Costs and Potential Funding of Expanded Public Pension Coverage in Asia

By

Peter J. Morgan* and Long Q. Trinh**

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Abstract: Public pension burdens in most emerging Asian economies are still relatively small. However, there are a number of reasons to believe that they will increase markedly in coming years. First, many Asian economies will face rapidly aging populations, which will raise pension and other old-age-related spending dramatically. Second, as economies develop, political pressures to expand the coverage of public pensions and raise pension benefits will likely increase. The first objective of this paper is to identify the potential fiscal burden of public pensions in 23 emerging Asian economies, based on econometric models and forecasts of GDP and demographic trends. Using two different methodologies yields estimated increases in the average share of public pension expenditures in GDP of 1.0 percentage points and 3.6 percentage points by 2030 compared with current levels. We believe the latter estimate is more realistic. The second objective is to recommend policies to provide adequate funding for public pension needs, including enhancing the efficiency of social insurance programs; improving the balance of revenues and expenditures; implementing more explicit fiscal rules and frameworks; and establishing stronger fiscal surveillance at the national and regional levels.

JEL Classification Codes: H2, H51, H54, H55, H62, H63, J11

Keywords: public pensions, Asian emerging economies, social protection, population aging

Main point: Using two different methodologies, our paper projects estimated increases in the average share of public pension expenditures in GDP in Asian economies of 1.0 percentage points and 3.6 percentage points by 2030 compared with current levels.

* Senior Consultant for Research, Asian Development Bank Institute, Tokyo. Email: pmorgan@adbi.org
** Project Consultant, Asian Development Bank Institute, Tokyo. Email: ltrinh@adbi.org

1. Background, objectives and contribution of the study

The fiscal burden of public pensions in most Asian emerging economies is relatively small, reflecting relatively young populations and relatively limited coverage of the retired-age population in public pension programs. Nonetheless, these conditions are likely to change dramatically in coming decades. First, many Asian economies will face rapidly aging populations, which will raise pension and other old-age-related spending dramatically. Second, as economies develop, political pressures to expand the coverage of public pensions and raise pension benefits will likely increase.

Despite this daunting prospect, there have been relatively few studies of forecasts of public pension spending by emerging Asian economies. The Organisation for Economic Cooperation and Development (OECD) has published extensively on the prospects for member countries (e.g., OECD 2013), but, aside from Japan and the Republic of Korea, their study only covers the People's Republic of China (hereafter PRC), India and Indonesia, i.e., the other Asian members of the G20. IMF (2011) only covers five emerging Asian economies: the PRC, India, Indonesia, Malaysia, Pakistan, the Philippines and Thailand.

The objectives of this paper are to: (i) identify the current status of public pension spending in Asia; (ii) develop models to explain public pension spending in Asia in terms of basic economic and demographic variables; (iii) use the models forecast the likely developments of spending on public pensions in 23 emerging economies through 2030 as a result of demographic and income trends; and (iv recommend policies to expand the financial capacity to cover such expenditure increases, including: enhancing the efficiency of social insurance programs; improving the balance of revenues and expenditures; implementing more explicit fiscal rules; and establishing stronger fiscal surveillance at the national and regional levels.

The main contribution of this paper is that it covers many more emerging Asian economies than previous studies—23 in all. In addition, it explicitly models changes in the pension coverage (eligibility) ratio and changes in average pension benefits. (In contrast, the forecasts in IMF (2011) assume a constant coverage ratio.) Also, our study utilizes the latest data from the ADB Social Protection Index database and World Bank Pension database.

Section 2 of this paper reviews the current situation of public pension schemes in Asia and the outlook for demographic change. Section 3 develops models of pension expenditures as a function of demographic, income and other variables. Section 4 projects the expected path of public pension spending through 2030. Section 5 identifies possible funding options, while Section 6 presents conclusions and recommendations.

2. Status of public pensions in emerging Asia

This section describes the current status of public pensions in Asia.[1] Figure 1 shows the share of public pension spending in GDP for emerging Asian economies and Japan. There is a great amount of variation, ranging from less than 1% of GDP for a number of low-income countries to 11% of GDP for Japan. However, the gap between Japan and the rest of the region is large, as Uzbekistan, the country with the second-highest expenditure share, spends only 8% of GDP, followed by the Kyrgyz Republic at 7% of GDP. Excluding former republics of the Soviet Union, the highest share is only 3.6% in Palau, and most economies have shares lower than 1%.

**Figure 1: Public pension expenditures in Asia, 2013, % of GDP**

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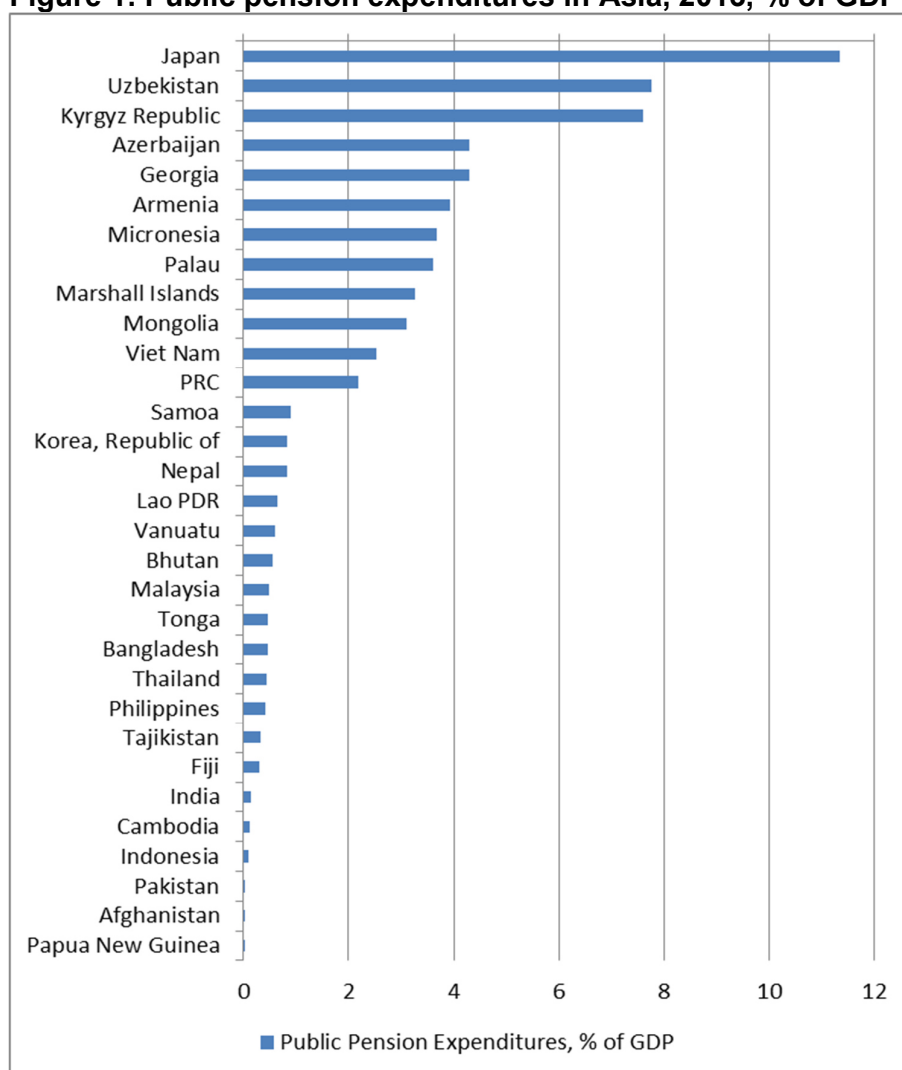
[1] See the appendix for a description of Asian public pension fund systems.

Note: Data for Bhutan, India, Indonesia and Rep. of Korea are 2012; for Tonga, 2011; for Afghanistan, Malaysia, Nepal, Papua New Guinea and Philippines, 2010; and Pakistan, 2008. PRC = People's Republic of China. Lao PDR = Lao People's Democratic Republic.
Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016)

Figure 2 shows the relationship of the percent share of public pension spending in GDP to per capita GDP. Generally, the share rises in line with per capita GDP, although the average level in the former republics of the USSR Union is much higher than those in other Asian economies, especially Uzbekistan and the Kyrgyz Republic at around 8%. Excluding the ex-USSR countries, the simple correlation of the share of pension spending in GDP with per capita GDP is relatively high at 0.61.

Figure 2: Share of public pension spending in GDP vs. per capita GDP, 2013
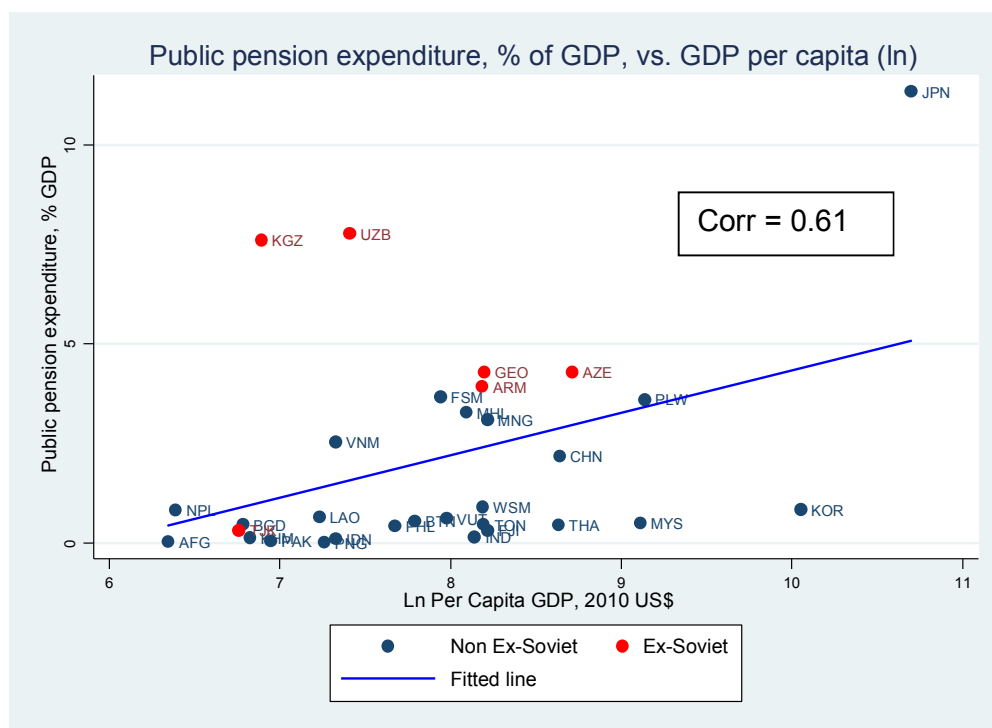

Note: Data for Bhutan, India, Indonesia and Rep. of Korea are 2012; for Tonga, 2011; for Afghanistan, Malaysia, Nepal, Papua New Guinea and Philippines, 2010; and Pakistan, 2008. PRC = People's Republic of China. Lao PDR = Lao People's Democratic Republic. Ex-USSR countries include Armenia, Azerbaijan, Georgia, Kyrgyz Republic, Mongolia, Tajikistan and Uzbekistan.
Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016)

These very low ratios reflect a number of factors at work. First, the populations of most Asian economies are still relatively young. Figure 3 shows the trend and projections of the old-age dependency ratio, i.e., ratio of the aged population (age 65 and over) relative to the working-age population (age 15-64). Japan's ratio already hit 35% in 2013, and that of the Republic of Korea hit 16%. In contrast, the ratios in most emerging Asian economies are still considerably lower, in the range of 4%-10%. However, old-age dependency ratios are expected to rise markedly to over 20% in a number of emerging Asian economies by 2030, including especially Armenia (37%), Azerbaijan (26%), the PRC (48%), Georgia (35%), India (26%), Kazakhstan (22%), Malaysia (23%), Mongolia (22%), Nepal (22%), Thailand (40%), Uzbekistan (21%) and Viet Nam (31%).

**Figure 3: Rapid rise in the old-age dependency ratio (%), 2013-2030**
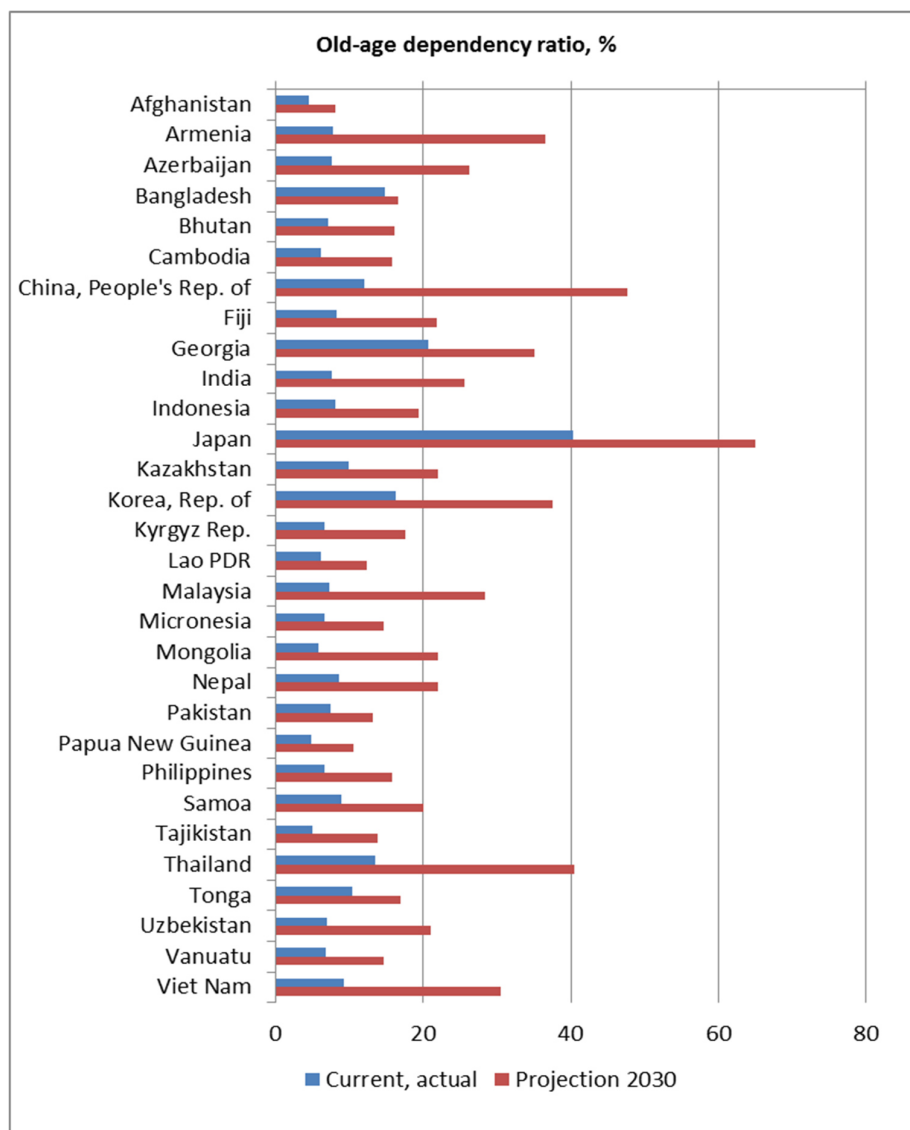
Note: The ratio of the aged to the working-age population is defined as the ratio of population aged 65 and over to population aged 15-64.
Sources: World Population Prospects: The 2015 Revision of the United Nations Population Division (medium fertility variant), available at: https://esa.un.org/unpd/wpp/ and Council for economic planning and development (Taipei,China), available at: http://www.cepd.gov.tw/encontent/m1.aspx?sNo=0001457, accessed 23 December 2012.

Figure 4 shows that, excluding the ex-USSR economies, there is a very high correlation of 0.89 between the share of public pension spending in GDP and the old-age dependency ratio, although this is affected by the very high value for Japan.

Figure 4: Share of public pension spending in GDP vs. old-age dependency ratio, 2013
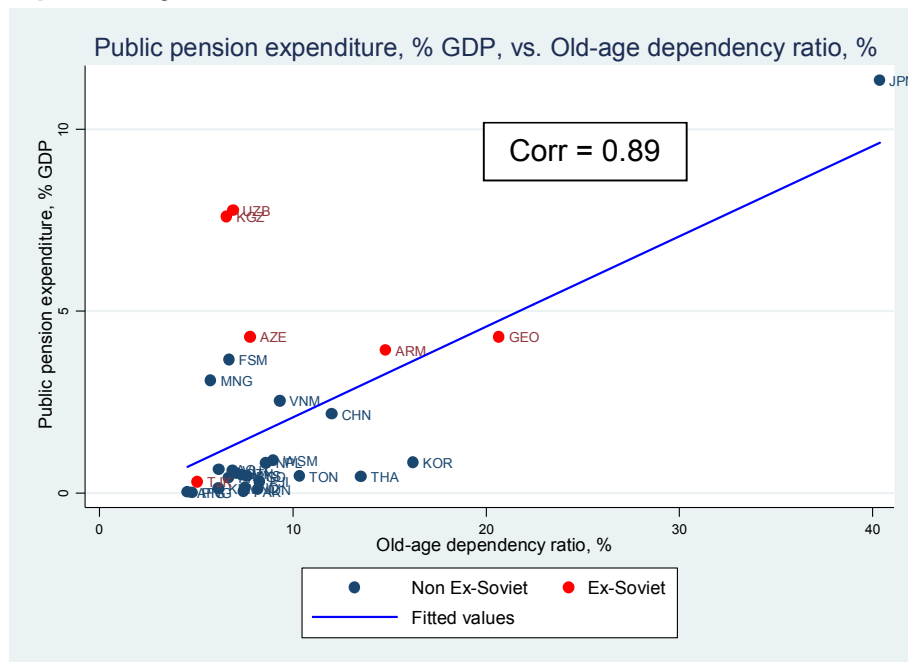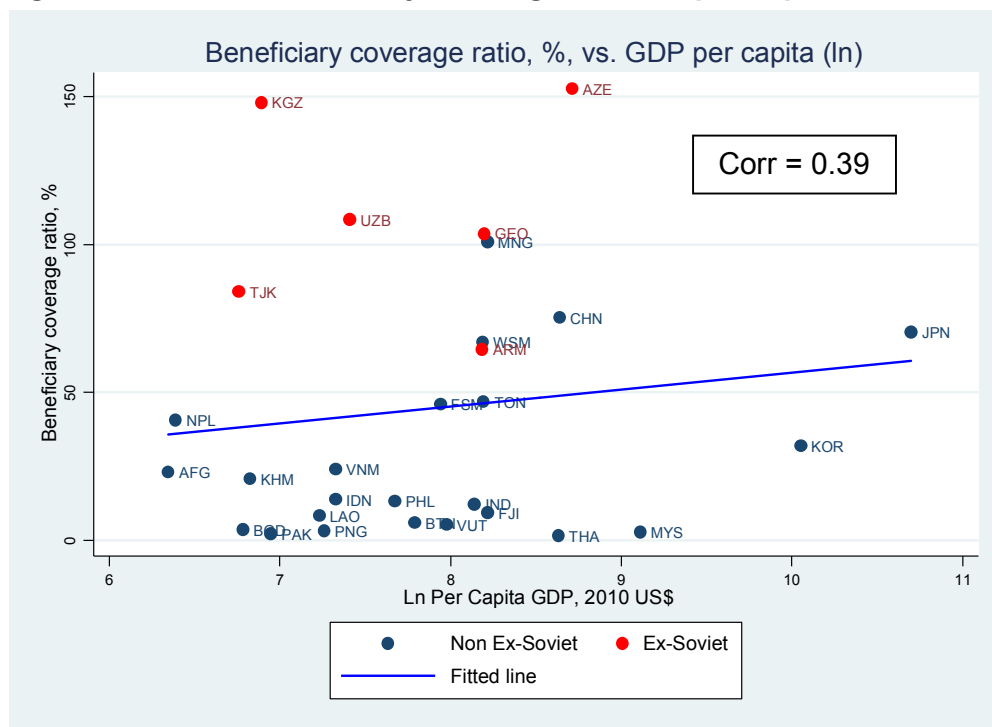

Note: Old-age dependency ratio = ratio of population over age 65 to population age 15-64. Data for Bhutan, India, Indonesia and Rep. of Korea are 2012; for Tonga, 2011; for Afghanistan, Malaysia, Nepal, Papua New Guinea and Philippines, 2010; and Pakistan, 2008. PRC = People's Republic of China. Lao PDR = Lao People's Democratic Republic. Ex-USSR countries include Armenia, Azerbaijan, Georgia, Kyrgyz Republic, Mongolia, Tajikistan and Uzbekistan. Correlation coefficient excludes ex-USSR economies.
Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016)

Second, the share of the old-age population receiving public pension benefits (the pension coverage ratio) is still low in many economies. In some cases, eligibility is restricted mainly to civil servants and the military, although implementation of social pensions to reduce old-age poverty is increasing. Figure 5 shows the share of the eligible old-age population[2] receiving pension benefits. Generally, as per capita income rises, the pension beneficiary coverage ratio increases. The main exception is the former republics of the Soviet Union, which mostly have very high coverage ratios.[3] Excluding the ex-USSR countries, there is a moderately high correlation of the coverage ratio with per capita GDP of 0.39.

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[2] The age cut-off varies by country according to the retirement age.

[3] In many cases, the coverage ratio is higher than 1 in the ex-Soviet economies, reflecting widespread early retirement as a result of economic restructuring in the transition to a market economy.

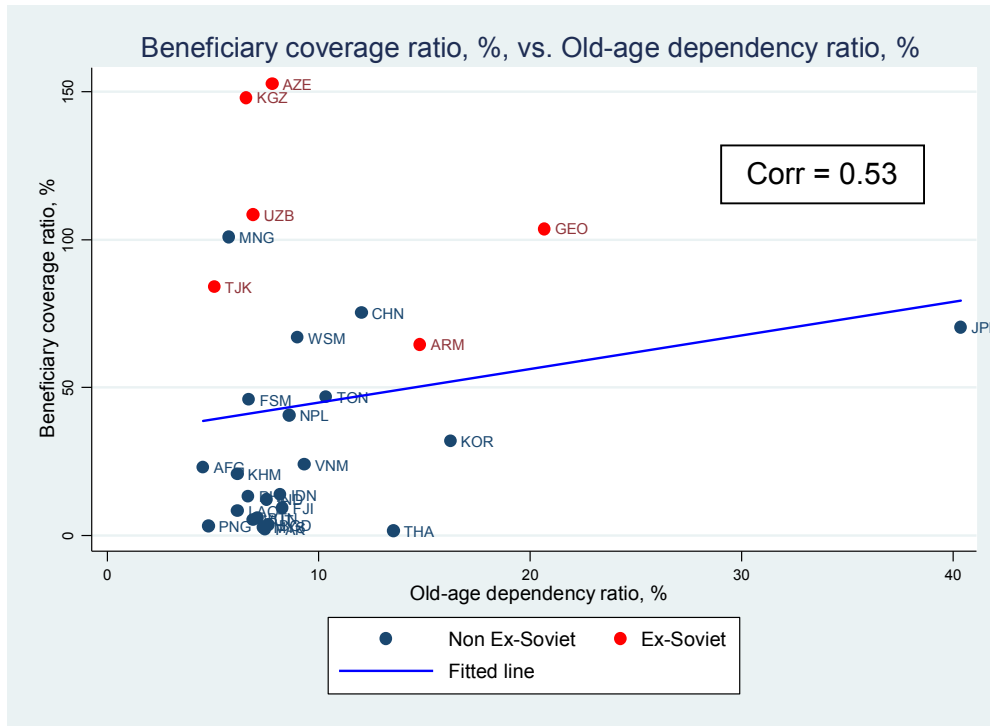**Figure 5: Pension beneficiary coverage ratio vs. per capita GDP, %, 2013**

Note: Beneficiary coverage ratio = ratio of number of pension beneficiaries over pension-age population. Data for Bhutan, India, Indonesia and Rep. of Korea are 2012; for Tonga, 2011; for Afghanistan, Malaysia, Nepal, Papua New Guinea and Philippines, 2010; and Pakistan, 2008. PRC = People's Republic of China. Lao PDR = Lao People's Democratic Republic. Ex-USSR countries include Armenia, Azerbaijan, Georgia, Kyrgyz Republic, Mongolia, Tajikistan and Uzbekistan.
Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016)

The pension coverage ratio is also related to the old-age dependency ratio. Figure 6 shows the pension coverage ratio against the old-age dependency ratio. For the non-USSR countries, the correlation is relatively high at 0.53, although this partly reflects the high value for Japan, which is an outlier. This effect may result from greater awareness of the aging issue leading to greater political pressure for wider pension coverage.

Figure 6: Pension beneficiary coverage ratio vs. old-age dependency ratio, %, 2013


Note: Beneficiary coverage ratio = ratio of number of pension beneficiaries over retirement-age population. Old-age dependency ratio = ratio of retirement-age population to working-age population. Data for Bhutan, India, Indonesia and Rep. of Korea are 2012; for Tonga, 2011; for Afghanistan, Malaysia, Nepal, Papua New Guinea and Philippines, 2010; and Pakistan, 2008. PRC = People's Republic of China. Lao PDR = Lao People's Democratic Republic. Ex-USSR countries include Armenia, Azerbaijan, Georgia, Kyrgyz Republic, Mongolia, Tajikistan and Uzbekistan.
Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016)

Third, average public pension benefits per beneficiary tend to be low relative to per capita income in low-income countries, although there is considerable variation. Figure 7 shows the relationship between average public pension benefits and per capita GDP. Unlike the previous figures, there is no obvious difference between average benefit levels in non-ex-USSR and ex-USSR economies. The correlation with per capita GDP is high at 0.73.

Figure 7: Average pension benefits and per capita GDP, 2013
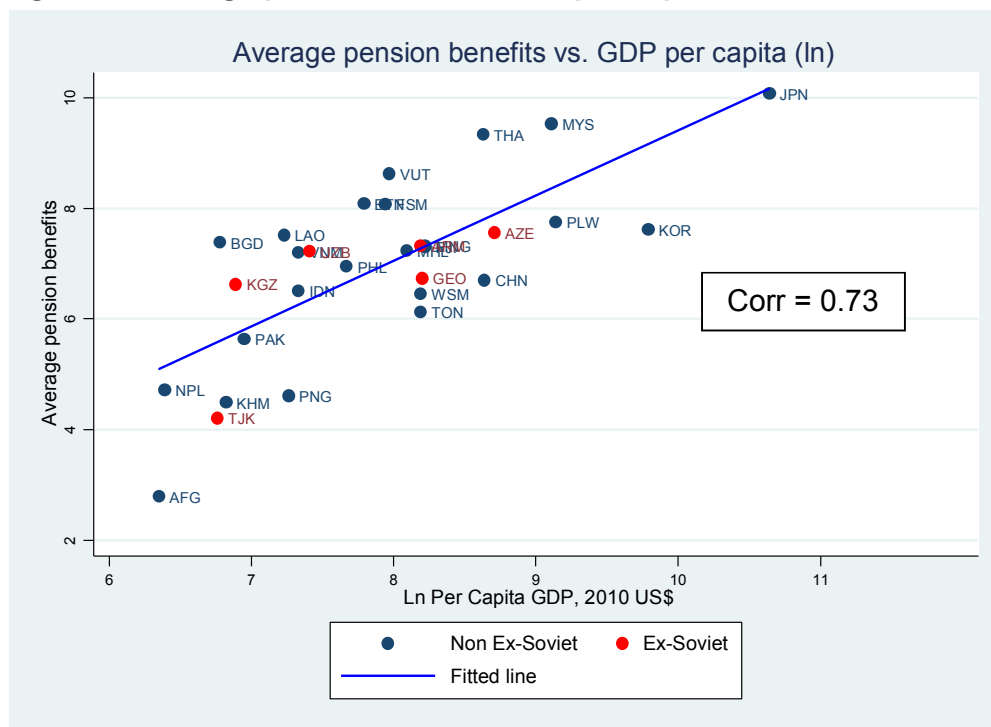
Note: Data for Bhutan, India, Indonesia and Rep. of Korea are 2012; for Tonga, 2011; for Afghanistan, Malaysia, Nepal, Papua New Guinea and Philippines, 2010; and Pakistan, 2008. PRC = People's Republic of China. Lao PDR = Lao People's Democratic Republic. Ex-USSR countries include Armenia, Azerbaijan, Georgia, Kyrgyz Republic, Mongolia, Tajikistan and Uzbekistan.
Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016)

3. Modelling public pension expenditures

This section describes the estimation of some simple models of public pension spending in Asian economies. These will be used in the next section to extrapolate public pension expenditures as a function of growth of per capita GDP, the aging of their populations and the coverage ratio.

3.1 Data

We collected data on public pensions for 30 Asian economies, including Japan and the Republic of Korea. Our main sources were the Social Protection Index (SPI) database of the Asian Development Bank, the World Bank Pensions database and the United Nations Population Division's World Population Prospects: The 2015 Revision. The sample included 24 economies with annual data ranging from 2003-2013, although the actual samples were smaller in some regressions due to data availability.

The SPI data are problematic because in some cases the data for a particular economy were collected from different sources in different years, using different bases and definitions, and hence are not always comparable. Our approach was to limit the sample to a single data source for each country. The selection of that source was based on the length of the series and the broadness of coverage. In some cases there implausible data values, so those observations were dropped if they could not be corrected or explained.

The main variables used in the analysis are:

ppenex = public pension expenditures (2010 US$)
ppenex/gdp = share of public pension expenditures in GDP
gdppc = GDP per capita (2010 US$)
benif = number of public pension beneficiaries
ppenex/benif = average benefits per beneficiary (2010 US$)
pop = total population
workage = working-age population (ages 15 to retirement age less 1)
retpop = population of retirement age (normally age 65 and over, but varies by country depending on retirement age)[4]
benif/workage = ratio of pension beneficiaries to working-age population
coverage = ratio of pension beneficiaries to retirement-age population = *benif/retpop*
ussr = dummy variable for former Soviet republics

3.2 Modelling approach

We took two main approaches to modelling pension expenditures. In the first approach, we directly estimated the share of public pension expenditures in GDP (*ppenex/gdp*) as a function of per capita GDP, the share of pension beneficiaries relative to the working-age population (*benif/workage*) and other control variables (referred to as Method 1). In the second approach (referred to as Method 2), we decompose *ppenex/gdp* by the following identity:[5]

$$ppenex/gdp = ppenex/benif * coverage * retpop/pop / gdppc \qquad (1)$$

We then estimated separate equations for *ppenex/gdp* and *coverage* as a function of per capita GDP and dummy variables. The objective of this approach

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[4] If the retirement age is not a multiple of 5, e.g., 55, 60, or 65, we use the closest multiple of 5, i.e., if the retirement age is 62, we use 60. This is because population forecasts are only available in 5-year intervals. When there is no formal retirement age, we assume a retirement age of 60 for both men and women.

[5] IMF (2011) adopts a more complex decomposition, including the share of labor in total income, the average wage level, and the replacement rate. However, there was not sufficient data for this level of analysis. Therefore, our approach is to compare the average pension benefit with per capita GDP directly.

is to identify separate factors affecting the growth of average pension benefits and the share of the retired population covered by public pensions over time.

The equation for Method 1 is:

$$ppenex/gdp_{i,t}=\alpha+\beta gdppc_{i,t}+\gamma benif_{i,t}/workage_{i,t} + \eta_t+\varepsilon_{i,t}. \qquad (2)$$

where η_t is a vector of time dummies and $\varepsilon_{i,t}$ are identically and independently distributed error terms. In particular, we include a dummy variable for former republics in the Soviet Union (USSR) in some regressions, based on the difference in behavior of these economies described in Section 2.

Similarly, the first equation in the Method 2 approach is:

$$ppenex/benif_{i,t}=\alpha + \beta gdppc_{i,t} + \eta_t+v_i+\varepsilon_{i,t}. \qquad (3)$$

where η_t is a vector of time dummies, v_i a vector of country dummies, and $\varepsilon_{i,t}$ are identically and independently distributed error terms.

The second equation in the Method 2 approach is:

$$coverage_{i,t}=\alpha+\beta gdppc_{i,t} + \gamma ussr_i+\eta_t+v_i+\varepsilon_{i,t}. \qquad (4)$$

where $ussr_i$ is the dummy variable for ex-USSR economies and η_t is a vector of time dummies, v_i a vector of country dummies, and $\varepsilon_{i,t}$ are identically and independently distributed error terms.

3.3 Estimation results

Table 1 shows the regression results for equation (2) for the share of public pension expenditures in GDP. We estimated them using ordinary least squares (OLS) clustered by country for the full sample, and separately for the ex-USSR and non-ex-USSR economies.[6] The most significant variable was the ratio of pension beneficiaries to the working-age population, which was positive as expected. The coefficients were similar in magnitude for all three samples. Surprisingly, GDP per capita was not significant in any of the regressions. This is probably because the population aging and income effects move in the same direction, but the former are much stronger. The results for all three equations were similar, although the goodness of fit in regression (3) was much poorer

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[6] Japan and the Republic of Korea were excluded from the sample due to being outliers. Also, our main focus is emerging economies.

than that of the others, owing to the smaller sample and the high variance of values in the ex-USSR economies.[7]

Table 1: Estimation results for share of public pension expenditures in GDP

Estimation method: OLS, clustered by country

Regression number	All countries (1)	Non Ex-USSR countries (2)	Ex-USSR countries (3)
GDP per capita	-0.001	0.003	-0.013
	[0.004]	[0.002]	[0.008]
No of Beneficiaries/Total working-age population	0.189***	0.268***	0.301
	[0.038]	[0.058]	[0.166]
Constant	0.009	-0.019	0.082
	[0.022]	[0.017]	[0.053]
R2	0.492	0.593	0.210
F statistics	19.82	11.00	1.72
N	101	69	32

Notes: Standard errors in brackets; * $p<0.1$, ** $p<0.05$, *** $p<0.01$. All specifications are estimated using the OLS estimator, clustered by economy. GDP per capita is in natural logs. The Republic of Korea, Japan and Malaysia were not included in the sample.
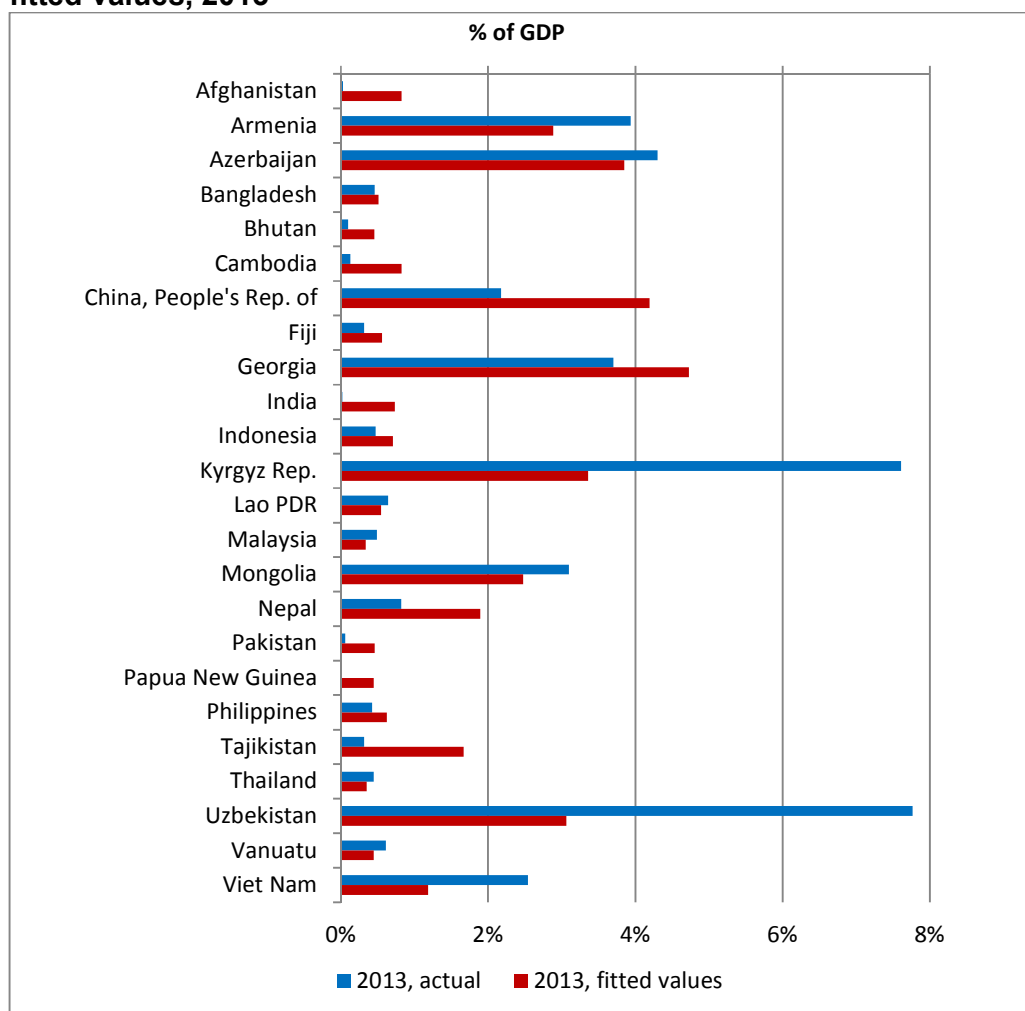
Source: Authors' estimates.

Figure 8 shows the comparison of actual and fitted values for the ratio of public pension expenditures to GDP (equation 2) based on regression 1, using the combined sample. There is a considerable variation between them. Estimated values for Armenia, Azerbaijan, Georgia, Mongolia and Viet Nam are relatively close to the actual figures, but estimates for the other economies exhibit wide variation. For example, in percentage terms, the predicted values for the Kyrgyz Republic and Uzbekistan are much lower than the actual values, reflecting very high pension coverage ratios in those economies. However, the fitted values for most other economies are much higher than the actual values. To be sure, in

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[7] An alternative specification using the ratio of pension beneficiaries to the retirement-age population yielded very similar results. However, using this variable fails to capture the important effect of the rise of the retirement-age population relative to the working-age population.

most cases, the actual figures are so small that it is easy for forecasts to be off significantly in percentage terms, even when the fitted values are still small, generally less than 1% of GDP. The biggest deviations in percentage point terms are those for the PRC, the Kyrgyz Republic, Nepal, Tajikistan, Uzbekistan, and Viet Nam.

Figure 8: Share of public pension expenditures in GDP (%): Actual vs. fitted values, 2013

Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016) and authors' estimates.

Table 2 shows the regression results for equation (3) for average public pension expenditures per beneficiary. We estimated them using ordinary least squares (OLS) with fixed-effects for the full sample, and separately for the ex-USSR and non-ex-USSR economies. The coefficient for GDP per capita in regression (4) was highly significant and positive as expected. Moreover, the coefficient was greater than one, which implies that average pension payments tend to grow faster than per capita GDP. When the ex-USSR economies were excluded, the

coefficient was less than one and less significant. However, visual observation of the data did not suggest any significant differences in behavior between the two subsamples. Therefore, we are inclined to accept the results from the full sample that the elasticity of benefits with respect to per capita income is greater than one. That suggests that economic development per se will put upward pressure on the share of pension expenditures in GDP, in addition to any demographic aging effects.

Table 2: Estimation results for average public pension expenditures per beneficiary
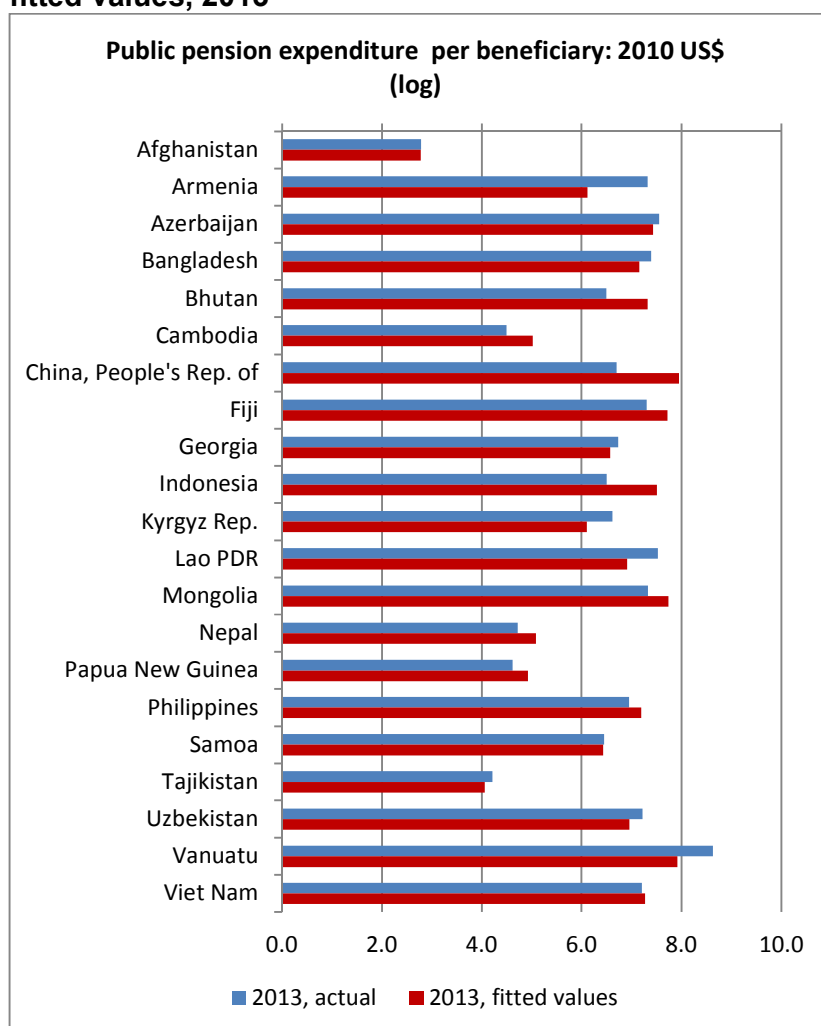
Estimation method: Fixed effects

Regression No.	All countries (4)	Non Ex-USSR countries (5)	Ex-USSR countries (6)
GDP per capita	1.397***	0.829*	2.974**
	[0.495]	[0.445]	[1.334]
Constant	-4.012	0.507	-16.879
	[3.745]	[3.340]	[10.343]
R2	0.419	0.503	0.431
F Statistics	7.96	3.47	4.97
N	113	81	32

Notes: Standard errors in brackets; * p<0.1, ** p<0.05, *** p<0.01. All specifications are estimated using the fixed effects estimator. Both dependent variable and independent variable (GDP per capita) are in natural logs. Malaysia was not included in the sample, since it has a fully-funded defined contribution plan..

Source: Authors' estimates.

Figure 9 shows the comparison of actual and fitted values for the level of average public pension expenditures per beneficiary (equation 3) based on regression 4. The goodness of fit is considerably better than for equation 2. Fitted values for India, Thailand and Tonga were not estimated due to the poor quality of the data. Deviations from actual values were relatively large for Afghanistan, the PRC and Papua New Guinea on the high side, and Bangladesh and Vanuatu on the low side.

Figure 9: Average public pension expenditures per beneficiary: Actual vs. fitted values, 2013

Public pension expenditure per beneficiary: 2010 US$ (log)

■ 2013, actual   ■ 2013, fitted values

Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016) and authors' estimates.

Table 3 shows the regression results for equation (4) for the ratio of pension beneficiaries to the total retirement-age population (pension coverage ratio). We estimated them using ordinary least squares (OLS) with random-effects for the full sample, and separately for the ex-USSR and non-ex-USSR economies, as well as using random effects for the whole sample.[8] None of the explanatory variables in regression 7 were significant. The coefficient of per capita GDP was positive and modestly significant for the full sample when dummy variables for the ex-USSR economies were included (regression 8), and also positive and modestly significant for the non-ex-USSR economies (regression 9). However,

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[8] We also estimated the equation using the FE estimator. However, Hausman tests indicate that the RE estimators provide more efficient results than FE estimators.

regression 9 has very low explanatory power. This supports our view that rising incomes are likely to lead to an increase in the coverage ratio, which will tend to raise the burden of public pension expenditures independently of the aging of the population. The coefficient of per capita GDP was negative for ex-USSR economies in regression 10, presumably reflecting legacy effects of early retirement along with restructuring during the transition from a socialist economy.

Table 3: Estimation results for ratio of public pension beneficiaries to total retirement-age population (coverage ratio)

Estimation method: Random effects

| Regression No.	All economies (7)	All economies (8)[9]	Non Ex-USSR economies (9)	Ex-USSR economies (10)
GDP per capita	0.116	0.106**	0.149*	-0.150**
	[0.072]	[0.054]	[0.063]	[0.070]
Ex-USSR		0.947***		
		[0.113]		
Constant	-0.411	-0.558	-0.883	2.366***
	[0.5553]	[0.407]	[0.479]	[0.558]
R2	0.01	0.558	0.058	0.027
F statistics	2.56	75.88	5.55	4.56
N	196	196	157	49

Notes: Standard errors in brackets; * $p<0.1$, ** $p<0.05$, *** $p<0.01$. All specifications are estimated using the random effects estimator (Hausman tests show that the RE estimator produces more efficient estimates than the FE estimator). Dependent variable is the share of pension beneficiaries to total retired population (which is in turn calculated based upon the retire age in each country). GDP per capita is in the natural log. Malaysia not included in the sample.

Source: Authors' estimates.

Figure 10 shows the comparison of actual and fitted values for the ratio of public pension beneficiaries to the total retirement-age population. Generally the fit is good, with the main outliers being Armenia on the high side and the PRC on the low side. Fitted values were not estimated for Samoa and Tonga due to data issues.

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[9] For projection, we re-estimate this specification without two countries (Azerbaijan and Kyrgyz) due to their potential outlier. The final equation used for projection is Ratio of public pension beneficiaries to total working population = 0.107*GDP per capita + 0.772*Ex-USSR -0.566

Figure 10: Ratio of public pension beneficiaries to total retirement-age population: Actual vs. fitted values, 2013
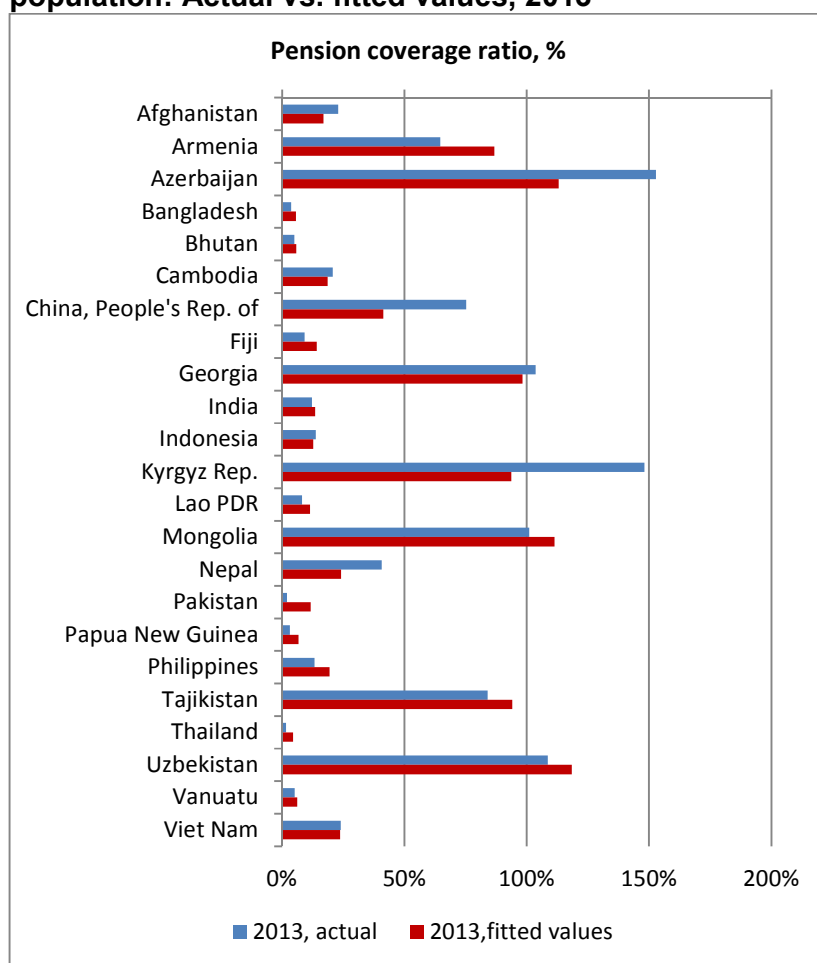
Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016) and authors' estimates.

4. Aging populations in Asia and pension expenditure projections

This section develops forecasts of public pension expenditures through the year 2030 using the models described in the previous section and forecasts of demographic trends and growth of per capita GDP. Takahata (2015) describes three approaches to forecasting pension expenditures: (i) arithmetical methods; (ii) micro-simulation models, and (iii) dynamic general equilibrium model. Our approach falls into the first and simplest category. Considering the large number of economies included in the study, we regard this to be the only feasible approach, especially in view of data limitations for this kind of sample.

There are surprisingly few studies of multi-country public pension expenditure projections in Asia. An early example was Standard & Poors (2010), although it was heavily criticized in Asher and Vora (2016), for example. Perhaps the most

comprehensive study is IMF (2011), which estimates that many emerging economies will face large increases in public spending on pensions and health care services (an average increase of 7.0 percentage points of GDP between 2010 and 2050) due to aging populations. However, that study only included a few major emerging Asian economies—the PRC, India, Indonesia, Malaysia, Pakistan, the Philippines and Thailand. The methodology was based on the arithmetical approach: including the following assumptions: (i) constant coverage ratio of pensioners to population aged above 65 years and constant replacement rate; and (ii) changes driven by the employment ratio and the old-age dependency ratio (IMF 2010: 40).

More detailed projections were made recently for the PRC, India, Indonesia and Japan in various studies contained in Asher and Zen (2016). Table 4 compares the IMF and Asher & Zen projections. In general, the latter projections are higher. This partly reflects one of the key assumptions in the IMF study, namely a constant coverage ratio for pensioners above retirement age. In contrast, the studies in Asher and Zen (2016) explicitly consider the effects of increasing coverage ratios together with other reforms.

Table 4: Projections of Public Pension Expenditures, % of GDP

	IMF (2011)			Asher & Zen (2016)	
	2010	2030	2050	2030	2050
PRC	3.4	6.7	9.2	8.0	9.6
India	1.0	1.0	0.7	0.9-1.8	--
Indonesia	0.7	1.1	1.6	1.6-2.6	--
Japan	10.0	9.8	10.7	13-17	13-23
Rep. of Korea	1.7	6.2	12.5	--	--
Malaysia	3.0	4.9	6.9	--	--
Pakistan	0.6	0.7	1.2	--	--
Philippines	1.7	2.6	3.9	--	--
Thailand	1.0	1.7	2.0	--	--

"—" indicates no estimates.
Source: IMF (2011:53), Asher & Zen (2016)

Using the regression equations reported in Section 3, we have estimated projected values for the level of average pension benefits and pension coverage ratio for retirement-age persons in 2030, and then used these estimates to project the share of public pension expenditures in GDP in 2030. Forecasts of per capita GDP are taken from unpublished ADB projections (Zhuang 2012), while forecasts for the old-age dependency ratio are taken from the UN projections shown in Figure 3.

Figure 11 shows the actual values for 2013 and the forecast values for 2030 of the level of average pension benefits per beneficiary, using equation 3

(regression 4) and the exogenous forecasts of per capita GDP.[10] On an unweighted average basis, pension benefits per beneficiary are estimated to grow 8.9% per year, vs. 6.0% per year for real per capita GDP. The biggest increases occur in those economies with the fastest projected growth rates, including Afghanistan, the PRC, Cambodia, the Kyrgyz Republic, Mongolia, Nepal, Tajikistan and Uzbekistan.

Figure 11: Average Public Pension Expenditures per Beneficiary: 2013 actual and 2030 projections

Public pension expenditure per beneficiary: 2010 US$ (log)

■ 2013, actual   ■ 2030, projected

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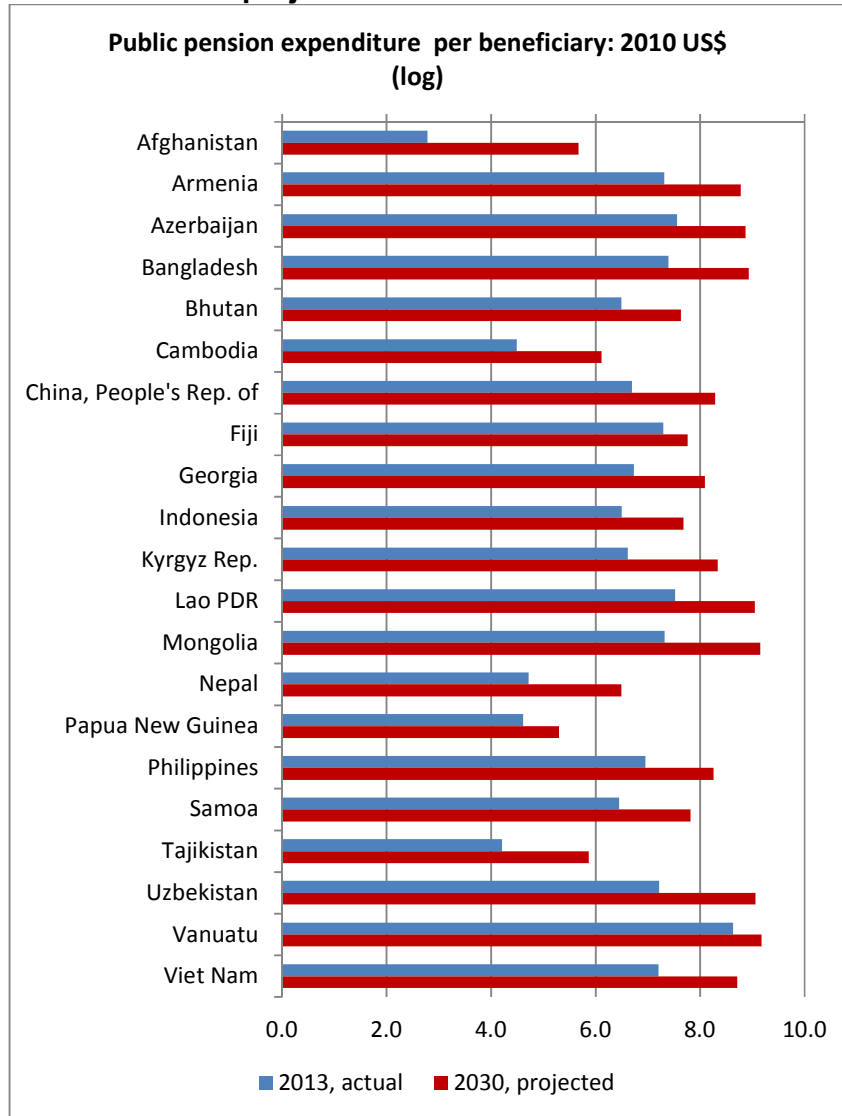
[10] Projected values are estimated as the actual value for 2013 plus the difference between projected value for 2030 less the fitted value for 2013 in order to minimize forecast error arising from differences from the actual and fitted 2013 values. The same procedure is followed for other projections below.

Figure 12: Share of public pension beneficiaries in retirement-age population (%): 2013 actual and 2030 projections
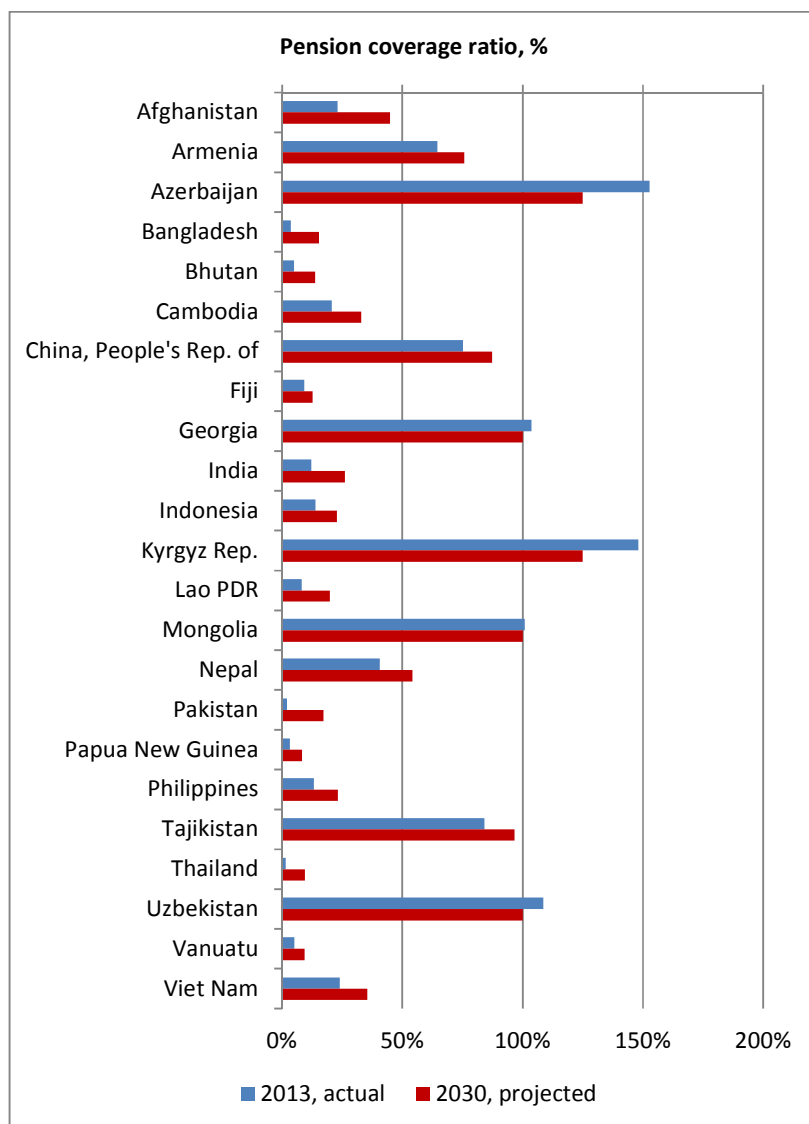
Pension coverage ratio, %

Figure 12 shows the actual values of the public pension coverage ratio in 2013, together with the projected values for 2030, using equation (4) (regression 8) and the exogenous values for per capita GDP.[11] The average increase is 6.9

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[11] The model is not used to forecast the coverage ratios in Azerbaijan, Georgia, Kyrgyz Republic, Mongolia and Uzbekistan, since those ratios are already over 100%. Instead, we assume that the ratios for

percentage points over the period, but this includes some ex-USSR economies with projected drops. The biggest percentage point increases are seen in Afghanistan, India, Nepal and Pakistan.

The actual share of public pension expenditures in GDP in 2013 and the projected shares based on Method 1 are plotted in Figure 13. The projections for 2030 are made using the coefficients from regression 1, the ratio of pension beneficiaries to the retirement-age population in 2030, and the exogenous projections of per capita GDP and age structure of the population in 2030.[12] The average projected increase between 2013 and 2030 is only about 1.0 percentage points of GDP, although this still represents a 55% increase of the ratio on average. The biggest percentage point increases are seen in the PRC (3.9 pctg. pts.), Armenia (2.6 pctg. pts.), Azerbaijan (2.6 pctg. pts.), Georgia (2.2 pctg. pts.) and Mongolia (1.9 pctg. pts.). The share for the PRC is estimated to hit 6.1% of GDP, a bit lower than the IMF's estimate (6.7%) and further below that of Asher and Zen (8%) in Table 4. The estimates for Indonesia, Pakistan, the Philippines and Thailand are generally lower than those in Table 4 as well.

Georgia, Mongolia and Uzbekistan fall to 100%, while those for Azerbaijan and the Kyrgyz Republic, being significantly higher, fall to 125%.

[12] As mentioned in footnote 10, in order to reduce forecast error, the 2030 projection is calculated as the actual value for 2013 plus the difference between the fitted values for 2030 and 2013.

Figure 13: Public pension spending as % of GDP: 2013 actual and fitted and 2030 projections (Method 1)
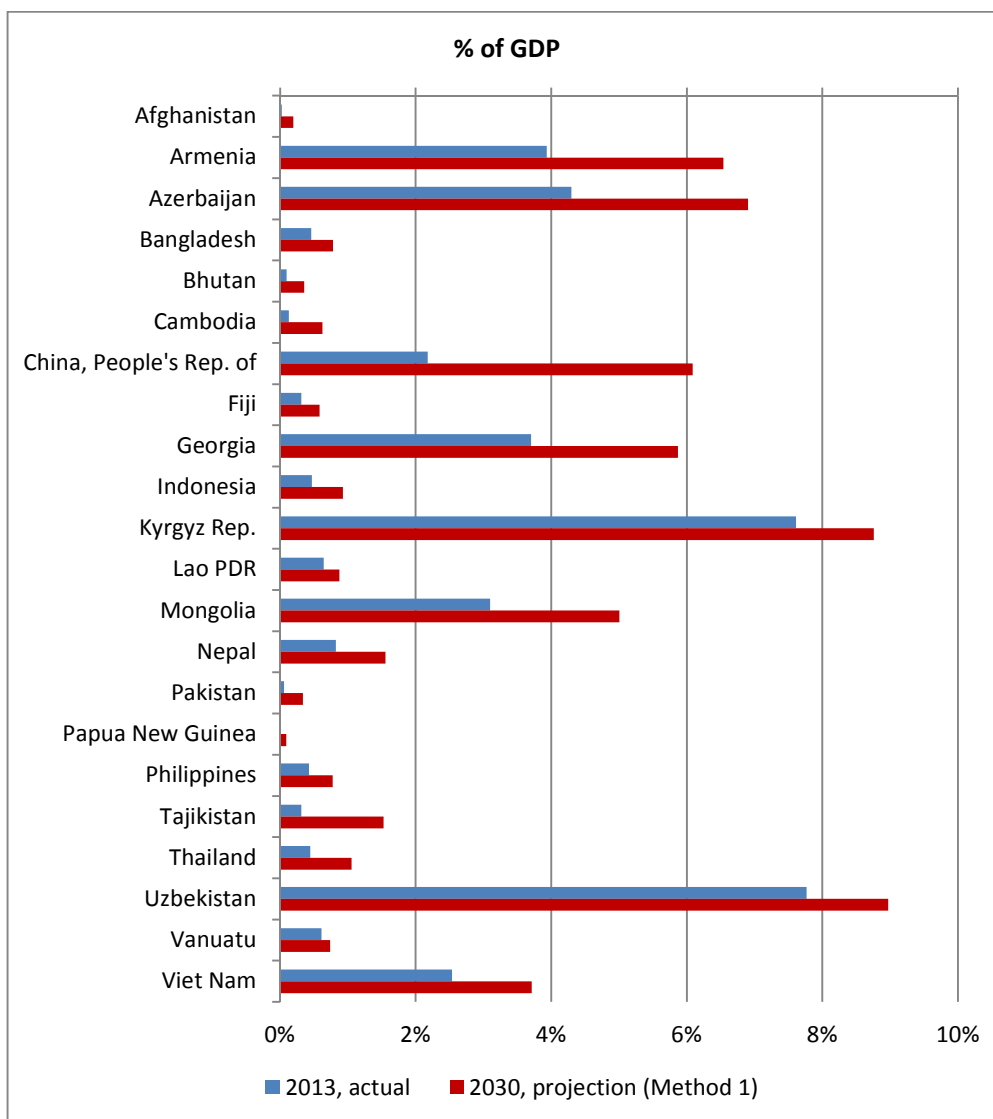
Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016)) and authors' estimates.

As described above, an alternative approach to projecting the share of public pension spending in GDP in 2030 (called Method 2) is to take the projections for average pension benefits and the coverage ratio developed above and use them, together with the exogenous values of the share of retirement-age persons in the total population and per capita GDP to calculate the share in GDP from equation (1). Figure 14 and Table 5 compare the estimates from Method 2 with those of Method 1. (The number of economies estimated by Method 2 is somewhat smaller, due to data availability.) Using Method 2, the average projected increase in the pension expenditure share in 2030 is substantially larger at 3.6 percentage points, with especially large percentage point increases in Armenia (7.5 pctg. pts.), Azerbaijan (5.7 pctg. pts.), Kyrgyz Republic (9.8 pctg. pts.), Mongolia (7.0 pctg. pts.), Uzbekistan (12.1 pctg. pts.) and Viet Nam (7.4 pctg. pts.). The two estimates for Afghanistan, Bhutan, Cambodia, the PRC, Fiji, Georgia, Indonesia, Nepal, Papua New Guinea, Tajikistan and Vanuatu are relatively close. The estimates for the former USSR countries Armenia, Azerbaijan, Kyrgyz Republic and Uzbekistan, plus Mongolia, are much higher than for Method 1, while those for Bangladesh and Viet Nam are also significantly higher.

Figure 14: Public pension spending as % of GDP: 2030 projections, Methods 1 and 2
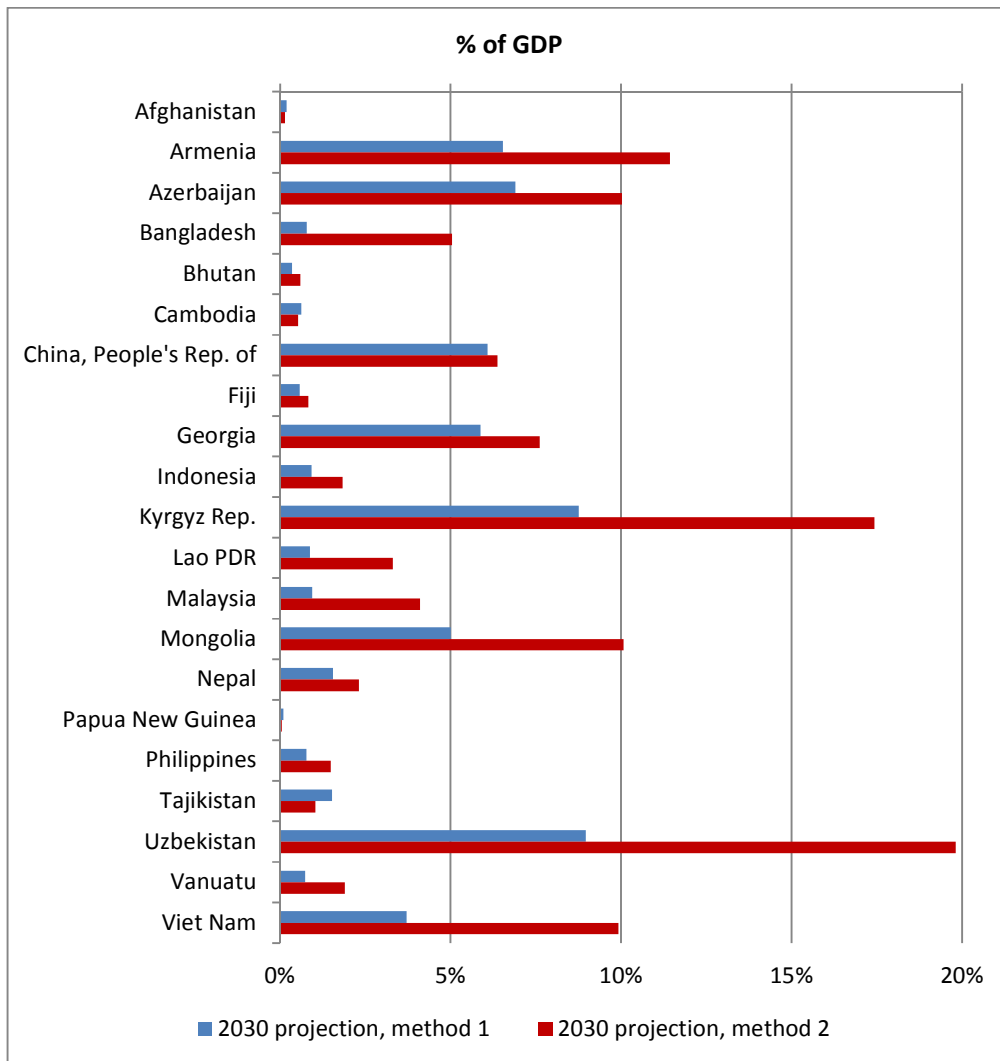
Source: Authors' estimates.

Table 5: Main factors determining projected public pension spending increases

					Pension benefits/GDP		
		2013-2030 projected % change				2013-2030 projected pctg. pt. change	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Beneficia ries/Re-tirement age pop'n.	Retire-ment-age pop'n./Working-age pop'n.	Retireme nt-age pop'n./Tot al pop'n.	Pension benefits/ GDP per capita	2013 actual, %	Method 1	Method 2
Afghanistan	95.3	178.4	23.2	126.9	0.0	0.2	0.1
Armenia	17.2	468.3	61.4	51.5	3.9	2.6	7.5
Azerbaijan	-18.2	346.1	97.6	45.0	4.3	2.6	5.7
Bangladesh	318.7	112.1	63.2	54.7	0.5	0.3	4.6
Bhutan	173.4	228.5	59.7	38.4	0.1	0.3	0.5
Cambodia	59.8	256.7	60.1	58.6	0.1	0.5	0.4
China, People's Rep. of	16.0	397.1	65.1	57.0	2.2	3.9	4.2
Fiji	38.2	264.1	61.4	14.1	0.3	0.3	0.5
Georgia	-3.6	169.5	45.3	47.2	3.7	2.2	3.9
India	115.3	338.9	45.5	N/A	0.0	0.8	N/A
Indonesia	64.8	236.6	68.9	39.8	0.5	0.5	1.4
Kyrgyz Rep.	-15.6	267.8	65.8	62.9	7.6	1.1	9.8
Lao PDR	140.1	199.7	41.1	54.2	0.6	0.2	2.7
Mongolia	-1.0	381.3	90.4	68.1	3.1	1.9	7.0
Nepal	33.2	256.5	44.3	51.8	0.8	0.7	1.5
Pakistan	733.3	177.3	31.1	N/A	0.1	0.3	N/A
Papua New Guinea	161.3	219.7	53.7	21.5	0.0	0.1	0.0
Philippines	74.5	236.5	63.1	28.6	0.4	0.4	1.1
Tajikistan	15.0	273.6	80.6	60.2	0.3	1.2	0.7
Thailand	524.7	298.7	82.8	N/A	0.4	0.6	N/A
Uzbekistan	-7.9	304.2	63.8	68.8	7.8	1.2	12.1
Vanuatu	80.4	211.9	46.4	16.8	0.6	0.1	1.3
Viet Nam	47.7	326.9	67.8	53.5	2.5	1.2	7.4
Unweighted average	115.8	267.4	60.1	51.0	1.7	1.0	3.6

Note: NA = not available. Lao PDR = Lao People's Democratic Republic. See section 3.2 for a description of Method 1 and Method 2.
Source: ADB Social Protection Index database (https://spi.adb.org/spidmz/) (accessed 10 October 2016), authors' estimates.

Table 5 also shows the projected percent changes between 2013 and 2030 of the four main factors affecting the projections of the share of public pension spending in GDP—the ratio of beneficiaries to the retirement-age population (column 1), the old-age dependency ratio (column 2), the ratio of the retirement-age population to the total population (column 3), and the ratio of pension benefits per beneficiary to per capita GDP (column 4). As explained above, the projections under Method 1 are mainly a function of the combined effects of (1) and (2)[13], while the projections using Method 2 are a function of the combined effects of (1), (3) and (4). For Method 1, the average increase in the old-age

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[13] The impact of the per capita GDP term is negligible.

dependency ratio (2) is more than twice as large as that of the ratio of beneficiaries to the retirement-age population (1), so is the dominant factor for most countries. For Method 2, on average the ratio of beneficiaries to the retirement-age population (1) is the most important factor, but there is much variation by country. The relative large forecast increases for the ex-USSR countries, Mongolia and Viet Nam result mainly reflect the combined effects of rapidly aging populations with relatively high growth of per capita GDP. On the whole, we believe that the estimates using Method 2 are probably more accurate, because they incorporate all three sources of potential costs increases—coverage ratio, population aging and economic growth.

These projected increases in public pension spending in many cases are substantial. This underlines the need for these economies to adopt clear strategies to raise revenues and control old-age related expenditures. Key policy recommendations to address these fiscal pressures are in Section 5 below.

5. Policy Options and Recommendations

As related earlier, public pension expenditures tend to rise with a country's income and average age. The inexorable movement toward more comprehensive – and more expensive – public pension programs has been reinforced by recent international declarations in support of expanded health and social protection coverage[14]. In this context, emerging Asian economies will need to strengthen rule-enforced fiscal discipline to maintain fiscal sustainability.[15] Yet it is important to note that richer countries have shown that greater social protection spending can be accommodated in the public budget if countries consider fiscal sustainability in shaping their social protection systems. This section describes policy recommendations that will help enable countries to expand social protection in a fiscally responsible way.

5.1 Affordability of Public Pensions

We believe that the cost of providing a basic level of social protection is feasible even for poor countries. Hagemejer and Behrendt (2009:89) argue that a basic "social protection benefit package is within a reach of even poorest countries while making it affordable requires political will followed by rationalization of current spending programs, reallocations of domestic resources and donor aid, as well as policies and measures creating new fiscal space."

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[14] In particular, the ILO Recommendation on the Social Protection Floors, No. 202, June 2012, and the United Nations General Assembly Resolution on Universal Health Coverage, December 2012.

[15] Adams, Ferrarini and Park (2010) also argue that Asian economies should adopt strong fiscal policy frameworks, and resist, to the extent possible, the temptation to shift toward a more activist philosophy for fiscal policy interventions than previously.

Hagemejer and Behrendt (2009:97) estimate that a the cost of a basic old-age pension package that would meet the most basic needs of the population would cost the following amounts as percent of GDP in the following selected Asian economies: Bangladesh (0.8%), India (0.6%), Nepal (1.3%), Pakistan (0.6%) and Viet Nam (0.8%). Even if a basic public old-age pension package cannot be implemented at once, a sequential approach can generate immediate benefits in terms of poverty reduction, pro-poor growth and social development" (Hagemejer and Behrendt 2009:102).

5.2 What Governments Can Do to Ensure Fiscal Sustainability of Public Pension Spending

There are many things that governments can do to promote inclusive growth (which is underpinned by social protection), while at the same time maintaining fiscal soundness. In particular, governments can increase spending in the social sectors and on social assistance, increase property taxes, and improve the collection of VAT and personal income tax (ADB 2014). For example, tax revenue in the PRC represents just 22 percent of GDP, compared to 34 percent in OECD member countries. The country could boost such revenue by broadening the tax base, introducing new fiscal measures, and improving tax compliance and enforcement (Nakao 2014).

Reduce costs of social insurance programs

Despite the general need to expand the scope of social protection coverage, benefits and premiums may need to be adjusted to maintain sustainability in the face of aging populations. Economies facing sharp increases in aging and social protection expenditures need to take a number of steps, including:

- Introducing obligatory premium payments on pension insurance and increasing premiums;
- Implementing means testing for pension benefits;
- Taxing benefits (if this is not done already);
- Shifting from defined benefit plans to defined contribution plans for pension systems;
- Adjusting the replacement ratio and raising the retirement age; and

Improve efficiency of social protection administration and expenditures

Every developing Asian country can carry out an audit of its social protection programs, which across the region tend to be highly fragmented (adding to inefficiencies and greater costs). For example, Alam (2013:3) notes that "Bangladesh has about 95 social protection schemes, which are fragmented across various sectors, geographical areas and ministers, as well as having overlapping objectives and beneficiaries."

Use technology to improve overall efficiency of social insurance and general tax collection

Technology can also be leveraged to enhance the efficiency of social insurance administration and tax collection in Asia. "ICT improves every aspect of tax administration: taxpayer services, tax audit, tax collection, and other internal management processes. ICT benefits tax administration by improving the performance of tax administration bodies, reducing tax administration costs, reducing taxpayers' compliance costs, and enhancing interaction between taxpayers and tax administration bodies. These four benefits are interrelated. From the perspective of tax administration bodies, a well-established ICT system supported by good ICT-based media expedites the collection of information from taxpayers and other government institutions. Once within the tax administration body, the collected information can be used efficiently for the various tax administration functions such as taxpayer management, audit, and arrears collection. Electronic tax filing systems are the most visible of ICT-based taxpayer services." (ADB 2014:82).

Establishment of fiscal rules

A number of Asian economies have established fiscal rules as a tool to maintain fiscal discipline. The nature of these rules is summarized in Table 6. It is not always easy for countries to follow their rules, however. Of the four countries in Table 6, only Hong Kong, China has generally been successful in keeping to the rules, reflecting its generally strong fiscal conditions and low levels of expenditures. An important aspect of fiscal management is the coordination of borrowing between national and subnational levels within an overall framework. This is particularly relevant for infrastructure projects, as is discussed in Liu and Padrelli (2012), for example.

Table 6: Elements of fiscal rules in Asia

Economy	Expendi-ture rule	Budget balance rule	Debt rule	Key elements of fiscal rules
Hong Kong, China		Yes		The budget should always display an operating surplus, i.e. an excess recurrent revenue over recurrent expenditure.
India		Yes*		Originally the target was to reduce the fiscal deficit to 3 percent of GDP by 2008. The escape clause in the fiscal rule law (FRBMA) allows the government not to comply with the targets in exceptional circumstances "as the central government may specify."
Indonesia		Yes	Yes	DR (since 2004): Total central and local government debt should not exceed 60 percent of GDP. BBR: The consolidated national and local government budget deficit is limited to 3 percent of GDP in any given year.
Japan	Yes	Yes		ER: The Fiscal Management Strategy in effect since 22 June 2010, introduced a Medium-term Fiscal Framework, including an "Overall Expenditure Limit" (the amount of the General Account Expenditure, excluding debt repayment and interest payment, should not exceed that of the previous fiscal year). BBR: The Fiscal Management Strategy introduced in 2010 (with effect of 2011) a pay-as-you go rule, which implies that any measure that involves increases in expenditure or decreases in revenue need to be compensated by permanent reductions in expenditures or permanent revenue-raising measures.

Note: *Implemented by Indian Government until 2008.
Source: Budina, Kinda, Schaechter and Weber (2012).

Debt management office

Indonesia and Thailand have also established debt management offices to increase the efficiency of their fund raising activities. The objectives of these offices are summarized in Table 7, and can be seen primarily as ways to reduce the cost of government debt. However, they have only been established recently, and it is unclear to what extent they can actually contribute to lowering the amount of government debt.

Table 7: Role of debt management offices in emerging Asia

Country	Objectives
Indonesia	**1.** Manage government debt portfolio in an effective, transparent and accountable manner **2.** Control debt issuance and procurement by maintain a borrowing capacity that supports fiscal sustainability **3.** Establish development financing independence by prioritizing domestic financing sources and developing an efficient and stable domestic market **4.** Promote international cooperation in obtaining alternative financing sources as well as supporting regional financial market stability
Thailand	**1.** Manage public debt to achieve low costs subject to acceptable risks **2.** Develop the domestic bond market to be one of the three main pillars of the financial market **3.** Evaluate and mobilize feasible funds to finance government's infrastructure products **4.** Modernize technology to support PDMO's operations

Sources: Ministry of Finance of the Republic of Indonesia. The presentation of Mr. Widjanarko
Director, Directorate General of Debt Management on 8th UNCTAD Debt Management Conference
Geneva, 14 - 16 November 2011 and Public Debt Management Office of Thailand, available at: http://www.pdmo.go.th/en/about.php?m=about

Strengthening of fiscal surveillance can also contribute to fiscal sustainability. At the national level, this can be done by the finance ministry, central bank and financial supervisors. At the regional level, the ASEAN+3 Macroeconomic Research Office (AMRO) can also play a role. Development of regional guidelines for sustainability conditions could contribute to increasing pressure on governments to maintain responsible fiscal policies.

5.3 Some Examples of Social Protection Reform and Expansion

In the mid-1990s, Kazakhstan reformed its pension system, jettisoning the USSR-era pay-as-you-go system of defined benefits, and adopting a fully-funded, defined-contribution system. Beginning in January 2014, Kazakhstan began raising women's retirement age from 58 to 63 over 10 years (the retirement age for men is currently higher). Beginning in 2012, Armenia also shifted to a fully-funded pension system. It should be noted that the tension between 'sustainability' and 'adequacy' of pensions that plays out in many countries, is also doing so in former Soviet republics. As noted by Vlachantoni and Falkingham (2013), for individuals qualifying for a contributory pension in Armenia, Kazakhstan, the Kyrgyz Republic and Tajikistan, the average level of benefits is just above the subsistence minimum. For those on a social pension (i.e., a social assistance grant made to elderly persons), benefits are insufficient to lift them above the minimum.

Kim and Hendricks (ADB 2008:1) note that "…As part of an effort to control escalating civil service pension costs, the Government of India closed its defined benefit scheme (DBS) for pensions to new entrants on 1 January 2014. Civil employees hired on that day or after were and will be employed in a defined contribution scheme, the New Pension Scheme (NPS). Under this new scheme, the government and the civil servant each contribute 10% of the employee's basic pay to a retirement fund, which is invested. At retirement, the balance of the employee's retirement account, consisting of 20% of wages and all interest that accrued during the employee's civil service career, is available to support the employee. The Government has encouraged states to follow its lead by closing their traditional DBSs to new entrants and by adopting defined contribution schemes like the NPS."

6. Conclusions

With the exception of most former republics of the USSR, public pension costs emerging Asian economies are generally low, less than 2.5% of GDP, and, in many cases, less than 1% of GDP. This reflects a combination of low coverage ratios for pension eligibility and relatively young populations. However, this picture is likely to change for a number of reasons. Most importantly, some economies, notably the Asian NIEs and (somewhat later) the PRC and Thailand, have rapidly aging populations. Moreover, as incomes rise, pressures are likely to build to extend pension benefits to a broader segment of the retirement-age population. However, there are few estimates of the likely development of public pension spending in these economies.

In order to gauge the likely impacts of such shifts in income and demographics on public pension spending, we estimated models of: (i) the ratio of public pension expenditures to GDP; (ii) the level of average pension benefits per beneficiary; and (iii) the share of the retirement-age population eligible to receive pension benefits. The ratio of the number of pension beneficiaries to the working-age population was found to be a significant determinant of the share of public pension spending in GDP, while pension benefits per beneficiary were found to rise faster than per capita GDP, and the coverage ratio for pension eligibility tends to rise with income. These all point to upward pressure on pension spending as economies age and incomes rise.

We then used these models to project in 2030 the level of average pension benefits per beneficiary, the share of the retirement-age population eligible to receive pension benefits, and the share of public pension expenditures in GDP. For the latter, we used two different projection methodologies. Using Method 1 based on equation (2), for the the average projected increase in public pension spending between 2013 and 2030 for 23 economies is 1.0 percentage points of GDP. The biggest percentage point increases are seen in the PRC (3.9 pctg. pts.), Armenia (2.6 pctg. pts.), Azerbaijan (2.6 pctg. pts.), Georgia (2.2 pctg. pts.) and Mongolia (1.9 pctg. pts.). The share for the PRC is estimated to hit 6.1%

of GDP, somewhat lower than earlier published estimates, but still almost three times the 2013 level.

Using the Method 2 on 20 economies, the average projected increase in the pension expenditure share is significantly larger at 3.6 percentage points, with especially large percentage point increases in Armenia (7.5 pctg. pts.), Azerbaijan (5.7 pctg. pts.), Kyrgyz Republic (9.8 pctg. pts.), Mongolia (7.0 pctg. pts.), Uzbekistan (12.1 pctg. pts.) and Viet Nam (7.4 pctg. pts.)). On the whole, we believe that the estimates using Method 2 are probably more accurate, because they incorporate all three sources of potential costs increases—coverage ratio, population aging and economic growth. These results imply that the economies facing population aging will have to make substantial efforts to secure greater fiscal resources and increase the efficiency of their programs to fund these increasing demands.

To be sure, these estimates are still very crude. They do not attempt to distinguish between different kinds of public pension programs—only overall average expenditures and coverage. The accuracy of regression estimates is limited due to the scarce number of observations. Greater availability of data would allow greater refinement of the analysis.

We believe that countries have the capacity to overcome these challenges and provide adequate public pension coverage for their populations. Risks to medium-term fiscal sustainability can be reduced by timely adoption of various measures, including those directed specifically at social insurance programs and those more generally aimed at improving fiscal management. However, it is important to start strengthening social protection systems early to prepare for aging of populations in the region.

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Appendix: Public Pension Systems of Asian Economies

Country	Type of program	Pension contribution	Pension age	Coverage/Notes
Armenia	Social insurance, mandatory individual account, and social assistance system; defined benefit.	Employed: 3% of net monthly earnings for social insurance; 5% of monthly earnings for mandatory individual account; For self-employed: 15% of annual income up to 1,200,000 drams and 5% of income greater than 1,200,000 drams for social income; 5% of monthly earnings for mandatory individual account;	Old age pension: Age 63 with at least 25 years of covered employment; Old age benefit: 63 years old; Old-age social pension: 65 years old with less than five years of covered employment.	Employed and self-employed persons; Social insurance, mandatory individual account (voluntary for those born before 1974), and social assistance system
Azerbaijan	Social insurance, , and social assistance system: defined contribution (since 1 Jan 2006)	3% of gross earnings for employed; 20% of the national monthly minimum wage (but 50% if working in a trade or construction)	63 years old for men and age 59.5 years old for women (rising to 60 by 2016) with 12 years of covered employment.	All workers residing in Azerbaijan, including self-employed persons, members of collective farms, landowners, and foreign citizens.
Bangladesh	Social assistance system: defined benefit	None (it is a social assistance system)	Age 65 (men) or age 62 (women) with monthly income below to 3,000 taka but only one member from each family can receive the pension.	Low-income citizens residing in Bangladesh

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China, People's Republic of	Social insurance, mandatory individual account, and social assistance : defined contribution	8% of wages	60 years old for men and 55 years old for women	Mostly urban workers; Two-tier pension system: basic pension and a mandatory employee contribution
Fiji	Provident fund and social assistance system: defined contribution	Employed. 8% of total wages; For self-employed: An annual contribution of 30% of earnings;	55 years old (50 if unemployed for the last three years with an account balance of up to F$2,000); 70 years old and not receiving any other pension will receive old-age social pension.	Employed workers who reside in Fiji; Voluntary for self-employed persons, household workers, students, some foreign workers employed in Fiji, and informal-sector workers.
Georgia	Social assistance system: defined benefit	None (it is a social assistance system)	Age 65 (men) or age 60 (women).	Sources of fund: Central Government; Local Governments provide additional benefits
Hong Kong, SAR	Universal allowances, mandatory occupational benefit (privately run), and social assistance system: defined contribution	At least 5% of monthly earnings (additional voluntary contribution is allowed); and monthly or yearly income (for self-employed)	Age 60 if ceasing employment permanently.	Employees under contract for 60 days or more (except no limit in some industries); self-employed persons; Not covered: self-employed hawkers; household workers; persons covered by statutory pension plans or provident funds and some other cases

India	Provident fund, social insurance, employer-liability, and social assistance system: both defined benefit and defined contribution	10% of monthly salary for civil servants; 12%7 of his monthly PF Salary to Employees Provident Fund Scheme	58 years old with minimum of 10 years of contribution; 60 years for for civil servants and 62 years for government teachers/	Two systems: civil service defined benefit pension schemes for civil servants; earnings-related employee pension scheme and defined contribution employee provident fund and other employer managed funds (for other workers)
Indonesia	Provident fund and social insurance system: defined contribution	Employees contribute 2% of earnings and employers pay 3.7% of the payroll.	55 years old for both men and women	Employees in private sectors are covered by defined contribution plan.
Japan	Social insurance system: Defined benefit	From 8.737% to 9.150% of monthly earnings; 15,250 yen a month (up to 16,900 yen a month from Sept 2017) for self-employed people	- National pension program: Age 65 with at least 25 years of contributions; - Employees' pension insurance: Age 60 (age 65 by 2025 (men) and 2030 (women)) or age 59 (seamen and miners) with at least 25 years of coverage.	- For national pension program: Residents aged 20 to 59; voluntary coverage for residents aged 60 to 64 and for Japanese citizens residing abroad (aged 20 to 64; to age 69 in special cases). Self-employed persons who run an unincorporated business with up to four workers; - For employees' pension insurance: Employees younger than age 70 in

				covered firms in industry and commerce. - Special system for civil servants.
Kazakhstan	Mandatory individual account, social insurance, and social assistance system: defined contribution	10% of monthly earnings.	63 years old for men and 58 for women (rising to 63 by 2017); Age 55 (men and women) if the account balance is sufficient to finance a benefit at least equal to the minimum monthly pension	- Employed and self-employed residents of Kazakhstan.
Korea, Republic of	Social insurance and social assistance system: defined benefit	4.5% of gross monthly earnings; For voluntarily contributors: 9% of previous year median monthly income; for self-employed: 9% of gross monthly earnings	Age 61 (gradually rising to age 65 by 2034) with 20 years of coverage.	Employed and self-employed persons (incl. farmers and fisherman.) Voluntary coverage for employed and self-employed persons aged 60 to 64. Special systems for civil servants, and some types of workers); Basic old-age pension for citizens and foreigners married to citizens;
Kyrgyzstan	Social insurance, mandatory individual account, and social assistance	8% of earnings (social insurance and NDC) and 2% (mandatory	63 years old with 25 years of contribution (for men) and 58 years old with	All employed persons and members of cooperatives and state and

	system: defined contribution	individual account). For self-employed: 9.25% of monthly average earnings.	20 years of contributions.	collective farms. Special system for military personnel.
Laos	Social insurance system: defined contribution	2.5% of gross monthly insurable earnings (5% for self-employed workers)	60 years old for men and 55 years old for women with 15 years of contributions.	Civil servants, employees (including private firms) and police and military personnel; self-employed workers (voluntary)
Malaysia	Provident fund, social insurance, and social assistance system: defined contribution	Employee: 11% of monthly earnings; Employees can make voluntary additional contributions	55 years old for both men and women	Private sector employees and non-pensionable public sector employees
Micronesia	Social insurance system: defined benefit	7.5% of earnings (by January 2013). For some types of self-employed: 5% of annual gross revenue in the previous year	65 years (with at least one quarter of coverage for each year since age 21 up to age 60 and a total of at least 50 quarters of contributions and US$2,500 in contributions.)	All employed persons, including certain self-employed persons (except those work less than one week/month, some types of self-employed persons, and family labor). Special systems for some types of civil servants.
Nepal	Provident fund and social assistance system: defined contribution	10% of monthly earnings	Age 58 or upon termination of employment.	For provident fund: Government employees; Voluntary coverage for employees in firms with 10 or more employees; Not covered self-employed persons,

				temporary workers, part-time workers, and household workers.
Pakistan	Social insurance system: defined benefit	5% of the minimum wage	60 years old for both men and women	Workers in firms with 5 or more employees required to be insured under employees' old-age benefit scheme
Papua New Guinea	Mandatory occupational retirement system: defined contribution	6% of gross monthly earnings; At least 20 kina a month for self-employed (US$1.00 = 2.43 kina)	Age 55 and retired from active employment; at any age if unemployed and not contributing for three months (partial withdrawal) or 12 months (full withdrawal).	Mandatory for employed persons in firms with 15 or more employees (except for temporary workers and household workers); Voluntary coverage for noncitizens, self-employed persons, and employed persons in firms with fewer than 15 employees
Philippines	Social insurance system: defined benefit	3.33% of monthly gross insured earnings	60 years old if having at least 120 months of contribution	Employees up to age 60 earning more than 1,000 pesos a month covered by covered by the basic, earnings-related and minimum pensions; special systems for government employees and military personnel
Singapore	Provident fund system: defined contribution	20% for workers aged up to 50; progressively reduced to 5%	55 years old for withdrawal in lump sum and 62 years old for	All workers including most civil servants

		for workers aged more than 65.	phased withdrawal.	
Sri Lanka	Provident fund system: defined contribution	8% of wage	55 years old for men or 50 years old for women; 60 years old for government officers	Employees in the formal private sector; Civil servants covered by contributory pension scheme.
Taipei,China	Social insurance, mandatory individual account, and social assistance system: defined benefit	National pension program: 4.5% of the monthly insured amount; Labor insurance program: 1.7% of gross monthly earnings (gradually rising to 2.4% by 2027) for employed and 5.1% of gross monthly income (gradually rising to 7.2% by 2027) for self-employed; Labor pension fund : Voluntary contribution of up to 6% of monthly earnings;	National pension program: 65 years old and registered in the program. Labor insurance program: 60 years old (and 65 years old by 2026) with at least 15 years of coverage. Labor pension fund: 60 years old with at least 15 years of contributions.	National pension program: Citizens of Taipei,China aged 25 to 65 not covered by any other public pension system; Labor insurance program: Mandatory for employees in firms with at least five employees (including some wage earners in public-utility firms), fishermen, and some types of self-employed persons. Special systems for civil servants, farmers, public sector employees, and private-school employees. Labor pension fund: Employed citizens of Taipei,China, and employed spouses under the Labor Standards Act;

Tajikistan	Social insurance, notional defined contribution, mandatory individual account, and social assistance system.: defined benefit	- Employed do not have to pay social insurance while the self-employed pays 20% of declared income; for mandatory individual account: 1% of earnings	For men: 63 years old with at least 25 years of covered employment; For women: 58 years old with at least 20 years of contribution	- For social insurance and defined contribution: all employed and self-employed persons. - For Mandatory individual account: All employed persons and not covered self-employed persons.
Thailand	Social insurance and social assistance system: defined benefit	20% of earnings for the first 15 years and then 1.5% for every year thereafter	55 years old	Private sector employees in the formal sectors; monthly payment if contribution period is at least 15 years
Uzbekistan	Mandatory individual account, social insurance, and social assistance system: defined contribution	- Employed: 1% of earnings for mandatory individual account; 5.5% of wages for social insurance; - Self-employed: 1% of declared earnings for mandatory individual account; A monthly contribution of at least the value of the monthly minimum wage;	60 years old for men and 55 years old for women	Employed residents of Uzbekistan. Voluntary coverage for self-employed persons and certain other categories of workers.
Vanuatu	Provident fund system: defined contribution	At least 4% of monthly earnings (additional voluntary contributions are possible). Voluntarily insured persons	55 years old for both men and women	All employees in regular employment (including those working abroad for firms registered in Vanuatu.)

		and self-employed pay 1,000 vatu to 10,000 vatu a month (US$1.00 = 95.01 vatu)		
Vietnam	Social insurance and social assistance system: defined benefit	8% of monthly salary/wage	Pension age is 60 for men and 55 for women;	Monthly payment for those with at least 20 years of contribution and lump-sum payment for those with lower period of contribution

Source: OECD (2013), SSA and ISSA (2015)