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Social Security Coverage Around the World: The Case of China, India, and Mexico

Abstract

We describe the current state and recent trends in the landscape of social security programs in China, Mexico and India. A common thread across these countries is the introduction and recent expansion of old-age pension programs with non-contributory components. We use surveys from the family of international Health and Retirement studies (HRS) to analyze trends in the levels and correlates of social security coverage in China, Mexico and India. The most notable development is the increase in public pension coverage for the elderly population. In China, coverage rates for the population aged 70 and older grew from 33% in 2011 to 68% in 2015; and in Mexico from 32% to 55% in the ten years following 2002. In India, average coverage between 2017 and 2019 was 43% (using cross-sectional data), which is higher than earlier reports in 2010. The new programs also caused significant changes on the determinants of coverage in ways that share similarities across countries. Variables such as education attainment, urban status, and a history of employment in the formal sector, were strong predictors of public pension receipt in the earlier survey-waves, but not in the most recent ones for China and Mexico, although in India, these are still significant. However, a strong relationship remains, and is unchanged across time, between those same characteristics and the average income pension amount. Likewise, there are no significant changes between them and receipt of benefits from other social programs. Based on these results, we conduct simulations that show, for example, that even rapid transformation of the labor market or education levels of the population would not radically change the proportion covered by pension programs but would largely increase average pension amounts.

Citation

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Preface

The global population aged 60 and over is growing faster than younger age groups throughout the world. Population aging poses an increasing fiscal burden in many countries through increased government spending on pensions and social benefits for the elderly, which has led to reforms such as increased retirement ages. Conversely, some developing countries are creating or expanding programs aiming to increase the fraction of the elderly population that is covered. Within the context of the International Social Security Association (ISSA), social security administrations around the world, including SSA, collaborate to learn from each other. This study provides information about coverage, which is a key topic of its 2017–2019 work plan, in three of the largest emerging economies. In Purchasing Power Parity-dollars, the Chinese, Indian, and Mexican economies here studied are the 1st, 3rd, and 11th largest in the world, respectively; and together they amount to almost 30% of the world economy. China, India, and Mexico are the first, second, and tenth largest countries by population in the world; together they cover 37% of the world population, and they are the three most common nations of origin among immigrants to the U.S.

Studying these three countries is also of interest because of their varied policy landscape and the rapid transformation that they are experiencing. According to the International Labour Organization (ILO, 2018), China, Mexico, and India are each representative of one of the three most common Social Security landscapes: 39% of countries have a “contributory scheme only” like China, 34% of countries have a contributory scheme and a non-contributory means-tested scheme (like India), and 13% have a contributory scheme and non-contributory scheme that is conditional on not

having another pension (like Mexico).

Understanding the extent of social insurance from social security programs is crucial for policy design. Furthermore, given current social security programs, we measure coverage which populations are at risk and how changing markets and policies affect them.

Introduction

Globally, the population aged 60 or over is growing faster than all younger age groups. In 2017, there were an estimated 962 million people aged 60 or over in the world, with Europe having the highest percentage of population aged 60 or over (25%). With rapid aging projected to occur in all regions of the world, by 2050 all regions of the world except Africa will have 25% or more of their populations at ages 60 and above (UN, 2017).

Population aging poses an increasing fiscal burden in many countries through increased government spending on pensions and social benefits for the elderly. In many countries, policy makers have been actively engaged in debates on how to enhance fiscal sustainability, while maintaining adequate pension income. In several instances, this has led to pension reforms. (Carone et al., 2016)

Current and historical changes in social security programs (the number of programs increased, especially in developing countries, but retirement ages increased in developed countries) and in labor markets (increased participation of women, changes in occupational structure/economic growth/other macro developments, increase in formal sector as countries develop) imply likely changes in the structure and level of future social security benefits.

Recent reforms in social security programs in China, Mexico and India have expanded eligibility to a larger fraction of the population. China followed a series of expansions to its pension system since the mid 2000s. Before 2009, only two institutional mechanisms for income security in old age existed in China: one for urban workers based on social insurance principles, and one for civil servants and others of

similar status based on the employer liability approach. From 2011 onwards, an old-age pension scheme with a non-contributory component was established for the rural populations not participating in the social insurance scheme, and has expanded rapidly. A similar program now provides benefits for non-salaried workers in urban areas as well (Vilela, 2013).

In 2007, Mexico introduced a non-contributory pension program for the over 70-year-old living in small towns, where most people were not eligible for pension benefits from the traditional SS programs (Aguila et al, 2013). It has been subsequently expanded to cover larger towns of up to 30 thousand inhabitants (2009), all localities (2012), and for all people over 65 who are not eligible for other pensions (2013). Current policy proposals include expanding the non-contributory program by removing the conditionality on not receiving other pension so that it becomes truly universal, and also to double the monthly benefit amount.

India reformed its formal pension system by creating the National Pension System or (NPS) in 2004. This is a defined contribution plan that replaced the defined benefit programs that employees of the federal government used to be entitled to. Enrollment is mandatory for federal and state government employees who were hired in 2004 or later, but it is open on a voluntary basis for individuals who are not government employees as well. Furthermore, many programs have been added to increase coverage of social security. The largest of these, the Indira Gandhi National Old Age Pension Scheme (IGNOAPS), is another program by the central government, which aimed to provide about 4 USD for individuals age 65 and over in poor households.

We explore these changes, and the factors that affect social security coverage

across the three countries using data from the Chinese Health and Retirement Longitudinal Study (CHARLS), the Mexican Health and Aging Study (MHAS), and the Longitudinal Aging Study in India (LASI). We analyze the relative importance of each of the factors, as well as how that has changed across the waves.

We find that the policy changes have resulted in substantial changes in both the levels of coverage and the characteristics of those covered. In the first full wave of the CHARLS data, which corresponds to China in 2011, we find that 33.5% of the population over 70 years of age had some sort of pension, and this proportion had more than doubled to 68% four years later. This pattern is not evident in the same way in Mexico because the new program is not recorded in the data as a pension, so the proportion with pension payments remains mostly flat at 25% between the first wave of MHAS (2002) and the third wave (2012). However, once we add the number of people receiving either a pension or a payment from the noncontributory program, the pattern is more similar to China. The proportion in that case expands from 33% in the first wave to 56% in the last wave.

The increase in coverage has been mostly concentrated among people who did not work in the formal sector. In China, this has been mostly concentrated in rural areas and in urban areas outside of government or state-owned enterprises (SOEs). In Mexico, it has also been mostly among the rural, and recently among the informal workers in urban areas. Hence, on average, the characteristics of individuals receiving income support in old ages has changed in important ways. Whereas in the early 2000s, characteristics among the Chinese elderly that are associated with formal employment — such as having higher levels of education, being male, having

contributed to a pension program earlier on, living in cities, and having an urban hukou[1]—were significantly positively correlated with receiving a social security retirement payment. By 2014, however, the association with these variables had disappeared or had even become adversely correlated. For example, individuals with a rural hukou were more likely to receive a public pension payment. In Mexico, the association between such variables and receiving a public pension payment remains roughly stable across the years when we define as public pensions only those that require a contribution. However, once we add the non-contributory pension programs, a pattern similar to the one for China occurs. The effect of having tertiary education is halved between the first and last wave and while having worked for pay was positively and significantly associated with receiving a pension in the first wave, its positive association with public pension receipt disappeared by the last one.

The new programs in China and Mexico, however, are not perfect substitutes for the traditional contributory pensions. The basic payments from these programs equaled about 4.2% and 5.2% for China and Mexico, respectively, of the average payments of the contributory programs or the pension programs for government and formal enterprise employees. Thus, though coverage has increased and may reach universality in the next few years, it is still important to understand the trends and factors that affect access to the programs that provide a higher income.

We find that that the same characteristics that are associated with having a pension program in the early 2000s are associated with having access to the traditional

[1] The hukou registration system in China established in 1955. The hukou status influences employment opportunities (formally and informally so) and social security benefits. (Liu, 2005)

pensions and to a higher pension benefit and replacement rates in the most recent survey waves. Thus, the patterns that affect things like the development of the formal sector and urbanization will likely have important consequences in terms of the population who is more fully supported by social security.

We use the results from our regression models to simulate what would happen to coverage and pension income under alternative scenarios. In particular, we simulate effects of increases in the proportion of the workforce with tertiary education, rates of urbanization, proportion of men in the population and increased formalization in the labor market. Our projections share some commonalities across the three countries: even large changes in these factors would make little difference for the proportion of elderly covered with social security, but would make a large difference in terms of pension income.

The results of these analyses show that though recent reforms and program expansions may go a long way in terms of achieving universality of coverage, the evolution of the labor market will still be an important determinant affecting the economic reality of the elderly in China, India, and Mexico.

2. Background: Past and Present of Social Security in China, Mexico, and India

The three countries studied have experienced important transformations in terms of their social security programs. The public pension programs in China, Mexico, and India covered small fractions of the older population in the 1990s. The existing social security programs in India and Mexico at that time had been developed for the formal sector only, and the formal sector had not grown enough to cover a majority of the

population. China had traveled a different path, but reduced government control over the economy left large sectors of the population without coverage. Mexico reformed the pension program in the 1990s, moving from a defined benefit to an individual account defined contribution program, but this did not change substantially the extent of the population coverage. India introduced programs for the poor elderly in the mid-1990.

The three countries made significant reforms in the 2000s, making strides toward achieving universal coverage. As many other countries, Mexico and India introduced and expanded non-contributory pension programs to reach the uncovered population. Mexico introduced a pension program for adults over 70 who live in rural areas, which was subsequently expanded to reach everyone older than 65 who are not covered by a formal pension. India expanded the non-contributory programs from the 1990s and added a defined contribution plan aimed at the informal sector. India also reformed its government employees pension scheme and allowed others to enroll in it. China's reforms were similarly complex, consisting of both reforms to their existing programs for government and state-owned enterprise employees, and the creation of new programs for individuals in the rural sector and those without an urban hukou. The latter program has both contributory and non-contributory elements.

While the introduction of these programs has implied an increase in coverage in the three countries, the extent differs, with India covering the smaller share and China getting closer to reaching the goal of full coverage for 2020 set by the government in 2006.

2.1 China

In the 1980s, existing the pension system was comprised by defined benefit programs for urban state sector employees (Giles et al, 2013). In the 1990s, China primarily had two pension programs: one for urban workers based on social insurance principles, and one for civil servants and others of similar status based on the employer liability approach. Following a series of reforms in 2009, 2011, 2014, and 2015, an old-age pension scheme was established for the rural and urban populations not participating in the social insurance scheme, while the civil servants scheme was merged with the social insurance scheme for urban workers.

By 2015, there were three main systems: (1) a pension scheme for urban workers; (2) a pension scheme for civil servants and other government employees; and (3) a pension scheme for rural and urban residents not covered under the first two (World Bank, 2016b). The Social Insurance and Individual Accounts Program (SIIAO) merged the pension program for civil servants and for urban workers; and the New Pension Schemes for Rural and Non-salaried Urban Residents (the *Rural Pension*)[2] is the old-age pension scheme for the rural and urban populations not participating in the social insurance scheme (ILO, 2018).

China added labor inspectors and sent them to places of employment with the objective of increasing compliance and coverage. These inspections were facilitated by the unification of information systems for employment and social security systems (ILO, 2018).

[2] This program replaced the *Old Rural Pension Scheme,* which aimed to be a fully funded defined contribution plan, but its growth stagnated in 1998 (Lei et al, 2015)

More important in terms of increasing coverage was the introduction of a pension scheme for rural and urban residents not covered by the existing programs. The *Rural Pension* program has two main components: (i) the non-contributory program (or the "solidarity" component), a basic pension in the form of a basic fixed benefit that is paid by the government; and (ii) an individual pension component, financed by the individual's own contributions but "topped-off" by government subsidies (with contributions to the subsidy from both the central and local governments). Members contribute annually, choosing the level of contribution from a range of CNY100 to CNY2,000. The initial value of the basic pension under the scheme is CNY70 per month (about $20 USD-PPP of 2017), supplemented by the individual pension component and possibly topped up by local governments at their discretion from their own revenues. Fifteen years of contribution to the system are required in order to become eligible for the pension.

The non-contributory component of the *Rural Pension* makes it very attractive to potential contributors under 60. To make participation strongly desirable for those above 60, the program gives them the flat CNY70 amount as long as the individual either makes a lump-sum contribution or, if they have children, they apply for a family-binding policy that allows them to qualify if their working-age child makes their contribution (World Bank, 2016b). With this rule, the program incentivizes participation of both the parent and the child.

Protection against unemployment and disability

China has an unemployment insurance (UI) scheme, in which both employers and employees contribute a percentage of their wages (1% and 2% respectively). Upon

unemployment, the contributor receives a payment that varies by state, but lies between the local *dibao* (which is the minimum level of standard of living guaranteed by governments) and the minimum wage (ILO, 2018).

2.2 Mexico

IMSS, ISSSTE, and the traditional social security system

The *Instituto Mexicano del Seguro Social (*IMSS) and the *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado* (ISSSTE) are the two pillars that provide social security in health, disability, and pensions to workers or retirees of the private and public sector, respectively. Though they have grown in size and in the proportion of the population that they cover since their founding in 1943 and 1959 respectively, they have always covered only a minority of the population because more than half of workers are informally employed.

IMSS and ISSSTE reformed their pension systems from traditional pay-as-you-go (PAYG) programs to fully funded with personal retirement accounts (PRA) in July 1997 and April 2007, respectively. In both cases, the minimum years of contribution for eligibility to receive pension benefits is 10 years (500 weeks) and there is a minimum pension guarantee (MPG) based on the minimum wage of Mexico City. Moving across IMSS and ISSSTE is not possible. Under both the PRA and PAYG systems, normal retirement is at 65 years of age, but early retirement is also possible after age 60. With the personal retirement accounts, individuals can contribute even when not working, and their contributions count even outside the system, but the minimum contribution requirement is 25 years. In the PAYG, the early retirement pension benefits are reduced for each year that one retires earlier than the normal retirement age. In the PRA, early

retirement is not explicitly penalized because individuals receive pension benefits according to the amount accumulated in the personal retirement account. Under the new PRA system, early retirement is available for those who can obtain a pension equivalent to 130 percent of the minimum wage of Mexico City, which is the MPG. Individuals who do not satisfy the minimum years of contribution in the PRA system can withdraw the amount accumulated in the individual account, but they cannot claim the MPG (Aguila et al., 2011).

Non-Contributory Pension Programs

In 2007, the Mexican government established a non-contributory pension program for individuals 70 years or older in rural locations (localities with less than 2,500 inhabitants). The *Programa de Atención a los Adultos Mayores de 70 años y más en zonas rurales* (PAAM) provided a monthly pension of MXN500 or US $82.2 PPP (SEDESOL, 2007). The program expanded in 2008 to all localities with less than 20,000 inhabitants; in 2009, it expanded to all localities with less than 30,000 inhabitants (SEDESOL, 2008, 2009) and was renamed to *Programa 70 y Más* (70 y Más) in 2009. In 2012, it expanded to all urban and rural localities in the country but excluded adults receiving any other social security benefits (SEDESOL, 2012).

In 2013, the age requirement for the program decreased from 70 to 65 years old (Aguila et al 2013) and the program was renamed *Programa Pensión para Adultos Mayores* (PPAM). The monthly cash transfer set in 2007 remained unchanged until 2013, when it increased 5% to MXN525 (USD 67.0 PPP). In 2014, the program started including individuals who receive social security benefits of less than MXN1,092 per month and the monthly amount of the pension increased to MXN580 (USD 73.3 PPP of

2017[3]) (SEDESOL, 2014).

2.3 India

There are a large number of public pension and social security programs in India. Some are programs of the central government and others are programs of state governments. SSA (2017) lists programs and their characteristics.

India's central government reformed its formal pension system, by creating the National Pension System (NPS), which is a defined contribution (DC) plan that replaced the defined benefit (DB) payments that employees of the federal government were entitled to. An extensive discussion of this reform is given in Shah (2006). Through this program, participation of central government employees joining after 2004 is mandatory. State government employees and state autonomous body employees also are mandated to participate if they joined after an initial date that varies across states. Thus, some current and former government employees are still enrolled in the previous DB plan, whereas others are enrolled in the NPS.

Private sector employers can choose to provide their employees with pension benefits through the NPS corporate branch. Federal employees who had joined before, as well as non-federal employees and every citizen between the ages of 18 and 60 years old can join the program on a voluntary basis. Furthermore, to encourage participation, the government added a contribution of INR 1,000 per year[4] between

[3] https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm

[4] In 2017, INR. 17.767 was about equal to US$ 1, purchasing power parity (PPP) adjusted, according to the OECD https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm. Hence, INR. 1,000 is approximately equal to $56.

2010 and 2017 to each eligible NPS enrollee who contributed a minimum of INR 1,000 and maximum of INR 12,000 per year. However, it is still the case that the bulk of NPS participants are the federal employees whose participation is mandatory. By 2016, about 35% of the 14.1 million participants were government employees, but they accounted for close to 90% of the investment funds, suggesting the contributions of the voluntary enrollees were on average much lower (Economic Times, 2017[5]).

Members of the NPS who are mandated to participate contribute 10% of their salary (plus a 10% contribution from the government) to the scheme. Withdrawals can occur upon retirement or resignation. If retirement, the member is required to invest at least 40% in an annuity approved by the regulatory authority; whereas upon resignation, the member is required to invest at least 80% in such an annuity.

Though important, the NPS leaves the vast majority of the population uncovered, with particularly dire consequences for the poor. Thus, social assistance programs to support the elderly have been launched by both central and state-governments. The largest program was launched by the central government: the Indira Gandhi National Old Age Pension Scheme (IGNOAPS), which aimed to provide INR 200 monthly for individuals above the age of 65 in poor households (Bloom et al., 2010). By current rules, individuals between ages 60 and 80 who live below the national poverty line are entitled to INR 300 per month, and those above 80 are entitled to INR 500. The IGNOAPS is part of the National Social Assistance Program that also includes the Indira Gandhi National Widow Scheme and the Indira Gandhi National Disability Pension

[5] The Economic Times, Jan 16, 2017. https://economictimes.indiatimes.com/wealth/save/nps-sees-manifold-increase-in-aum-subscribers-since-2010/articleshow/56603636.cms. Last accessed on September 20, 2018

Scheme. These operate in a similar manner as the IGNOAPS, and they provide, respectively, a monthly payment of INR 200 for widows under the age of 60 (since later they are eligible for the pension part) and INR 300 for individuals under 60 with a work limiting disability, in both cases subject to be living below the poverty line.

The public pension landscape becomes more complex beyond the central government, as states are allowed, and indeed encouraged, to top off the national pension program beyond the INR 100 per month that they are required to contribute. Furthermore, some states choose to relax the limitation of providing it to those living under the poverty line, and provide it to wider groups. In Delhi, for example, the monthly amount is INR 1,000, and it is available to a much larger fraction of the residents. Other states do not expand the coverage of the IGNOAPS, but have established parallel programs that cover families not supported by IGNOAPS.

In addition, recently developed “micro pension” schemes have arisen (Bloom et al, 2010; Shankar & Asher, 2011). These are mostly based on private contributions, but some are supported by state level governments.

3. Data and Methodology

3.1 Data

We use data from the family of international Health and Retirement studies (HRS). Specifically, we use the Mexican Health and Aging Study (MHAS), the Longitudinal Aging Study in India (LASI), and the China Health, Aging, and Retirement Longitudinal Study (CHARLS).

One of the advantages of using these data is that despite the large differences in

the background of these countries, the questionnaires of these studies are highly comparable. Furthermore, the research team at the Gateway to Global Aging Data (g2aging.org) has done an important work in harmonizing data with consistent variable names and definitions that are constructed and made available at the Gateway to Global Aging Data (g2aging.org). This allows us to do parallel analysis in the three countries and thus be able to make comparisons across them.

The questionnaires all ask whether individuals are currently receiving social security benefits, and if not, whether they are eligible for future social security benefits. Hence, we are able to estimate the fraction of the population that is covered, broken down by relevant variables. Further, the data contain a wealth of information about demographics, education, employment, income, and wealth that we can use for breakdowns and modeling. For our purposes, an important aspect of the surveys in the HRS family is that they contain both a detailed labor force module and an income module. Many of the data sets that are often used for studies of Social Security are labor force studies that contain detail labor force modules but not detailed income data. The labor force module provides variables including contribution to pension and social security programs, benefits, among others poneeded to predict who will be eligible for pension benefits or social security. But many of the newer social security programs are not intrinsically linked to employment; and whether an individual is part of these programs is often not asked in the labor force module but in the Income module, where the questionnaires ask about receipt of benefits from different government programs.

For the case of China and Mexico, the panel nature of the surveys in the HRS family allows to compare not only the current stage of the two countries, but also their

trajectories. We use all the existing waves of the surveys. For China, we use three waves of CHARLS, corresponding to years 2011, 2013 and 2015. Though it spans a relatively short 5-year period, it is a time of stunning transformation that we are able to analyze. For Mexico, we use three waves for MHAS, for 2001, 2003 and 2012, which also captures a period of important transformations in Mexico's social policy. Finally, we use data for India corresponding to 2017-2019. Furthermore, we hope our research is used as a platform to comparatively study the progress in these three countries when future waves are added in each of these countries.

Sample

Our main sample consists of every survey respondent age 45 and older. However, we focus on different subsamples for different aspects of the analysis. For social security pension coverage, we only consider individuals 64 years old and older for the three countries analyzed. To build the new cohort of future pension beneficiaries for the counterfactual scenarios, we focus on individuals ages 45 to 64.

Table 3.1.1.a shows the gender composition of the samples in CHARLS wave 4 (left) and MHAS wave 3 (right) by age group for respondents age 45 and older. Table 3.1.1.b shows the levels of urban/rural hukou for China and residency for Mexico.

Table 3.1.1.a: Sample composition for CHARLS and MHAS, by age and gender

	China (CHARLS)			Mexico (MHAS)		
Age group	Male	Female	Total	Male	Female	Total
45-49	1,275	1,426	2,701	129	455	584
50-54	1,709	1,881	3,590	972	1,361	2,333
55-59	1,513	1,532	3,045	881	1,550	2,431
60-64	1,734	1,873	3,607	1,220	1,459	2,679
65-69	1,320	1,285	2,605	1,213	1,325	2,538
70+	1,838	1,890	3,728	2,169	2,639	4,808
Total	9,389	9,887	19,276	6,584	8,789	15,373

Table 3.1.1b: Sample composition for CHARLS and MHAS, by urbanicity

	China		Mexico
Urban hukou	4,246	Urban community	12,277
Rural hukou	14,014	Rural village	3,011
Total	18,260	Total	15,288

LASI data

For India, we use data from the Longitudinal Ageing Study in India (LASI), wave 1. We use the Harmonized LASI data, version A, as developed by the Gateway to Global Aging Data team at the University of Southern California (g2aging.org), supplemented with a number of variables from the wave 1 raw LASI files. Wave 1 of LASI was administered in three phases. Phase 1 was administered in 2017; phase 2 was administered in 2018; and phase 3 was administered in 2018-2019.

Table 3.1.2.a shows the composition of the data. This covers all states and territories in the country except Sikkim.

Table 3.1.2.a: Sample composition for LASI, by state and urbanicity

State or territory	Urban	Rural	Total
1.Jammu & Kashmir	408	1,078	1,486
2.Himachal Pradesh	146	1,109	1,255
3.Punjab	556	1,416	1,972
4.Chandigarh	923	9	932
5.Uttarakhand	345	917	1,262
6.Haryana	555	1,202	1,757
7.Delhi	1,149	22	1,171
8.Rajasthan	458	1,673	2,131
9.Uttar Pradesh	893	3,396	4,289
10.Bihar	350	2,948	3,298
12.Arunachal	228	754	982
13.Nagaland	345	857	1,202
14.Manipur	410	841	1,251
15.Mizoram	572	557	1,129
16.Tripura	243	801	1,044
17.Meghalaya	137	749	886
18.Assam	264	1,756	2,020
19.West Bengal	1,732	1,703	3,435
20.Jharkhand	466	1,762	2,228
21.Odisha	414	2,207	2,621
22.Chhatisgarh	374	1,527	1,901
23.Madhya Pradesh	739	1,978	2,717
24.Gujarat	864	1,284	2,148
25.Daman & Diu	578	325	903
26.Dadra & Nagar Have	343	646	989
27.Maharashtra	1,771	1,826	3,597
28.Andhra Pradesh	636	1,764	2,400
29.Karnataka	664	1,419	2,083
30.Goa	773	492	1,265
31.Lakshadweep	823	239	1,062
32.Kerala	1,118	1,183	2,301
33.Tamil Nadu	1,872	1,333	3,205
34.Puducherry	893	395	1,288
35.Andaman & Nicobar	399	714	1,113
36.Telangana	718	1,534	2,252
Total	23,159	42,416	65,575

Table 3.1.2.b below shows that the sample has a very even distribution of age and gender among those 45 and older.

Table 3.1.2.b: Sample composition for LASI, by age and gender

Age group	Male	Female	Total
45-49	5,909	7,273	13,182
50-54	5,004	5,907	10,911
55-59	4,468	5,537	10,005
60-64	4,640	5,494	10,134
65-69	4,325	4,520	8,845
70+	6,141	6,357	12,498
Total	30,487	35,088	65,575

We use a number of demographic variables from the Harmonized LASI file, specifically gender, age, marital status, and whether the household resides in a rural area. We also use educational attainment from this file, as well as individual earnings and individual pension income. For the latter, we use income from all (public and private) pensions. One of the key variables we use from the Harmonized LASI file is a dummy variable for whether the individual currently receives a public pension. These variables have been harmonized across surveys and thus, the results for India regarding these variables can be compared with the analogous results from China and Mexico.

Appendix A.1 describes in detail an analysis of the variables we use from this preliminary dataset, both the ones that are already harmonized, and the ones we construct from the raw data.

3.2 Methodology

By using the relevant survey weights, we obtain representative estimates of the proportions of the population covered by Social Security programs, as well as the level of benefits enjoyed by those groups. We use these estimates to make comparisons across:

- Population groups of interests. In particular, we look at gender, urban or rural status, education groups, etc.
- Time. We use the available survey waves to analyze trends at the national and subgroup of interest level, to see how changing conditions have affected patterns.
- Countries. We compare levels in the most recent waves across the three countries. In the case of China and Mexico, we also compare the trends in the variables of interests over time.

In addition to the use of cross tabulations, we also run regression models to estimate the contribution of a number of variables on the outcomes of interest. For this purpose, we developed and estimated models of determinants of social security coverage and pension income from public programs, which we will use for projections and static comparative analyses. The predictors in these models fall in the following categories: demographics (gender, age, marital status, rural/urban status, rural/urban residency), educational attainment, and work history (ever worked/age of first job, proxies for formal sector, tenure, full/part time, hours worked, self-employment, earnings).

First, we estimated cross-sectional models of current social security pension coverage and pension income which can be used for the three countries. Second, we estimated models of current social security pension coverage and pension income using

lagged variables, exploiting the panel dimension of the data. Because there is only one wave of data for India, the second set of models will only be used for China and Mexico. Lastly, we estimated a model of eligibility for future social security pension coverage for current workers.

Social security coverage is defined as receiving public pensions. The models for coverage estimate the probability of receiving public pensions using a logit regression on the subsample ages 65 and older. For the estimations of pension income, we used linear regressions on the 65 and older subsample. We estimate public pension eligibility using logit models and the sample of 45 and older. To estimate the probability of receiving income from other government programs, we use logit regressions on the sample ages 45 and over.

We ran several specifications to account for all factors affecting each variable of interest. Each cross-sectional specification estimates the outcome of interest as a function of a subset of the following set of regressors and relevant interactions: an age polynomial, gender, marital status, educational attainment, an indicator of whether the individual ever worked, age of first work, years in the labor force before retiring, earnings, whether rural or urban hukou registration (for China), whether urban or rural household.

Each model using the panel dimension of the data (for China and Mexico only) estimate the outcome of interest as a function of a subset of the following regressors and relevant interactions: a second order polynomial on age, gender, marital status, educational attainment, current and lagged values of whether rural or urban hukou (for China), current and lagged values of whether urban or rural household, an indicator of

whether the person has ever worked, age of first work, lagged values of average hours worked, lagged values of self-employment indicators, lagged values of whether the person worked mainly part- or full-time, years in the labor force before retiring, current and lagged values of earnings, past indicators of public pension eligibility.

4. Who are covered and not covered by social security programs?

The three countries studied here, China, Mexico, and India, have experienced important transformations in terms of their social security coverage in the last few decades. In some aspects, they have experienced very different trends, as expected given their very different starting points and very different growth trajectories in the 2000s.

While China's economy has seen unprecedented growth in the last two decades, with its per capita GDP growing an average of 8.5% per year, Mexico's economy and formal sector have growth comparatively slower at almost 1% per year on average. Despite this, they share commonalities in the changes taking place in their social security systems (albeit important differences too). In China, the coverage of social security has grown in parallel with the economy. Mexico has seen mostly stable levels in the share of employment in formal sector and in the coverage rates of their contributory pension programs.

China, Mexico and India have expanded or created new programs to extend coverage. They have transformed from only having in place pension systems with broad coverage for employees in certain sectors (formal sector in Mexico, salaried workers and civil servants in China and India), and are moving towards a situation where almost all above a certain age have some coverage. China created the *Rural Pension* scheme

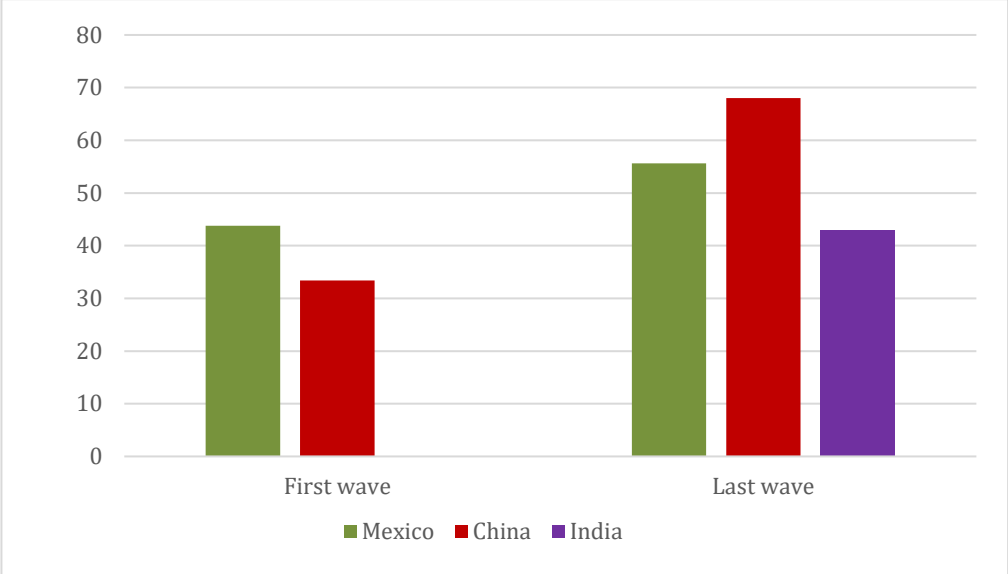
in 2012, Mexico created the 70 y Mas (later PPAM) that originally covered everybody above 70 in small rural towns but currently is expanding to cover everyone. India created and expanded the IGNOAPS to cover those over 60 who live under the poverty line (and the related programs for widows and disabled).

These changes have resulted in increased coverage. Figure 4.0.1 shows the coverage rates in the first and last waves available in the harmonized data for Mexico and China, and the only wave available for India. The coverage rates have increased dramatically in Mexico and China. While for India we don't have an earlier wave to compare it to, the 50% coverage rate of over 70 year-olds is higher than the number cited in other years by other studies (e.g. ILO, 2018).[6]

In what follows we describe these patterns, and use data form CHARLS, MHAS and LASI to help elucidate what these patterns have meant for the populations in these countries. Most of our focus is on analyzing coverage in old-age, where the transformation has been most dramatic. When relevant and possible, we also describe other aspects of social security including unemployment insurance and disability.

[6] Though caution is needed when making comparisons of studies using different data sources.

Figure 4.0.1. Effective Coverage of Old Age Pensions. 70+ year-olds who are pension beneficiaries.



Note: The graph shows percentage of elders 70 and over receiving a pension program. The last wave of data for Mexico corresponds to 2012, for China it corresponds to 2015 and for India it corresponds to 2017. In the case of Mexico, the share receiving a pension includes individuals who receive benefits from the PPAM, even though the harmonized variable available in MHAS does not include pensions from this program.

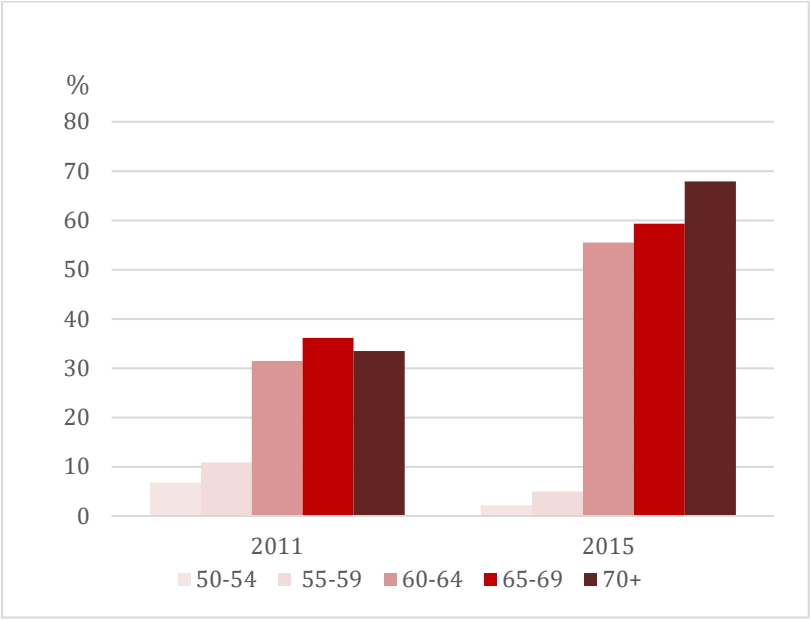
First, we investigate what population is covered by social security programs in China, Mexico and India, and how that has changed in recent years. We compute the overall fraction of the population that is covered, and where relevant split this by type of social security program and by whether individuals are currently receiving benefits or expect to receive them in the future. We compute these statistics also separately by urbanicity, which is strongly related to social and economic outcomes in developing countries. We then break down our results by likely determinants or correlates of coverage: demographic correlates like age, gender, marital status, and educational attainment; and labor force status and history, such as whether individual worked in

earlier years, whether she worked in the formal sector, age at first employment, etc.

4.1. China

We analyze the CHARLS data to describe the covered and uncovered populations. By 2015, a majority of adults over 60 received a pension: 71.5% of those in the 60-69 age range and 74.2 % among those over age 70. Figure 4.1.1 shows that the fraction of population covered by public pensions is substantially higher in 2015 than in 2011. The growth in coverage is remarkable even in the context of rapid economic growth, and it can be explained by the rapid expansion of the social security program landscape in China. These numbers show that China is on trend towards the universal coverage, which is a goal that the government set for 2020 (Giles et al, 2013).

Figure 4.1.1: Recipients of public pensions, fraction, by age group, China



Source: CHARLS, waves 1 and 4.

The growth in coverage had large effects on the characteristics of the covered

population. Table 4.1.1 shows the composition of those receiving public pension ages 65 and over. There are several changes to note. At baseline, in 2011, there was no gender difference in the proportion who was covered: 34.5% of both male and female adults over 65 were receiving benefits. The proportion among both genders increased, but the increase was larger among women: by 2015, the proportion receiving a public pension was 7 percentage points larger among women. The fact that the increase was larger among women is likely a result that the new programs benefit those outside government and enterprise employment, where more men work.

The pattern is more remarkable among education levels. There was a small positive education gradient in 2011, when Chinese elders with tertiary education were 5 percentage points and 3 percentage points more likely to be a public pension recipient than those with upper secondary and those with lower secondary and below, respectively. The gradient had completely reversed by 2015: those with the least education were now twice as likely of being a recipient of public pensions than that of those with upper secondary education or higher.

Those with an urban hukou were more likely to receive a public pension in 2011, since having an urban hukou is helpful in order to secure a formal or government job or a job in the bureaucracy (Liu, 2005), which were the jobs that were covered by the SIIAO for urban enterprise workers, and for government and civil servants. By 2015, the coverage rate among those with an urban hukou had slightly declined, whereas the corresponding proportion among those with a rural hukou had more than doubled. These patterns can be explained by the introduction and quick expansion of the *Rural Pension* program.

As an aside note, the reader may be surprised to see a decline (albeit small) in the coverage among some groups such as those with tertiary education. This is likely a result of more people receiving income from individual contribution programs which are not catalogued as public programs. As discussed in Chapter 2, some of the defined benefit programs became defined contribution and some people who may have earlier declared to be receiving a public pension may now not be doing so in the most recent waves. That does not necessarily mean, however, a reduction in their income stream. This becomes clearer in the text below when we discuss the pension benefit amounts.

The expansion of the *Rural Pension* can be appreciated in the rapid growth of public pension receipt among the rural sector, both among those who live in rural areas and among those who live in urban areas but have a rural hukou. The *Rural Pension* program was targeted to both rural residents and “non-salaried” urban residents, who are often individuals who live in cities but cannot obtain a formal salaried position because they have a rural hukou. The percentage of public pension recipients among both those who live in a rural area and among those who have a rural hukou (but may or may not live in a rural area) increased steeply from about 33% to 75% and 77% respectively. It also increased significantly among those living in urban areas (with or without an urban hukou), from 37% to about 51%, but it did not increase among those with an urban hukou. These results are more consistent with the entirety of the coverage growth being attributable to the rollout of the *Rural Pension* than to other factors such as economic growth.

Table 4.1.1: Recipients of public pension in China, percentages (Age 65 and older)

Year	*2011*	*2015*
Male	34.4	61
Female	34.5	67.9
Less than lower secondary educ.	34.3	67.6
Upper secondary & vocational training	36.2	33.6
Tertiary educ.	39	18
Never married	45.9	64.4
Married	36.6	61.4
Partnered/separated/divorced/widowed	30.4	70.8
Urban hukou	39.5	33.4
Rural hukou	32.8	76.6
Urban community	36.8	51.2
Rural village	32.8	74.6

Note: Percentage of individuals age 65 and older receiving income from a public pension.
Source: CHARLS waves 1 and 4.

Table 4.1.2 shows average pension income in 2015 among those who do receive a pension, and by subpopulation groups. Despite the reversal of the coverage correlates described in Table 4.1.1, where it became the case that characteristics typically associated with positive economic outcomes became predictors of not having a pension, these characteristics still remain *positive* predictors of the pension amount.

Average pension receipt is highest among the more educated: it is about CNY35 thousand for those with higher education, compared to CNY30 thousand for those with upper secondary education and CNY6 thousand for those without an education. On average, male retirees have higher pensions than females (CNY11.7 thousand versus CNY6.4 thousand). The difference between those with a rural and urban hukou are very

large: those with an urban hukou receive about CNY20 thousand while those with a rural hukou get CNY1.4 thousand.

The yearly average amount of CNY1.4 thousand for those with a rural hukou is less than double the yearly basic contribution that the central government provides as the “solidarity component” of CNY70 per month. This reflects the fact that a large fraction of those with a rural hukou are receiving only the solidarity component.

Table 4.1.2: Mean public pension income in China by demographic characteristic

Total pension income if retired, 2015	Mean (in 2010 CNY)
All	8,882.10
Male	12,310.80
Female	5,846.00
Less than lower secondary educ.	5,830.60
Upper secondary & vocational training	29,723.00
Tertiary educ.	35,434.50
Age 65-69	10,382.30
Age 70+	8,143.50
Never married	1,523.60
Married	10,241.60
Partnered/separated/divorced/widowed	6,661.00
Urban hukou	19,817.20
Rural hukou	1,406.20

Note: Average annual pension amount received among those receiving any amount, age 65 and older. Pension amounts are deflated to 2010 CNY using the annual consumer price index provided by the OECD Consumer Price (MEI) data set.

Source: CHARLS wave 4.

These findings reflect the evolution of the social security landscape over recent

years. The introduction of the *Rural Pension* reached a large proportion of people, mostly with lower levels of education and a rural hukou. But this program provides much lower benefits than other pension programs. This is particularly so for the first entrants to the program since, as described in Chapter 2, they only get access to the non-contributory part of the program (currently CNY70 per month, or about $20 USD-PPP at 2017 prices).

Individuals can be covered for old-age pensions as well as spousal benefits or disability, and one does not logically imply the other. Hence, they merit separate attention. The number of recipients of disability or unemployment benefits is too low for us to show their correlates with any confidence in their statistical power. According to the ILO (2018), 18.8% of the unemployed received benefits in China in 2015, and all them from a contributory program. Since the unemployment rate is low (4.08% in 2015[7]), the total proportion of respondents who were receiving unemployment benefits would be expected to be too low to be captured with statistical precision in a survey with sample sizes like the ones with use. Disability rates are also low. According to our estimates, less than 2% of men and women reported to be disabled in 2015.

We analyze the population receiving benefits from all other social programs combined. Table 4.1.3 shows the fraction reporting to have received "other government transfers." There is important growth in this fraction, particularly among groups such as the one composed of individuals with tertiary education, who are the group most likely to be a recipient in 2015.[8]

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[7] World Bank Data https://data.worldbank.org/

[8] This reflects in part the change of some individuals who before reported "public pension" and are now being reported in "other government transfers" which in turn explains the slight decline

The changes over time in the characteristics of pension recipients do not all carry over to explaining receipt of transfers of other programs either. There are no large differences in government transfers recipiency by gender either in 2011 or 2015.

Table 4.1.3: Recipients of other government transfers in China. Percentage, ages 45 and over

	Other Government Transfers	
Year	2011	2015
Male	7.3	17
Female	6	16.3
Less than lower secondary education	6.6	16.7
Upper secondary & vocational training	7	14.4
Tertiary education	5.5	22
Age 45-49	4.7	11.6
Age 50-59	4.6	10.25
Age 60-69	6.5	13.75
Age 70+	13.3	13.3
Never married	20.2	38.2
Married	5.3	13.6
Partnered/separated/divorced/widowed	10.4	28.2
Urban hukou	8.2	19.4
Rural hukou	5.9	15.8
Urban community	7.8	19.0
Rural village	5.9	14.9

in public pension described for that group under the discussion of Table 4.1.1.

Regression models

A more comprehensive way to show how the characteristics of the covered population have changed is to analyze the correlates in a regression model. Table 4.1.4 shows regressions using data from each of the three waves. In the first wave for China, being a pensioner was positively predicted by variables such as an indicator of having tertiary education and an urban hukou, which tend to be indicators of high socioeconomic status. Only two years later, by the second wave, (see column 2) this relationship had reversed, with the coefficients for those same variables becoming negative and statistically significant. This adverse relationship remains and strengthens when using the data from the most recent wave.[9]

Columns 4 and 5 shows the estimation results for *annual pension income amount* (deflated to 2010 prices for cross-round comparability). Contrary to what occurs with the coverage outcomes, the estimated coefficients are more stable across survey waves. In all cases, education is strongly and positively correlated with the pension amount, and in all waves the coefficient is close to CNY20,000, with a small reduction across waves. Likewise, the rural hukou dummy is always negative and strongly significant. It is worth noting that there is a premium for high school education, but it mostly disappears in 2015 for those with a rural hukou, as the interaction between high school education and rural hukou almost equals the size of the high school premium.

Column 6 presents the results of a logit model where the dependent variable is

[9] For robustness, we also ran specifications controlling for additional interactions and work history variables, like age of first-time work. However, the results are not sensitive to these variations. These tables, not presented here for simplicity and to save space, are available upon request.

an indicator of whether the individual is enrolled in a public pension program, which serves as a proxy for whether they will be eligible for Social Security pension benefits at retirement. In this case, the sample is composed of adults aged 45 or older. As in the case of pension income amount, the variables that are correlated with better labor force outcomes (higher education levels, *urban hukou* and *male*) have a positive and statistically significant coefficient. This is because those who are working are contributing to the traditional pension programs like the SIIAO rather than relying only on the non-contributory aspect of the *Rural Pension.*

Table 4.1.4. Cross-Sectional Regression Models of Social Security Benefit Receipt and Eligibility, China.

	Pension Coverage			Pension Income		Pension Eligibility	Other Govt. Transfers
	2011	2013	2015	2011	2015	2015	2015
Age group	65+	65+	65+	65+	65+	45+	45+
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Regressor	Average marginal effects from logit regression			Coefficients from linear regression		Average marginal effects from logit regression	
Age	0.001	0.004***	0.011***	-450.600	-135.924	0.241	0.015***
	(0.002)	(0.002)	(0.002)	(807.639)	(469.278)	(0.235)	(0.001)
Female	0.002	0.042***	0.043***	1,614.021**	243.973	0.800	-0.025
	(0.024)	(0.021)	(0.020)	(755.045)	(675.483)	(0.611)	(0.018)
Married	-0.097	0.006	0.057	3,062.652***	2,498.920***	0.207	-0.358*
	(0.111)	(0.072)	(0.080)	(838.849)	(731.702)	(0.371)	(0.190)
Partnered/separated/ divorced/widowed	-0.160	0.022	0.058	2,431.661**	1,517.933*		-0.333*
	(0.113)	(0.075)	(0.082)	(973.168)	(837.354)		(0.191)
Female & Married			-0.164***	-3,741.720***	-1,090.295	-1.916***	
			(0.058)	(1,010.686)	(881.446)	(0.651)	

Female & Part/Div/Widow			-0.440***	-4,741.985***	-1,907.444**		
			(0.130)	(1,081.905)	(918.086)		
Upper secondary & vocational training	-0.031	-0.133***	-0.164***	12,623.066***	10,235.453***	0.550*	-0.042
	(0.064)	(0.060)	(0.058)	(2,246.938)	(2,233.449)	(0.298)	(0.045)
Tertiary educ.	0.040	-0.191	-0.440***	21,285.191***	19,427.044***	1.300***	0.147
	(0.237)	(0.222)	(0.130)	(3,859.807)	(3,331.406)	(0.374)	(0.172)
Rural hukou	-0.062*	0.452***	0.380***	-15,759.648***	-12,509.160***	0.012	0.003
	(0.037)	(0.031)	(0.031)	(1,037.687)	(807.494)	(0.296)	(0.025)
Rural household	-0.032	0.051***	0.036**			0.412	-0.011
	(0.026)	(0.019)	(0.018)			(0.267)	(0.017)
Rural hukou & Secondary educ.				-7,639.260***	-9,155.320***		
				(2,918.009)	(2,447.477)		
Rural hukou & Tertiary educ.				-12,872.470	-2,037.905		
				(8,057.330)	(5,886.285)		
Ever worked for pay	0.164	0.130	0.204***	6,373.313***	6,495.972***		0.063
	(0.143)	(0.080)	(0.076)	(2,505.402)	(1,958.391)		(0.090)
Earnings (log)						0.081***	0.005*
						(0.026)	(0.003)
Interaction female x education	Y						Y
Interaction rural x education	Y						Y
Constant				21,746.650 (30,082.890)	10,318.916 (17,895.447)	-8.245 (6.583)	
Observations	3,575	4,747	5,440	3,358	3,847	740	4,968

Note: All regression models include a second order polynomial on age. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

An advantage of using the CHARLS data is that we can exploit the panel data aspect to analyze individuals' transitions across survey waves. As described in the

methodology subsection (3.2), we regress the outcome variable of interest in the last wave (*public pension coverage* and *pension amount*) against a set of labor market and demographic variables measured both contemporaneously and in the prior waves. In particular, this allows us to estimate the effect of labor force status in 2011 and 2013 on individuals who are 65 years old and older in 2015.

Table 4.1.5 below shows these results using two specifications. Column 1 controls for an indicator of whether the individual has ever worked for pay, and column 2 shows the results which include a rich set of work history variables including average hours worked, part-time vs full-time work, and self-employment status. In the case of *pension coverage* few variables are strongly significant. The female dummy has a positive and significant coefficient, as is *working in wave 1*. However, most of the labor force status variables do not have much explanatory power. This is consistent with the "decoupling" of the labor history and pension accrual that we have described using the static models. One exception is that those who have ever worked and those who started working at younger ages are more likely to receive public pensions.

Also, consistent with the results above are the results shown in column 3 of table 4.1.5, that correspond to a linear regression of the income amount against the set of variables from the contemporaneous and prior waves. Here, the labor market variables are of the anticipated signs, with having worked part-time or as self-employed predictive of not having pension income. The education dummies are positive, and having tertiary education is associated with CNY32 thousand more per year in pension income. Currently having, or having had in the past, a rural hukou predicts not having pension income.

Overall, these results show that some characteristics that used to be associated with receiving a pension for old age have lost their explanatory power, but have remained equally important as predictors for pension *amounts.*

Table 4.1.5. Dynamic models of pension coverage and income in China

	Pension coverage, 2015		Pension Income, 2015
Age group: 65+	(1)	(2)	(3)
Regressor	Average marginal effects from logit regression		Coefficients from linear regression
Age	0.010***	0.022***	-141.157
	(0.002)	(0.003)	(483.188)
Female	0.040**	0.036**	-484.136
	(0.020)	(0.016)	(451.699)
Married	0.018	0.159*	1,173.951**
	(0.085)	(0.090)	(555.698)
Partnered/separated/divorced/widowed	0.034	0.162*	274.637
	(0.087)	(0.092)	(646.471)
Upper secondary & vocational training	-0.067	-0.013	7,438.805
	(0.057)	(0.035)	(5,987.070)
Tertiary educ.			31,979.637***
			(4,814.837)
Rural hukou, 2011			-904.026
			(1,128.075)
Rural hukou, 2013			-5,474.471***
			(1,288.905)
Rural hukou, 2015	0.110**	0.142**	-3,921.001**
	(0.051)	(0.065)	(1,549.854)
Enrolled in pub. pension progr.	-0.049	-0.122**	-1,086.770
	(0.062)	(0.061)	(909.990)
Working, 2011	0.076***	0.079***	-1,285.715***
	(0.025)	(0.030)	(492.647)
Working, 2013	0.017	-0.010	-849.054
	(0.040)	(0.032)	(736.866)
Earnings 2011 (log)	0.002	-0.007***	-91.046
	(0.005)	(0.003)	(154.764)
Earnings 2013 (log)	-0.001	-0.001	18.455
	(0.003)	(0.003)	(69.035)
Ever worked for pay	0.245**		
	(0.114)		
Self-employed, 2001		0.058	-116.818
		(0.039)	(580.507)
Self-employed, 2003		-0.024	-1,573.949*
		(0.045)	(816.429)
Interaction female x marital status	Y	Y	Y
Interaction female x education	Y	Y	Y

Interaction rural x education	N	N	Y
Lags of hours worked	Y	Y	Y
Lags of part time work	N	Y	Y
Constant			17,918.131 (18,116.944)
Observations	3,781	4,152	2,042

Notes: All models include a second order polynomial on age.Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.2 Mexico

As described in Chapter 2, the expansion of social protection in Mexico has been almost exclusively done through non-contributory programs, including the non-contributory pension program *Programa Pensión para Adultos Mayores* (PPAM). Given that it does not have a contributory component, it is often the case that datasets do not count their recipients among the public pension benefit recipients. This is the case in the MHAS survey waves that we analyze.

If one uses exclusively the public pension definition used in MHAS, we see a low level of coverage and almost null growth in the 2002 to 2012 period. The proportion of individuals ages 70 and older covered in 2012, was 24.7% and grew only by 0.1 percentage points in over a decade (Panel A of Figure 4.2.1). Both the level and growth contrast sharply with the results for China analyzed above. However, once we add the recipients of the non-contributory programs, the pattern is different. We use a variable that we created by indicating a person as a public pension beneficiary if he or she receives either a traditional contributory public pension (including IMSS or ISSSTE) or a transfer from a public program for elders (including the PPAM). This provides a more accurate comparison to the cases of China and India, and a more complete panorama of the evolution of social security coverage in Mexico. In this case, coverage grows from

32.7% to 55.6% among the 70 and older (Panel B of Figure 4.2.1). There is almost no growth among the 60-65 and 65-69, which is explained by the fact that the PPAM only covered the 70 and older before 2013 (see Chapter 2).

Figure 4.2.1: Recipients of public pensions in Mexico by age group

Note: Shares of each age group covered by public pensions.
*This variable indicates if respondent has a contributory pension or receives benefit from other government transfers which includes the PPAM.

Table 4.2.1 shows the evolution of pension coverage among those 65 and older in Mexico, by subgroups. The fraction covered according to the definition with contributory programs only (the "exclusive definition") grew from 22% to 28% overall. The growth was higher among men: 26% to 30%, versus 14% to 17% among women. On the other hand, the variable including non-contributory programs (the "inclusive definition"), shows a steeper growth, from 33% to 48%, which was higher among women (25% to 43%, versus 41% to 53% among men).

Coverage grew only among those with lower and middle levels of education. Among those with less than lower secondary education, coverage grew from 31% to 48% according to the inclusive definition, while it showed a slight decline among those with tertiary education (56% to 50%). This resulted in the elimination of an education gradient in coverage (when using the inclusive definition). In 2001, those with tertiary education were 25 percentage points more likely to be covered than those with less than lower secondary (56% vs 31%). By 2012, however, both groups were about as likely to be covered (50% versus 48%).

Growth was also concentrated exclusively among those aged 70 or older: from 20% to 25% with the exclusive definition, and from 33% to 56% with the inclusive definition. This compares to a 1 percentage point growth among the 60-69 with either definition of coverage.

Table 4.2.1: Recipients of public pension in Mexico, percentages

(Ages 65 and over)

	Contributory programs only			*Including non-contributory programs (such as PPAM)*		
Fraction who receives public pension, ages 65+	2001	2002-2003	2012	2001	2002-2003	2012
	21.7	24.5	27.6	32.7	40.7	47.9
Male	25.7	30.6	30.1	40.6	47.4	53.2
Female	14.1	16.9	17.1	25.1	34.4	43.3
Less than lower secondary education	17.9	21.3	21.7	31.4	39.2	47.9
Upper secondary & vocational training	55.3	46.2	42.7	56.9	54.6	53.5
Tertiary education	54.4	66	49.2	55.9	69	50.2
Age 60-69	19.7	21.6	20.7	32.8	35.2	34.4
Age 70+	19.8	24.7	24.8	32.7	43.8	55.6
Never married	16	20.3	15.6	36.1	37.4	37.6
Married	19.6	25.1	21.5	32.1	39.6	45.6
Partnered/separated/ divorced/widowed	20.4	22.1	26.5	33.1	42.3	52.2
Working		11.7	11.6		31.4	40.7
Retired		87.5	84.7		89.1	86
Retired and other status			76.3			80.7
Population = 100,000+			37.4			47.46
Population = 15,000 - 99,999			23.2			40.77
Population = 2,500 - 14,999			13.3			43.92
Population <2,500			7.7			53.92

As in the case of China, the education gradient remains when analyzing average pension amounts, which are shown for the last MHAS wave in Table 4.2.2. While the average pension amount was about MXN46 thousand for those in the lowest education group, it was more than double that amount among the highest group. Average pension

income was about the same across genders and was slightly higher among the 70 and older than among the 65-69 age group.

Table 4.2.2. Mean public pension income by demographic characteristic. Mexico

Total pension income if retired, 2011	Average (in 2010 MXN)
All	55,464.80
Male	54,306.80
Female	59,593.50
Less than lower secondary educ.	45,896.50
Upper secondary & vocational training	96,499.10
Tertiary educ.	98,111.20
Age 65-69	52,398.50
Age 70+	57,114.40
Never married	69,516.50
Married	61,060.10
Partnered/separated/divorced/widowed	45,680.00

Table 4.2.3 shows the significant growth in the fraction of beneficiaries of public programs (which, in this case, includes the PPAM as well as other cash-transfer programs). While there has been modest growth among the middle aged, with the percentages receiving benefit growing from 10.3 to 12.3 among the 45-49 and slightly declining among the 50-59, the growth among those aged 70 is the driving force. The proportion more than doubles between 2001 and 2012, clearly reflecting the introduction and expansion of the PPAM.

Furthermore, this increase has been concentrated among those with lower secondary education, reflecting the targeting of the program (which originally was only in rural areas and small towns, with predominantly poorer populations).

Table 4.2.3 Respondents receiving income form public programs in Mexico, percentages (Ages 45 years and older)

Year	*2001*	*2003*	*2012*
Less than lower secondary education	12.9	16.7	18.8
Upper secondary & vocational training	1.4	5.2	3.7
Tertiary education	2.3	3.5	2.5
Age 45-49	10.3	14.5	12.3
Age 50-59	10.4	13.3	9.7
Age 60-69	12.5	13.7	12.8
Age 70+	14.4	20.8	34.6

Table 4.2.4 shows the fraction of adults 45 years of age or older who receive disability insurance. The variable was not asked in the third wave of the MHAS, so we only report it for the first two waves. The fraction is largely unchanged across the two years, but the numbers are too small to do analysis of differences across groups.

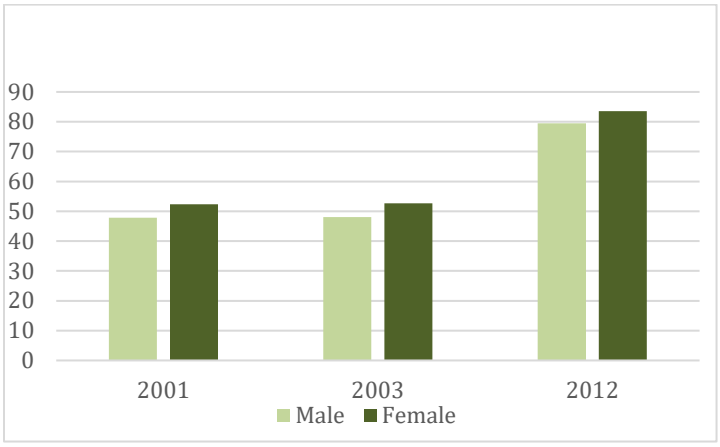
Table 4.2.4: Recipients of disability insurance in Mexico, percentages (Ages 45 and older)

Year	*2001*	*2002-2003*
	1.4	0.94
Male	2	1.3
Female	1.2	0.6
Less than lower secondary education	1.4	0.9
Upper secondary & vocational training	0.6	0.8
Tertiary education	3.4	1.4
Age 45-49	0	0.3
Age 50-59	1.8	0.8
Age 60-69	1.6	1.1
Age 70+	1.1	0.9
Never married	1.6	0.7
Married	1.7	0.8
Partnered/separated/divorced/widowed	1.2	1.2
Working		0.5
Retired		1.4

Mexico did not provide unemployment benefits during the years covered in this data (ILO, 2018). However, there are severance payment rules, though enforcement of them is low (Kaplan and Sadka, 2008).

Another important aspect of the expansion of social security coverage is the introduction of the *Seguro Popular* which consisted of health insurance for those not covered by IMSS and ISSSTE, the traditional social security programs. The *Seguro Popular* was introduced in 2002, and it was gradually rolled-out after that (Aterido et al, 2011). Figure 4.2.2 shows the increase in health insurance coverage resulting from this program. Before the introduction of *Seguro Popular,* being covered by public health insurance (through IMSS and ISSSTE) was a good indicator of employment in the formal sector.

Figure 4.2.2: Enrollment in public health insurance in Mexico



Note: Fraction covered by government health insurance, ages 45 and older

Regression models

An alternative way to show how the characteristics of the covered population are changing is to analyze its correlates from a regression model. Table 4.2.5 below shows regressions using data from each of the waves. In the first wave for Mexico, having a public pension (with either definition) was positively predicted by higher education status, and adversely affected by being female.

The positive coefficients for the middle and high education categories remain positive and highly significant in the second and third waves when the dependent variable is *pension receipt* according to the exclusive definitions (shown in columns 1 to 3). However, these coefficients are importantly reduced when using the inclusive definition (columns 4 to 6). For instance, the effect of *tertiary education* was to increase the probability of *pension receipt* by 0.24 in the model of column 4, but only by 0.11 in the model of column 6.

Table 4.2.5. Cross-Sectional Regression Models of Social Security Benefit Receipt and Eligibility in Mexico.

	Pension Coverage Contributory programs only			Pension Coverage Including non-contributory programs		
	2001	2002-03	2011	2001	2002-03	2011
Age group	65+	65+	65+	65+	65+	65+
	(1)	(2)	(3)	(4)	(5)	(6)
Regressor	Average marginal effects from logit regression					
Age	0.003*	0.002	0.003**	0.003*	0.006**	0.019***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Female	-0.092***	-0.093***	-0.130***	-0.125***	-0.106***	-0.123***
	(0.022)	(0.026)	(0.022)	(0.028)	(0.031)	(0.026)
Married	0.025	0.052	0.035	-0.000	0.016	0.013
	(0.038)	(0.041)	(0.031)	(0.059)	(0.066)	(0.055)
Not married, not single	0.082**	0.068*	0.134***	0.071	0.078	0.062
	(0.039)	(0.041)	(0.035)	(0.060)	(0.067)	(0.058)
Upper secondary & vocational training	0.183**	0.144*	0.238***	0.045	0.070	0.075
	(0.076)	(0.084)	(0.069)	(0.077)	(0.088)	(0.075)
Tertiary educ.	0.373***	0.434***	0.324***	0.241***	0.298***	0.106**
	(0.086)	(0.075)	(0.051)	(0.085)	(0.067)	(0.047)
Ever worked for pay	0.080***	0.117***	0.043	0.103***	0.082**	-0.015
	(0.031)	(0.036)	(0.026)	(0.033)	(0.036)	(0.029)
Interaction female x marital status	Y	Y	Y	Y	Y	Y
Interaction female x education	Y	Y	Y	Y	Y	Y
Observations	5,038	4,939	6,971	5,048	4,986	6,972

Note: All regression models include a second order polynomial on age. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.2.6 shows similar regression models, but where the dependent variable is the annual income amount (deflated to be made comparable across rounds). Contrary to what occurs with the coverage outcomes, here the coefficients are very stable. In all cases, education is strongly and positively correlated with the pension amount, and the coefficients are similar in magnitude across waves.

Column 3 presents results of a logit model where the dependent variable is a proxy for whether the individual is eligible for Social Security, which takes a value of 1 if the respondent is covered by public health insurance. The sample is composed of 45 and older adults. In this case, there are few predictors that are quantitatively important, as health insurance coverage is no longer associated with employment in the formal sector since the introduction of *Seguro Popular*. Column 4 presents results for other government transfers (including non-contributory pension programs). The coefficients for the middle and higher education categories are strongly significant (-0.040 and -0.168), since the noncontributory social programs are targeted to those with lower income (who tend to have lower levels of education).

Table 4.2.6. Cross-Sectional Regression Models of Social Security Benefit Income and Eligibility in Mexico.

	Pension Income		Pension Eligibility§	Other Government Transfers
	2001	2011	2011	2011
Age group	65+	65+	45+	45+
	(1)	(2)	(3)	(4)
Regressor	Coefficients from linear regression		Average marginal effects from logit regression	
Age	1,195.664	3,445.054***	0.002	0.016***
	(3,355.121)	(1,284.712)	(0.002)	(0.001)
Female	11,444.362	4,311.808	0.080***	-0.013
	(11,094.630)	(6,367.300)	(0.020)	(0.023)
Married	18,280.077*	10,112.037	0.045**	-0.015
	(10,990.471)	(6,177.110)	(0.020)	(0.060)
Not married, not single	16,782.158	7,835.464		-0.053
	(10,668.247)	(6,554.826)		(0.060)
Upper secondary & vocational training	35,601.455**	29,552.423*	-0.040	-0.168***
	(14,674.237)	(15,148.593)	(0.044)	(0.063)
Tertiary educ.	138,979.192**	148,152.957***	-0.027	-0.222***
	(61,482.821)	(10,755.226)	(0.028)	(0.044)
Ever worked for pay	2,626.668***	2,543.718*		-0.037
	(999.142)	(1,363.797)		(0.025)
Earnings (log)			0.009***	-0.015***
			(0.003)	(0.005)
Interaction female x marital status	Y	Y	Y	Y
Interaction female x education	Y	Y	Y	Y
Work history			Y	
Constant	-58,703.886	-133,616.881***		
	(119,015.944)	(50,367.293)		
Observations	3,977	6,979	9,209	6,979

Note: All regression models include a second order polynomial on age. § Pension eligibility is defined as being covered by public health insurance Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

As for the case of China, we exploit the panel data aspect to analyze individuals'

transitions across the survey waves. As described in the methodology subsection (3.2), we regress the outcome variable of interest in the most recent wave against a set of labor market and demographic variables measured both contemporaneously and in the earlier waves. In particular, this allows us to estimate the effect of labor force status in 2002 and 2004 on individuals who are over 65 years of age in 2012. The dependent variables of interest are, in turn, the indicator of whether the respondent receives a public pension, and the total amount received.

Table 4.2.7 below shows these results. Results for *pension coverage* are shown in columns (1) to (3) – only for the exclusive definition-. Several variables are strongly significant and of the anticipated sign. Being a woman has an adverse and strongly significant coefficient, while education has strongly significant positive coefficients (as is *having worked in wave 1*). However, most of the labor force status variables do not have much explanatory power, mostly because the variable *government health insurance, 2001 and 2003* absorbs most of that effect.[10]

The results shown in the last column of the table that correspond to a linear regression of the income amount against the set of variables from the concurrent and prior waves. The labor market variables are of the anticipated signs, with having worked part-time or as self-employed predictive of not having pension income. The education dummies are positive, and having tertiary education is associated with MXN75 thousand per year in pension income.

[10] This variable is often used as an indicator of whether the individual works in the formal sector (Kaplan and Perez Arce Novaro, 2006). It works as a proxy for formal sector employment before the expansion of *Seguro Popular*, which offered public health insurance to individuals in the informal sector)

Table 4.2.7. Dynamic models of pension coverage and income in Mexico

	Pension coverage, 2011			Pension Income
Age group: 65+	(1)	(2)	(3)	2011
Regressor	Average marginal effects from logit regression			Coefficients from linear regression
Age	-0.001	0.001	0.001	-6,293
	(0.002)	(0.001)	(0.001)	(6,264)
Female	-0.203***	-0.193***	-0.200***	-4,765
	(0.021)	(0.019)	(0.019)	(6,050)
Married	-0.126***	-0.116***	-0.118***	4,754
	(0.035)	(0.033)	(0.032)	(8,346)
Partnered/separated/divorced/widowed	-0.007	-0.000	-0.001	-4,304
	(0.037)	(0.034)	(0.033)	(7,141)
Upper secondary & vocational training	0.035	0.038	0.028	47,469
	(0.076)	(0.051)	(0.051)	(28,951)
Tertiary educ.	0.132***	0.087**	0.092***	75,049***
	(0.037)	(0.034)	(0.034)	(10,148)
Government health ins, 2001	0.190***	0.175***	0.175***	-8,653
	(0.024)	(0.024)	(0.024)	(6,116)
Government health ins, 2003	0.243***	0.242***	0.237***	14,837**
	(0.025)	(0.025)	(0.025)	(6,855)
Working, wave 1	-0.049	0.025	0.057	-17,647***
	(0.032)	(0.033)	(0.038)	(5,853)
Working, wave 2	-0.090*	-0.139**	-0.087	13,608*
	(0.054)	(0.056)	(0.059)	(8,047)
Earnings 2001 (log)	0.010***	0.007***	0.007**	617
	(0.003)	(0.003)	(0.003)	(389)
Earnings 2003 (log)	0.002	0.001	0.001	-227
	(0.003)	(0.003)	(0.003)	(427)
Ever worked for pay	0.022			
	(0.023)			
Self-employed, 2001		-0.118***	-0.099***	-6,391
		(0.029)	(0.029)	(5,160)
Self-employed, 2003		0.079*	0.042	2,051
		(0.047)	(0.046)	(9,927)
Tenure in years, 2001			-0.001*	
			(0.001)	
Tenure in years, 2003			-0.002**	
			(0.001)	
Interaction female x marital status	Y	Y	Y	Y
Interaction female x education	Y	Y	Y	Y
Lags of hours worked	Y	Y	Y	Y
Lags of part time work	N	Y	Y	Y
Lags of private health insurance	Y	Y	Y	Y

Constant				315,353 (233,663)
Observations	5,407	5,857	5,857	1,650

Notes: All models include a second order polynomial on age. Past coverage of private health insurance is not statistically significant in any specification. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

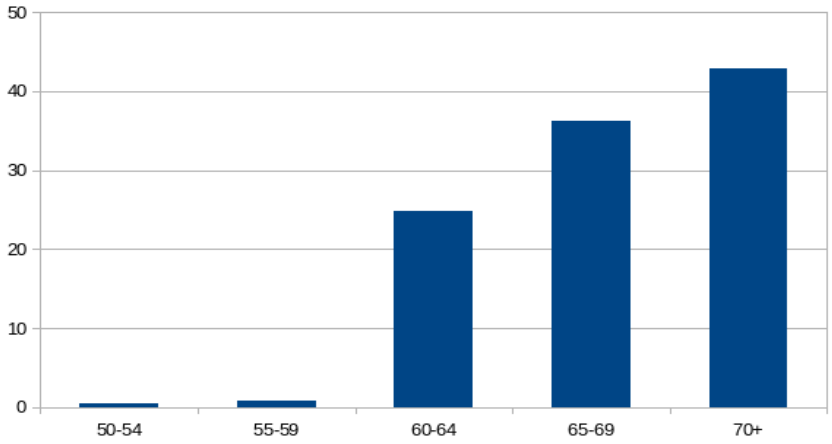
Overall, and similar to the case of China, the results presented in this chapter are consistent with a “decoupling” of the labor history with pension coverage, though not when using the “exclusive” definition. Also, similarly to China, this decoupling does not translate to other outcomes, such as average pension income.

4.3 India

As in China and Mexico, India has several programs to deal with social security. Coverage rates, shown in Figure 4.3.1, are 25% of those aged 60 to 64, 36% among the 65 to 69 and 43% among the 70 and older. These numbers reflect the growth of coverage through programs like the IGOAPS. Estimates from earlier studies showed a lower percentage of coverage, reflecting the fact that they used earlier data before the full expansion of such programs. For example, according to ILO (2018), 24.1% of the 60 and older were covered by a pension program in 2011, either through a contributory or non-contributory program.

The fraction of individuals receiving public pensions before age 60 is negligible in India, including in the 55-59 age groups. This is despite the fact that some pension programs allow for withdrawals before 60. For example, retirement age in the NPS and its predecessor, the Providence Fund, is 58. However, the large majority of Indians are not covered by these programs and rely solely on social programs that provide benefits starting at age 60.

Figure 4.3.1: Recipients of public pensions in India by age group, percentage



Source: LASI wave 1

Table 4.3.1 shows the fraction of individuals receiving a public pension in selected subpopulations among individuals ages 65 and over. This shows essentially no gender difference. An interesting phenomenon here is the non-monotonic relationship with education, with those with medium-level education having the lowest coverage rate, which likely arises from the existence of mainly two large programs: the pension schemes for government employees and civil servants, who are usually highly educated, and the non-contributory pension programs (notably IGOAPS) who is only available for those with incomes below the poverty line, who usually have very low levels of education.

Table 4.3.1 Recipients of public pension in India by characteristics, percentage (Ages 65 and older)

Year	*2017-2019*
Male	40.7
Female	39.5
Less than lower secondary education	40.5
Upper secondary & vocational training	36.4
Tertiary education	43.8
Married	36.2
Partnered	24.9
Separated	42.1
Divorced	39.0
Widowed	45.8
Never married	32.3
Urban	34.9
Rural	42.4
Not retired	35.4
Retired	46.2

Source: LASI wave 1

A much lower fraction of non-married partnered (i.e., cohabiting) individuals receive a public pension than married and formerly married individuals. Receiving public pensions is less common in urban areas than in rural areas. These patterns are consistent with government programs that target specific groups: means-tested programs that target the poor (who are more likely low-educated), programs for widows (e.g. the IGNWS), and programs in rural areas.

Table 4.3.2 below shows average total pension income (including private pension income) for retirees ages 50 and over. Unlike the fraction of receipt of public pensions in Table 2, this shows a large difference across genders, with men receiving much more income on average than women. This also shows a strong and monotonic relation with

education. This pattern is similar to that observed in China (and to a lesser degree, Mexico). Though individuals with characteristics typically associated with low SES are increasingly covered by public non-contributory pensions, the amount provided is an order of magnitude lower than the traditional contributory pensions. As a result, though there is no gradient with education in terms of the indicator of *receiving a pension*, it is strong in terms of their relationship with pension amount.

Table 4.3.2: Mean public pension income in India by demographic characteristics (INR per year)

Total pension income if retired 2017-2019, Ages 50+	Mean
Male	38,667
Female	5,632
Less than lower secondary education	5,084
Upper secondary & vocational training	62,187
Tertiary education	153,674
Age 50-54	4,996
Age 55-59	8,381
Age 60-64	34,580
Age 65-69	31,401
Age 70+	21,853
Married	29,975
Partnered	14,011
Separated	5,599
Divorced	5,811
Widowed	11,461
Never married	21,851

Source: LASI wave 1

Conversely, the relation with age is non-monotonic, with average income peaking in the 60-64 age group. This could be due to a combination of cohort effects (later cohorts accumulating more pension), age effects (individuals at younger ages having

accumulated less pension), and selectivity effects (individuals with more accumulated pension benefits retiring earlier). Married and cohabiting individuals have the highest pension incomes. Note that these are *individual* pension amounts, not couple-level or household level, and thus this is not simply due to potentially having multiple incomes.

Other government transfers are primarily asked at the household level in LASI, and thus we are unable to present tables about other government transfers to the individual. Therefore, in Table 4.3.3, we present the fraction of individuals who live in a household that receives other government transfers. This is mathematically identical to defining each household member as a recipient in a household that receives other government transfers, and thus will show higher fractions than according to the definitions used for Mexico and China if population distributions were identical. Moreover, because this variable is constant within households, this hides differences between household members. This explains why in Table 4.3.3, differences across subgroups are modest compared to the previous tables. Depending on intra-household allocation of resources, this may better reflect the situation in practice. In the LASI data, only five respondents report receiving a public disability pension, so we do not report a results table.

Table 4.3.3: Recipients of other government transfers in India. Percentage, ages 45 and older

	Other Government Transfers
Year	2017-2019
Male	54.6
Female	56.2
Less than lower secondary education	55.0
Upper secondary & vocational training	57.1
Tertiary education	53.6
Age 45-49	54.2
Age 50-54	53.7
Age 55-59	53.4
Age 60-64	55.9
Age 65-69	57.3
Age 70+	58.8
Married	54.5
Partnered	66.0
Separated	52.8
Divorced	52.6
Widowed	58.7
Never married	44.7
Not retired	55.0
Retired	56.6

Note: LASI reports recipiency of government transfers at the household level.

Regression models

Table 4.3.4 presents the results from a set of regressions for receiving public pension benefits. As discussed above, these are the average marginal effects from logit models with demographics, education, and work history indicators included, as well as

some interactions of them. The table shows that after controlling for the other regressors, older individuals are still more likely to receive pension benefits, even among individuals over 65. Women are less likely to receive a public pension than men, while after controlling for the other characteristics, marital status is not significant anymore.

Education is a strong predictor in the full sample (columns 1 and 3). Individuals with mid-level education are less likely to be receiving public pension benefits than individuals with lower education, even after controlling for the other characteristics. However, this does not hold for those with high education. Moreover, the effect of education is different in the model that uses the subsample of individuals who declare having worked at some point and that include the age the individual first worked. Using this model, education seems to have no effect (column 2), but after controlling for rural residence in this subsample, those with higher levels of education are more likely to receive public pension benefits (column 4).

Not surprisingly, individuals who ever worked are more likely to receive public pension benefits. Interestingly, individuals who started working at older ages are more likely to receive a public pension. Individuals in rural areas are about seven percentage points more likely to receive public pension benefits after controlling for the other characteristics.

Table 4.3.4: Cross-sectional regressions of probability of receiving public pension benefits in India, 2017-2019

Age group	65+	65+	65+	65+
Regressor	(1)	(2)	(3)	(4)
	Average marginal effects from logit regression			
Age	0.006***	0.007***	0.006***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)
Female	-0.025**	-0.030**	-0.025**	-0.031***
	(0.010)	(0.012)	(0.010)	(0.012)
Married	-0.008	0.019	-0.017	0.017
	(0.048)	(0.051)	(0.049)	(0.052)
Partnered/separated/divorced/widowed	0.083*	0.092*	0.077	0.091*
	(0.049)	(0.052)	(0.049)	(0.052)
Upper secondary & vocational training	-0.066***	-0.022	-0.054***	-0.019
	(0.012)	(0.017)	(0.014)	(0.018)
Tertiary educ.	-0.010	0.044	0.038	0.088**
	(0.027)	(0.030)	(0.039)	(0.041)
Ever worked	0.089***		0.077***	
	(0.011)		(0.011)	
Age first worked		0.002**		0.003***
		(0.001)		(0.001)
Rural			0.074***	0.070***
			(0.009)	(0.011)
Observations	21,323	15,078	21,323	15,078

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.3.5 presents analogous results for regressions in which the dependent variable is whether the individual is enrolled in a public pension program but does not receive a public pension yet. Because the number of individuals in this situation is small (about 3% of the sample), we would not anticipate observing large effects. However, there are some noticeable and statistically highly significant patterns in this table. Age is related to not being in this situation (although the effect size is very small), because older individuals are more likely to already receive a public pension. Women are about

one percentage point less likely to be enrolled in a public pension scheme than men, although in one of the models, this effect is practically zero and not statistically significant.

Table 4.3.5: Cross-sectional regressions of whether enrolled in public pension scheme but not receiving benefits yet in India, 2017-2019

Age group	45+	45+	45+	45+
Regressor	(1)	(2)	(3)	(4)
	Average marginal effects from logit regression			
Age	-0.000***	-0.000	-0.000***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.008***	-0.002	-0.008***	-0.012***
	(0.002)	(0.003)	(0.002)	(0.003)
Married	-0.002	-0.006	-0.002	-0.002
	(0.008)	(0.011)	(0.008)	(0.010)
Partnered/separated/divorced/widowed	-0.007	-0.014	-0.007	-0.010
	(0.008)	(0.012)	(0.008)	(0.011)
Upper secondary & vocational training	0.018***	0.019***	0.018***	0.020***
	(0.002)	(0.003)	(0.003)	(0.003)
Tertiary educ.	0.063***	0.056***	0.061***	0.068***
	(0.007)	(0.007)	(0.009)	(0.011)
Ever worked	0.212***		0.212***	
	(0.030)		(0.030)	
Age first worked		0.001**		0.001***
		(0.000)		(0.000)
ln(earnings)		0.004***		
		(0.000)		
Rural			-0.000	0.000
			(0.002)	(0.003)
Observations	53,190	37,392	53,190	37,392

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Most importantly, there is a strong relation with education, with higher educated individuals being significantly more likely to be enrolled in a public pension scheme.

This pattern is stable across subsamples (full sample in columns 1 and 3, and subsample of those who ever worked in columns 2 and 4). Analogously, individuals who ever worked are more likely (by about 21 percentage points) to be enrolled in a public pension scheme (columns 1 and 3) and conditional on having worked, individuals with higher current earnings are more likely to be enrolled (column 2). The age the individual started to work is also slightly positively related to being enrolled.

In Table 4.3.6, we present results of pension income among individuals ages 65 and older, with non-recipients coded as zero. This variable combines both private and public pension income. Age is positively related to pension income, but it is far from statistically significant. Women receive much lower benefits on average than men, even while controlling for ever having worked (columns 1 and 3), whereas the gender difference halves in magnitude and becomes statistically insignificant after conditioning on ever having worked (columns 2 and 4).

As anticipated, education is strongly positively related to the amount of pension benefits received. This effect is slightly amplified when looking only at individuals who ever worked (columns 2 and 4). The age the individual started working is positively related to pension income (later starters obtain more income), even after controlling for age and education, although education is included in broad categories, so it is possible that this still reflects an additional education effect. Pension income is lower in rural areas, but standard errors are large and this effect is only statistically significant for those who ever worked.

Table 4.3.6: Cross-sectional linear regressions of total pension income in India (including private pension income; INR per year)

Age group	65+	65+	65+	65+
Regressor	(1)	(2)	(3)	(4)
	Coefficient from linear regression			
Age	646	495	630	478
	(464)	(438)	(471)	(454)
Female	-7,599***	-3,652	-8,243***	-4,158
	(1,828)	(2,732)	(2,156)	(3,096)
Married	-29,404	-25,929	-28,512	-25,147
	(21,261)	(25,686)	(21,294)	(25,747)
Partnered/separated/divorced/widowed	-27,269	-27,842	-26,532	-27,162
	(21,236)	(25,670)	(21,271)	(25,753)
Upper secondary & vocational training	35,474***	49,275***	31,530***	45,919***
	(4,452)	(5,851)	(6,723)	(8,255)
Tertiary educ.	110,618***	131,688***	95,401***	117,601***
	(17,389)	(22,453)	(14,065)	(13,436)
Ever worked	-3,378		-2,902	
	(5,391)		(5,871)	
Age first worked		470***		398***
		(126)		(132)
Rural			-5,331	-7,148**
			(3,789)	(3,057)
Observations	21,329	15,083	21,329	15,083

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5. Projections and Scenario Simulations

From the results in chapter 4, we learned that the introduction or expansion of programs with non-contributory components have weakened the association between education, urban status, and formal sector employment with public pension receipt, but the association with pension income amount has remained very strong.

To better understand the magnitude of these relationships, we conduct projections and scenario simulations that use as a base the regression models with coverage and with pension income as dependent variables, and demographic and

employment variables as regressors estimated in Chapter 4. The result is a predictive model that allows us to calculate counterfactuals that give us insights into how further changes in the labor markets may affect social security.

The main purpose of these exercises is to evaluate “what if” scenarios related to projected or possible changes in the labor market, for example, “what if the informal sector diminishes in importance”, or “what if education levels were higher”. For each of these scenarios, we assess likely changes in social security coverage (and average pension income).

Conceptually, there are two ways of constructing the counterfactual scenarios. To fix ideas, consider the example of an exercise where we want to analyze what our model would predict if tertiary education rates were higher. A first approach is to construct alternative demographic compositions to the actual population. In this case, we artificially endow a cohort with increased tertiary education rates. We compute the “counterfactual population” by altering the relative weights of the individuals in the sample, that is, by increasing the probabilistic weights of the subpopulation with the desired characteristic (in this example, those with tertiary education). This approach changes the population distribution of any other characteristic which is correlated with the main variable of interest. For instance, if those with secondary education are more likely to be working, then increasing the weights of the high school graduates changes the demographic composition by work status as well. A second approach is to instead change the values of the regressors directly (instead of changing the probabilistic weights). For instance, and to continue with our example, we randomly select observations with less education and change its value (i.e. “give them” secondary

education). This approach keeps constant the distribution of the rest of the characteristics in the sample.

In practice with our data, we found the results to be qualitative similar. Therefore, we present here only our results using the second approach (Appendix A.2 includes the figures with results from the counterfactuals using the first approach).

Our strategy comprises the following steps:

1. Compute the outcomes of interest for the 65 and older population (as of the last survey wave). We refer to this as the **current situation**.
2. Compute the means of the regressors for the respondents aged 65 and over and predict the outcomes of interest for these means using the estimated regression models. This is the **predicted current situation**. As anticipated, these outcomes are very similar to the current situation, although they are not numerically identical because the models are nonlinear.
3. Replace the means of the regressors for the respondents aged 65 and over in the previous scenario by the corresponding means for those aged 45-65, except for age and its square. Thus, this considers a hypothetical population age 65+ in 2030 that, aside from age, looks like the current population age 45-64 in terms of educational attainment, work history, and demographics. Then predict the outcomes of interest for these hypothetical means using the regression models. This is the **baseline** scenario.
4. For the counterfactual scenarios, we take the baseline scenario, modify one or more of its regressors, and then predict the outcomes of interest using the regression models.

These scenarios give approximate indications of how expected and hypothetical changes in population characteristics may affect public pension receipt and total pension income. Much larger effects are anticipated of recent (and possibly future) policy changes, specifically the recently introduced public pension schemes discussed

in earlier chapters. As we have argued, changes in policy across China and Mexico have had very large effects. The policy landscape is evolving, and we cannot predict how it will change in the near future. Therefore, our projections should not be thought of as reliable predictions of the levels of social security coverage.

In this chapter, we first present the results for India, as these are based entirely on cross-sectional results and thus are simpler. We then present the results for China and Mexico.

5.1 India

We simulate the fraction who receives a public pension and the mean pension income for the population aged 65 and over, using the regression models we use are those reported in the third column of Tables 4.3.5 and 4.3.7.

Table 5.1.1 shows the characteristics of the predicted current and baseline scenarios. The most notable differences in the characteristics are the higher fraction married and higher education in the baseline scenario. The effect is a lower fraction that is predicted to receive a public pension, but a much higher mean total pension income amount. Again, note that the latter is unconditional and thus includes the zeros for non-recipients.

Table 5.1.1: Predicted current and baseline scenarios

Characteristic	Predicted current	Baseline
Age (mean; years)	72.1	72.1
Female (%)	50.3	45.2
Married (%)	57.0	84.4
Partnered/separated/divorced/ widowed (%)	42.2	14.4
Less than upper secondary education (%)	82.3	70.3
Upper secondary & vocational training (%)	14.1	23.8
Ever worked (%)	74.5	78.5
Rural (%)	69.3	67.2
Predicted public pension receipt (%)	39.6	36.2
Predicted mean total pension income (INR/year)	16,710	22,198

Gender ratios

In the first set of simulation scenarios, we analyze gender ratios. Population-wide, the female-male ratio has been increasing since 1991: in 1991, there were 927 women per 1000 men, whereas in 2011, there were 943 (MOSPI, 2018, p. 2), which likely is the result of decreased gender inequality and decreased son preference among parents in India. Linearly extrapolating this trend, we obtain 947.8 in 2017 and 958.2 in 2030. This ratio is different for the over-65 population, but we can take these numbers as a starting point for some gender parity scenarios. We add a scenario in which there is population-wide parity (1000) and one in which the population-wide ratio is equal to the one in the U.S. in 2017 (1030.6).[11] To convert these numbers into scenarios, we compute the female-male ratio in the baseline scenario, multiply this by GR/947.8 where

[11] Computed from Table S0101 from the ACS 1-year estimates for 2017 from the American Fact Finder website of the U.S. Census Bureau at https://factfinder.census.gov/

GR is the hypothetical nationwide gender ratio, and then convert this back into the fraction female. Table 5.1.2 shows the resulting fraction of respondents who are female among the 65 and over in these scenarios and the corresponding predicted outcome variables. The higher fraction female is associated with lower fraction who receive a public pension and lower mean pension amounts, but the differences are small. The difference between predicted current and baseline is larger.

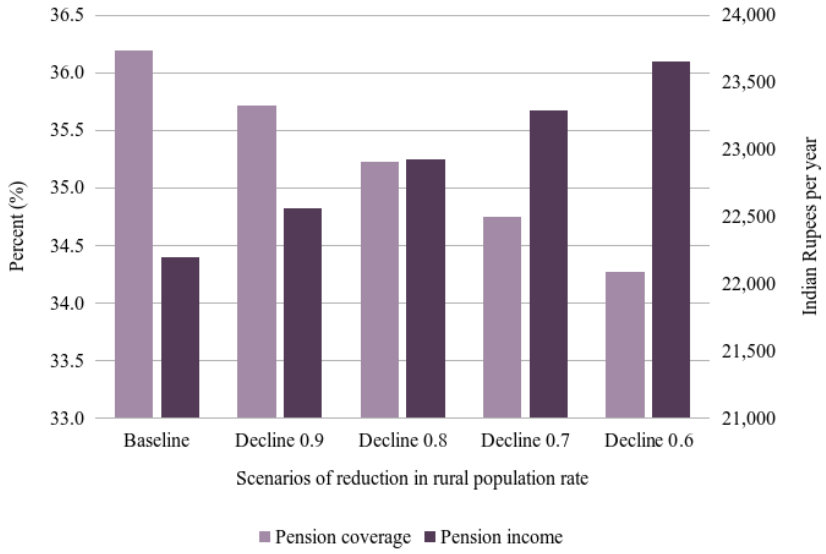
Table 5.1.2: Gender ratio scenarios

Scenario	Gender ratio (nationwide)	Female (%)	Public pension receipt (%)	Pension income (mean; INR/yr)
Predicted current	947.8	50.3	39.6	16,710
Baseline	947.8	45.2	36.2	22,198
Projected gender ratio 2030	958.2	45.4	36.2	22,142
Equal size	1,000.0	46.5	36.0	21,922
U.S. 2017 ratio	1,030.6	47.2	35.9	21,766

Rural population share decline

The urban population has grown much faster than the rural population in India (MOSPI, 2018, p. 2). Our second set of scenarios involves a further decline of the fraction of the population that lives in rural areas. Specifically, we multiply the fraction rural by 0.9, 0.8, 0.7, or 0.6 and evaluate its effect on the predicted outcome variables. These numbers correspond with a drop of the fraction rural from the baseline 67.2% to 40.3% of the population of 65 and over, a very wide range. Figure 5.1.1 shows that lower fractions of the rural population are associated with lower fractions of public pension receipt, but the overall range is narrow, only about two percentage points among the scenarios other than the current. Mean total pension incomes increase when lowering the fraction of rural, but again, the differences are small.

Figure 5.1.1 Simulations of Social Security pension coverage and pension income under changes in urbanization levels, India



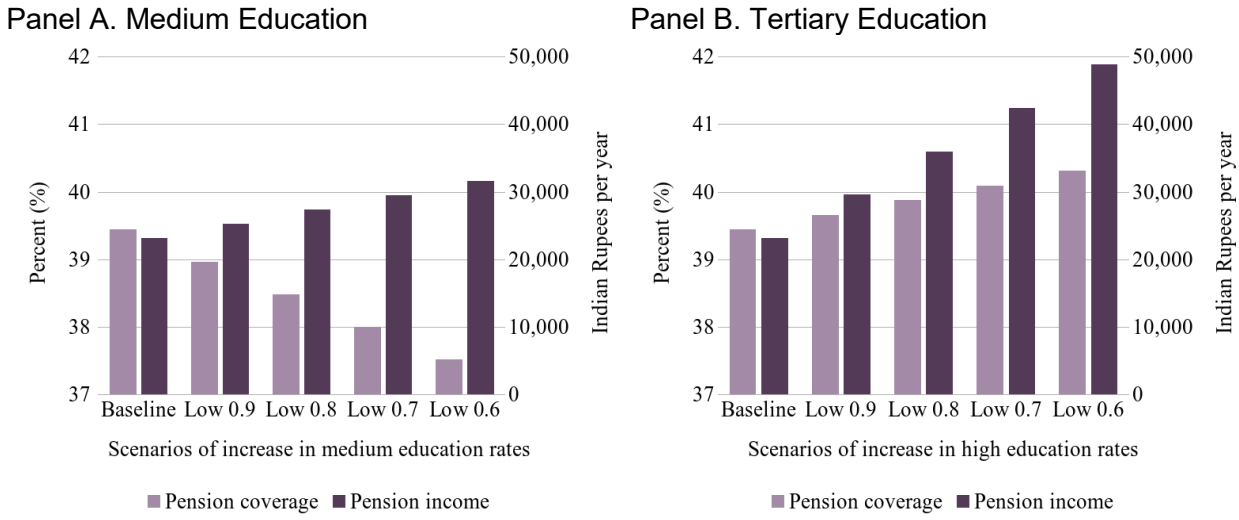
Educational attainment

As in many developing countries, educational attainment is low for most people in India, but it is growing (World Bank, 2011). In this section, we evaluate a number of scenarios related to hypothetical changes in the education distribution. In our models, we included education as a categorical variable with three possible values: (1) lower secondary education or less; (2) upper secondary and vocational training; and (3) tertiary, which we call low, medium, and high education, respectively, in this section. In the LASI data, among those age 65+, 79 percent have low education, 17 percent medium, and 4 percent high. The first set of educational attainment scenarios considers what happens when the fraction low education is reduced by multiplying it with a factor 0.9, 0.8, 0.7, or 0.6 and compensating this by increasing the fraction with medium education correspondingly. The second set of scenarios is the same as the first set, except that the fraction with medium education is now untouched and the fraction with

high education is compensated instead. Figure 5.1.2 presents these scenarios.

Low education ranges from 70.3% in the baseline scenario down to 42.2%. This is a wide range, and the corresponding ranges for medium and high education are equally wide. This is especially dramatic for the scenarios that increase tertiary education, where the highest fraction is more than five times the baseline fraction, which itself is 1.7 times the current fraction. Nevertheless, the projected range for public pension receipt is a relatively modest 2.8 percentage points, although it is interesting to note that this goes up in the tertiary education scenarios and down in the medium education scenarios. However, the implications for projected mean pension income are large. This more than doubles from one end of the spectrum to the other. The effects on income are much more pronounced for the scenarios that increase high education than the scenarios that increase medium education, where the largest value is 37% higher than in the baseline scenario.

Figure 5.1.2. Simulations of Social Security pension coverage and pension income under changes in education levels, India



Work history

In India, some programs are non-contributory and independent of work history, but dependent on economic situation through a means test, whereas others are related to previous formal or informal employment. Hence, as we saw in Table 4.3.4, public pension receipt is significantly related to having ever worked. We saw only a small and not statistically significant (and actually adverse) relation with pension income. Here we consider scenarios related to an increased work history. Specifically, our scenarios multiply the fraction who ever worked by 1.1 or 1.2, respectively, corresponding with a range of the fraction ever worked between 79% and 94%.

Figure 5.1.3 shows that this has only modest effects on public pension receipt and no discernable effect on pension income. As indicated, this is probably because of the non-contributory nature of most programs available for the current elderly.

Figure 5.1.3 Simulations of Social Security pension coverage and pension income under changes in work history

Note: The bars for the counterfactual scenarios, which are indicated by (Ever work 1.1, Ever work 1.2 and Ever work 1.3) are constructed by multiplying the fraction who ever worked by 1.1, 1.2, and 1.3, respectively.

5.2 China

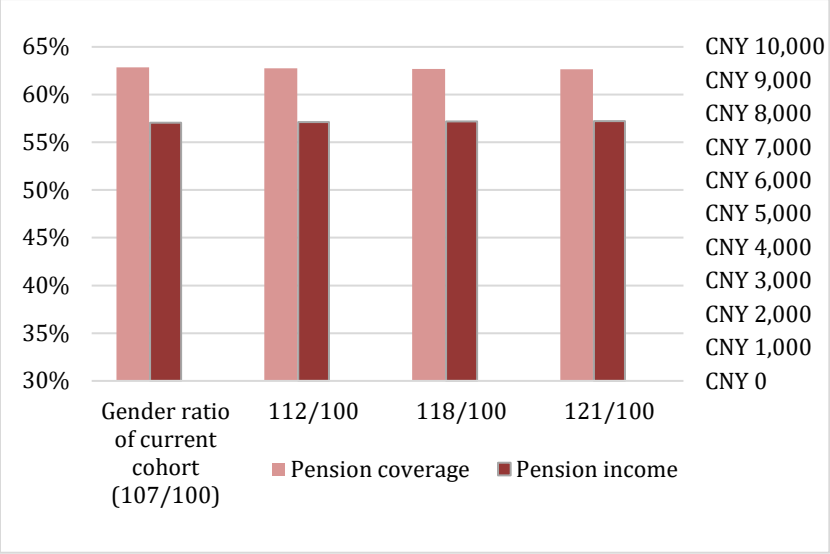
Gender ratios

The gender ratio at birth in China, defined as the number of men born for every 100 women, increased from its natural rate of 107 to an all-time high of 121 in 2004. Since then it has decreased, reaching 113.5 in 2015. This ratio, one of the highest in the world, is forecast to drop below 112 by 2020 and then raise again to 107 by 2030 (State Council, 2017). We analyze the potential impact of this sudden increase in gender ratio. For this, we change the gender ratio of the current cohorts starting from the assumption that changes in gender balance at birth are reflected in proportional changes in gender

balances at older ages. This is a first order approximation, as there are gender differences in mortality that we are not accounting for. For these counterfactual scenarios, we simulate the model with higher gender ratios, consistent with the ones for current generations born after the 1980s. The gender ratio at birth of the current cohort was 107 men per 100 women. We adjust the gender ratio of the counterfactual cohort proportionally to increases from the baseline 107 to 112, 118 and the historical maximum 121.

Figure 5.2.1 shows that our model predicts that changes in gender composition of the population, even in the most extreme case of an increase to its historical maximum, would not affect neither pension coverage nor average pension income.

Figure 5.2.1. 2 Simulations of Social Security pension coverage and pension income under changes in the Gender Ratio, China



Note: Scenarios of increased gender ratio at birth (men per 100 women).

Rural population share decline

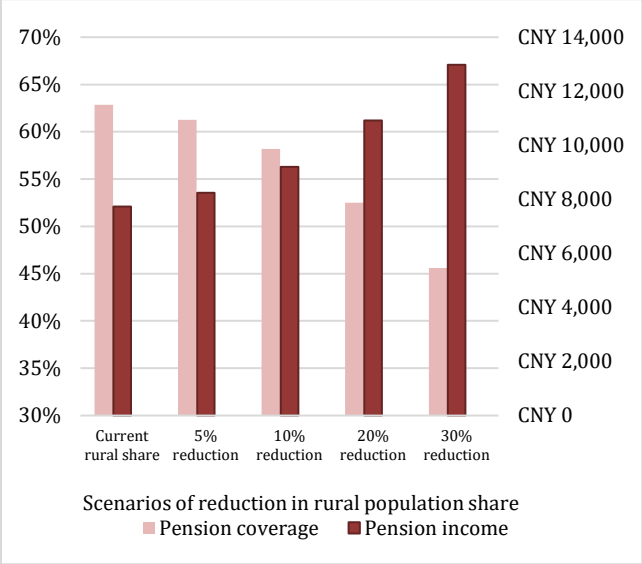
The fraction of rural population in China has decreased quickly over the past four decades. In 1977, 82.5% of China's population was rural, while that share dropped to 42% in 2017.[12]

This scenario presents changes in coverage rates if we assume continued decline in the share of workers living in rural areas. The declining trend in the share of rural population has been linear during the last couple of decades. If we assume the trend continues, we would anticipate a decrease of 20% in the next decade.

Figure 5.2.2 shows the changes in social security pension coverage for a scenario where the share of rural population decreases by 5%, 10%, 20% and 30%. Such reductions would result in decreased coverage rates but increase average pension amounts. The difference among the most extreme change in urbanization rates would amount to a reduction in coverage rates of about 17 percentage points and an increase in average pension amount of more than CNY50 thousand.

[12] Source: WB https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=CN

Figure 5.2.2 Simulations of Social Security pension coverage and pension income under changes in urbanization levels, China

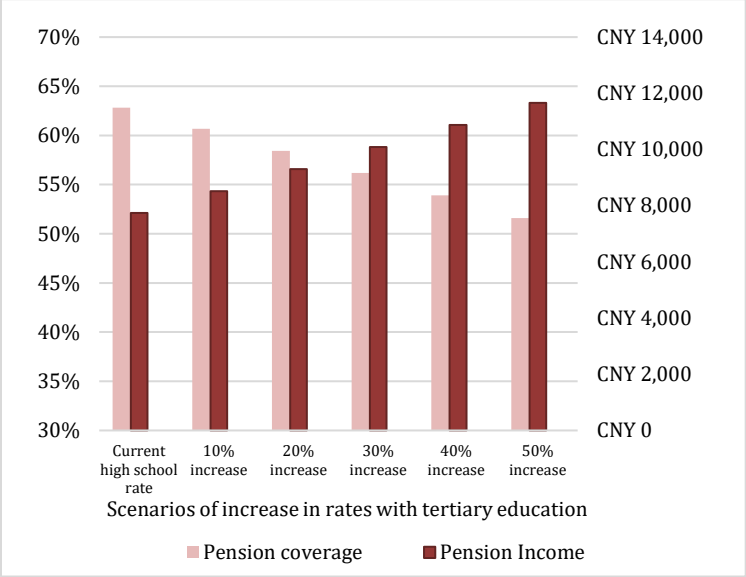


Note: The light-colored bars represent the simulated pension coverage rates, and the dark colored bars show average income under reduced rural population rates

Educational attainment

Figure 5.2.3. shows the results corresponding to improvements in the educational attainment exercise, where we simulate increases in the proportions completing secondary education of between 10% and 50% (to the expense of decreasing low-education and high school drop-out rates). There are strong positive effects on the pension amounts, suggesting that a 10% increase in tertiary education rates would increase the pension amount from about CNY7,740 to CNY8,515 and a 50% increase would further raise it CNY11,657. This is despite the fact that this same simulation would show a *reduction* in coverage rates, which results from the negative coefficient on education in the regression models estimated with the most recent survey wave.

Figure 5.2.3. Simulations of Social Security pension coverage and pension income under changes in education levels, China



Note: The light-colored bars represent the simulated pension coverage rates, and the dark colored bars show average income under increased tertiary education rates.

Work history

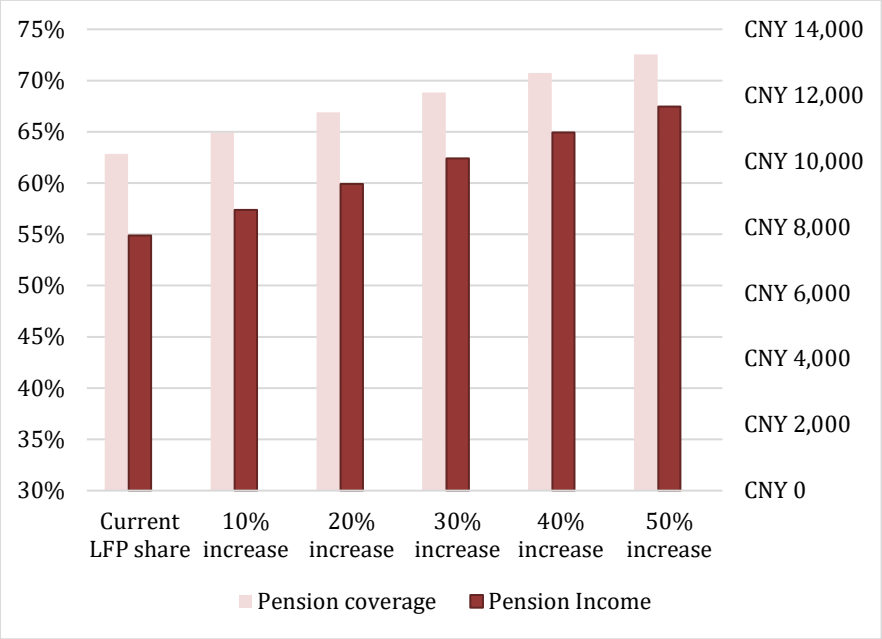
We also project the impact of changes in economic trends. To account for projected economic growth, we compute scenarios for future social security coverage of the current cohort of working age individuals. We artificially age the currently working-age cohort, and predict their social security pension receipt using the earnings in the current survey data as lagged values in the projections. For this projection, use the results from the dynamic model presented in Table 4.1.5.

In a first exercise, we assume per capita income keeps growing at the same rate as in the last decade. This implies growth of 20% by 2025, and 40% by 2030. The coverage rate decreases by less than 1% under both scenarios (0.03 and 0.05,

respectively). Results are not shown for this exercise.

Furthermore, we simulate what would happen under scenarios where share of the population who has “ever worked for pay” increase. This simulation does generate important changes in outcomes, (contrasting with the simulation of changes in per capita income). Results are shown in Figure 5.2.4. A 10% increase in this share raises the percentage covered from 63% to 65%, while a 50% increase raises it to 73%. It also results in increased pension amounts where the difference in the most extreme simulations reach almost CNY4,000 per year.

Figure 5.2.4 Simulations of Social Security pension coverage and pension income under changes in work history, China



Note: Scenarios of change in population share who has ever worked

5.3 Mexico

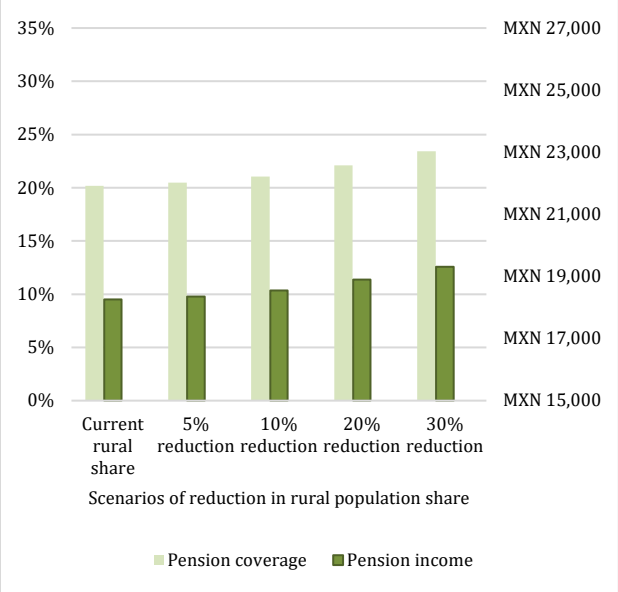
In the case of Mexico, we present results for the population covered using the "exclusive definition", which counts only those covered by a contributory pension program and for the average yearly pension income.

Rural population share decline

An important trend in Mexico from the last few decades has been the increase in the share of the population living in cities. The rural population share in Mexico in 1997 was 26% and it fell to 20.2% in 2017. We compute scenarios for cases where rural share of Mexico's population further declines.

An increase in urbanization would raise the proportion of the population covered with a contributory pension by up to 3.4 percentage points (under the steepest rural decline). Likewise, the average yearly pension amount would increase by about MX1,000, or about 5% of the baseline level.

Figure 5.3.1 Simulations of Social Security pension coverage and pension income under changes in the rural population share, Mexico

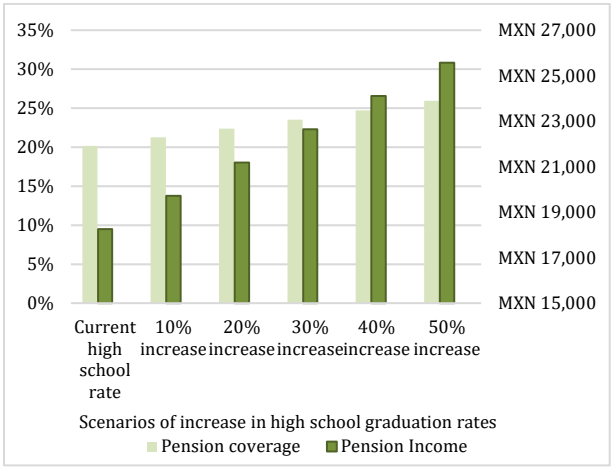


Educational attainment

The rate of high school graduation is low in Mexico but has improved over the last couple of decades. The improvement has been similar for both genders: 28.33% (32.5) females (males) completed upper secondary education in 2006 and 32.12% (34.7%) in 2017 (World Bank[13]). We analyze counterfactual scenarios which represent further improvements in educational attainment.

Increasing the proportion of individuals with secondary education would result in an increased proportion of the population with a contributory pension program. The increase is not very large: about 6 percentage points (or 30%) under the most extreme simulated increase in the tertiary education rate. The increase in the pension amount would be proportionally larger: the average pension amount would increase by more than 40% (from MX 18,000 to over MX 26,000).

Figure 5.3.2 Simulations of Social Security pension coverage and pension income under changes in education levels, Mexico

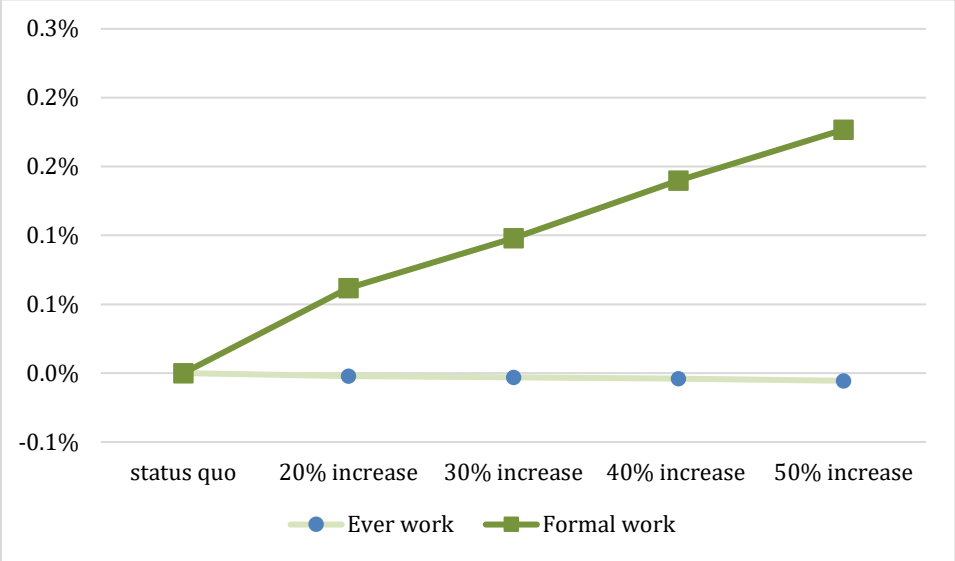


[13] World Bank Data https://data.worldbank.org/

Work history

There is a large informal sector in Mexico, and our previous results indicate that formality status is a good indicator for pension coverage. We analyze the impact of increases in formality in labor market and in the share of population who has ever worked for pay. The results in Figure 5.3.3 show that if there were increases in the degree of formality, the projected coverage rate would increase. In the case of a 50% increase in the share of workers in the formal sector, the coverage rate would go up by 1.8%.

Figure 5.3.3 Simulations of Social Security pension coverage and pension income under changes in work history, Mexico



6. Conclusions

Mexico, China, and India have made important progress toward extending social security coverage to a larger fraction of their population. In only four years, China increased the proportion of individuals age 70 and older who are covered from 33.5% to 73.2%. Likewise, the proportion covered of China's 65 to 70-year old population increased from 31% in 2011 to 55.4% in 2015. A similar pattern was experienced by Mexico, albeit slightly slower. Once we account for both contributory and non-contributory programs, the proportion of individuals age 70 and older who are covered raised from 33% in 2002 to 56% in 2012. In the case of India, we find that in 2017-2019, 43% of individuals age 70 and older were covered by a pension program. Though we do not have a prior wave with which to compare, we showed that this number is higher than other estimates from prior years (with different data sources) and thus suggest that India has experienced a growth in coverage too.

The growth of coverage has occurred primarily due to the expansion of non-contributory programs that aim to reach vulnerable groups. The *Pension Schemes for Rural and Non-salaried Urban Residents* in China targets those living in rural areas and those who worked in the non-salaried sector, effectively benefitting those with rural hukous who tend to be of low socioeconomic status. In Mexico, the *Programa Pension para Adultos Mayores* originally targeted rural areas, but was then expanded and currently targets anyone who does not have another form of pension. In the case of India, the Indira Gandhi Old Age Pension Program specifically targets the elderly living below the poverty line.

As a result, the characteristics of the covered population have changed

dramatically. In the first wave of the data for China, among the older population, individuals covered by a public pension tended to be those with higher education, living in urban areas, with urban hukous, and a history in salaried employment. Only four years later, those same variables were predictors of not having coverage. Likewise, in 2002 in Mexico those covered by public pensions were mostly those receiving benefits from the contributory systems, and therefore were those who had worked for sufficiently long periods of time in the formal private or public sectors. By 2015, the majority of public pensioners were receiving benefits through the PPAM, many of them living in rural areas. For India, while we do not have multiple waves to compare across, we do see an interesting u-shaped pattern where individuals with both the lowest and highest education levels are those more likely to be covered (presumably because those with middle levels of education are more likely to live above the poverty line, hence not qualifying for the non-contributory programs, but most of them without access to government or other salaried jobs that provide a pension).

Separately for each survey wave, we estimated logistic regression models in which the dependent variable is an indicator of “receiving a public pension” and the regressors include education, marital status and other demographic predictors of employment, as well as rough indicators of work history in some models. Variables that were positive predictors in the first wave of MHAS and CHARLS go the other direction and become statistically significant predictors by the last wave of analysis. Thus, we find a very fast transformation, where the labor market has been “decoupled” from the coverage of public pensions.

However, a very strong relationship remains between the labor market

characteristics and the income pension *amount*. We find this relationship to be almost unchanged, which is a result of the much smaller amounts that are paid by the non-contributory programs. For instance, we find that though tertiary education predicts not receiving a pension in the last wave of the CHARLS and MHAS data, it predicts a pension that is many times higher than the average pension received by those with primary education (six times higher in China and ten times higher in Mexico). Likewise, we do not find large significant changes between these variables and receipt of benefits from other social programs.

These patterns are apparent in our findings from our modeling and projections under alternative scenarios. We find that, for example, even a rapid transformation of the labor market will not radically change the proportion of the population who is covered by a pension program, but would indeed substantially increase average pension amounts. By the same token, increasing the population shares with tertiary education would not largely change the coverage patterns in either of our three countries but would substantially raise average pension income in all three of them.

These results show that the introduction of non-contributory programs has brought about dramatic increases in coverage which are independent from the strength of labor markets or size of the formal sector. However, these findings also imply that strong labor markets are necessary to improve the level of benefits and economic security of the future elderly populations. Therefore, continued growth and improvement of labor market opportunities are still crucial factors to increase the wellbeing of these populations.

The harmonized longitudinal data that we use, as developed by the Gateway to

Global Aging at the University of Southern California with support from the National Institute on Aging, has proven to be useful for capturing the fast transformations taking place in the social security landscapes in these three countries and for comparing patterns across these countries. Future rounds of these surveys will allow researchers to analyze further implications of these and other policy changes and economic transformations affecting the lives of the large and growing number of elderly in these three countries.

Abbreviations

SS	Social Security
IGNDPS	Indira Gandhi National Disability Pension Scheme
IGNOAPS	Indira Gandhi National Old Age Pension Scheme
IMSS	Instituto Mexicano de Seguridad Social
ISSA	International Social Security Association
ISSSTE	Instituto de Seguridad Social para Trabajadores del Estado
The Rural Pension	Pension Schemes for Rural and Non-salaried Urban Residents
PPAM	Programa Pensión para Adultos Mayores
SES	Socioeconomic status
SIIAO	The Social Insurance and Individual Accounts Program

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A.1 Data Appendix

The labor force status variable in the Harmonized LASI file is different from the corresponding variable in the other surveys. Correspondingly, the Harmonized LASI file currently does not have an indicator for whether the individual is retired that is comparable to the variable we use for MHAS and CHARLS. Therefore, we have created this variable from the raw data. Specifically, we implemented the following definition from the Harmonized CHARLS codebook (Beaumaster et al., 2018, pp. 398-399, paraphrased and adapted to the LASI questionnaire): The individual is considered retired if the individual has worked in the past and is not currently working, temporarily laid off, on sick or other leave, on job training, or unemployed and looking for work, or otherwise looking for work. Note that this definition includes disabled individuals and homemakers who previously worked as being retired, whereas these are not always considered retired; for example, in the RAND HRS, they have separate categories in the labor force status variable.

We also obtain an indicator for whether the individual has ever worked and the age the individual first worked from the raw data. Table A.1.1 shows the percentage of respondents who are currently working or who have ever worked for pay. Almost all men and about half of the women have ever worked in their lives, with no discernible age (i.e., cohort) trend. For currently working, we see the anticipated relationship with age among those older than 45.

Table A.1.1: Percentage currently working and ever working by age and gender

	Currently working (%)			Ever working (%)		
Age group	Male	Female	Total	Male	Female	Total
-40	95.0	36.3	36.8	100.0	47.5	48.0
40-45	64.7	38.3	38.7	79.4	51.4	51.9
45-49	86.4	39.2	60.4	96.8	53.8	73.0
50-54	83.8	36.2	58.0	97.1	53.5	73.5
55-59	78.2	32.1	52.7	96.4	53.0	72.4
60-64	58.3	24.8	40.1	95.8	52.0	72.1
65-69	45.6	19.2	32.1	96.0	52.0	73.5
70+	25.4	8.7	16.9	93.7	49.3	71.2
Total	62.4	28.9	43.1	95.9	52.0	70.5

Finally, we created an indicator for whether the individual is enrolled in a public pension scheme, but not receiving a pension yet. This takes information from two sections: (1) In the work, employment, and pensions section, there are questions about whether the respondent currently receives, or expects to receive in the future, various types of pensions. The first type is central government pension schemes (Central Civil Service Pension Scheme, Civil Service Provident Fund, retiring pension, Superannuation, etc.), the second type is state government pension schemes, the third type is employer funded pension schemes, and then the respondent can mention other work-related pensions. From this, we include central government and state government pensions in our measure, provided that the respondent expects to receive this in the future but is not receiving this currently. (2) In the social welfare schemes section, there is a question about "some government schemes and programs for older persons": National Old Age Pension Scheme, Widow Pension Scheme, Annapurna Scheme (which distributes rice), and other; the latter primarily refers to state schemes. This question is only asked if the respondent is 60 or over and it only asks about benefit receipt. These programs are non-contributory and thus respondents who currently do

not receive benefits are not "enrolled", and we are unable to predict future eligibility, which largely depends on future events and future circumstances. Hence, we cannot use this for our indicator of whether an individual is eligible for a future benefit but not currently receiving. Table A.1.2 shows the public and private programs the survey asks about and how many respondents indicate they receive benefits or expect them in the future.

Table A.1.2: Enrollment and receipt of benefits of public and private programs

Type/name of scheme	Expected	Receives
Central govt pension schemes	723	908
State govt pension schemes	1649	1216
Employer funded pension schemes	194	180
Other work related pension	54	43
Other work related pension	8	6
Other work related pension	17	15
Total	2645	2368

	Receives
National Old Age Pension Scheme	7836
Widow Pension Scheme	1839
Annapurna Scheme	364
Other	161
Other	208
Total	10408

A.2 Additional Figures for Counterfactual Scenarios

Figure A.2.1. Simulations of the effect of increasing higher educational attainment and the share in urban areas on the proportion of the population 65+ covered by Social Security