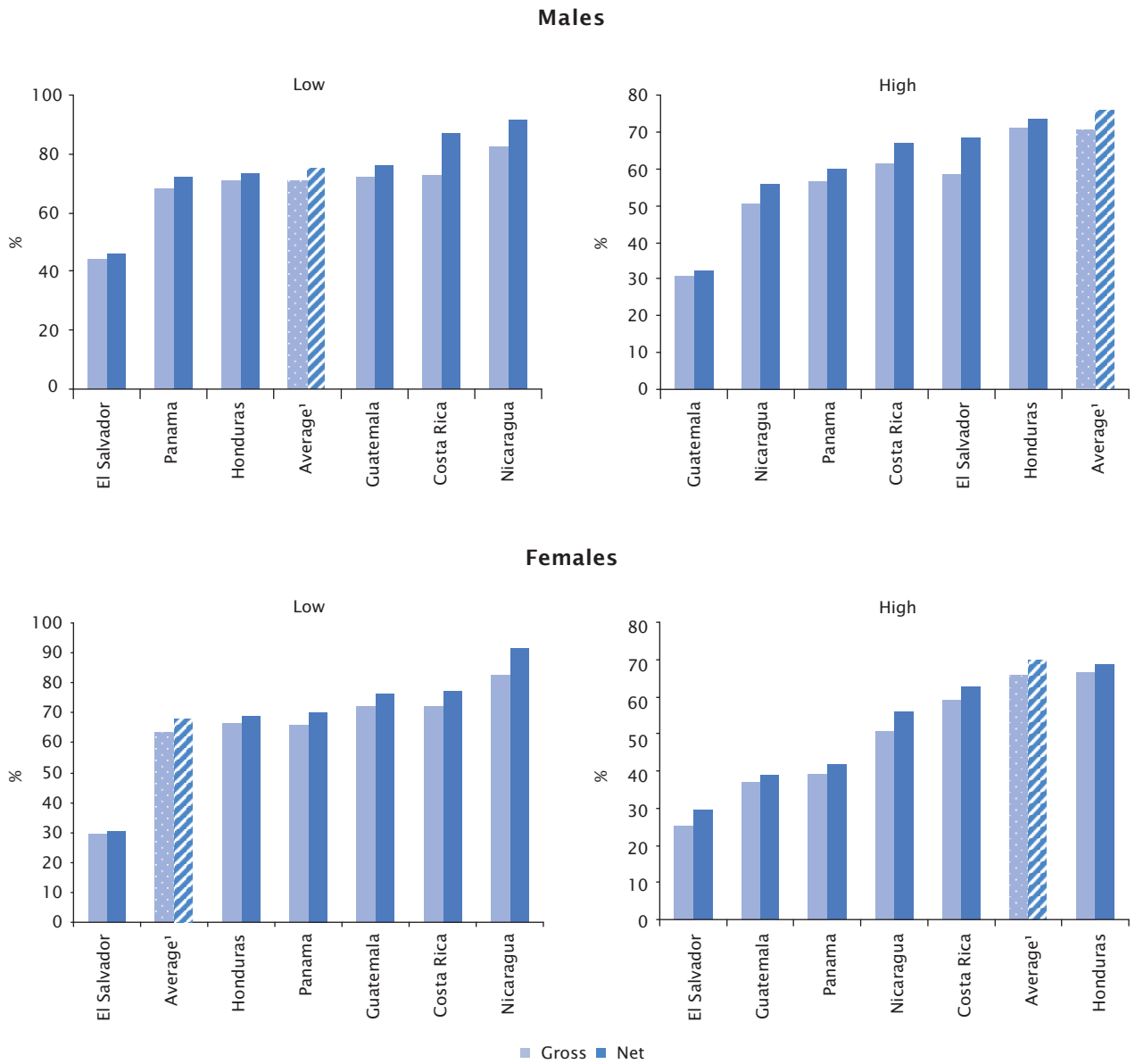


**Figure 7.5**  
Replacement Rates for Low and High Salaries, Andean



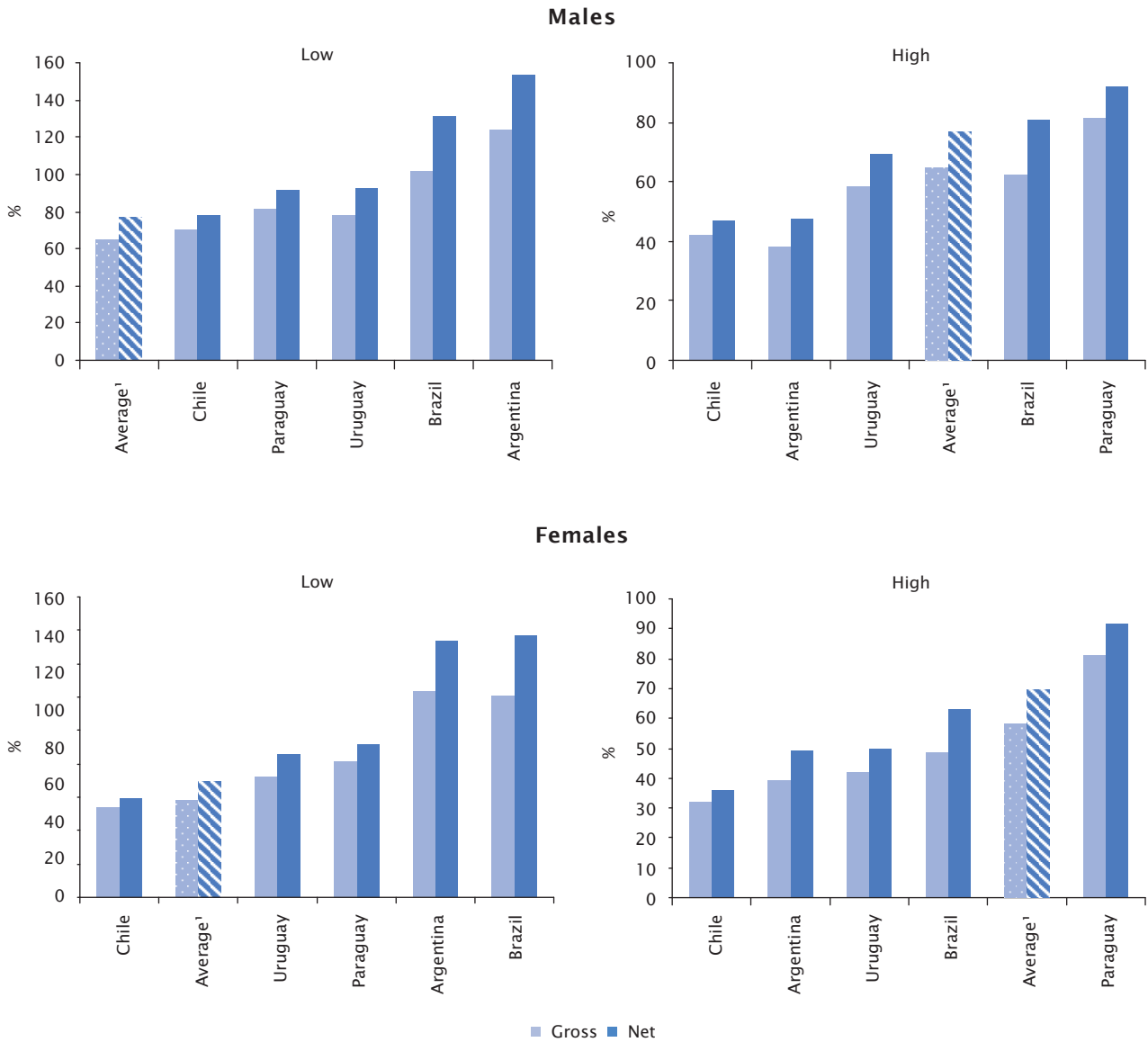
Note: 1/ Average replacement rate for the average-salaried within the region.

**Figure 7.6**  
Replacement Rates for Low and High Salaries, Central America



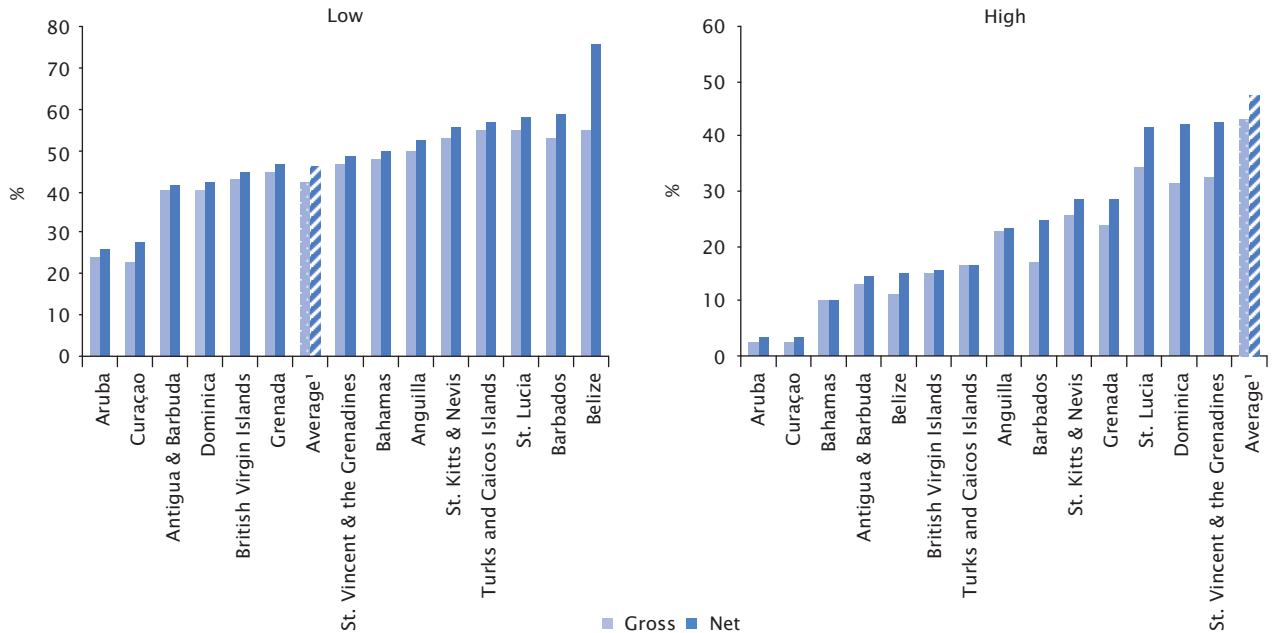
Note: 1/ Average replacement rate for the average-salaried within the region.

**Figure 7.7**  
Replacement Rates for Low and High Salaries, South Cone



Note: 1/ Average replacement rate for the average-salaried within the region.

**Figure 7.8**  
**Replacement Rates for Low and High Salaries, English Caribbean**  
**Males and Females**



Note: 1/ Average replacement rate for the average-salaried within the region.

Tables 7.5 and 7.6 show the calculations of gross pension wealth across countries. The average gross pension wealth across the distribution of salaries in all LAC countries is 8.4 times<sup>1</sup> the annual salary. When looking at it with respect to type of pension regime it is 10.9 in mixed, 9.5 in DC, and 8.2 in DB regimes. Pension wealth may be higher in DB systems for women because they have a higher life expectancy at pensionable age, but as they also tend to have lower wages, the sign of the variation with respect to males is uncertain. Women have pension wealth of 8.7 versus 7.6 of men in DB regimes, 9 versus 9.6 in DC, and 11 versus 10.8 in mixed. Canada and the U.S. (OECD calculations) show differentiated gross pension wealth values by gender. Average-salaried males have lower gross pension wealth than females. In Canada, average male workers obtain 7.5 versus 8.4 (times the annual salary) of females; and in the U.S. males receive 5.8 versus 6.8 of females.

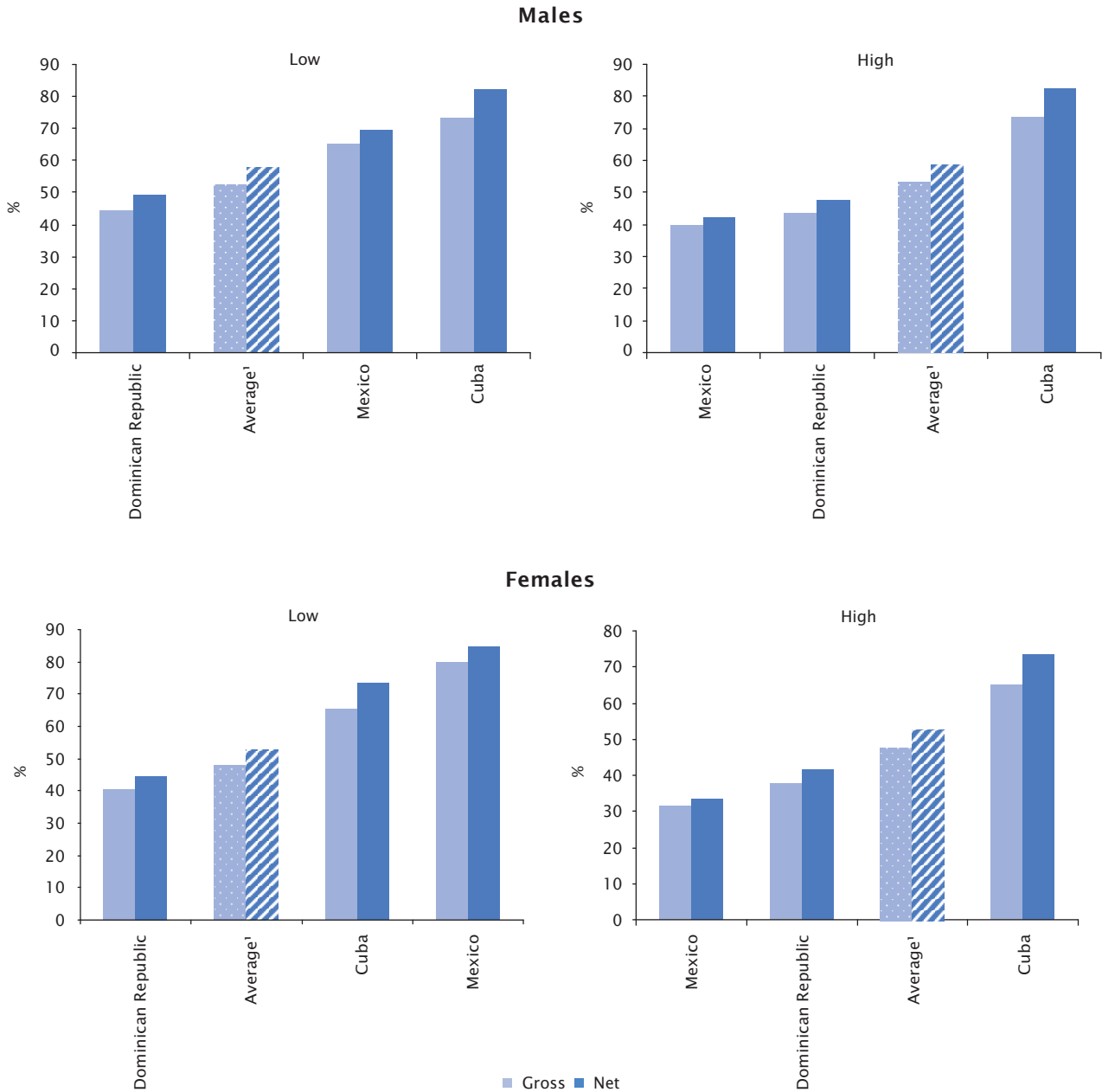
Figure 7.10 compares gross pension wealth across Latin American countries for average-salaried workers. Gross pension wealth averages 11.4, a mix

of 10.8 for males and 11.9 for females. The lowest values are found for Mexico (6.7 for males versus 7.6 for females), Venezuela (7.6 for males versus 8.7 for females), and the Dominican Republic (7.9 for males versus 7.6 for females). By comparison, countries with the highest gross pension wealth values are Ecuador (22.8 for males versus 26 for females) and Nicaragua (14.7 for males versus 16.5 for females). The higher the calculation of pension wealth, the higher the expected fiscal cost in DB regimes and it becomes more likely that the topic of pension reform will be sooner or later at the center of national debates on pension reform.

Calculations of gross pension wealth in the English Caribbean are presented in Figure 7.11. Average-salaried workers receive gross pension wealth equivalent to 6.3 times the annual salary; 5.8 for men and 6.7 for women. Almost all countries in this region have pension wealth values of around 6 or more, except for Aruba and Curaçao. Women have higher pension wealth than men—as salaries do not differ by gender in this calculation, the higher values



**Figure 7.9**  
Replacement Rates for Low and High Salaries, Mexico and Latin Caribbean



Note: 1/ Average replacement rate for the average-salaried within the region.

of pension wealth among women are due to gains in their life expectancy.

**Net Pension Wealth.** Net pension wealth is defined as net pension benefits divided by net pre-retirement salaries (the difference are social security contributions). The average difference across the 33 countries in LAC between net and gross pension wealth is 11% (Tables 7.7 and 7.8). Average net pension wealth across countries and gender is 9.3 (9 for men and 9.7 for women). According to the type of pension regime, net pension wealth averages 11.5 in mixed regimes, 10.3 in DC, and 9.1 in DB.

The difference between gross and net pension wealth in Canada and the United States is low in comparison with the LAC differences. Notice however, that income taxes are considered in the OECD calculations for Canada and the U.S., but excluded for LAC in our calculations. In Canada, for average-salaried males, the value of net pension wealth 7.4 is very close to the 7.5 of their gross pension wealth. The same happens for the U.S.; the value of male net pension wealth 5.8 is very close to the 5.6 of their gross pension wealth. By gender, male net pension wealth is lower than female wealth. In Canada, average male workers obtain 7.4 versus 8.3 of females and 5.6 versus 6.5 in the U.S.

Net pension wealth values in LA countries and in the English Caribbean are shown in Figures 7.12 and 7.13. In LA countries, values of net pension wealth have an average of 11.4 times the annual salary; this

represents a difference of 11 percentage points with the gross pension wealth (11.9 for women and 10.8 for men). In the English Caribbean average net pension wealth is 6.3 (6.7 for women and 5.8 for men) which gives a difference of about 9 percentage points.

Figures 7.14 to 7.18 show the difference in net and gross pension wealth for low- and high-salaried workers within regions. The pattern is that low-salaried receive higher pension wealth than the high-salaried (a redistributive feature common to all countries). In the Andean region, low-salaried males receive net pension wealth equivalent to 16.2 and the high-salaried receive 10.3; low-salaried females receive net pension wealth of about 21 while the high-salaried receive 9.3. In Central America, the low-salaried also face a higher index of pension wealth: 12.7 against 10.1 of the high-salaried; low-salaried females receive net pension wealth of 14.1 while the high-salaried receive 10.1. For the South Cone the average comparison in net pension wealth of the low- and the high-salaried is 15.8 to 11.8; and for females the figures are 19 and 17.8. In Mexico and the Latin Caribbean countries, values are lower, but the pattern is the same, and for low-salaried males, net pension wealth is 11.3, while for the high-salaried it is 9.6; low-salaried females receive 13.4 while the high-salaried receive 10. The English Caribbean countries average, for low-salaried males, net pension wealth equals 6.6 while the high-salaried receive 3; low-salaried Caribbean females receive in net pension wealth 7.5 while the high-salaried receive 3.4.

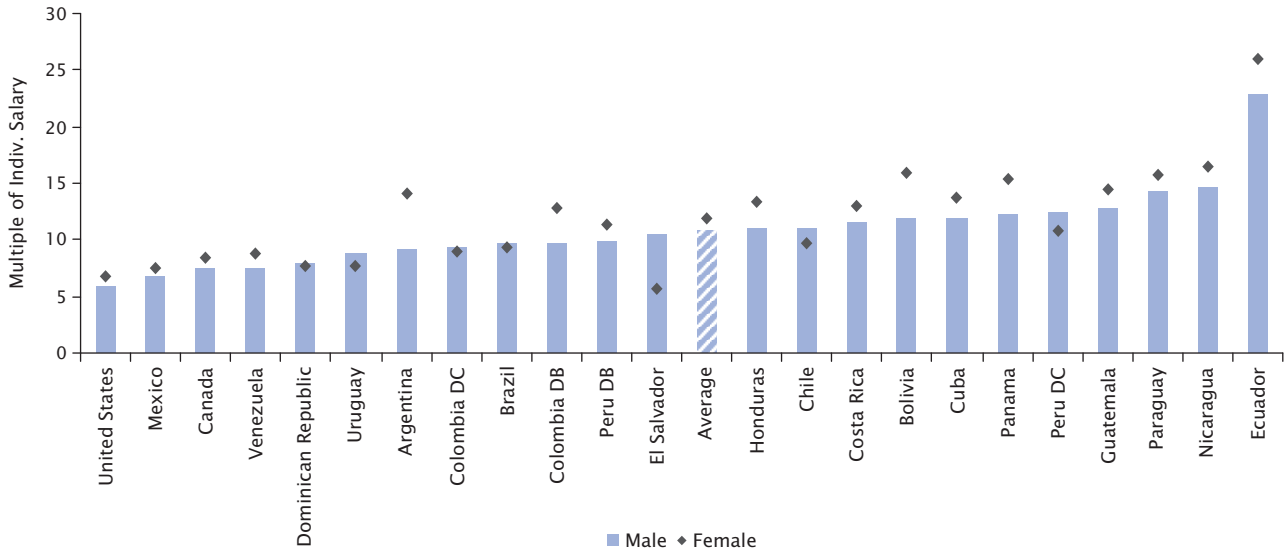
**Table 7.5**  
**Gross Pension Wealth across the Salary Distribution, Males**

	Individual salary, multiple of mean for men								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	6.5	6.5	6.5	6.5	6.5	5.9	4.9	3.7	3.0
Antigua & Barbuda	5.8	5.8	5.8	5.8	4.8	3.8	3.2	2.4	1.9
Argentina	18.4	12.2	9.2	7.7	7.0	6.6	6.3	5.9	5.7
Aruba	3.7	2.4	1.9	1.2	0.9	0.7	0.6	0.5	0.4
Bahamas	6.2	6.2	6.2	4.5	3.4	2.7	2.2	1.7	1.3
Barbados	6.4	6.4	6.4	6.4	5.2	4.2	3.5	2.6	2.1
Belize	7.1	7.1	7.1	4.8	3.6	2.9	2.4	1.8	1.4
Bolivia	19.6	13.1	11.9	11.9	11.9	11.9	11.9	11.9	11.9
Brazil	15.5	10.3	9.6	9.6	9.6	9.6	9.6	9.6	9.6
British Virgin Islands	5.6	5.6	5.6	5.6	4.9	3.9	3.3	2.4	2.0
Chile	11.0	11.0	11.0	11.0	10.9	10.5	9.8	8.2	6.6
Colombia DB	10.3	9.7	9.7	9.7	9.7	9.7	9.7	8.6	8.6
Colombia DC	10.8	8.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Costa Rica	11.7	11.7	11.6	11.4	11.1	10.9	10.9	10.8	9.9
Cuba	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
Curaçao	3.5	2.2	1.8	1.2	0.9	0.7	0.6	0.4	0.4
Dominica	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.7	4.5
Dominican Republic	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.6
Ecuador	29.7	25.1	22.8	20.5	19.3	15.6	13.0	9.8	7.8
El Salvador	7.9	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Grenada	6.5	6.5	6.5	6.5	6.5	6.5	5.8	4.3	3.5
Guatemala	12.8	12.8	12.8	12.8	12.8	10.9	9.0	6.8	5.4
Honduras	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
Mexico	11.0	7.4	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Nicaragua	14.7	14.7	14.7	11.7	9.0	9.0	9.0	9.0	9.0
Panama	12.3	12.9	12.2	11.3	10.9	10.7	10.5	10.3	10.2
Paraguay	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Peru DB	13.4	9.8	9.8	9.2	6.9	5.5	4.6	3.5	2.8
Peru DC	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
St. Kitts & Nevis	7.2	7.2	7.2	7.2	7.2	7.0	5.8	4.4	3.5
St. Lucia	7.1	7.1	7.1	7.1	7.1	7.1	7.1	5.6	4.4
St. Vincent & the Grenadines	6.8	6.8	6.8	6.8	6.8	6.8	6.8	5.8	4.7
Turks and Caicos Islands	7.1	7.1	7.1	7.1	5.4	4.3	3.6	2.7	2.1
Uruguay	14.0	7.9	8.7	9.5	9.8	10.1	10.2	10.4	10.5
Venezuela	7.6	7.6	7.6	7.5	7.5	7.5	6.5	4.9	3.9
Canada (OECD 2011)	12.9	9.3	7.5	5.0	3.7				
United States (OECD 2011)	7.6	6.4	5.8	5.2	4.4				

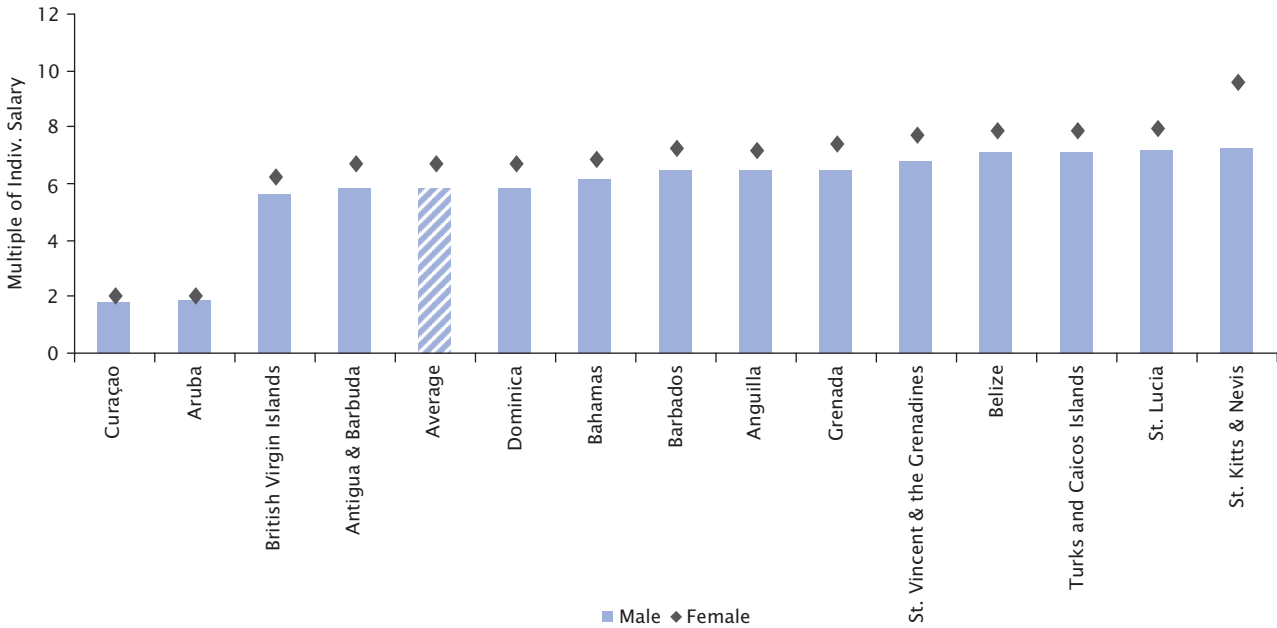
**Table 7.6**  
**Gross Pension Wealth across the Salary Distribution, Females**

	Individual salary, multiple of mean for women								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	7.2	7.2	7.2	7.2	7.2	6.6	5.5	4.1	3.3
Antigua & Barbuda	6.7	6.7	6.7	6.7	5.4	4.4	3.6	2.7	2.2
Argentina	25.8	17.2	14.1	11.6	10.4	9.7	9.2	8.6	8.2
Aruba	4.0	2.5	2.0	1.3	1.0	0.8	0.7	0.5	0.4
Bahamas	6.9	6.9	6.9	5.0	3.7	3.0	2.5	1.9	1.5
Barbados	7.2	7.2	7.2	7.2	5.8	4.7	3.9	2.9	2.3
Belize	7.9	7.9	7.9	5.3	4.0	3.2	2.7	2.0	1.6
Bolivia	31.7	21.1	15.8	11.8	12.4	11.8	10.6	9.0	9.0
Brazil	18.5	12.4	9.3	7.4	7.4	7.4	7.4	7.4	7.4
British Virgin Islands	6.2	6.2	6.2	6.2	5.4	4.4	3.6	2.7	2.2
Chile	11.3	9.8	9.8	9.8	9.8	9.7	9.3	8.2	6.8
Colombia DB	15.7	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.7
Colombia DC	12.1	8.0	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Costa Rica	13.2	13.0	13.0	12.7	12.5	12.3	12.1	12.1	10.8
Cuba	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
Curaçao	4.0	2.6	2.0	1.3	1.0	0.8	0.7	0.5	0.4
Dominica	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.5	5.2
Dominican Republic	8.1	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Ecuador	34.1	28.7	26.0	23.3	21.9	18.5	15.4	11.6	9.3
El Salvador	6.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Grenada	7.4	7.4	7.4	7.4	7.4	7.4	6.6	4.9	4.0
Guatemala	14.5	14.5	14.5	14.5	14.5	14.5	12.4	9.3	7.4
Honduras	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Mexico	15.1	10.1	7.5	6.0	6.0	6.0	6.0	6.0	6.0
Nicaragua	16.5	16.5	16.5	13.2	10.1	10.1	10.1	10.1	10.1
Panama	15.2	15.4	15.3	12.5	11.3	10.5	10.0	9.4	9.0
Paraguay	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Peru DB	19.3	12.9	11.3	11.3	10.0	8.0	6.7	5.0	4.0
Peru DC	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
St. Kitts & Nevis	9.6	9.6	9.6	9.6	9.6	9.3	7.7	5.8	4.6
St. Lucia	7.9	7.9	7.9	7.9	7.9	7.9	7.9	6.2	4.9
St. Vincent & the Grenadines	7.8	7.8	7.8	7.8	7.8	7.8	7.8	6.7	5.3
Turks and Caicos Islands	7.9	7.9	7.9	7.9	6.0	4.8	4.0	3.0	2.4
Uruguay	15.2	7.1	7.6	8.1	8.4	8.5	8.6	8.7	8.8
Venezuela	8.7	8.7	8.7	8.7	8.7	8.7	8.7	6.6	5.3
Canada (OECD 2011)	14.4	10.4	8.4	5.6	4.2				
United States (OECD 2011)	8.9	7.5	6.8	6.0	5.1				

**Figure 7.10**  
Gross Pension Wealth for the Average-salaried in Latin America



**Figure 7.11**  
Gross Pension Wealth for the Average-salaried in the English Caribbean



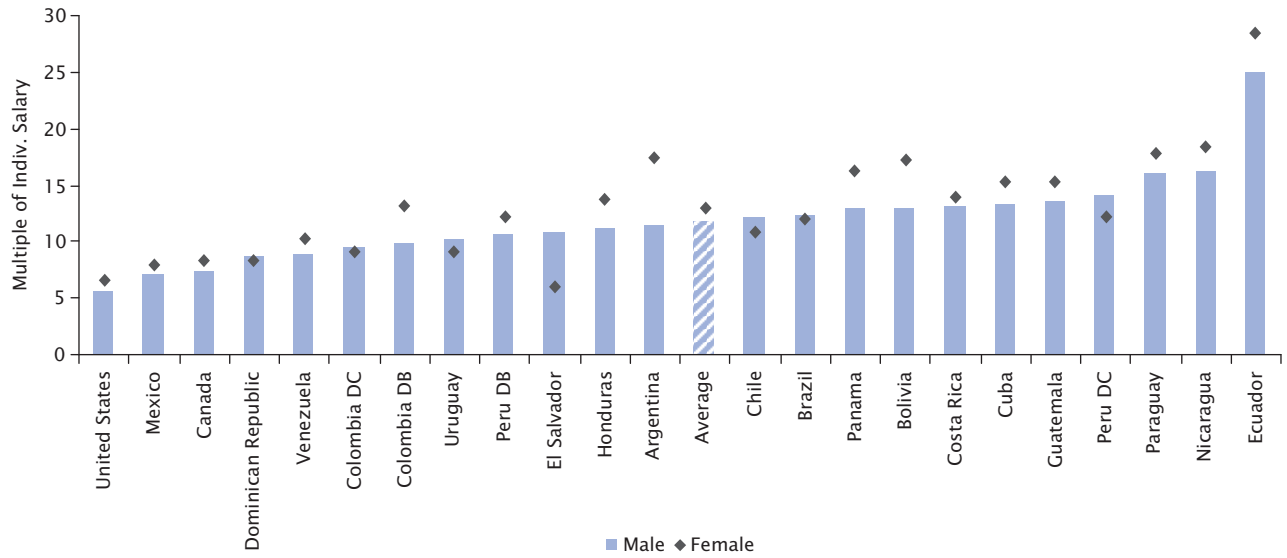
**Table 7.7**  
**Net Pension Wealth across the Salary Distribution, Males**

	Individual salary, multiple of mean for men								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	6.8	6.8	6.8	6.8	6.8	6.2	5.1	3.8	3.0
Antigua & Barbuda	6.0	6.0	6.0	6.2	5.1	4.1	3.5	2.6	2.1
Argentina	22.8	15.2	11.4	9.6	8.7	8.1	7.8	7.3	7.1
Aruba	3.9	2.6	2.1	1.4	1.1	0.9	0.8	0.6	0.5
Bahamas	6.4	6.4	6.4	4.6	3.4	2.7	2.3	1.7	1.4
Barbados	7.2	7.2	7.6	8.1	6.8	5.6	4.8	3.7	3.0
Belize	9.8	9.8	9.8	6.5	4.9	3.9	3.2	2.4	1.9
Bolivia	21.4	14.3	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Brazil	20.1	13.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
British Virgin Islands	5.8	5.8	5.8	5.8	5.0	4.0	3.3	2.5	2.0
Chile	12.2	12.2	12.2	12.2	12.1	11.6	10.9	9.1	7.3
Colombia DB	10.5	9.9	9.9	9.9	9.9	9.9	9.9	8.7	8.7
Colombia DC	11.1	8.3	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Costa Rica	14.0	13.5	13.1	12.7	12.2	12.1	12.0	11.8	10.7
Cuba	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
Curaçao	4.3	2.8	2.2	1.5	1.2	1.0	0.9	0.7	0.6
Dominica	6.1	6.1	6.2	6.5	6.7	7.0	7.2	7.3	6.1
Dominican Republic	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.4
Ecuador	32.5	27.5	25.0	22.5	21.2	17.2	14.3	10.7	8.6
El Salvador	8.2	10.9	10.9	10.9	10.9	10.9	12.4	12.3	12.3
Grenada	6.8	6.8	6.8	6.8	6.8	6.8	6.1	4.9	4.1
Guatemala	13.5	13.5	13.5	13.5	13.5	11.5	9.5	7.2	5.7
Honduras	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
Mexico	11.7	7.8	7.1	7.1	7.1	7.1	7.1	7.1	7.1
Nicaragua	16.3	16.3	16.3	13.0	9.9	9.9	9.9	9.9	9.9
Panama	13.0	13.7	13.0	12.0	11.5	11.3	11.1	10.9	10.8
Paraguay	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Peru DB	14.5	10.6	10.6	10.0	7.5	6.0	5.0	3.7	3.0
Peru DC	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
St. Kitts & Nevis	7.6	7.7	7.7	7.8	7.8	7.6	6.4	4.8	3.9
St. Lucia	7.5	7.5	7.8	8.2	7.7	8.1	8.3	6.6	5.4
St. Vincent & the Grenadines	7.0	7.0	7.0	7.2	7.6	8.0	8.3	7.5	6.1
Turks and Caicos Islands	7.3	7.3	7.3	7.3	5.5	4.4	3.6	2.7	2.2
Uruguay	16.7	9.4	10.3	11.2	11.7	12.0	12.1	12.4	12.5
Venezuela	8.9	8.9	8.9	8.9	8.8	8.8	7.6	5.7	4.6
Canada (OECD 2011)	12.9	9.3	7.4	4.9	3.7				
United States (OECD 2011)	7.6	6.2	5.6	4.9	4.1				

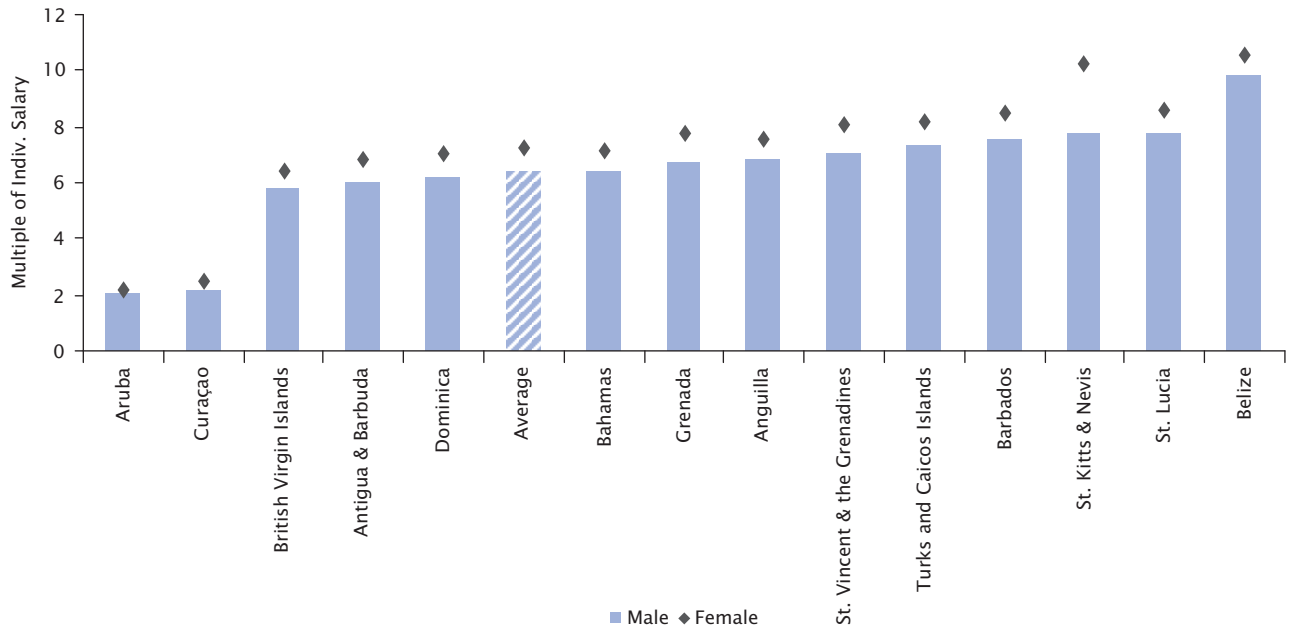
**Table 7.8**  
**Net Pension Wealth across the Salary Distribution, Females**

	Individual salary, multiple of mean for women								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	7.6	7.6	7.6	7.6	7.6	6.9	5.7	4.2	3.4
Antigua & Barbuda	6.9	6.9	6.9	7.1	5.9	4.7	4.0	3.0	2.4
Argentina	32.0	21.3	17.5	14.5	12.9	12.0	11.4	10.7	10.2
Aruba	4.2	2.8	2.2	1.5	1.2	1.0	0.8	0.7	0.6
Bahamas	7.2	7.2	7.2	5.1	3.8	3.0	2.5	1.9	1.5
Barbados	8.0	8.1	8.5	9.1	7.7	6.3	5.4	4.1	3.4
Belize	10.5	10.5	10.5	7.0	5.2	4.2	3.4	2.6	2.1
Bolivia	34.6	23.1	17.3	12.9	13.6	12.9	11.5	9.8	9.8
Brazil	24.0	16.0	12.0	9.6	9.6	9.6	9.6	9.6	9.6
British Virgin Islands	6.5	6.5	6.5	6.4	5.6	4.5	3.7	2.8	2.2
Chile	12.6	10.9	10.8	10.8	10.8	10.7	10.4	9.1	7.6
Colombia DB	16.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	12.9
Colombia DC	12.3	8.2	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Costa Rica	14.2	14.0	13.9	13.5	13.3	13.1	12.9	12.9	11.5
Cuba	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4
Curaçao	5.0	3.2	2.5	1.7	1.4	1.1	1.0	0.8	0.6
Dominica	7.0	7.0	7.1	7.4	7.7	8.0	8.2	8.4	6.9
Dominican Republic	8.9	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.3
Ecuador	37.5	31.5	28.5	25.6	24.1	20.3	16.9	12.7	10.2
El Salvador	6.9	6.0	6.0	6.0	6.0	6.0	6.0	6.8	6.7
Grenada	7.7	7.7	7.7	7.7	7.7	7.7	7.0	5.6	4.7
Guatemala	15.3	15.3	15.3	15.3	15.3	15.3	13.0	9.8	7.8
Honduras	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
Mexico	16.0	10.7	8.0	6.3	6.3	6.3	6.3	6.3	6.3
Nicaragua	18.3	18.3	18.3	14.7	11.2	11.2	11.2	11.2	11.2
Panama	16.1	16.3	16.2	13.2	11.9	11.1	10.6	10.0	9.6
Paraguay	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
Peru DB	21.0	14.0	12.3	12.3	10.8	8.7	7.2	5.4	4.3
Peru DC	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
St. Kitts & Nevis	10.1	10.2	10.3	10.3	10.4	10.1	8.4	6.4	5.1
St. Lucia	8.4	8.4	8.6	9.1	8.6	9.0	9.3	7.4	6.0
St. Vincent & the Grenadines	8.0	8.0	8.0	8.2	8.7	9.1	9.5	8.6	7.0
Turks and Caicos Islands	8.2	8.2	8.2	8.1	6.1	4.9	4.0	3.0	2.4
Uruguay	18.1	8.5	9.1	9.7	9.9	10.1	10.2	10.4	10.5
Venezuela	10.2	10.2	10.2	10.2	10.2	10.2	10.2	7.8	6.2
Canada (OECD 2011)	14.4	10.4	8.3	5.5	4.1				
United States (OECD 2011)	8.8	7.2	6.5	5.6	4.7				

**Figure 7.12**  
**Net Pension Wealth for the Average-salaried in Latin America**

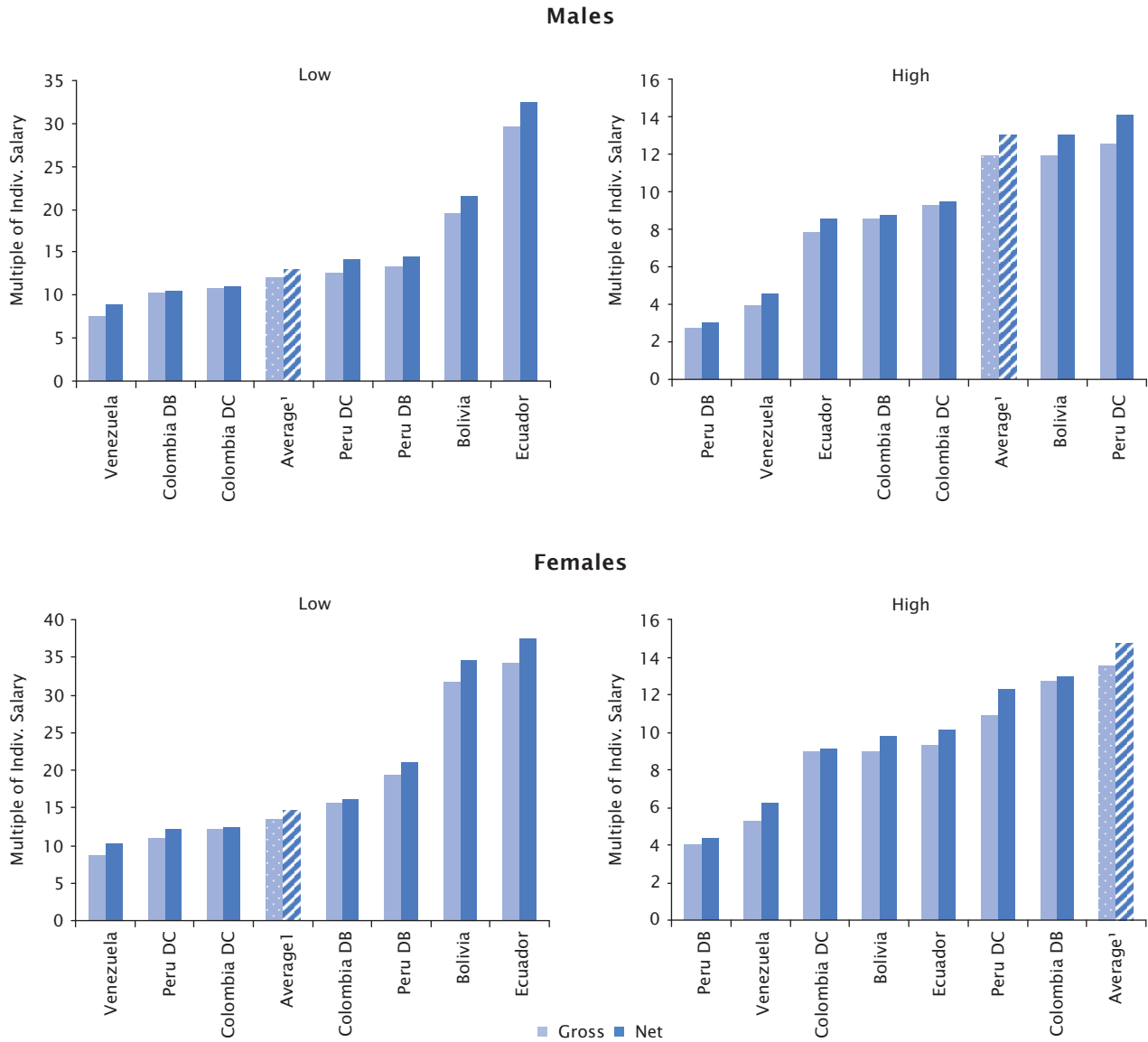


**Figure 7.13**  
**Net Pension Wealth for the Average-salaried, English Caribbean**



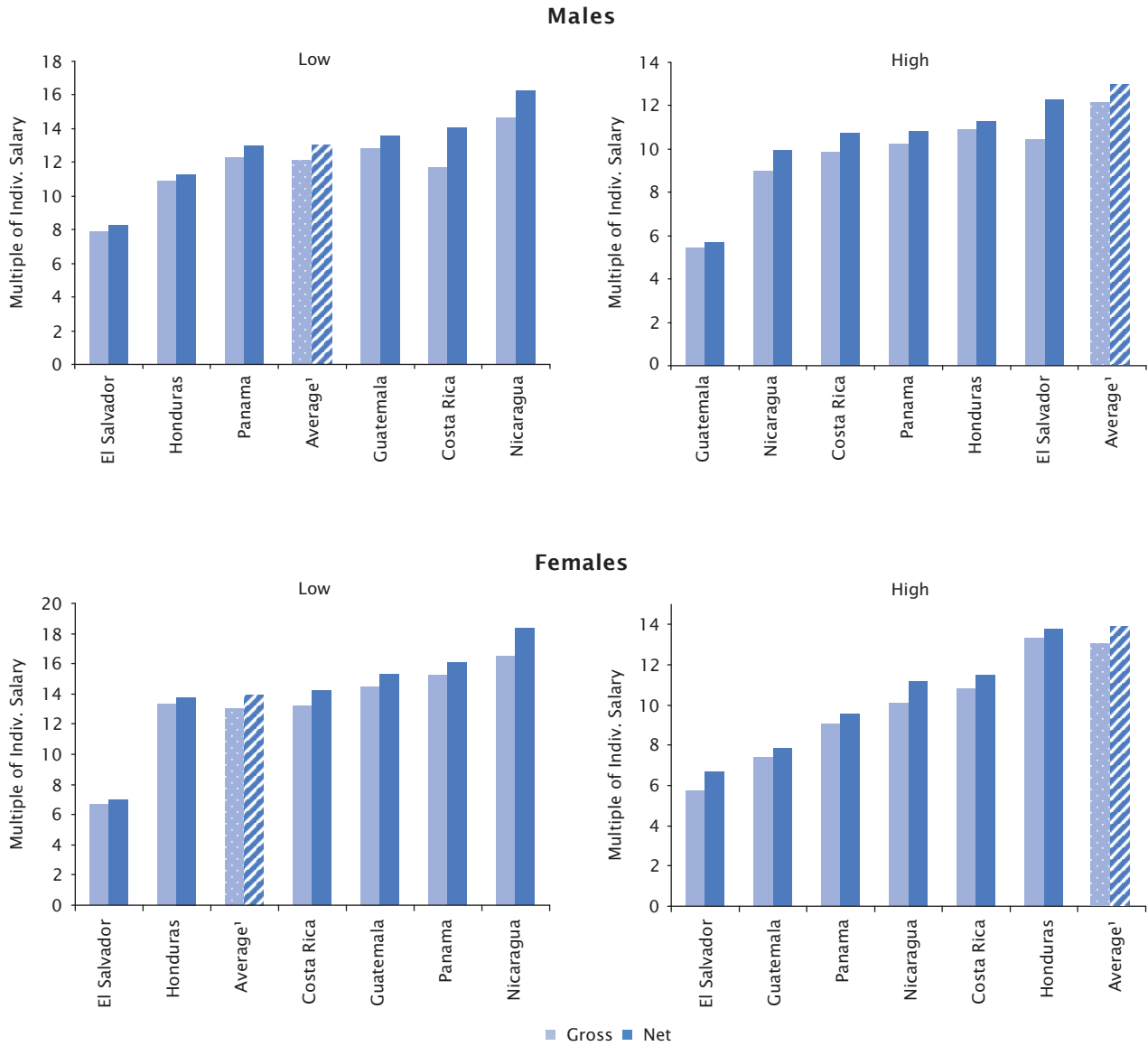


**Figure 7.14**  
**Pension Wealth for Low and High Salaries, Andean**



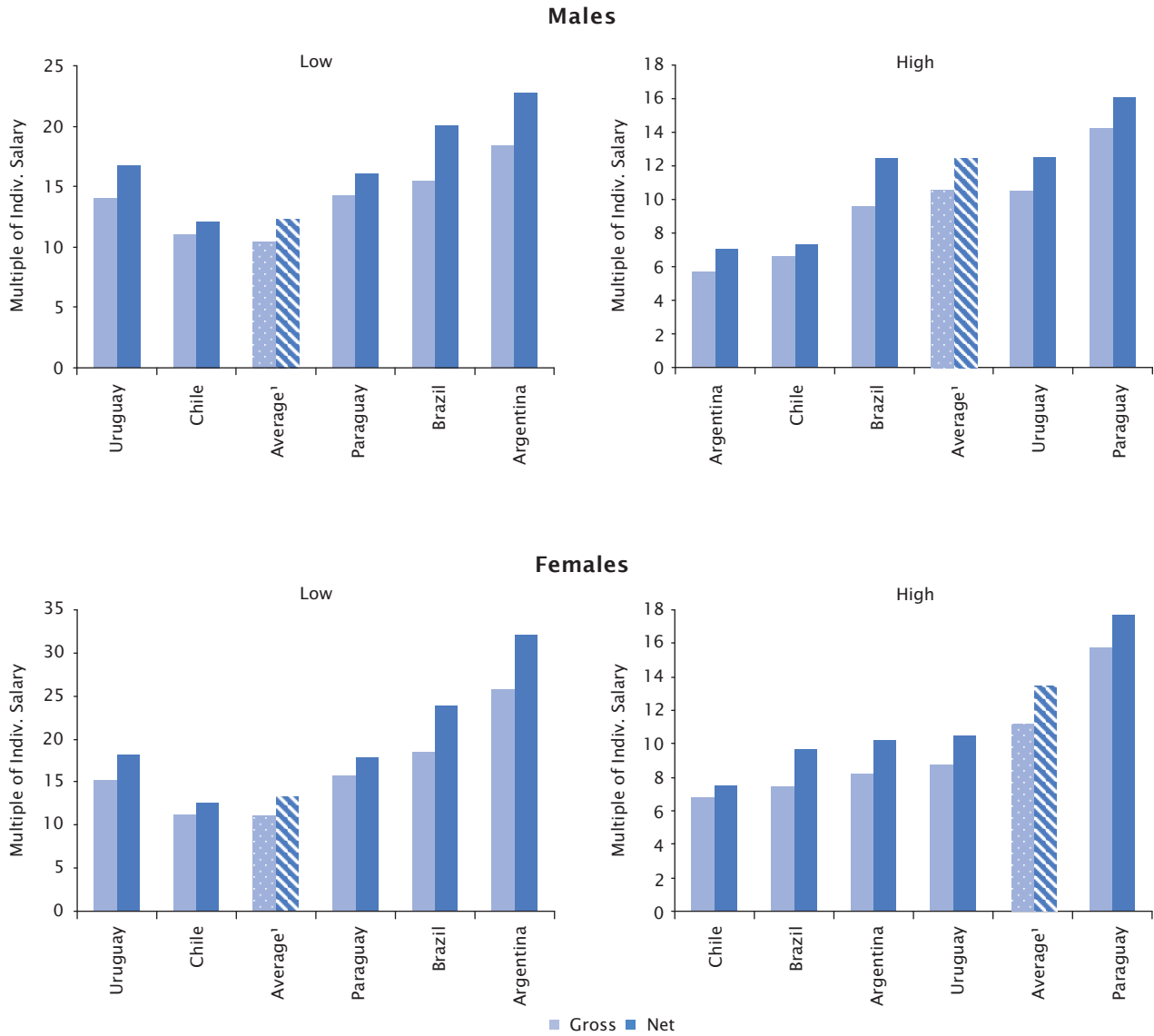
Note: 1/ Average pension wealth for the average-salaried within the region.

**Figure 7.15**  
**Pension Wealth for Low and High Salaries, Central America**



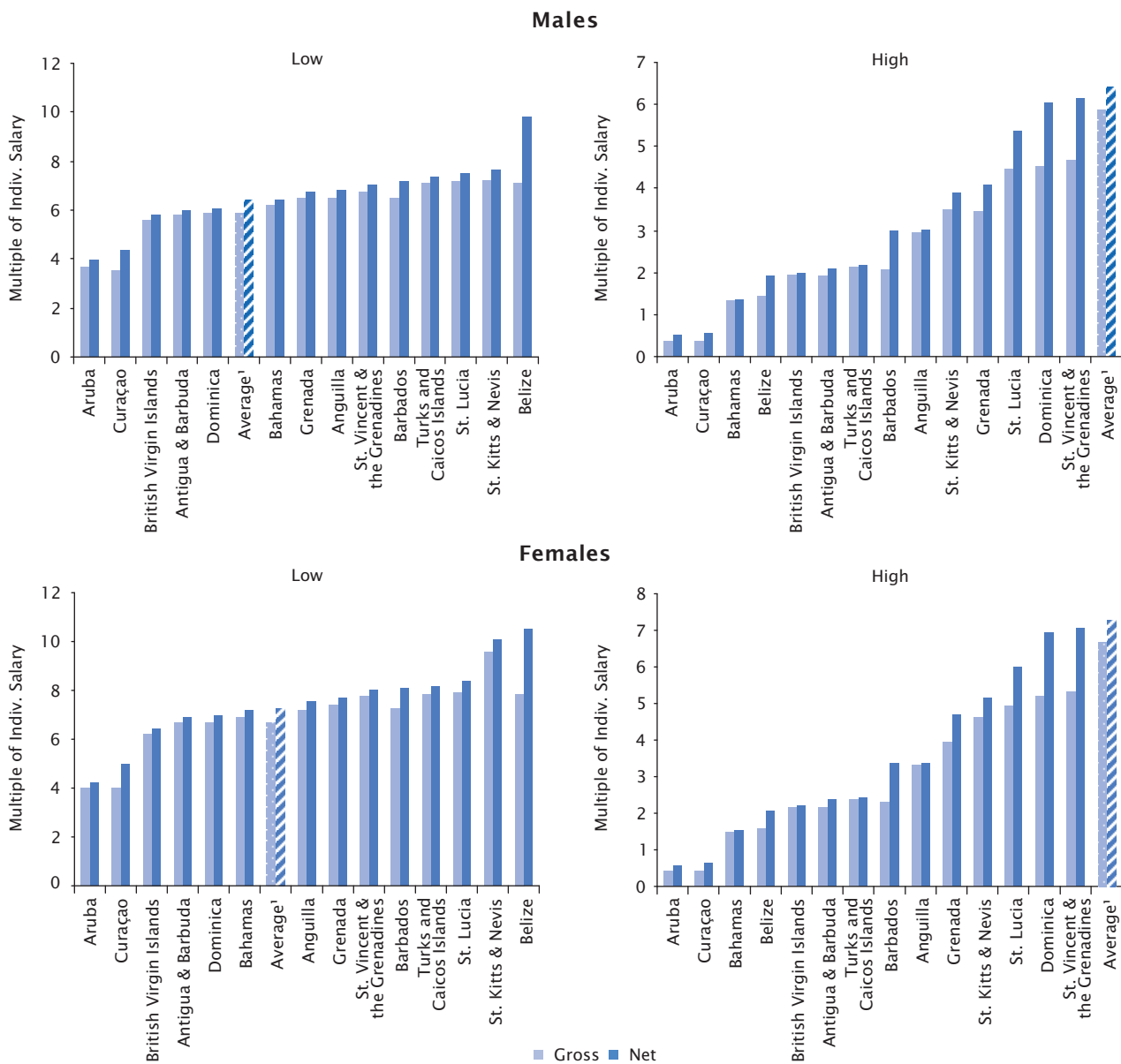
Note: 1/ Average pension wealth for the average-salaried within the region.

**Figure 7.16**  
**Pension Wealth for Low and High Salaries, South Cone**



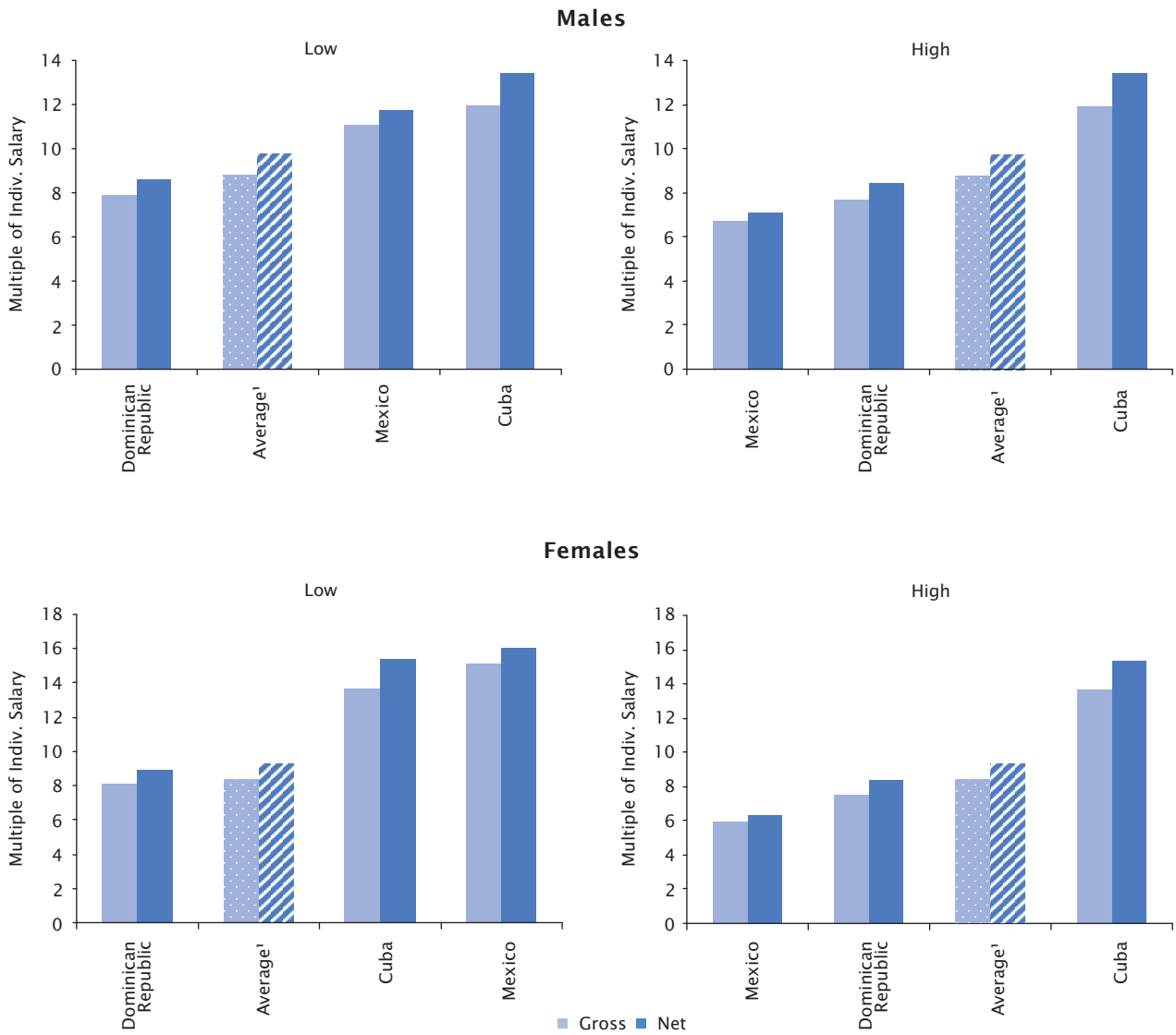
Note: 1/ Average pension wealth for the average-salaried within the region.

**Figure 7.17**  
**Pension Wealth for Low and High Salaries, English Caribbean**



Note: 1/ Average pension wealth for the average-salaried within the region.

**Figure 7.18**  
**Pension Wealth for Low and High Salaries, Mexico and Latin Caribbean**



Note: 1 / Average pension wealth for the average-salaried within the region.

#### 7.4 Sensitivity Analysis: The Effect of Inflation

Sensitivity analysis is convenient and necessary when working with long-term projections. The uncertainty around the actual values of the variables that are required for the calculations may imply that small variations in assumptions lead to large variations in results. Furthermore, national pension systems are subject to business cycles and historical events that substantially change the environment in comparison with the visualization of past decades. Inflation is one of the more common maladies that generate deviations between expectations and deliveries of pension systems.

With the intention of modeling pension benefits according to more suitable assumptions about the economic environment, a second scenario is presented in which countries face in the long-run the average inflation rates observed during the last five years. Table 7.9 presents the values to be used in the simulation exercise. For those countries with little or no information available on inflation we assume a regional average.

##### ***Results on the Effect of Inflation***

Inflation generally results in lower gross replacement rates across the salary distribution in comparison with the baseline scenario. Tables 7.10 and 7.11 show that the value of this variable is now 46.2, compared with the 48.8 of the baseline to define a reduction of about 6%. Roughly, this is the impact of the low inflationary environment of the last five years on pension values. The impact of inflation in net replacement rates is very similar (Tables 7.12 and 7.13).

By type of pension regime, gross replacement rates are now 49.5 (a reduction of 13%) in countries with mixed regimes, 51.8 (a reduction of 2%) in countries with DC pensions and, 44.8 when DB regimes are in place (a reduction of 7%).

Figures 7.19 to 7.22 are used in combination with Figures 7.23 to 7.36 to examine the difference in replacement rates and pension wealth. We found that net-to-gross differences in indicators are just slightly affected, presumably because contribution rates to social security were unaffected. In the Andean region, for example, average-salaried workers have a difference in net and gross replacement rates in this scenario of 8.8%, almost the same as the 9% difference resulting in the baseline scenario. In the same region, low-salaried workers have a difference in net and gross rates of 8.7% (against 8.9% in baseline scenario); the high-salaried have a difference of 8.5% in this scenario as the difference of 8.5% in the baseline scenario. Thus, inflation does not discriminate by income level.

Tables 7.14 to 7.17 show gross and net pension wealth. The average gross pension wealth falls on average 6% after the effect of higher inflation and is now 8 times the annual salary. By type of pension regime it is 9.4 (minus 12%) in mixed, 9.3 (minus 2%) in DC and 7.6 (minus 7%) in DB regimes. Women have gross pension wealth of about 8.3 versus 7.7 of men. Average net pension wealth falls also in 6% with respect to the baseline scenario. Measured by type of scheme the fall is practically the same as the one found for gross pension wealth. Notice that mixed regimes are the most affected by increasing inflation, possibly because there are more floors and ceilings (which divide the amount of contributions that go into each one of the components) that are revalorized according to prices to calculate pension benefits.

**Table 7.9**  
**Inflation Rates, 2005-2010**

	2005	2006	2007	year 2008	2009	2010	average
Anguilla	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Antigua & Barbuda	n.a.	n.a.	5.2	0.7	2.4	n.a.	2.8
Argentina	9.6	10.9	8.8	8.6	6.3	9.6	9.0
Aruba	n.a.	n.a.	10.2	-2.8	8.1	-1.2	3.6
Bahamas	n.a.	n.a.	2.8	4.5	1.3	n.a.	2.9
Barbados	n.a.	n.a.	4.0	8.1	3.6	5.8	5.4
Belize	3.6	4.2	2.3	6.4	-1.1	n.a.	3.1
Bolivia	5.4	4.3	8.7	14.0	3.3	2.0	6.3
Brazil	6.9	4.2	3.6	5.7	4.9	4.8	5.0
Canada	2.1	1.7	2.4	1.2	1.3	2.4	1.9
Chile	3.1	3.4	4.4	8.7	1.5	1.3	3.7
Colombia	5.1	4.3	5.5	7.0	4.2	2.2	4.7
Costa Rica	13.8	11.5	9.4	13.4	7.8	5.5	10.2
Cuba	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Curaçao	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Dominica	n.a.	n.a.	6.0	2.0	-2.9	2.0	1.8
Ecuador	2.1	3.3	2.3	8.4	5.2	3.4	4.1
El Salvador	4.7	4.0	4.6	7.3	0.5	0.8	3.7
United States	3.4	3.2	2.9	3.8	-0.4	1.6	2.4
Grenada	n.a.	n.a.	7.4	5.2	-13.9	6.3	1.3
Guatemala	9.1	6.6	6.8	11.4	1.9	3.7	6.6
Guyana	n.a.	n.a.	14.6	6.4	2.0	4.5	6.9
Haiti	n.a.	n.a.	10.0	10.1	2.0	n.a.	7.4
Honduras	8.8	5.6	6.9	11.4	5.5	4.1	7.1
Jamaica	n.a.	n.a.	16.8	16.9	10.2	11.8	13.9
Turks & Caicos Islands	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
British Virgin Islands	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Mexico	4.0	3.6	4.0	5.1	5.3	3.8	4.3
Montserrat	n.a.	n.a.	4.0	4.5	10.2	n.a.	6.2
Netherlands Antilles	n.a.	n.a.	4.1	7.9	0.4	1.9	3.6
Nicaragua	9.4	10.0	10.7	19.6	3.0	5.1	9.6
Panama	0.9	2.5	4.2	8.8	2.4	3.1	3.6
Paraguay	6.8	9.6	8.1	10.1	2.6	4.3	6.9
Peru	1.6	2.0	1.8	5.8	2.9	1.5	2.6
Dominican Republic	4.2	7.6	6.1	10.6	1.4	5.9	6.0
San Kitts & Nevis	n.a.	n.a.	2.1	7.6	-12.2	3.9	0.3
Saint Lucia	n.a.	n.a.	6.8	3.8	1.0	n.a.	3.9
St. Vincent & the Grenadines	n.a.	n.a.	8.3	8.7	-9.8	2.0	2.3
Surinam	n.a.	n.a.	9.4	6.7	2.8	10.4	7.3
Trinidad & Tobago	n.a.	n.a.	7.6	14.5	1.3	13.4	9.2
Uruguay	4.7	6.4	8.1	7.9	7.1	6.4	6.8
Venezuela	16.0	13.7	18.7	31.4	28.6	27.9	22.7

Note: n.a.: not available.

Sources: Caribbean Centre for Money & Finances (2011), ECLAC (2011), Bank of Canada (2011), and U.S. Bureau, Department of Labor (2011).

**Table 7.10**  
**Gross Replacement Rates across the Salary Distribution in the Inflation Scenario, Males**

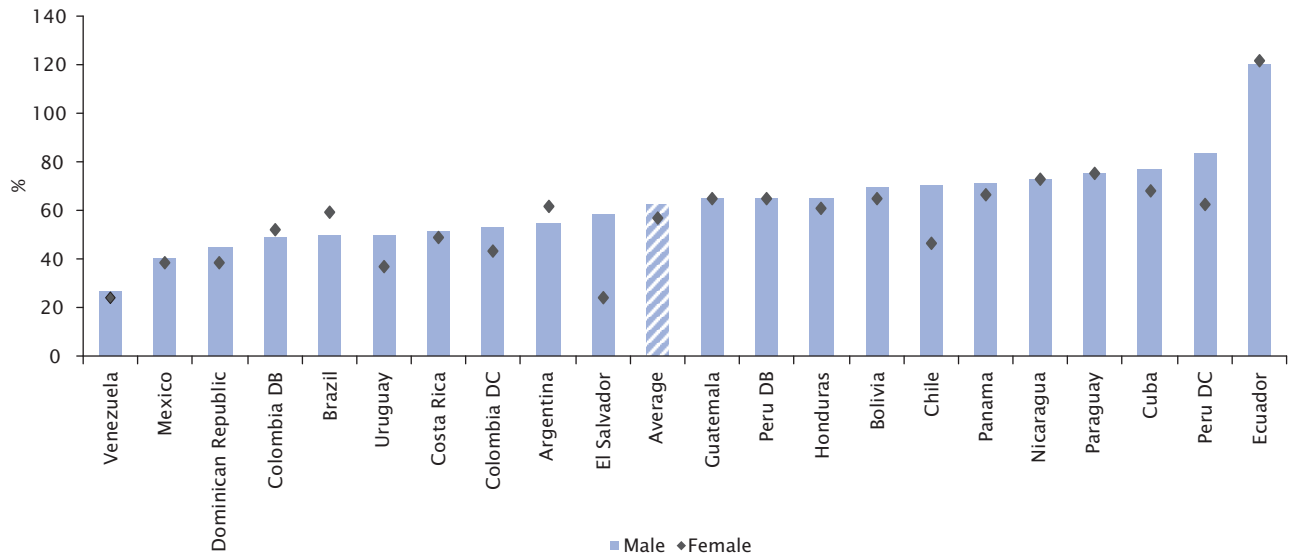
	Individual salary, multiple of mean for men								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	48.7	48.7	48.7	48.7	48.7	46.7	39.0	29.2	23.4
Antigua & Barbuda	40.1	40.1	40.1	40.1	33.0	26.4	22.0	16.5	13.2
Argentina	109.6	73.1	54.8	41.4	37.1	34.5	32.8	30.7	29.4
Aruba	24.4	15.4	12.2	8.1	6.1	4.9	4.1	3.1	2.4
Bahamas	47.3	47.3	47.3	34.5	25.9	20.7	17.3	12.9	10.4
Barbados	50.0	50.0	50.0	50.0	43.7	35.0	29.1	21.9	17.5
Belize	53.3	53.3	53.3	37.6	28.2	22.6	18.8	14.1	11.3
Bolivia	91.1	60.8	69.9	69.9	69.9	69.9	69.9	69.9	69.9
Brazil	98.9	65.9	49.5	49.2	49.2	49.2	49.2	49.2	49.2
British Virgin Islands	39.1	39.1	39.1	39.1	38.6	30.9	25.7	19.3	15.4
Chile	70.4	70.4	70.4	70.4	70.1	67.3	63.0	52.5	42.2
Colombia DB	54.2	49.1	49.1	49.1	49.1	49.1	49.1	43.3	43.3
Colombia DC	59.4	50.9	52.5	52.5	52.5	52.5	52.5	52.5	52.5
Costa Rica	55.3	51.8	51.3	50.7	50.2	49.6	49.0	48.4	48.4
Cuba	76.9	76.9	76.9	76.9	76.9	76.9	76.9	76.9	76.9
Curaçao	9.0	5.6	4.5	3.0	2.3	1.8	1.5	1.1	0.9
Dominica	41.6	41.6	41.6	41.6	41.6	41.6	41.6	39.0	31.2
Dominican Republic	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.9	43.2
Ecuador	156.5	132.0	119.7	107.4	101.3	83.6	69.7	52.3	41.8
El Salvador	46.0	58.5	58.5	58.5	58.5	58.5	58.5	58.5	58.5
Grenada	46.0	46.0	46.0	46.0	46.0	46.0	39.4	29.6	23.7
Guatemala	64.6	64.6	64.6	64.6	64.6	54.5	45.4	34.0	27.2
Honduras	65.2	65.2	65.2	65.2	65.2	65.2	65.2	65.2	65.2
Mexico	63.2	42.1	39.8	39.8	39.8	39.8	39.8	39.8	39.8
Nicaragua	72.6	72.6	72.6	58.1	44.3	44.3	44.3	44.3	44.3
Panama	64.3	68.2	71.4	65.2	62.4	60.8	59.7	58.3	57.4
Paraguay	75.1	75.1	75.1	75.1	75.1	75.1	75.1	75.1	75.1
Peru DB	88.5	64.8	64.8	60.9	45.7	36.6	30.5	22.9	18.3
Peru DC	82.8	82.8	82.8	82.8	82.8	82.8	82.8	82.8	82.8
St. Kitts & Nevis	53.7	53.7	53.7	53.7	53.7	50.0	41.7	31.3	25.0
St. Lucia	53.6	53.6	53.6	53.6	53.6	53.6	53.6	43.3	34.7
St. Vincent & the Grenadines	47.0	47.0	47.0	47.0	47.0	47.0	47.0	40.3	32.2
Turks and Caicos Islands	53.3	53.3	53.3	53.3	42.2	33.8	28.2	21.1	16.9
Uruguay	73.4	45.7	49.6	53.5	55.5	56.7	57.5	58.4	59.0
Venezuela	26.6	26.4	26.3	26.3	26.2	26.2	26.2	26.1	20.9



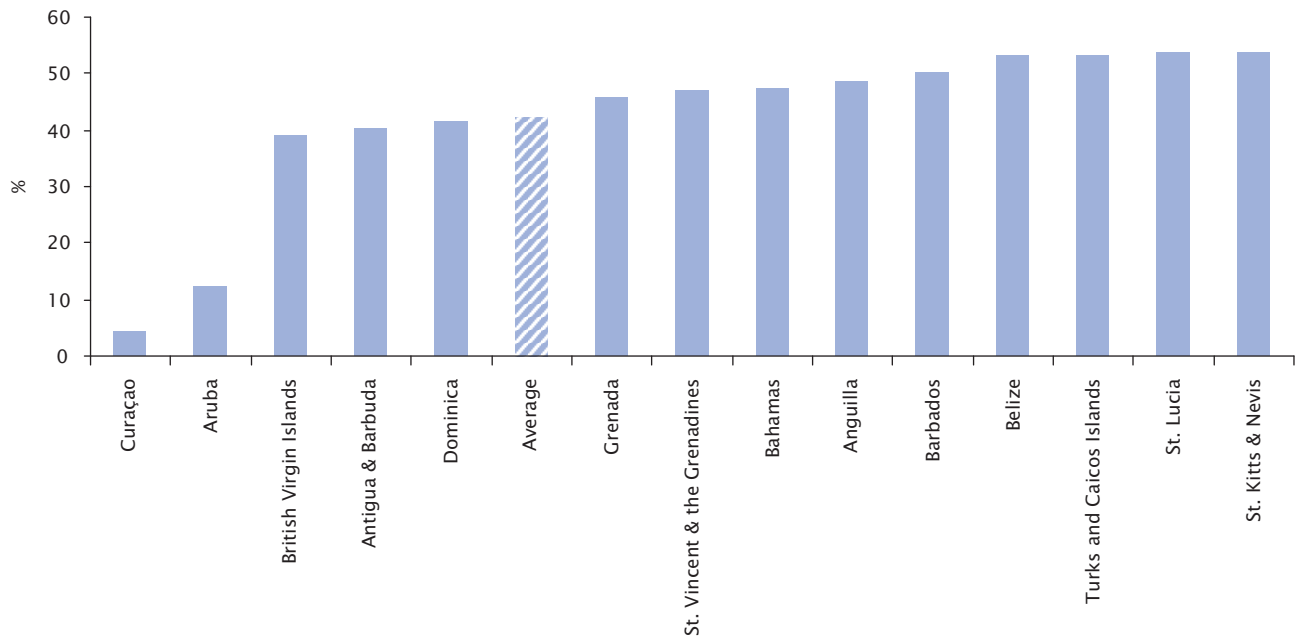
**Table 7.11**  
**Gross Replacement Rates across the Salary Distribution in the Inflation Scenario, Females**

	Individual salary, multiple of mean for women								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	48.7	48.7	48.7	48.7	48.7	46.7	39.0	29.2	23.4
Antigua & Barbuda	40.1	40.1	40.1	40.1	33.0	26.4	22.0	16.5	13.2
Argentina	123.6	82.4	61.8	47.6	41.8	38.3	35.9	33.0	31.2
Aruba	24.4	15.4	12.2	8.1	6.1	4.9	4.1	3.1	2.4
Bahamas	47.3	47.3	47.3	34.5	25.9	20.7	17.3	12.9	10.4
Barbados	50.0	50.0	50.0	50.0	43.7	35.0	29.1	21.9	17.5
Belize	53.3	53.3	53.3	37.6	28.2	22.6	18.8	14.1	11.3
Bolivia	130.1	86.7	65.0	59.7	62.7	52.0	46.5	46.5	46.5
Brazil	118.1	78.7	59.0	39.9	39.9	39.9	39.9	39.9	39.9
British Virgin Islands	39.1	39.1	39.1	39.1	38.6	30.9	25.7	19.3	15.4
Chile	53.6	46.6	46.3	46.3	46.3	45.9	44.2	38.7	32.1
Colombia DB	68.2	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.0
Colombia DC	56.6	37.9	43.3	43.3	43.3	43.3	43.3	43.3	43.3
Costa Rica	49.4	49.2	48.7	48.1	47.5	46.4	46.4	45.8	45.8
Cuba	68.4	68.4	68.4	68.4	68.4	68.4	68.4	68.4	68.4
Curaçao	9.0	5.6	4.5	3.0	2.3	1.8	1.5	1.1	0.9
Dominica	41.6	41.6	41.6	41.6	41.6	41.6	41.6	39.0	31.2
Dominican Republic	39.0	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.0
Ecuador	160.5	134.6	121.7	108.8	102.3	88.1	73.4	55.1	44.1
El Salvador	27.2	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8
Grenada	46.0	46.0	46.0	46.0	46.0	46.0	39.4	29.6	23.7
Guatemala	64.6	64.6	64.6	64.6	64.6	64.6	54.8	41.1	32.9
Honduras	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1
Mexico	77.3	51.5	38.6	31.8	31.8	31.8	31.8	31.8	31.8
Nicaragua	72.6	72.6	72.6	58.1	44.3	44.3	44.3	44.3	44.3
Panama	63.2	63.9	66.2	52.0	44.3	39.6	36.5	32.7	30.4
Paraguay	75.1	75.1	75.1	75.1	75.1	75.1	75.1	75.1	75.1
Peru DB	111.0	74.0	64.8	64.8	57.3	45.9	38.2	28.7	22.9
Peru DC	62.3	62.3	62.3	62.3	62.3	62.3	62.3	62.3	62.3
St. Kitts & Nevis	53.7	53.7	53.7	53.7	53.7	50.0	41.7	31.3	25.0
St. Lucia	53.6	53.6	53.6	53.6	53.6	53.6	53.6	43.3	34.7
St. Vincent & the Grenadines	47.0	47.0	47.0	47.0	47.0	47.0	47.0	40.3	32.2
Turks and Caicos Islands	53.3	53.3	53.3	53.3	42.2	33.8	28.2	21.1	16.9
Uruguay	71.2	35.0	37.1	39.3	40.3	41.0	41.4	41.9	42.3
Venezuela	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	21.9

**Figure 7.19**  
Gross Replacement Rates for the Average-salaried in the Inflation Scenario, Latin America



**Figure 7.20**  
Gross Replacement Rates for the Average-salaried in the Inflation Scenario, English Caribbean



**Table 7.12**  
**Net Replacement Rates across the Salary Distribution in the Inflation Scenario, Males**

	Individual salary, multiple of mean for men								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	51.2	51.2	51.2	51.2	51.2	48.9	40.5	30.1	23.9
Antigua & Barbuda	41.4	41.4	41.4	42.8	35.6	28.7	24.0	18.1	14.5
Argentina	136.1	90.7	68.0	51.5	46.1	42.9	40.7	38.1	36.5
Aruba	26.0	16.8	13.6	9.3	7.1	5.8	5.0	4.0	3.4
Bahamas	49.2	49.2	49.2	35.4	26.4	21.0	17.5	13.1	10.4
Barbados	55.6	56.1	58.6	62.3	57.1	47.1	40.1	30.9	25.1
Belize	74.1	74.1	74.1	51.5	38.4	30.6	25.4	19.0	15.2
Bolivia	99.6	66.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4
Brazil	128.1	85.4	64.0	63.7	63.7	63.7	63.7	63.7	63.7
British Virgin Islands	40.7	40.7	40.7	40.7	39.8	31.6	26.2	19.6	15.6
Chile	78.2	78.2	78.2	78.2	77.8	74.7	69.9	58.2	46.8
Colombia DB	55.3	50.1	50.1	50.1	50.1	50.1	50.1	44.2	44.2
Colombia DC	60.6	51.9	53.6	53.6	53.6	53.6	53.6	53.6	53.6
Costa Rica	68.4	61.5	59.3	57.2	55.8	55.6	54.5	53.3	53.0
Cuba	86.5	86.5	86.5	86.5	86.5	86.5	86.5	86.5	86.5
Curaçao	11.1	6.9	5.6	3.9	3.0	2.5	2.2	1.7	1.4
Dominica	43.4	43.4	44.2	46.4	48.2	49.9	51.2	50.4	41.7
Dominican Republic	49.5	49.5	49.5	49.5	49.5	49.5	49.5	49.4	47.5
Ecuador	171.7	144.8	131.4	117.9	111.2	91.7	76.5	57.3	45.9
El Salvador	47.9	60.9	60.9	60.9	60.9	60.9	69.4	69.0	68.7
Grenada	47.9	47.9	47.9	47.9	47.9	47.8	42.1	33.7	28.1
Guatemala	68.2	68.2	68.2	68.2	68.2	57.4	47.9	35.9	28.7
Honduras	67.4	67.4	67.4	67.4	67.4	67.4	67.4	67.4	67.4
Mexico	67.1	44.7	42.2	42.2	42.2	42.2	42.2	42.2	42.2
Nicaragua	80.6	80.6	80.6	64.5	49.2	49.2	49.2	49.2	49.2
Panama	68.1	72.1	75.6	69.0	66.1	64.3	63.1	61.7	60.8
Paraguay	84.5	84.5	84.5	84.5	84.5	84.5	84.5	84.5	84.5
Peru DB	96.0	70.2	70.2	66.1	49.6	39.7	33.1	24.8	19.8
Peru DC	93.4	93.4	93.4	93.4	93.4	93.4	93.4	93.4	93.4
St. Kitts & Nevis	56.6	57.4	57.7	58.0	58.2	54.4	45.5	34.5	27.8
St. Lucia	56.4	56.4	58.1	61.3	64.4	60.6	62.4	51.6	41.9
St. Vincent & the Grenadines	48.7	48.7	48.7	49.7	52.6	55.5	57.5	51.6	42.5
Turks and Caicos Islands	55.2	55.2	55.2	55.2	43.3	34.5	28.6	21.4	17.1
Uruguay	87.2	54.3	58.9	63.6	65.9	67.3	68.3	69.4	70.1
Venezuela	31.3	31.1	31.0	30.8	30.8	30.8	30.7	30.7	24.5

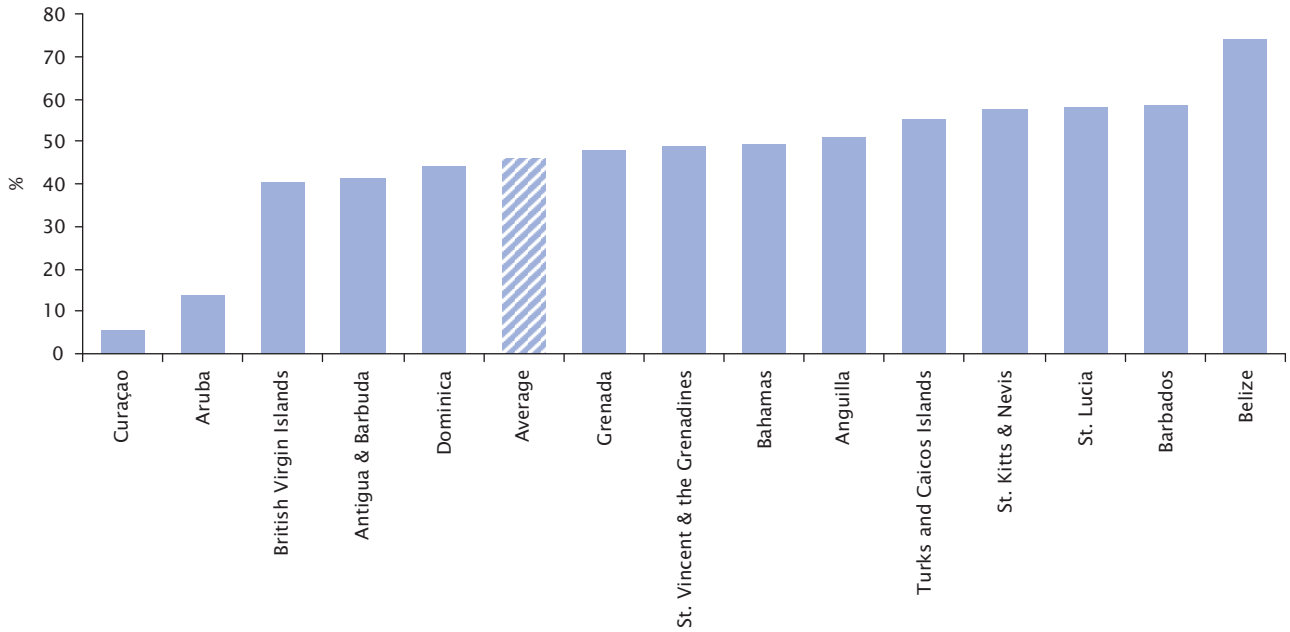
**Table 7.13**  
**Net Replacement Rates across the Salary Distribution in the Inflation Scenario, Females**

	Individual salary, multiple of mean for women								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	51.2	51.2	51.2	51.2	51.2	48.9	40.5	30.1	23.9
Antigua & Barbuda	41.4	41.4	41.4	42.8	35.6	28.7	24.0	18.1	14.5
Argentina	153.4	102.3	76.7	59.1	51.9	47.5	44.6	40.9	38.8
Aruba	26.0	16.8	13.6	9.3	7.1	5.8	5.0	4.0	3.4
Bahamas	49.2	49.2	49.2	35.4	26.4	21.0	17.5	13.1	10.4
Barbados	55.6	56.1	58.6	62.3	57.1	47.1	40.1	30.9	25.1
Belize	74.1	74.1	74.1	51.5	38.4	30.6	25.4	19.0	15.2
Bolivia	142.2	94.8	71.1	65.3	68.6	56.9	50.8	50.8	50.8
Brazil	152.9	101.9	76.5	51.6	51.6	51.6	51.6	51.6	51.6
British Virgin Islands	40.7	40.7	40.7	40.7	39.8	31.6	26.2	19.6	15.6
Chile	59.5	51.8	51.4	51.4	51.4	51.0	49.1	43.0	35.6
Colombia DB	69.6	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.1
Colombia DC	57.8	38.7	44.2	44.2	44.2	44.2	44.2	44.2	44.2
Costa Rica	52.6	52.4	51.8	51.2	50.6	49.4	49.4	48.8	48.8
Cuba	76.9	76.9	76.9	76.9	76.9	76.9	76.9	76.9	76.9
Curaçao	11.1	6.9	5.6	3.9	3.0	2.5	2.2	1.7	1.4
Dominica	43.4	43.4	44.2	46.4	48.2	49.9	51.2	50.4	41.7
Dominican Republic	42.9	42.3	42.3	42.3	42.3	42.3	42.3	42.3	41.8
Ecuador	176.1	147.7	133.5	119.4	112.3	96.7	80.6	60.5	48.4
El Salvador	28.4	24.8	24.8	24.8	24.8	24.8	24.8	27.9	27.8
Grenada	47.9	47.9	47.9	47.9	47.9	47.8	42.1	33.7	28.1
Guatemala	68.2	68.2	68.2	68.2	68.2	68.2	57.8	43.4	34.7
Honduras	63.2	63.2	63.2	63.2	63.2	63.2	63.2	63.2	63.2
Mexico	82.0	54.6	41.0	33.7	33.7	33.7	33.7	33.7	33.7
Nicaragua	80.6	80.6	80.6	64.5	49.2	49.2	49.2	49.2	49.2
Panama	66.9	67.6	70.0	55.0	46.8	41.9	38.7	34.6	32.2
Paraguay	84.5	84.5	84.5	84.5	84.5	84.5	84.5	84.5	84.5
Peru DB	120.4	80.3	70.2	70.2	62.2	49.7	41.5	31.1	24.9
Peru DC	70.3	70.3	70.3	70.3	70.3	70.3	70.3	70.3	70.3
St. Kitts & Nevis	56.6	57.4	57.7	58.0	58.2	54.4	45.5	34.5	27.8
St. Lucia	56.4	56.4	58.1	61.3	64.4	60.6	62.4	51.6	41.9
St. Vincent & the Grenadines	48.7	48.7	48.7	49.7	52.6	55.5	57.5	51.6	42.5
Turks and Caicos Islands	55.2	55.2	55.2	55.2	43.3	34.5	28.6	21.4	17.1
Uruguay	84.6	41.6	44.1	46.6	47.9	48.7	49.2	49.8	50.2
Venezuela	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	25.8

**Figure 7.21**  
**Net Replacement Rates for the Average-salaried in the Inflation Scenario, Latin America**



**Figure 7.22**  
**Net Replacement Rates for the Average-salaried in the Inflation Scenario, English Caribbean**



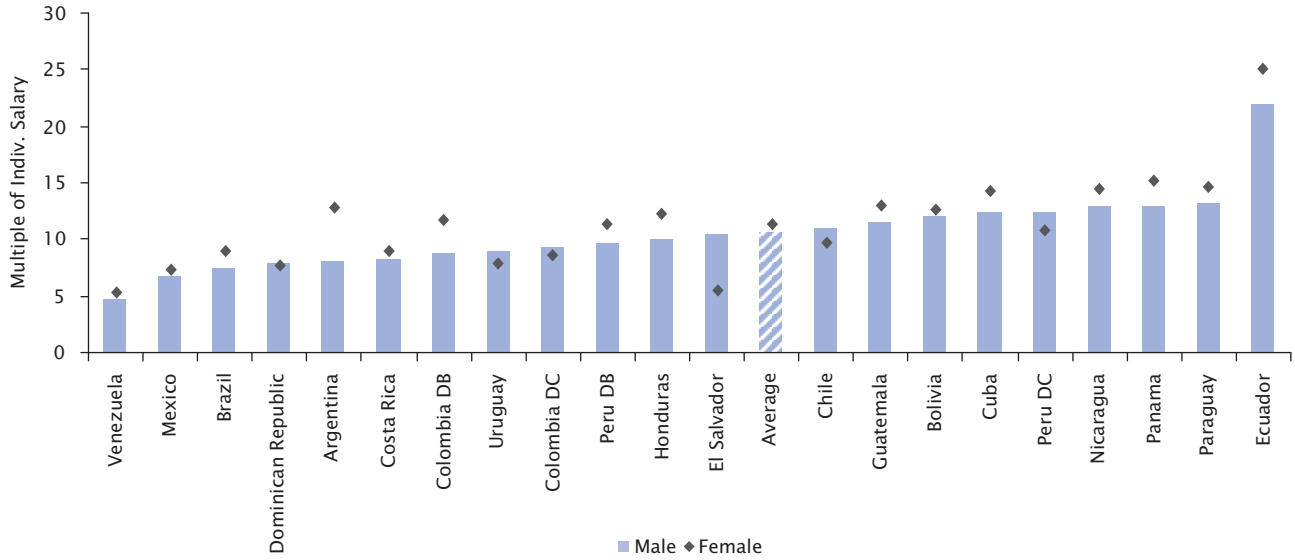
**Table 7.14**  
**Gross Pension Wealth across the Salary Distribution in the Inflation Scenario, Males**

	Individual salary, multiple of mean for men								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	6.3	6.3	6.3	6.3	6.3	6.1	5.1	3.8	3.0
Antigua & Barbuda	5.8	5.8	5.8	5.8	4.8	3.8	3.2	2.4	1.9
Argentina	16.3	10.9	8.1	6.2	5.5	5.1	4.9	4.6	4.4
Aruba	3.7	2.4	1.9	1.2	0.9	0.7	0.6	0.5	0.4
Bahamas	6.1	6.1	6.1	4.5	3.4	2.7	2.2	1.7	1.3
Barbados	6.1	6.1	6.1	6.1	5.3	4.3	3.6	2.7	2.1
Belize	6.9	6.9	6.9	4.9	3.7	2.9	2.4	1.8	1.5
Bolivia	15.7	10.4	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Brazil	15.2	10.1	7.6	7.5	7.5	7.5	7.5	7.5	7.5
British Virgin Islands	5.1	5.1	5.1	5.1	5.0	4.0	3.3	2.5	2.0
Chile	11.0	11.0	11.0	11.0	11.0	10.5	9.9	8.2	6.6
Colombia DB	9.6	8.7	8.7	8.7	8.7	8.7	8.7	7.7	7.7
Colombia DC	10.6	9.1	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Costa Rica	8.9	8.3	8.2	8.2	8.1	8.0	7.9	7.8	7.8
Cuba	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Curaçao	1.4	0.9	0.7	0.5	0.4	0.3	0.2	0.2	0.1
Dominica	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.6	4.5
Dominican Republic	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.6
Ecuador	28.7	24.2	22.0	19.7	18.6	15.3	12.8	9.6	7.7
El Salvador	8.2	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Grenada	6.6	6.6	6.6	6.6	6.6	6.6	5.7	4.3	3.4
Guatemala	11.5	11.5	11.5	11.5	11.5	9.7	8.1	6.1	4.8
Honduras	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Mexico	10.7	7.1	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Nicaragua	12.9	12.9	12.9	10.3	7.9	7.9	7.9	7.9	7.9
Panama	11.6	12.3	12.9	11.8	11.3	11.0	10.8	10.5	10.4
Paraguay	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
Peru DB	13.4	9.8	9.8	9.2	6.9	5.5	4.6	3.5	2.8
Peru DC	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
St. Kitts & Nevis	7.4	7.4	7.4	7.4	7.4	6.9	5.7	4.3	3.4
St. Lucia	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.6	4.5
St. Vincent & the Grenadines	6.8	6.8	6.8	6.8	6.8	6.8	6.8	5.8	4.7
Turks and Caicos Islands	6.9	6.9	6.9	6.9	5.5	4.4	3.7	2.7	2.2
Uruguay	13.2	8.2	9.0	9.7	10.0	10.2	10.4	10.5	10.7
Venezuela	4.7	4.7	4.7	4.6	4.6	4.6	4.6	4.6	3.7

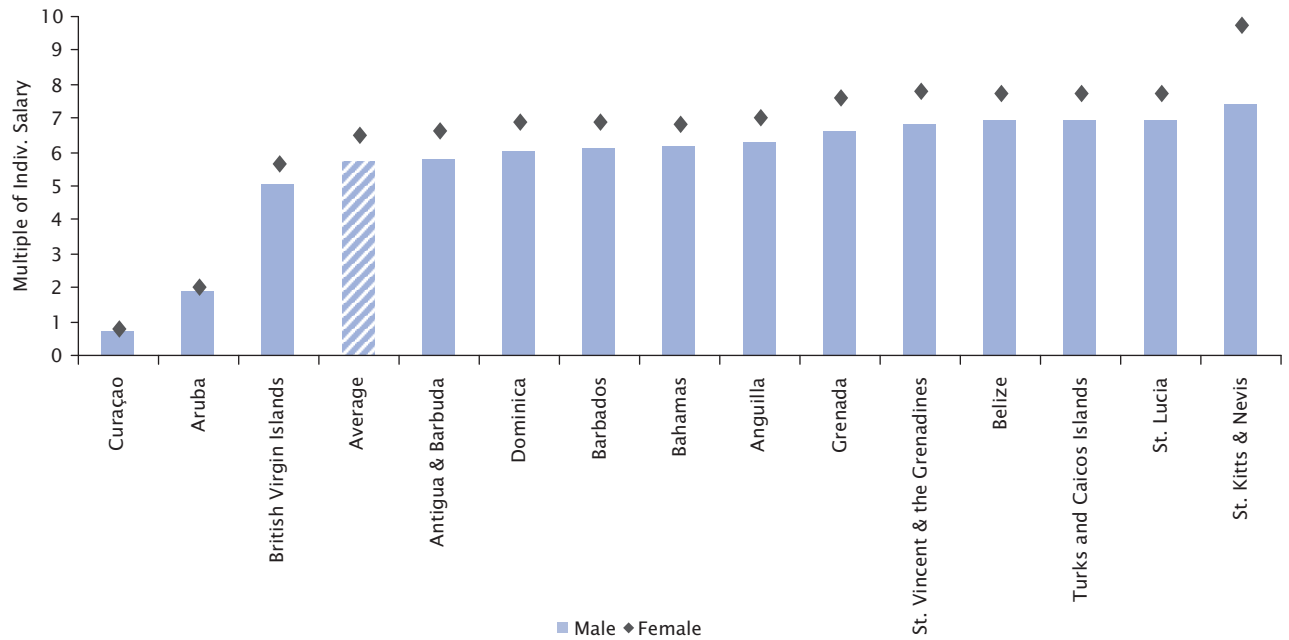
**Table 7.15**  
**Gross Pension Wealth across the Salary Distribution in the Inflation Scenario, Females**

	Individual salary, multiple of mean for women								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	7.0	7.0	7.0	7.0	7.0	6.8	5.6	4.2	3.4
Antigua & Barbuda	6.6	6.6	6.6	6.6	5.5	4.4	3.6	2.7	2.2
Argentina	25.8	17.2	12.9	9.9	8.7	8.0	7.5	6.9	6.5
Aruba	4.0	2.5	2.0	1.3	1.0	0.8	0.7	0.5	0.4
Bahamas	6.8	6.8	6.8	5.0	3.7	3.0	2.5	1.9	1.5
Barbados	6.9	6.9	6.9	6.9	6.0	4.8	4.0	3.0	2.4
Belize	7.7	7.7	7.7	5.4	4.1	3.3	2.7	2.0	1.6
Bolivia	25.3	16.9	12.7	11.6	12.2	10.1	9.0	9.0	9.0
Brazil	18.1	12.1	9.0	6.1	6.1	6.1	6.1	6.1	6.1
British Virgin Islands	5.6	5.6	5.6	5.6	5.6	4.5	3.7	2.8	2.2
Chile	11.3	9.9	9.8	9.8	9.8	9.7	9.3	8.2	6.8
Colombia DB	15.3	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.7
Colombia DC	11.3	7.5	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Costa Rica	9.1	9.0	8.9	8.8	8.7	8.5	8.5	8.4	8.4
Cuba	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Curaçao	1.6	1.0	0.8	0.5	0.4	0.3	0.3	0.2	0.2
Dominica	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.4	5.2
Dominican Republic	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.6
Ecuador	33.1	27.7	25.1	22.4	21.1	18.2	15.1	11.4	9.1
El Salvador	6.2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Grenada	7.6	7.6	7.6	7.6	7.6	7.6	6.5	4.9	3.9
Guatemala	13.0	13.0	13.0	13.0	13.0	13.0	11.0	8.3	6.6
Honduras	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
Mexico	14.6	9.7	7.3	6.0	6.0	6.0	6.0	6.0	6.0
Nicaragua	14.5	14.5	14.5	11.6	8.9	8.9	8.9	8.9	8.9
Panama	14.6	14.7	15.2	12.0	10.2	9.1	8.4	7.5	7.0
Paraguay	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6
Peru DB	19.3	12.9	11.3	11.3	10.0	8.0	6.7	5.0	4.0
Peru DC	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
St. Kitts & Nevis	9.8	9.8	9.8	9.8	9.8	9.1	7.6	5.7	4.5
St. Lucia	7.7	7.7	7.7	7.7	7.7	7.7	7.7	6.3	5.0
St. Vincent & the Grenadines	7.8	7.8	7.8	7.8	7.8	7.8	7.8	6.7	5.3
Turks and Caicos Islands	7.7	7.7	7.7	7.7	6.1	4.9	4.1	3.1	2.4
Uruguay	15.0	7.4	7.8	8.3	8.5	8.6	8.7	8.9	8.9
Venezuela	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.0

**Figure 7.23**  
Gross Pension Wealth for the Average-salaried in the Inflation Scenario, Latin America



**Figure 7.24**  
Gross Pension Wealth for the Average-salaried in the Inflation Scenario, English Caribbean





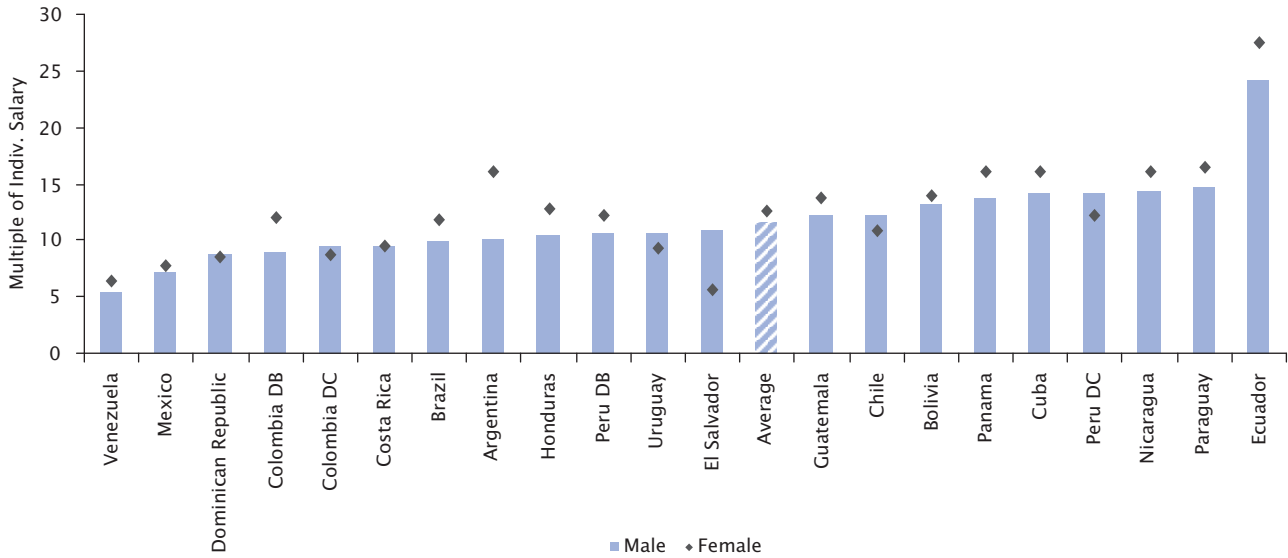
**Table 7.16**  
**Net Pension Wealth across the Salary Distribution in the Inflation Scenario, Males**

	Individual salary, multiple of mean for men								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	6.7	6.7	6.7	6.7	6.7	6.4	5.3	3.9	3.1
Antigua & Barbuda	6.0	6.0	6.0	6.2	5.1	4.1	3.5	2.6	2.1
Argentina	20.2	13.5	10.1	7.6	6.8	6.4	6.1	5.7	5.4
Aruba	4.0	2.6	2.1	1.4	1.1	0.9	0.8	0.6	0.5
Bahamas	6.4	6.4	6.4	4.6	3.4	2.7	2.3	1.7	1.4
Barbados	6.8	6.9	7.2	7.6	7.0	5.8	4.9	3.8	3.1
Belize	9.6	9.6	9.6	6.7	5.0	4.0	3.3	2.5	2.0
Bolivia	17.1	11.4	13.1	13.1	13.1	13.1	13.1	13.1	13.1
Brazil	19.6	13.1	9.8	9.8	9.8	9.8	9.8	9.8	9.8
British Virgin Islands	5.3	5.3	5.3	5.3	5.2	4.1	3.4	2.5	2.0
Chile	12.2	12.2	12.2	12.2	12.2	11.7	10.9	9.1	7.3
Colombia DB	9.8	8.9	8.9	8.9	8.9	8.9	8.9	7.9	7.9
Colombia DC	10.8	9.2	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Costa Rica	11.0	9.9	9.5	9.2	9.0	8.9	8.8	8.6	8.5
Cuba	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
Curaçao	1.7	1.1	0.9	0.6	0.5	0.4	0.3	0.3	0.2
Dominica	6.3	6.3	6.4	6.7	7.0	7.2	7.4	7.3	6.0
Dominican Republic	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.4
Ecuador	31.5	26.6	24.1	21.6	20.4	16.8	14.0	10.5	8.4
El Salvador	8.6	10.9	10.9	10.9	10.9	10.9	12.5	12.4	12.3
Grenada	6.9	6.9	6.9	6.9	6.9	6.9	6.1	4.9	4.1
Guatemala	12.1	12.1	12.1	12.1	12.1	10.2	8.5	6.4	5.1
Honduras	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
Mexico	11.3	7.6	7.1	7.1	7.1	7.1	7.1	7.1	7.1
Nicaragua	14.3	14.3	14.3	11.5	8.7	8.7	8.7	8.7	8.7
Panama	12.3	13.0	13.7	12.5	11.9	11.6	11.4	11.1	11.0
Paraguay	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8
Peru DB	14.5	10.6	10.6	10.0	7.5	6.0	5.0	3.7	3.0
Peru DC	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
St. Kitts & Nevis	7.8	7.9	7.9	8.0	8.0	7.5	6.2	4.7	3.8
St. Lucia	7.3	7.3	7.5	8.0	8.4	7.9	8.1	6.7	5.4
St. Vincent & the Grenadines	7.0	7.0	7.0	7.2	7.6	8.0	8.3	7.5	6.1
Turks and Caicos Islands	7.2	7.2	7.2	7.2	5.6	4.5	3.7	2.8	2.2
Uruguay	15.7	9.8	10.6	11.5	11.9	12.2	12.3	12.5	12.7
Venezuela	5.5	5.5	5.5	5.5	5.5	5.4	5.4	5.4	4.3

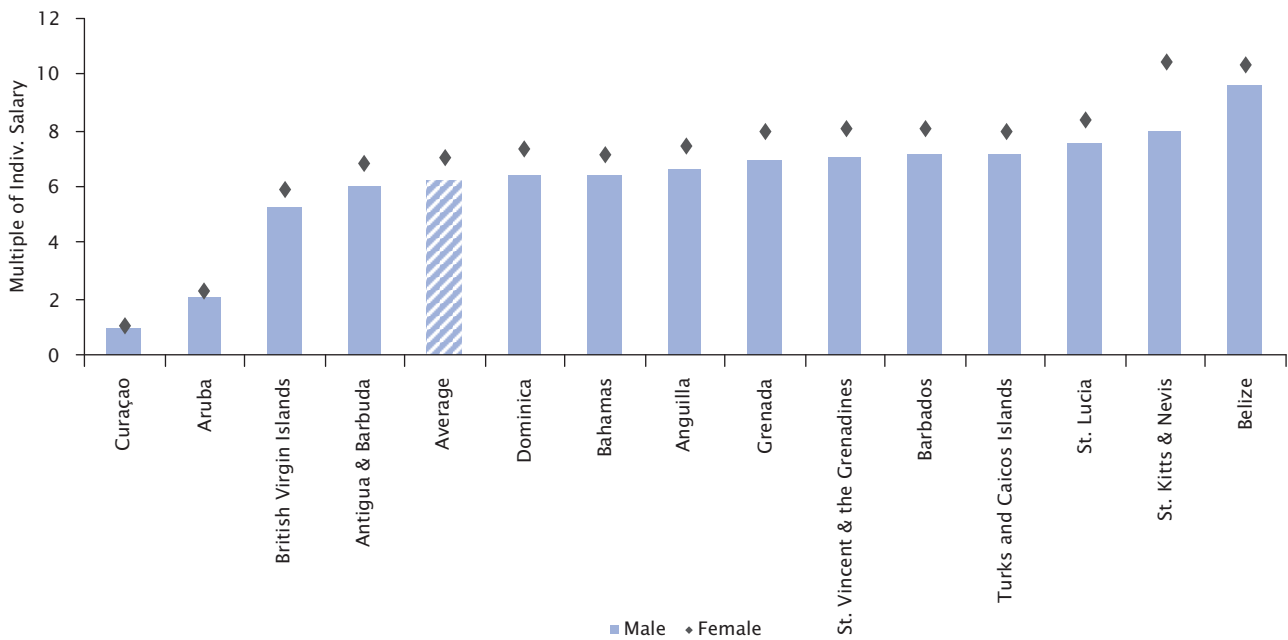
**Table 7.17**  
**Net Pension Wealth across the Salary Distribution in the Inflation Scenario, Females**

	Individual salary, multiple of mean for women								
	0.5	0.75	1	1.5	2	2.5	3	4	5
Anguilla	7.4	7.4	7.4	7.4	7.4	7.1	5.8	4.3	3.5
Antigua & Barbuda	6.8	6.8	6.8	7.1	5.9	4.7	4.0	3.0	2.4
Argentina	32.0	21.3	16.0	12.3	10.8	9.9	9.3	8.5	8.1
Aruba	4.3	2.8	2.2	1.5	1.2	1.0	0.8	0.7	0.6
Bahamas	7.1	7.1	7.1	5.1	3.8	3.0	2.5	1.9	1.5
Barbados	7.6	7.7	8.0	8.6	7.8	6.5	5.5	4.2	3.4
Belize	10.3	10.3	10.3	7.2	5.3	4.2	3.5	2.6	2.1
Bolivia	27.7	18.5	13.8	12.7	13.3	11.1	9.9	9.9	9.9
Brazil	23.4	15.6	11.7	7.9	7.9	7.9	7.9	7.9	7.9
British Virgin Islands	5.9	5.9	5.9	5.9	5.7	4.6	3.8	2.8	2.3
Chile	12.6	10.9	10.9	10.9	10.9	10.8	10.4	9.1	7.5
Colombia DB	15.7	12.0	12.0	12.0	12.0	12.0	12.0	12.0	11.9
Colombia DC	11.5	7.7	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Costa Rica	9.7	9.6	9.5	9.4	9.3	9.1	9.1	9.0	9.0
Cuba	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1
Curaçao	2.0	1.2	1.0	0.7	0.5	0.5	0.4	0.3	0.3
Dominica	7.2	7.2	7.3	7.7	8.0	8.3	8.5	8.3	6.9
Dominican Republic	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.3
Ecuador	36.3	30.4	27.5	24.6	23.1	19.9	16.6	12.5	10.0
El Salvador	6.5	5.7	5.7	5.7	5.7	5.7	5.7	6.4	6.4
Grenada	7.9	7.9	7.9	7.9	7.9	7.9	7.0	5.6	4.6
Guatemala	13.7	13.7	13.7	13.7	13.7	13.7	11.6	8.7	7.0
Honduras	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
Mexico	15.5	10.3	7.7	6.4	6.4	6.4	6.4	6.4	6.4
Nicaragua	16.1	16.1	16.1	12.9	9.9	9.9	9.9	9.9	9.9
Panama	15.4	15.6	16.1	12.7	10.8	9.7	8.9	8.0	7.4
Paraguay	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4	16.4
Peru DB	21.0	14.0	12.2	12.2	10.8	8.7	7.2	5.4	4.3
Peru DC	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
St. Kitts & Nevis	10.3	10.4	10.5	10.5	10.6	9.9	8.3	6.3	5.0
St. Lucia	8.2	8.2	8.4	8.9	9.3	8.8	9.0	7.5	6.1
St. Vincent & the Grenadines	8.0	8.0	8.0	8.2	8.7	9.2	9.5	8.5	7.0
Turks and Caicos Islands	8.0	8.0	8.0	8.0	6.3	5.0	4.1	3.1	2.5
Uruguay	17.9	8.8	9.3	9.8	10.1	10.3	10.4	10.5	10.6
Venezuela	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	5.8

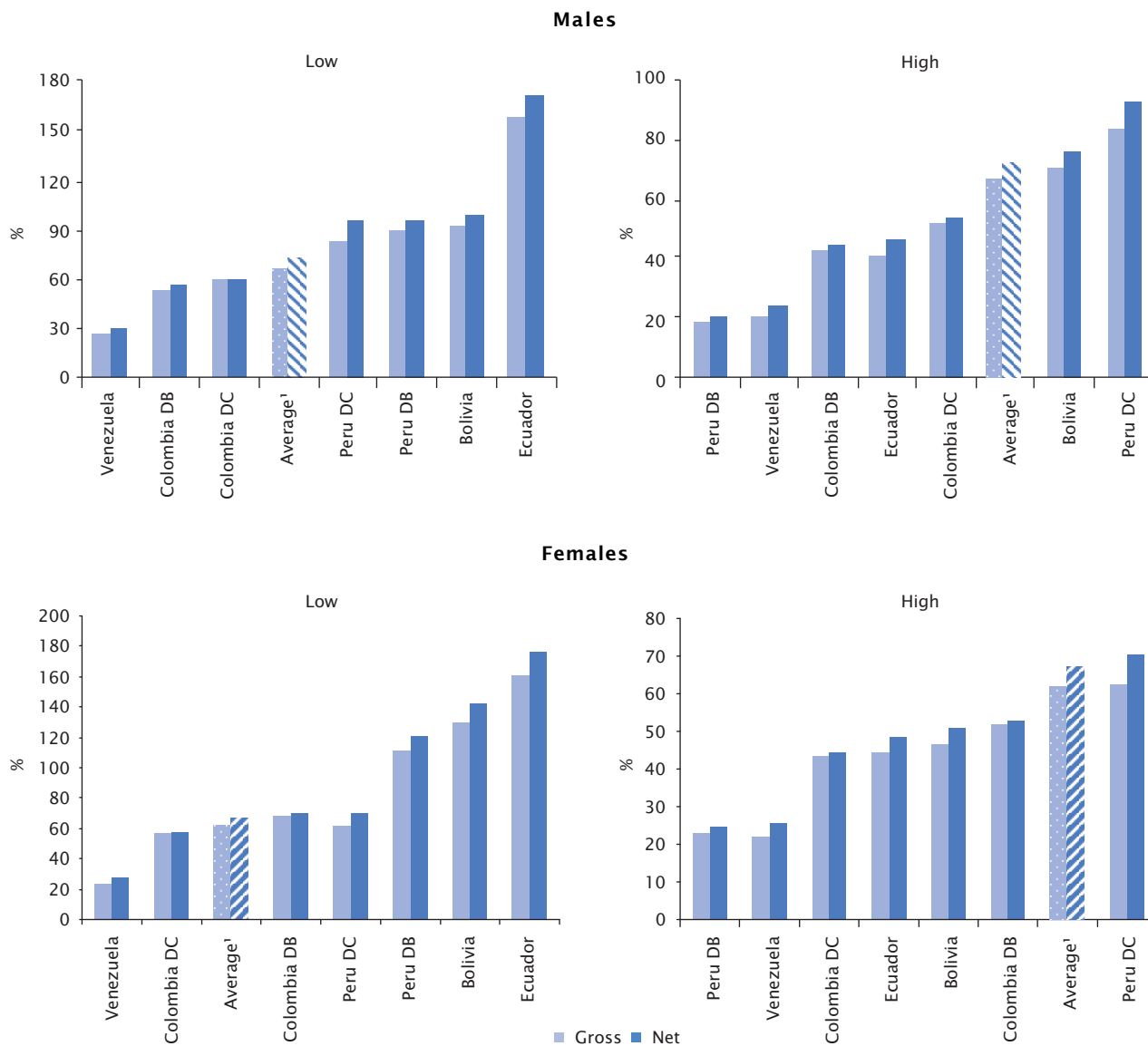
**Figure 7.25**  
**Net Pension Wealth for the Average-salaried in the Inflation Scenario, Latin America**



**Figure 7.26**  
**Net Pension Wealth for the Average-salaried in the Inflation Scenario, English Caribbean**

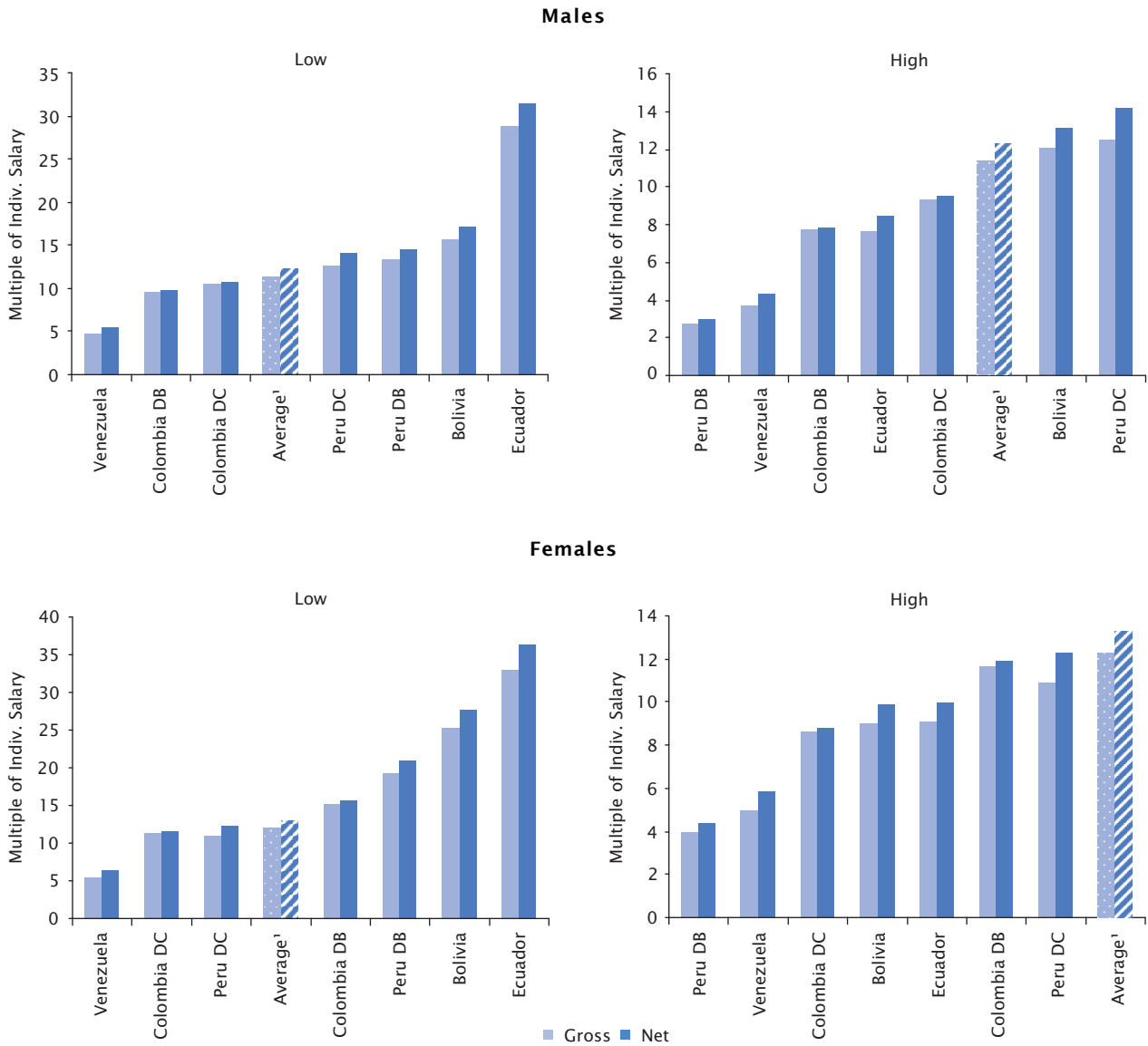


**Figure 7.27**  
**Replacement Rates for Low and High Salaries in the Inflation Scenario, Andean**



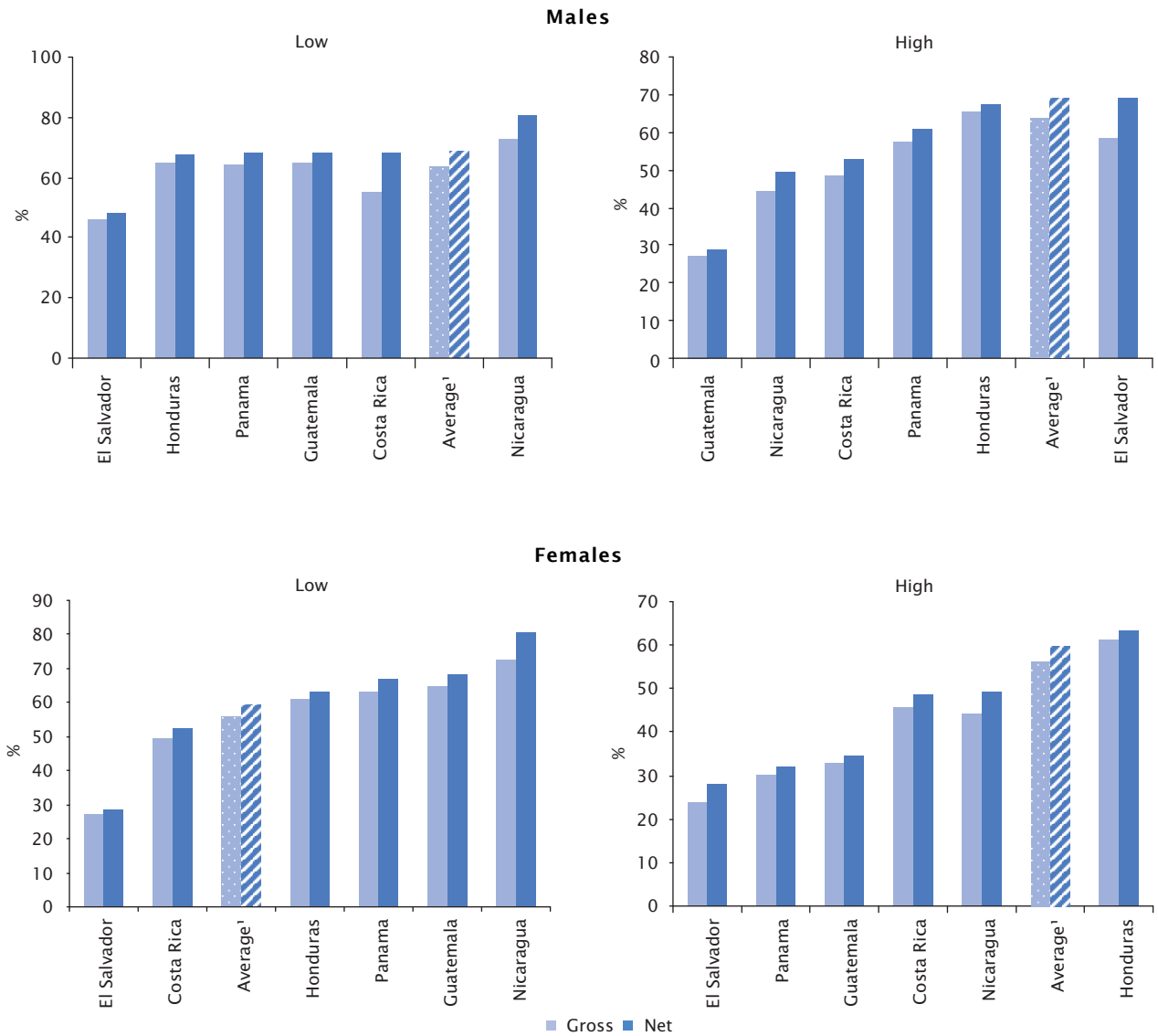
Note: 1/ Average replacement rate for the average-salaried within the region.

**Figure 7.28**  
**Pension Wealth for Low and High Salaries in the Inflation Scenario, Andean**



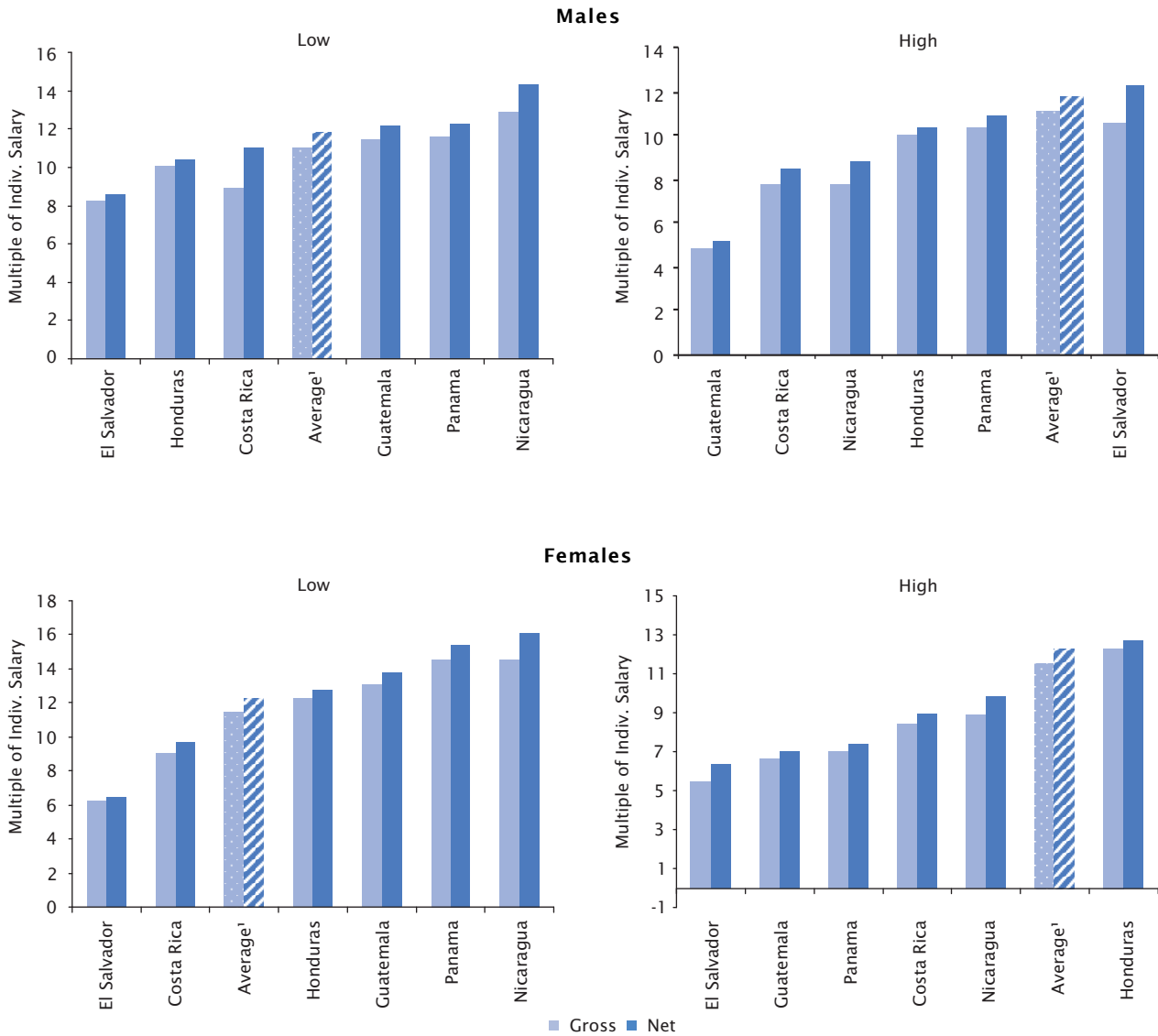
Note: 1/ Average pension wealth for the average-salaried within the region.

**Figure 7.29**  
**Replacement Rates for Low and High Salaries in the Inflation Scenario, Central America**



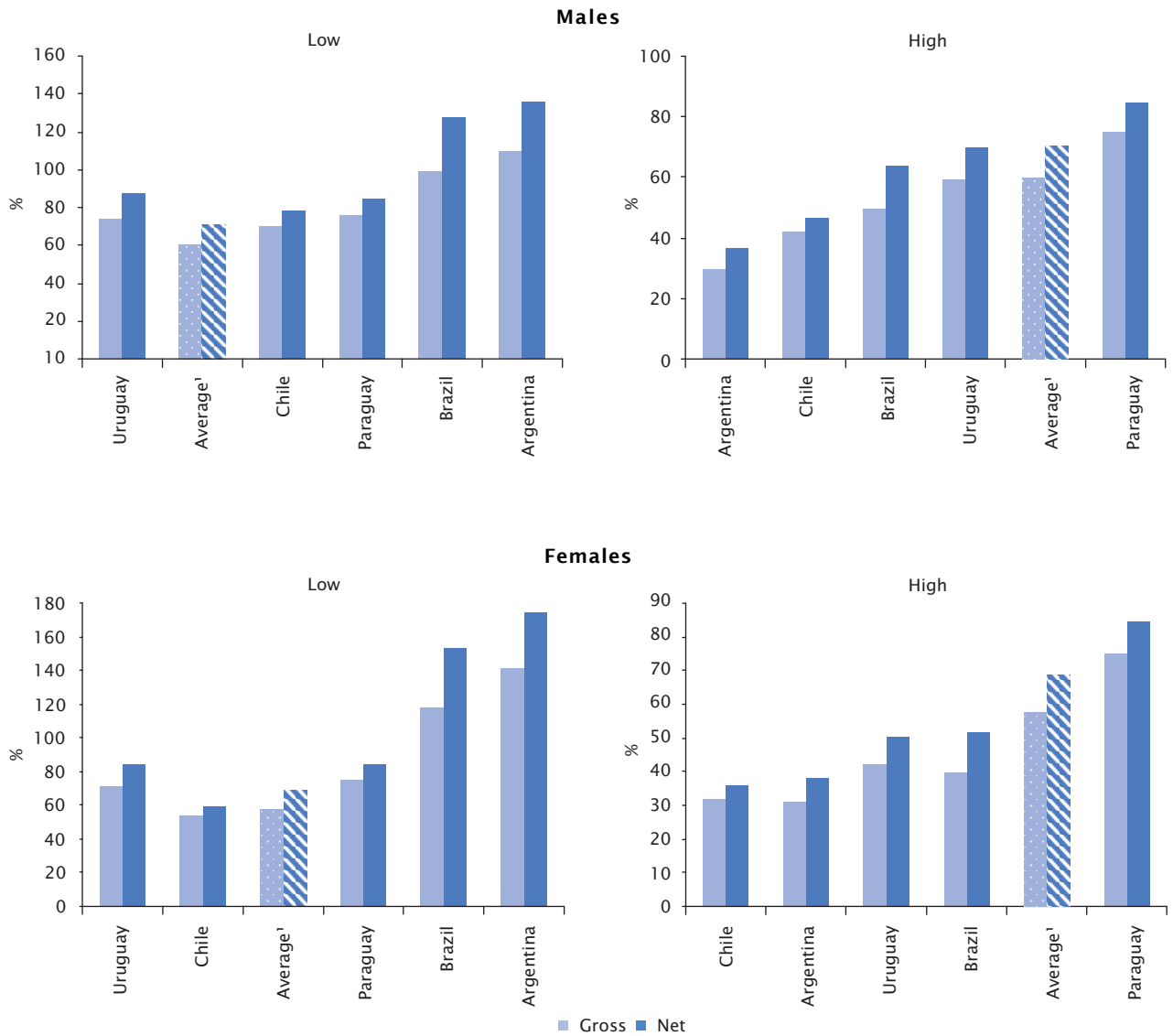
Note: 1/ Average replacement rate for the average-salaried within the region.

**Figure 7.30**  
**Pension Wealth for Low and High Salaries in the Inflation Scenario, Central America**



Note: 1/ Average pension wealth for the average-salaried within the region.

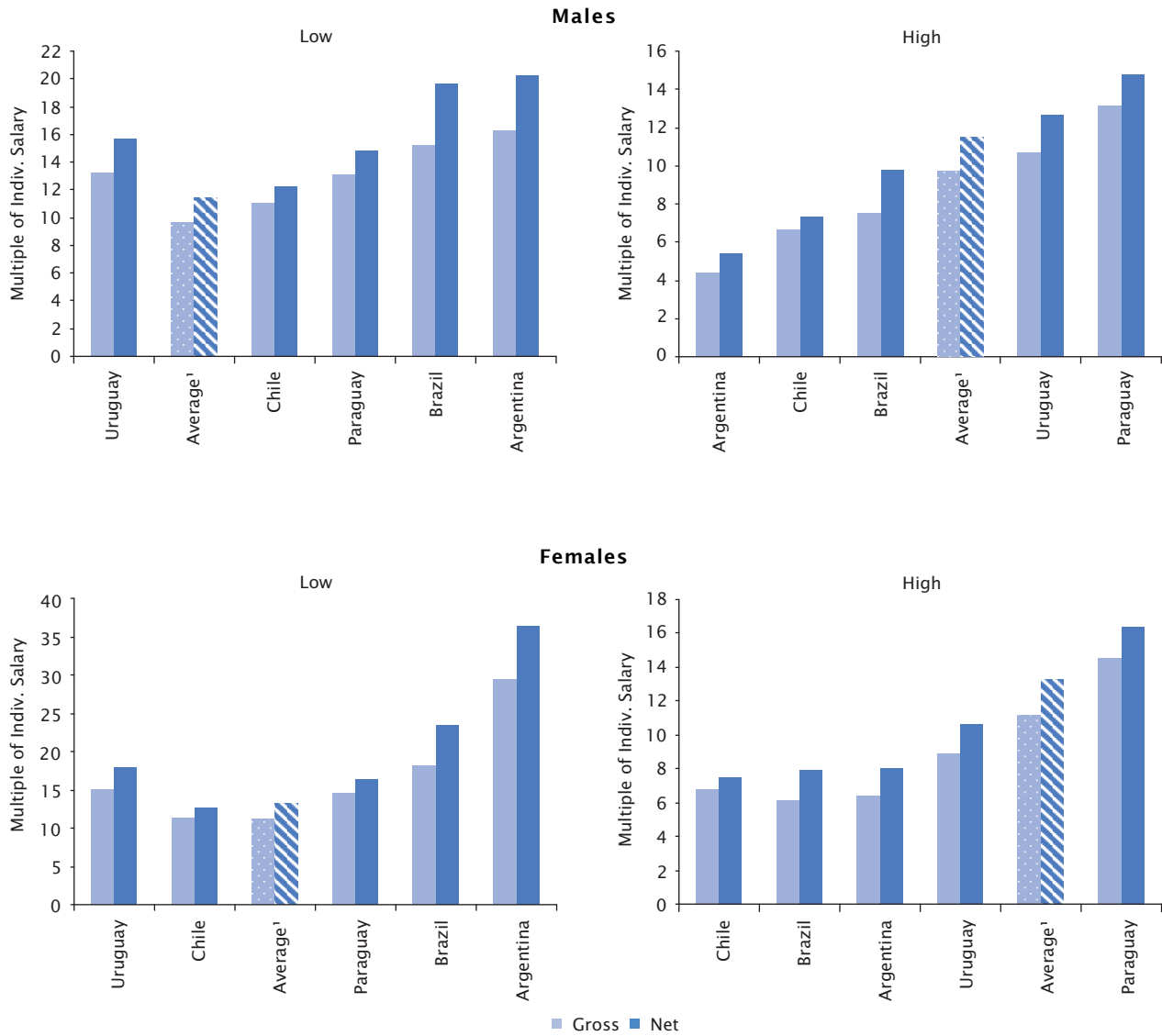
**Figure 7.31**  
**Replacement Rates for Low and High Salaries in the Inflation Scenario, South Cone**



Note: 1/ Average replacement rate for the average-salaried within the region.

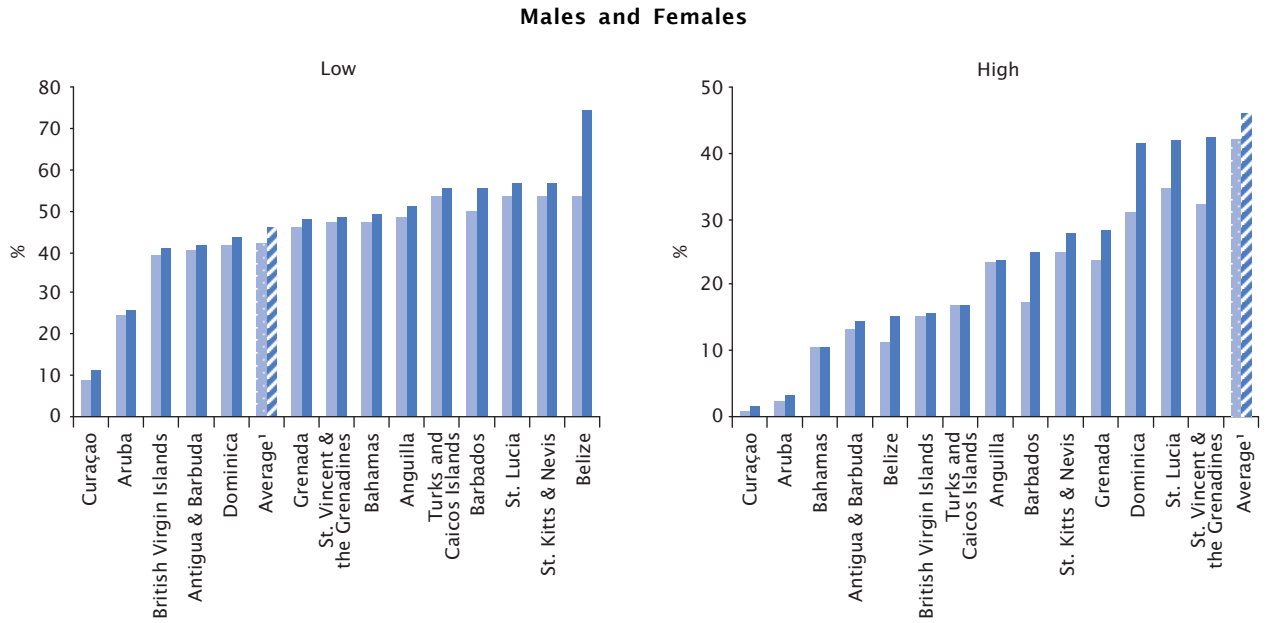


**Figure 7.32**  
**Pension Wealth for Low and High Salaries in the Inflation Scenario, South Cone**



Note: 1 / Average pension wealth for the average-salaried within the region.

**Figure 7.33**  
Replacement Rates for Low and High Salaries in the Inflation Scenario, English Caribbean



Note: 1/ Average replacement rate for the average-salaried within the region

**Figure 7.34**  
Pension Wealth for Low and High Salaries in the Inflation Scenario, English Caribbean

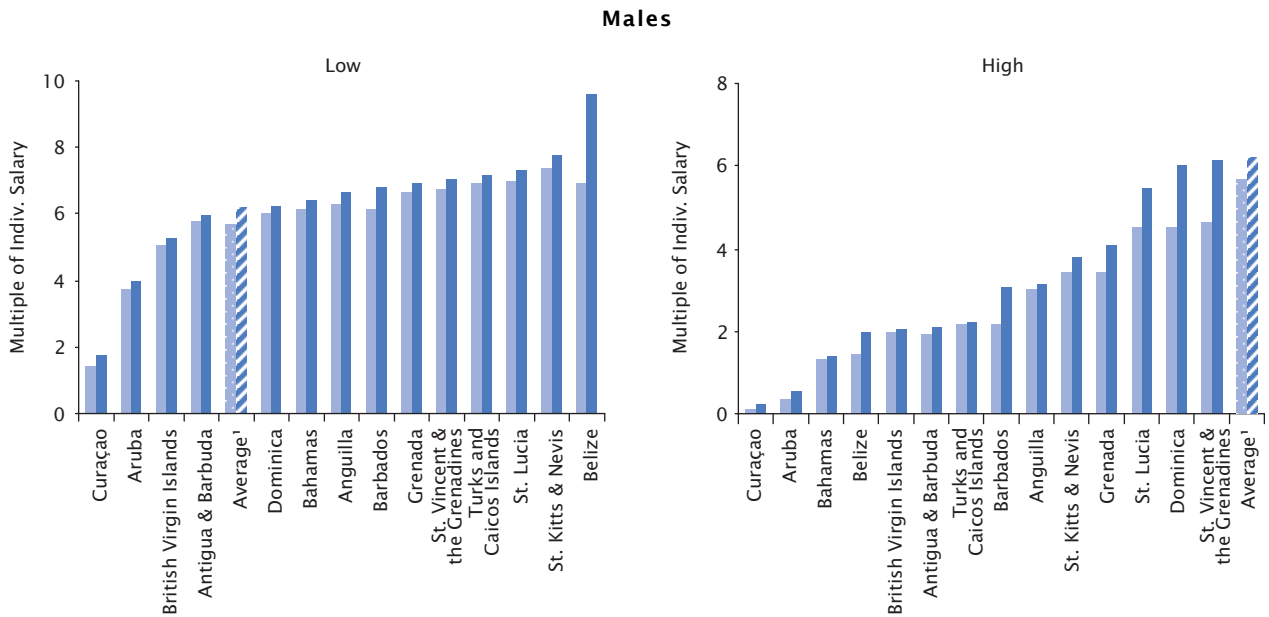
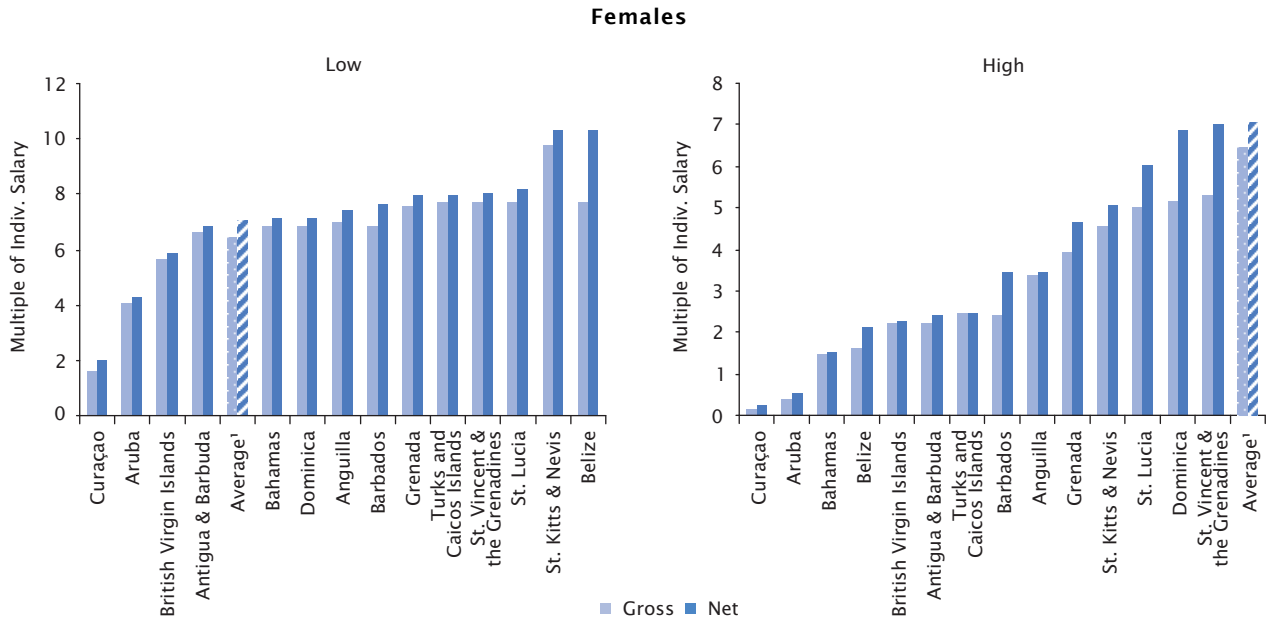


Figure 7.34 (continued)



Note: 1/ Average pension wealth for the average-salaried within the region.

Figure 7.35  
Replacement Rates for Low and High Salaries in the Inflation Scenario,  
Mexico and Latin Caribbean

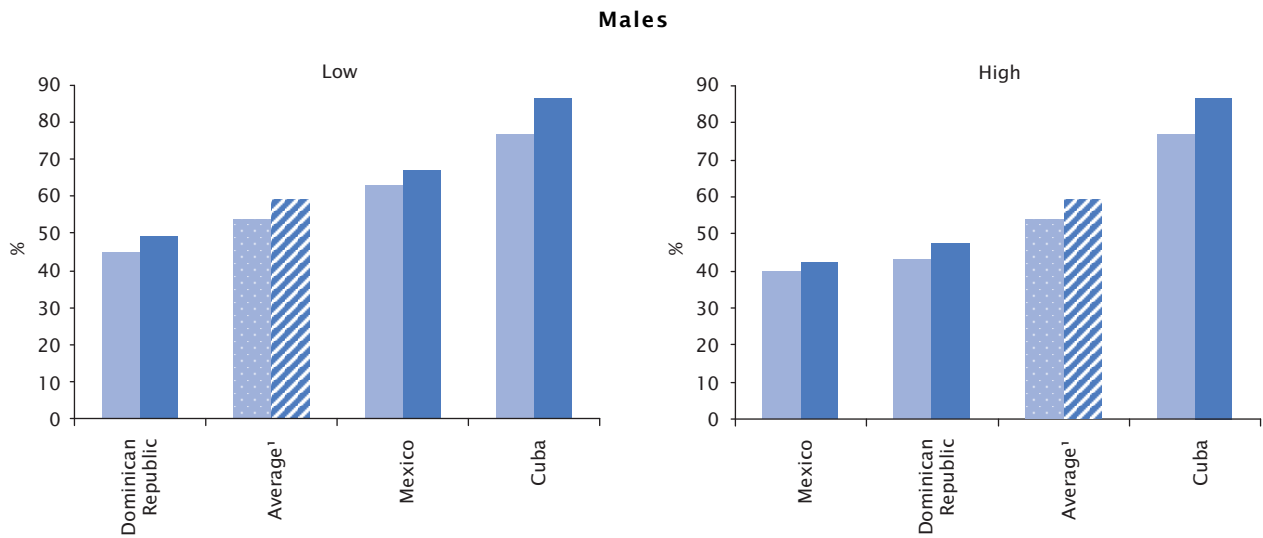
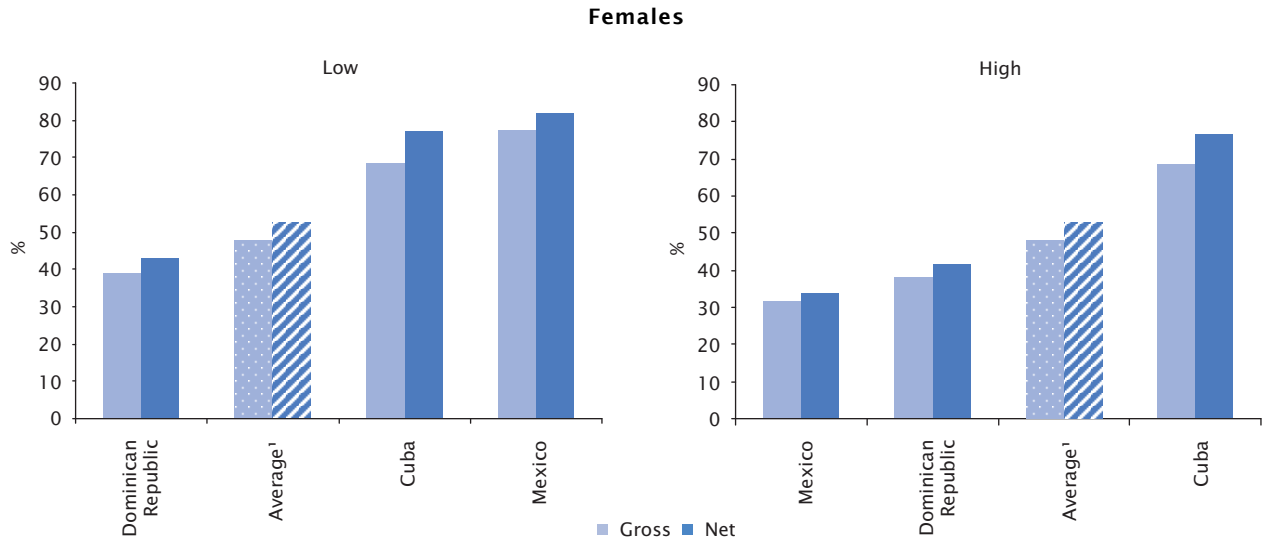


Figure 7.35 (continued)



Note: 1 / Average replacement rate for the average-salaried within the region.

Figure 7.36  
Pension Wealth for Low and High Salaries in the Inflation Scenario, Mexico and Latin Caribbean

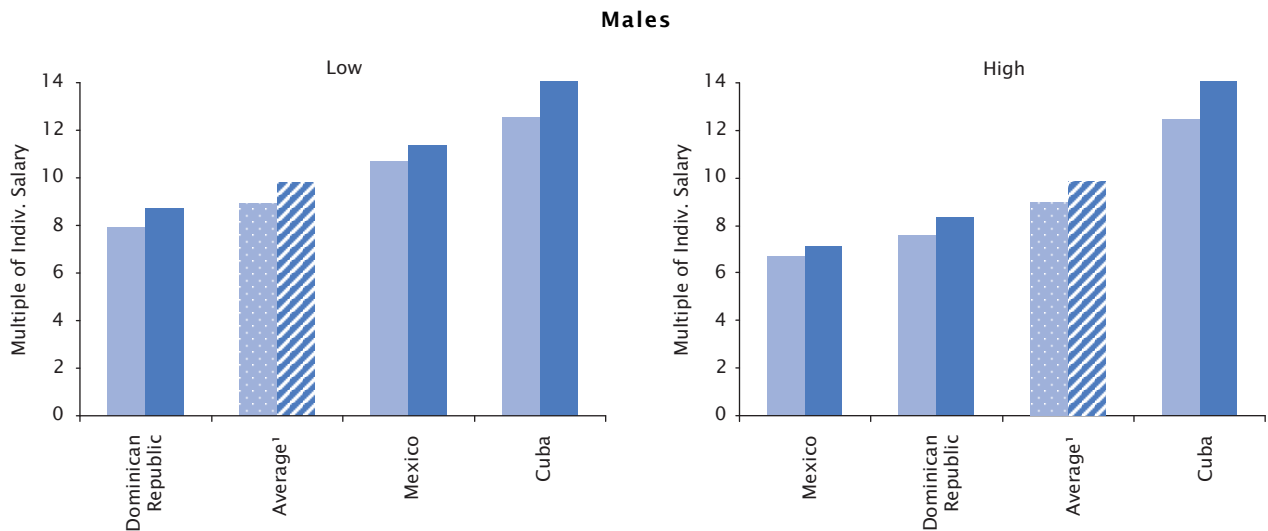
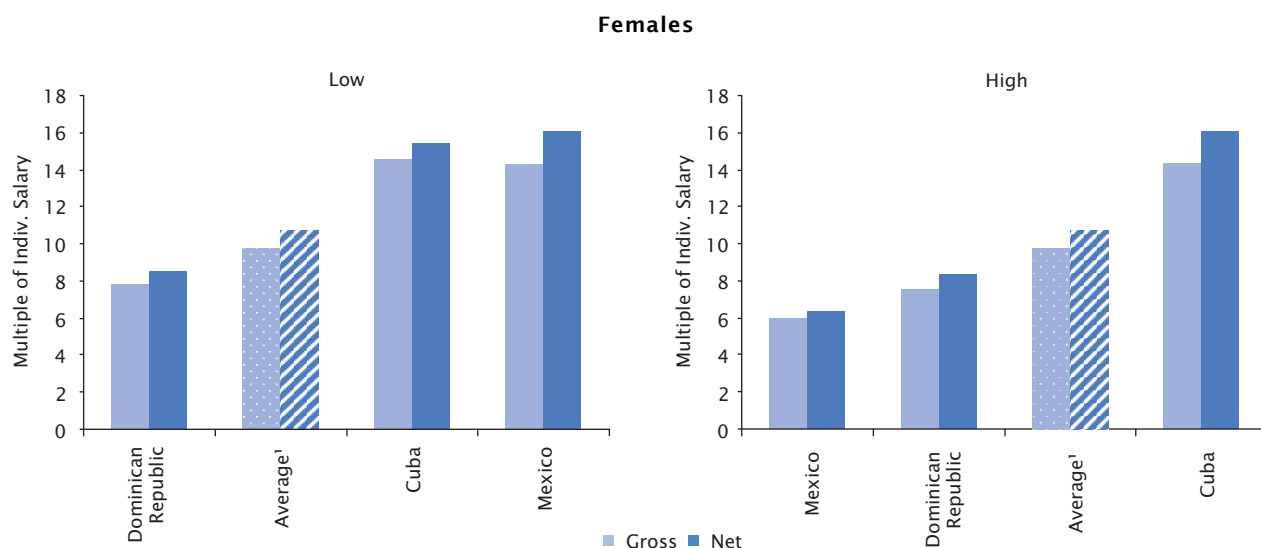


Figure 7.36 (continued)



Note: 1/ Average pension wealth for the average-salaried within the region.

## 7.5 Comparing Results

The literature on gauging promised benefits of national pension systems includes a deeper strand of measurement for OECD member countries plus a few large non-member countries, along with World Bank and ECLAC threads. For LAC, the last have focused on countries with DC systems. This Report aims to include all countries in the Americas. The main restriction has been the difficulty of measuring first-tier components in all cases because many anti-poverty pension programs have not been linked statutorily with the general second-tier contributory program in LA countries. In Section 7.2, a discussion of the wider methodological issues has already been presented.

DC systems have received relatively more attention, as attested to the ECLAC study by Duran and Peña (2011) and the studies by Forteza and Ourens (2009) and Whitehouse (2007). Duran and Peña provide a detailed analysis of variation in replacement rates in nine Latin American countries with DC pension regimes according to economic, social, demographic and institutional variables. The study examines replacement rates for different measures of salary, return on contributions, interest rate, administrative

fee, life expectancy and occupation. Salary profiles and density of contributions are explicitly modeled. Here, we do not explore the variation in the replacement rate indicator in detail; we examine instead replacement rates under standard assumptions not only for DC regimes, but for 33 countries in LAC, including DB and mixed pension regimes in addition to pension wealth calculations.

The study by Forteza and Ourens (2009) uses pension rules that were in place in 2007 to calculate male replacement rates net of contributions to social security in DC countries. Among the differences in assumptions with our study are their data on wages; which they assume to be equal to GDP per-capita. For mortality they use data by the WHO 2008. Their study focuses mainly on the calculation of internal rates of return of pension regimes in 11 LA countries.

Whitehouse (2007), or *Pensions Panorama* published by the World Bank, is a study on pensions that examines countries with DC pension regimes, using the same methodology as the OECD. The study provides calculations of the DC benefit for nine countries: Argentina, Bolivia, Colombia, Costa Rica, Chile, El Salvador, Mexico, Peru and Uruguay, assuming the pension rules that prevailed in 2007; since then

pension regimes have been reformed in some countries. Argentina eliminated the DC regime in 2008; Chile and Uruguay changed the rules for calculating old-age pensions in 2009 and 2008, respectively; in Colombia, the contribution rate increased. Moreover, in Whitehouse (2007) for countries with mixed pensions (Costa Rica, Uruguay) only DC entitlements were modeled.

We consider that in six out of the nine countries included in Whitehouse (2007), it would not be possible to compare calculations of pension indicators due to major changes in pension laws. As results in the World Bank study are presented in terms of average earnings, although here they are related to individual earnings, we focus on the differences in calculations of replacement rates and pension wealth for average-salaried workers in Table 7.18. There are three countries that are comparable: the Dominican Republic, El Salvador and Mexico. For the Dominican Republic, our results of pension wealth for males are very similar, but all other calculations are lower than Whitehouse (2007) in a range of 14 to 38%. For El Salvador we have lower estimates of pension wealth for females but estimates between 34 and 46% higher for males. This may be an indication of using different mortality data by gender, as well as a different parameter of pensionable age for women. For Mexico we have very similar results for replacement rates of males, but relatively higher estimates for female indicators and pension wealth of males. It would be interesting to investigate more deeply the source of these differences.

World Bank (2010) by Dorfman and Forteza examines the economic environment around pension systems in the English Caribbean and presents results of the internal rate of return of pension systems (which is not done here) and replacement rates under different assumptions on the number of contributed years. Tables 7.19 and 7.20 show our results in comparison with this study. Replacement rates are consistently lower in our study for any salary measure under analysis. Only in St. Vincent and the Grenadines are our values very similar for workers of average

salaries or more. As for pension wealth, our calculations are smaller and the difference increases with the level of salaries. In spite of observing such differences, when considering that simulations differ in the number of contributed years and the data on salaries, these discrepancies are explainable and expected.

The report by OECD (2011) includes estimates of pension wealth and replacement rates for six countries in the Americas: Argentina, Brazil, Canada, Chile, Mexico and the United States. The main differences of this study are that OECD models include income taxes for the calculation of net and gross indicators while we only include contributions to social security pension programs in LA countries, and that OECD models examine all sources of retirement income while we focus on benefits from insurance, earning related schemes. In our study, information on salaries was provided directly by the social security agencies and household surveys. Even after considering these discrepancies, the estimates in this Report are in line with what OECD found. Income taxes are not a significant variable in LA countries for most people due to the low value of pensions and to exemptions to pension income from taxation. Another factor that can be a source of discrepancies is mortality data; the OECD makes projections of mortality for 2040 while we use UN data for 2050. On these overall discrepancies, there are issues related to plain comparison of assumptions and data, which shall be solved through the standards of research, such as open access and discussion. However, there can also be issues of interpretation.

For reference purposes, we compare our results for the baseline scenario with those found by OECD (2011) in Table 7.21. For the average-salaried, we obtain higher replacement rates and pension wealth values for Chile and Mexico, which have DC regimes; and lower replacement rates and pension wealth for Argentina and Brazil, which have DB regimes. This is related mainly to not including any benefit of the first-tier in our calculations and, secondarily, to the effect of income taxes.

The most noticeable differences can be shown through examples. For Argentina, net pension wealth for a worker at the average salary is the same in this Report and in the OECD calculations (11.4 and 11.0). However, for that same person, the estimated net replacement rate is significantly different (76.7 against 91.3). With females of that same country, the variation is the opposite: calculated net replacement rates are approximately the same (83.9 against 82.8), but the net pension wealth differs at a much larger rate. For Brazil, this Report and the OECD report provide similar replacement rates for the worker at the average salary, but the OECD estimates way higher values of net pension wealth. For the two DC countries in Table 7.21, the OECD estimates replacement rates that are roughly between 4 and 30% below the figures in this Report, but the differences in net pension wealth are much higher, ranging between 22 and 50%.

It is well known that large variations in results may arise in calculations made by different researchers on the same topic. This is not necessarily undesirable as it may be an indication of differences due to improvements in methodologies, in measurement techniques, or in the quality of available data.

An important mechanism to improve these studies is to evaluate the results over time. For Canada, the U.S. and Mexico, Table 7.22 shows the calculations of replacement rates and pension wealth reported in the publications *Pensions at a Glance* in 2005, 2007, 2009 and 2011. Although results look stable, in some cases they vary significantly across time. With respect to the average-salaried, Mexico has seen a downward trend in replacement rates and pension wealth, even when the legislation and the labor market variables change little over that period, while Canada has seen a significant increase in gross pension wealth and a decline in net pension wealth. Results for the U.S. show a decline in net pension wealth, but no decrease in gross pension wealth. Pension wealth values diminished significantly after the 2005 OECD report for the three countries, for workers at twice the average salary; while for low-

salary workers the opposite result applies. Regardless of the source of this variation, the main lesson is that these sorts of studies must be done frequently and regularly to gradually improve the data and the interpretation of statutes.

There are several explanations for the differences found in the calculations of pension benefits' indicators by different researchers. This variability is not strange to practitioners of applied social science, a field where many debates focus on the role of sampling, estimation methods, and confirmation or contradiction of results under changing conditions. Also, during the dialogue with actuaries and administrators of CISS-member countries, one main concern has been that the assumptions used in the calculations of pension indicators may be far from an historical or expected experience. As they have noticed, inflation rates have been higher than the 2.5% figure used in the baseline. In fact, no country has had such low inflation rates for more than a few years, over the decades. The scenario that includes current rates of inflation addresses this issue.

Other considerations about the use of a standard methodology in the context of LAC are the assumption of a rate of return (net of administrative fees) of 3.5% in DC pension regimes, which presumes that regulation and governance of pension funds for individual accounts is adequate, as pension funds administrators are still believed to charge non-competitive fees in several countries (Tapia and Yermo 2008). By contrast, DC systems have delivered returns above that value even after the economic crisis of 2008. Finally, the assumption of a density of contributions equal to 100% is evidently debatable in any national experience, but even more so when labor markets function with substantial informality. The analysis of the way that feature of labor markets affect the calculations requires very detailed information on transitions into, and out of, the labor market for developing a proper modeling strategy; addressing this point is left for future studies.

The studies by the OECD (2005, 2007, 2009, and 2011) constitute an important source to examine the effects of varying the main assumptions on pension benefits' indicators. In particular, these studies examine the effects of: changing the indexation rules, changing the pensionable age, assuming differential mortality, and varying the rate of return on investment. Their results suggest that:

- If pensions are linked to average salary growth (which according to the baseline assumptions grows faster than inflation), benefits are higher and more costly.
- When increasing the pensionable age, pension wealth is lower because pensions are paid over a fewer number of years.
- When the life expectancy at pensionable age increases, pension wealth increases because the individual has to be paid more years.

**Table 7.18**  
**Comparison of Replacement Rates and Pension Wealth**

Country	Average salary			
	Replacement rates		Pension Wealth	
	Male	Female	Male	Female
Dominican Republic				
Gross-WB	52.6	52.6	7.6	9.3
Gross-CISS	44.7	38.2	7.9	7.6
Net-WB	55.9	55.9	8.1	9.9
Net-CISS	49.1	42.0	8.6	8.4
El Salvador				
Gross-WB	38.7	32.1	5.8	6.6
Gross-CISS	58.3	25.1	10.5	5.7
Net-WB	39.3	32.6	5.9	6.7
Net-CISS	60.8	26.1	10.9	6.0
Mexico				
Gross-WB	36.0	21.7	4.8	4.1
Gross-CISS	39.6	40.0	6.7	7.5
Net-WB	45.1	30.4	6.0	5.7
Net-CISS	42.0	42.4	7.1	8.0

Note: The comparison is with Whitehouse (2007).



**Table 7.19**  
**Comparison of Gross Replacement Rates, English Caribbean**

	Individual salary, multiple of mean		
	0.5	1.0	2.0
Antigua and Barbuda			
World Bank	60.5	50.0	50.0
CISS	40.3	40.3	32.9
Bahamas			
World Bank	60.0	60.0	57.9
CISS	47.7	47.7	25.8
Barbados			
World Bank	78.6	60.0	60.0
CISS	52.7	52.7	42.5
Belize			
World Bank	93.4	60.0	60.0
CISS	54.6	54.6	27.5
Dominica			
World Bank	66.0	66.0	66.0
CISS	40.4	40.4	40.4
Grenada			
World Bank	61.7	60.0	60.0
CISS	44.9	44.9	44.9
St. Kitts and Nevis			
World Bank	60.1	60.0	60.0
CISS	52.6	52.6	52.6
St. Lucia			
World Bank	60.0	60.0	60.0
CISS	55.0	55.0	55.0
St. Vincent and the Grenadines			
World Bank	85.3	49.0	49.0
CISS	46.9	46.9	46.9

Note: The comparison is with World Bank (2010).

**Table 7.20**  
**Comparison of Gross Pension Wealth, English Caribbean**

	Individual salary, multiple of mean		
	0.5	1	2
<b>Antigua and Barbuda</b>			
World Bank	4.9	8.2	16.3
CISS Male	5.8	5.8	4.8
CISS Female	6.7	6.7	5.4
<b>Bahamas</b>			
World Bank	3.9	7.7	14.9
CISS Male	6.2	6.2	3.4
CISS Female	6.9	6.9	3.7
<b>Barbados</b>			
World Bank	5.4	8.2	16.4
CISS Male	6.4	6.4	5.2
CISS Female	7.2	7.2	5.8
<b>Belize</b>			
World Bank	6.5	8.3	16.6
CISS Male	7.1	7.1	3.6
CISS Female	7.9	7.9	4.0
<b>Dominica</b>			
World Bank	5.6	11.3	22.5
CISS Male	5.8	5.8	5.8
CISS Female	6.7	6.7	6.7
<b>Grenada</b>			
World Bank	5.0	9.6	19.3
CISS Male	6.5	6.5	6.5
CISS Female	7.4	7.4	7.4
<b>St. Kitts and Nevis</b>			
World Bank	4.4	8.7	17.5
CISS Male	7.2	7.2	7.2
CISS Female	9.6	9.6	9.6
<b>St. Lucia</b>			
World Bank	4.5	9.0	18.0
CISS Male	7.1	7.1	7.1
CISS Female	7.9	7.9	7.9
<b>St. Vincent and the Grenadines</b>			
World Bank	6.7	7.7	15.3
CISS Male	6.8	6.8	6.8
CISS Female	7.8	7.8	7.8

*Note:* The comparison is with World Bank (2010).

Table 7.21  
Comparison of Replacement Rates and Pension Wealth, Four LA Countries

Individual salary, multiple of mean	Country and gender							
	Argentina		Brazil		Chile		Mexico	
	Male	Female	Male	Female	Male	Female	Male	Female
Gross replacement rate (% individual salary)								
CISS	123.6	123.6	101.3	120.9	69.9	53.6	65.4	79.9
OECD 2011	90.7	83.4	85.9	63.7	60.0	49.2	57.5	57.5
Net replacement rate (% individual salary)								
CISS	153.4	153.4	131.2	156.6	77.6	59.5	69.4	84.8
OECD 2011	106.0	97.5	96.6	71.6	74.4	61.7	58.2	58.2
Gross pension wealth (multiple of individual salary)								
CISS	18.4	25.8	15.5	18.5	11.0	11.3	11.0	15.1
OECD 2011	13.2	17.0	22.2	22.2	9.2	10.2	8.9	10.0
Net wealth rate (multiple of individual salary)								
CISS	22.8	32.0	20.1	24.0	12.2	12.6	11.7	16.0
OECD 2011	12.8	16.5	22.2	22.2	8.1	9.0	8.9	10.0
Gross replacement rate (% individual salary)								
CISS	61.8	67.6	62.7	60.5	69.9	46.2	39.6	40.0
OECD 2011	78.1	70.8	85.9	63.7	44.9	34.0	30.9	28.7
Net replacement rate (% individual salary)								
CISS	76.7	83.9	81.2	78.3	77.6	51.2	42.0	42.4
OECD 2011	91.3	82.8	96.6	71.6	64.3	49.9	32.2	29.9
Gross pension wealth (multiple of individual salary)								
CISS	9.2	14.1	9.6	9.3	11.0	9.8	6.7	7.5
OECD 2011	11.4	14.5	22.2	22.2	6.9	7.0	4.8	5.0
Net wealth rate (multiple of individual salary)								
CISS	11.4	17.5	12.4	12.0	12.2	10.8	7.1	8.0
OECD 2011	11.0	14.0	22.2	22.2	5.8	6.1	4.8	5.0

Table 7.21 (continued)

Individual salary, multiple of mean	Country and gender							
	Argentina		Brazil		Chile		Mexico	
	Male	Female	Male	Female	Male	Female	Male	Female
Gross replacement rate (% individual salary)								
CISS	47.1	50.0	62.7	48.6	69.6	46.2	39.6	31.7
OECD 2011	71.8	64.5	85.9	63.7	41.8	26.4	28.9	25.8
Net replacement rate (% individual salary)								
CISS	58.4	62.1	81.2	63.0	77.3	51.2	42.0	33.6
OECD 2011	88.0	79.8	100.4	74.5	62.5	43.5	33.5	29.9
2 Gross pension wealth (multiple of individual salary)								
CISS	7.0	10.4	9.6	7.4	10.9	9.8	6.7	6.0
OECD 2011	10.5	13.2	22.2	22.2	6.4	5.5	4.5	4.5
Net wealth rate (multiple of individual salary)								
CISS	8.7	12.9	12.4	9.6	12.1	10.8	7.1	6.3
OECD 2011	10.0	12.8	22.2	22.2	4.8	4.5	4.5	4.5

Note: The comparison is with OECD (2011).

Table 7.22  
Results in OECD Studies: Canada, Mexico, and the U.S.

Year	Individual salary, multiple of mean. Men and women (where different)											
	1					2						
	2005	2007	2009	2011	2005	2007	2009	2011	2005	2007	2009	2011
Canada												
Gross replacement rate	72.4	75.4	76.5	76.6	42.5	43.9	44.5	44.4	21.3	22.2	22.2	22.2
Net replacement rate	89.4	89.2	89.1	88.7	57.1	57.4	57.9	57.3	30.6	30.8	30.9	31.1
Gross pension wealth	5.5* (6.4*)	11.5 (13.4)	11.7 (13.6)	12.9 (14.4)	6.5* (7.6*)	6.7 (7.8)	6.8 (7.9)	7.5 (8.4)	6.5* (7.6*)	3.4 (4.0)	3.4 (4.0)	3.7 (4.2)
Net pension Wealth	7.4* (8.7*)	11.5 (13.4)	11.7 (13.6)	12.9 (14.4)	8.7* (10.2*)	6.6 (7.7)	6.7 (7.8)	7.4 (8.3)	8.7* (10.2*)	3.3 (3.9)	3.4 (3.9)	3.7 (4.1)
Mexico												
Gross replacement rate	39.1 (38.8)	52.8	55.3	57.5	36 (21.7)	35.8 (29.7)	36.1 (29.9)	30.9 (28.7)	34.4 (20.7)	33.6 (27.9)	33.7 (28.0)	28.9 (25.8)
Net replacement rate	50.4 (50.1)	50.3	56.0	58.2	45.1 (30.4)	38.3 (31.7)	38.0 (31.5)	32.2 (29.9)	44.1 (28.5)	40.0 (33.2)	39.7 (32.9)	33.5 (29.9)
Gross pension wealth	2.6* (3.6*)	7.0 (8.5)	7.3 (8.9)	8.9 (10.0)	4.8* (4.1*)	4.8	4.8	4.8 (5.0)	9.1* (7.8*)	4.5	4.5	4.5
Net pension Wealth	3.7* (5.2*)	7.0 (8.5)	7.3 (8.9)	8.9 (10.0)	6.0* (5.7*)	4.8	4.8	4.8 (5.0)	10.5* (9.5*)	4.5	4.5	4.5
United States												
Gross replacement rate	49.6	55.2	50.3	51.7	38.6	41.2	38.7	39.4	28.1	32.1	28.8	29.7
Net replacement rate	61.4	67.4	57.9	63.8	51.0	52.4	44.8	50.0	39.0	43.2	33.3	40.3
Gross pension wealth	3.5* (4.1*)	7.9 (9.2)	7.2 (8.3)	7.6 (8.9)	5.5* (6.4*)	5.9 (6.8)	5.5 (6.4)	5.8 (6.8)	8.0* (9.3*)	4.6 (5.3)	4.1 (4.8)	4.4 (5.1)
Net pension Wealth	4.7* (5.4*)	7.9 (9.2)	7.2 (8.3)	7.6 (8.8)	7.3* (8.5*)	5.7 (6.6)	5.5 (6.4)	5.6 (6.5)	9.9* (11.6*)	4.3 (5.0)	4.1 (4.8)	4.1 (4.7)

Note: Pension wealth for 2005 (\*) is calculated with respect to average earnings instead of individual earnings.

## 7.6 Conclusions

This chapter can be seen as a "measurement of expected benefits" from national pension systems. The chapter is not about the "evaluation of pension systems" or an evaluation of many other significant design or performance features. For example, it says nothing about whether a country should or should not change its balance between DC and DB plans; about the impact of a financial crisis on the welfare of retirees or about whether reformed systems have performed better than those still using mid-20th century legislation.

A first step towards having useful monitoring and evaluation tools is to understand the actual objects of study, avoid mixing the results with other issues that are important in a different context, and focus on which specific results at hand may shed a little light. While experimentation is rarely feasible in social issues, particularly when studying large events such as the long-term shifts in work and retirement, it is nevertheless useful to strive for improved measurements that can support our understanding of wider phenomena.

Thus, while the evaluation of expected benefits does not define a complete agenda of analysis of national pension systems, it can be a fruitful approach to standardize information on pension benefits' indicators across countries; this is a result that can hardly be achieved through comparison of the actuarial or economic studies performed regularly in each country, usually under the aegis of the national social security agency or the government. It is useful to conclude this Report by pointing out the main developments we expect from this approach which relate to improvements on the measurement of pension benefits and in the management of risk and uncertainty in pension studies, as well as in the possibility of having some points of comparability with national actuarial studies.

This chapter provides indicators of replacement rates and pension wealth for the main general social security regime in the Americas. Replacement rates and pension wealth are calculated with respect to

individual salaries. We follow closely the assumptions used by the OECD to expand the range of existing indicators of this type for LAC. The methodology simulates old-age pension benefits for individuals assumed to begin work at age 20 until they reach the statutory pensionable age, taking into account differences in social security contributions.

We found that the general average gross replacement rate in LAC countries is around 49%. Although this figure masks the existence of heterogeneity when we look at it by gender, within the distribution of salaries, or within regions, the evidence suggests that in LAC a person can expect to work for at least 40 years to receive almost a half of the pre-retirement salary. Taking as a reference the result found for OECD countries (OECD 2011), the average OECD worker receives a gross replacement rate of about 59% while the average worker in LAC expects a replacement rate at least 10 points lower. The average gross pension wealth in LAC is 8.4 times the annual salary and gives an indication to pension regimes of the average cost of paying the pension promise across the region.

This study focuses on second-tier pensions. Considering also that first-tier (basic, safety-net) pensions are not universal but mainly targeted to the poorest poor in the region, reinforcement of the institutional framework to achieve better insurance protection at retirement in LAC is a priority in terms of pension policy. The issue of strengthening social security institutions for ensuring financial protection at old-age goes beyond increasing the role of private voluntary saving by promoting the implementation of tax incentives and the development of financial markets. As was corroborated during the preparation of this study, few social security agencies in LAC have readily available information about workers affiliated to pension regimes. In some cases, the many assumptions that are made due to lack of information when financial projections are elaborated on may lead to inherent bias in the calculations. In the past, the CISS has raised attention toward the necessity of LAC social security agencies to promote the development

of integrated information systems to make the best possible use of individual data. This would help ensure efficiency in government budgets, especially in countries where fragmentation of pension systems is high (CISS 2007).

One main constraint in the existing literature is the lack of historical analysis, namely, the evaluation of systems across cohorts. The mentioned studies assume that current statutory environments will be sustained for several decades, and a naive question is why not to evaluate backwards in time, assume the same for those entering the labor market 10 or 50 years ago, and look at how results compare with the standardized approach of the aforementioned studies. Part of the answer is that it is difficult to find good databases on the history of the statutes and on the historical variables entering the calculations. Certainly, the groundbreaking research on the issue of age at retirement and pension benefits followed an empirical approach and aimed to obtain measurements of true, current conditions. This approach is summarized in the volumes edited by Gruber and Wise (1999), a series that is still active in producing research.

On a more practical note, the main recommendation for governments and agencies willing to improve the measurement of their national social security systems is to follow the below agenda:

- Develop national surveys of social protection to be able to measure labor careers and social conditions at the level of the individual.
- Link surveys with administrative records to enrich information of periods of contribution and earnings.
- Develop economic and actuarial studies that follow international studies that standardize the methodology across countries.
- Work with international organizations to develop international cooperation on the evaluation issues.

- Produce the statistics shown in this Report every year as part of the actuarial studies for any and all social security pension funds.
- Research the issue of longevity to understand the potential for longer working lives and enrich life-tables. This includes the issue of disability and the practical and meaningful ways to facilitate the work of older adults.

Yet, the main difficulty is not finding adequate or at least proxy data on which to model national experiences, but the interactions between a national pension system and the state of national economies and individual decisions on work and retirement. Virtually all national pension systems in the Americas have been reformed during the last 35 years, most of them in a significant way. Smaller reforms have been gradual parametric adjustments to age at retirement or to contribution rates. Large reforms have meant the introduction of mandatory IRA and significant changes in the number of periods of contribution required to reach entitlement. While financial adjustment is sometimes preached as the motivation for the reforms, it is obvious that the underlying cause is the arrival of new information that affects the pension system in a significant way. Even more, a pathway followed sometimes to adjust a social security system financially has been the plain depreciation of pension values through inflation or monetary controls.

The distinction between risk and uncertainty made in social science applies with great force to the problem of evaluating national pension systems. The uncertainty faced by pension systems in delivering values of a replacement rate and pension wealth can sometimes be measured statistically, but sometimes the complexity of the problem is such that it is meaningless to ascribe current conditions to the past, or to the future. It is meaningless to wonder if actuaries and policy makers in the past could have prevented the increase in life expectancy observed between 1940 and 2010, and, thus, could have

prevented the financial deterioration on the traditional defined benefit national pension plans. Similarly, it is incorrect to assume that simply correcting an old system because of new information will be enough to prevent future crises. Frank Knight (1921), the classic exponent of the argument, put it this way: "Change in some sense is a condition of the existence of any problem whatever in connection with life or

conduct...[W]e live in a world full of contradiction and paradox, a fact of which perhaps the most fundamental illustration is this: that the existence of a problem of knowledge depends on the future being different from the past, while the possibility of the solution of the problem depends on the future being like the past."



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