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**Conference Paper**

## Pension programs around the world: determinants of social pension

Beiträge zur Jahrestagung des Vereins für Socialpolitik 2015: Ökonomische Entwicklung - Theorie und Politik - Session: Social Policy, No. G14-V1

**Provided in Cooperation with:**

Verein für Socialpolitik / German Economic Association

*Suggested Citation:* Rudolph, Alexandra; Priebe, Jan (2015) : Pension programs around the world: determinants of social pension, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2015: Ökonomische Entwicklung - Theorie und Politik - Session: Social Policy, No. G14-V1, ZBW - Deutsche Zentralbibliothek für Wirtschaftswissenschaften, Leibniz-Informationszentrum Wirtschaft

This Version is available at:

<https://hdl.handle.net/10419/112986>

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# Pension programs around the world: determinants of social pension

## **Abstract**

Old age poverty is to become one of the most pressing issues in the coming decades given the demographic trends forecasted. This paper investigates the main instrument to fight old age poverty: Social, non-contributory pension systems. A new comprehensive data set on 172 countries over the 2001-2013 period on the provision of social pension across the world allows us to investigate recent trends in social pension implementation and test internal and external political economy drivers of the process. By using a first order Markov transition model to account for the state dependence inherent in public pension provision, we find that demand factors such as demographic trends drives the decision to reform internally. External actors can support the continuance of social pension especially in developing countries. Thus, international influence seems to be effective in enhancing the instruments to fight old-age poverty.

*Keywords: Public pension, demographic change, old age poverty, political economy, panel data*

*JEL Classification: H55, J14, I38*

## **I. Introduction**

Population growth, decreasing fertility rates and improvements in life expectancy in many countries around the world have contributed to a substantial rise in the world's elderly population. In line with this general trend, the total size of the global population above 60 years is expected to increase further and reach 2 billion by 2050 (UN, 2014).

Given the past and expected future increase in the elderly population, many countries in the world have introduced reforms in their pension systems with the double goal of mitigating old age poverty and to ensure the financial viability of the system. Despite reforms, until today the majority of the elderly in the world, especially in developing countries, is either not or only insufficiently covered by a pension scheme ((ILO 2014).<sup>1</sup>

These low coverage rates and frequently insufficient pension benefits in developing countries have been attributed by many scholars and pension experts to the specific nature of contributory retirement schemes ((Willmore 2007; Holzmann 2012). Contribution-based pension systems, which link pension eligibility and benefits to previous contributions or work history, failed to achieve the desired outcomes in several cases. This is particularly relevant in developing countries in which workers who participate in contribution-based pension schemes are usually from the upper half of the wealth distribution. They are predominantly from urban areas with a secure career within the public sector while large parts of the population are left without effective pension coverage (Palacios & Sluchynsky 2006; Willmore 2007).

The reliance on contributory pension systems alone has therefore been seriously questioned. As a consequence, several countries have introduced so called 'social pensions' (non-contributory fund), which provide cash transfers for the elderly with little or no link to previous contribution or work history. In the context of the larger debate over pension reform, some argue that these social pensions are an effective way to deal with the low coverage of contributory schemes and alleviate poverty among the elderly (Willmore 2007; WB 2009; ILO 2014; UNDP 2014).

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<sup>1</sup> For an overview and discussion on causes and measurement of old age poverty especially in developing countries see Barrientos et al. (2003)

Interestingly, despite the growing interest in and importance of social pensions around the world, little is known about the number of countries that have adopted social pensions and the related geographical distribution and trends over time. In fact, the academic and policy literature in these fields have been entirely based on OECD countries (Gruber and Wise, 1997, 2002, 2005; Gruber et al., 2009; OECD, 2013) or focused on individual country case studies (Holzmann and Hinz, 2005; Willmore, 2007; Whitehouse et al., 2009; WB, 2009; Chomik and Whitehouse, 2010; Pallares-Miralles et al., 2012; Kaushal, 2014). While these are important contributions, the existing studies fail to provide a comprehensive overview of the extent of social pensions across a larger number or more heterogeneous countries and on the developing world.

This article's principle objective is to fill this gap in the literature illustrating the trends on the development of social pension systems. Furthermore, we provide a systematic analysis of the cross-country determinants of adopting and implementing social pensions by using a new data set on social pension adoption from the 'Social Security Programs Throughout the World' (SSPTW) publications. The analysis covers 172 countries in two year periods over the 2001 – 2012 period. Thus we are the first to look at an extensive sample of countries including developed and developing countries. We use a first order Markov transition model to identify robust determinants for the initial reform process and the persistence of social pension separately. We separate between internal and external reform drivers. This allow us to analyze the nature of internal reform drivers and to link to the literature on the role between reception of foreign aid and recipient countries' social policies (Dreher, Gehring and Klasen, forthcoming). Budget financed programs such as social pensions are occasionally supported by development aid (Bloom and Mc Kinnon, 2013).

First results suggest that in the full country sample demographic factors are decisive for the persistence of social pension systems. This suggests that demand is the main driver internally whereas economic and political system and costs do matter to a lesser extent. External factors such as trade relations and development assistance are rather found to hinder reform processes especially in developing countries. We find on the contrary that for the reform of social pension cost considerations are major drivers. In this context the political sys-

tem seems to be an important component. Looking only at developing countries it seems to be the case that donors are able to support the initiation of social pension reform.

The paper is structured as follows. Section II introduces the comprehensive data on social pensions, provides a consistent classification of social pension schemes and shows the international distribution. In section III we summarize theoretical considerations and derive testable hypotheses. Section IV outlines the empirical identification strategy. In section V, we discuss the results and robustness tests and in section VI we conclude.

## **II. Social pension around the world**

The diversity in design and shaping of pension programs in general and social pension in particular make a comparison across countries difficult. The 'Social Security Programs Throughout the World' data provides a comprehensive coding of pension programs around the world which allows us to describe worldwide trends over time in the provision of social pension in recent years. We begin with a detailed explanation of the data set and a characterization of social pension systems. Finally, the data is used to describe the global distribution and recent trends in national provision of social pensions.

### **2.1 Social Pension Data**

The ongoing debate on pension reform and the development of sustainable retirement systems has increased the need for comprehensive data on pension programs worldwide. Initiatives by HelpAge International, the World Bank (WB) and other institutions such as the International Labor Organization (ILO), the UN population division or the European Commission try to measure the extent, coverage and distribution of retirement programs globally.<sup>2</sup> Although important in itself to collect as much data as possible to be able to establish best practice models, most of the information available from these sources is rather fragmented in its scope of countries or availability of information over time. To the best of our knowledge, the only database that has continuously collected data since 2001 is the 'Social Security Programs Throughout the World' (SSPTW) dataset compiled by the Social Security Association (SSA) and the International Social Security Association (ISSA). Little known, the

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<sup>2</sup> For an overview see HelpAge International (2014): Pension Watch: Social Protection in older age; available at: <http://www.pension-watch.net/pensions/about-social-pensions/about-social-pensions/social-pensions-database/> (accessed: 10.12.2014).

SSPTW data is of high quality and has been used in pension related academic (Bloom et al., 2007) and policy (ILO, 2014) publications. In total, the data set facilitates comprehensive data on social security programs for 179 countries and is issued in four regional reports over a two-year period since 2002.<sup>3</sup>

The reports provide country narratives covering all kinds of statutory social security programs that are intended to "insure individuals against interruption or loss of earnings power and certain special expenditures arising from marriage, birth, or death." (see, e.g., SSPTW: Africa, 2013, p. 1). Information is clustered into three aspects: employment-related, universal and means-tested systems. The first two provide the individual by right with benefits in case of shock (i.e., injury, death) and the third system bases the benefits formula on personal income or resources.

We use these reports and extract information on types of mandatory systems for retirement that are an integral part of national social security schemes. This dataset has several advantages. First, it uses a consistent classification of pension programs worldwide, guaranteeing comparability across countries. Second, it is available for a wide range of countries both developing and developed countries, which broadens the scope of data. And finally, the standardized format is available for the last decade, allowing the analysis over time. This is the only dataset that allows an analysis of the development of implementation and distribution of mandatory pension programs over time.

## **2.2 Classification of social pension**

Since a diverse range of national systems exist in the provision of old age cash transfers worldwide, a classification of social pensions is needed to enable a systematic analysis. The study focuses on social pensions or non-contributory pension systems that are used by governments to ensure against old age poverty. In our analysis we largely follow the World Bank's multi-pillar approach implemented in early 2000 (Holzman and Hinz, 2005).<sup>4</sup>

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<sup>3</sup> Online: <http://www.ssa.gov/policy/docs/progdesc/ssptw/> (accessed: 02.09.2014). Regional reports are available for Europe, Asia and Pacific, Africa and The Americas. Before 2000 these reports are compiled in single versions following a different structuring and are not publicly available.

<sup>4</sup> When the World Bank initially introduced their multi-pillar classification (WB, 1994), it consisted of 3 pillars. Pillar 1 referred to a basic pension which represented an anti-poverty pillar that guarantees a minimum income at old age irrespective of a person's earning history. Pillar 2 included a system of mandatory contributions to an

Diversity in pension schemes and social security programs fighting old age poverty made a pointed approach towards pensions necessary. The World Bank therefore expanded the three-pillar system to a five-pillar system (Holzmann and Hinz, 2005). Therein a new pillar, Pillar 0, was introduced and defined as "a non-contributory pillar (in form of a demogrant or social pension) that provides a minimal level of protection" (ibid, p. 1)<sup>5</sup>. The basic characteristic of social pension is that it is financed from general government revenue and is distributed to the elderly on a means-tested or universal basis. The original Pillar 2 was split into a new Pillar 1 (public earnings-related pension) and a new Pillar 2 (private earnings-related pension), with Pillar 3 referring to voluntary contributions to occupational or private pension plans and Pillar 4 including a variety of non-pension retirement savings.<sup>6</sup>

The SSPTW reports do not singularly categorize a zero pillar or 'social pension'; therefore we use the classification of components of social pensions provided by Willmore (2012). This allows us to identify whether or not a country has some kind of social pension scheme anchored in national legislation. The author classifies four different systems to be part of social pension programs: universal pensions, universal minimum pensions, recoverable social pensions and social assistance pensions. Universal pensions are provided to all residents independent of earnings and only dependent on the residency and age of recipients. Universal minimum pensions are minimum funds transferred by governments in order to guarantee a minimum income in old age in general. They are also based only on residence and age. Both are solely funded by the government and are transferred to all elderly residents independent of income.<sup>7</sup> The third component, recoverable social pensions, are universally distributed dependent on years of service or residency, but financed through the tax system (payroll taxes) and thus recoverable by tax authorities. Lastly, some social assistance pensions require applicants to pass a means-test guaranteeing a non-contributory pension for poor people with no personal wealth or family support (means-tested pension).

The advantage of this classification is first, that we use the same approach as the World Bank following their notion of anti-old age poverty reduction, and second, that we are able to take

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earnings-related scheme while Pillar 3 referred to a voluntary savings system available to anyone who wishes to supplement his/her retirement income by the first two pillars.

<sup>5</sup> Demogrant funds are universal flat rate funds based on other characteristics than contributions, i.e. age.

<sup>6</sup> See Willmore (2007) for a more detailed discussion on the respective pension pillars.

<sup>7</sup> E.g., in Bolivia "Renta Dignita" is financed by the government through taxes on hydro-carbons and dividends from public enterprises.

into account the diversity of social pension programs. This allows us to systematically investigate the determinants of social pensions and to look at the parameters of specific award programs of cash transfers. In the following, we describe the main facts and trends in social pension provision of the last decade and establish stylized facts.

## **2.3 International trends and distribution**

Over a twelve year period, the SSPTW reports cover 179 countries and territories. In total, we include 169 countries in the analysis; seven countries are excluded because they have only been reported once, and for three territories there are no data available.<sup>8</sup> Within this sample, overall 89 countries had a social pension at some point during the period observed. In 67 countries, social pensions were introduced prior to the start of the study period. In nineteen countries non-contributory cash transfer schemes are newly established while four countries abandon their social pension schemes.<sup>9</sup> This observed increase is in line with the observation of the World Social Protection Report on pension development, which states that there has been a recent increase in the provision of non-contributory pensions globally (ILO, 2014). Table 1 one visualizes this trend. The table compares the first and the last period of the sample of contribution-based pension (earnings-related and provident fund) and publicly financed pension (social pension).<sup>10</sup>

Earnings-related pensions are old age retirement systems based on the work-history of the individual. Thus, it only covers the formal working population and is generally financed through contributions from employees and/or employers. In around 70 percent of countries, workers have the possibility to refer to a contributory pension system in old age, which accounts for 134 and 135 countries in 2001 and 2012 respectively. This shows that the provision of contribution-based pensions has stagnated in the last decade (ILO 2014). The availability of an employment-related pension is generally very high in Europe and Central Asia (ECA), Latin America and Caribbean (LAC), the Middle East and North Africa (MENA) and Sub-

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<sup>8</sup> These are: Afghanistan and Iraq with only one observation in the first period and Djibouti, Lesotho, Namibia, Qatar and Tajikistan which have been newly added in the last report while Guernsey, Jersey and Taiwan report data on social pensions, however, no macro-economic data are available.

<sup>9</sup> Ecuador implemented a social pension in 2006 and dismissed it in 2010; in Senegal it was abandoned in 2004, in Turkmenistan in 2011 and in Turkey in 2003. All of these countries abandoned the means-tested social pension component and did not implement an alternative universal scheme instead.

<sup>10</sup> We follow the World Bank regional country classification and provide an overview in the appendix in table A2.

Saharan Africa with a share of countries between 80 and 97 percent. In South Asia, only India and Pakistan provide their elderly population with an earnings-related system. China and the Philippines had a pension reform that introduced an earnings-related pension in 2011. These numbers of pension provision hide the fact that availability of an earnings-related pension per se says nothing about the coverage of the population or whether or not the level of the pension is securing an adequate living standard.

The second pension scheme detailed in table 1 is provident funds. Provident-funded pensions are publicly managed funds where compulsory savings of employees, retained from wages are matched by employer's contributions, invested and paid at pension age. Pensions financed by a provident fund are the least common worldwide and exist primarily in developing countries. Looking into the distribution, only nine countries in East Asia, three in South Asia and five in Sub-Saharan Africa had such pension schemes in 2001. The low coverage in Sub-Saharan Africa further decreased by 2.5 percentage points in 2012 when Tanzania abandoned the provident fund in 2002. No other change is observed thereafter. In nine of these countries, provident-funded pensions are the only source of old age income available for the population.<sup>11</sup> In sum, no reform intentions have been observed in employment-related contribution pensions. The coverage of provident-funded pensions is concentrated in Asia, with no major increase in the last ten years.

Lastly, most reforms took place in the provision of social pensions. The availability of non-contributory pension increased worldwide by around nine percentage points. Global coverage thus reached just 53 percent of countries in 2012. The provision of this form of old age income is high in North America, Europe and Central Asia where it reaches full coverage or 77 percent of countries in the region, respectively. Three countries implement a social pension in East Asia, Europe, Central Asia, Latin America and two countries implement social pensions in South Asia. Interestingly, although many countries in Africa face an increasing share of elderly population and have included social security protection as a key pillar in their national strategies for poverty reduction (ISSA, 2008), no changes are observed over the last decade to prevent old age poverty. The same is true for countries in the Middle East with a low coverage of only 14 percent on average in both regions.

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<sup>11</sup> These countries are: Indonesia, Kenya, Kiribati, Malaysia, Singapore, Solomon Islands, Sri Lanka, Uganda and Vanuatu.

To get an idea which form of social pension reforms are implemented within countries table 2 provides the comparison for social pension types as classified in the last section for the first and the last period in the sample. Overall we see an increase in all four systems of social pensions between 2001 and 2012.<sup>12</sup> The largest increase is observed in means-tested pensions with a rise of more than 15 percentage points. In East Asia, Fiji and South Korea implemented a means-tested pension in 2011 and 2007, respectively. Considering the whole period, one country more is observed in Europe and Central Asia. However, within this period several reform projects have been conducted in this region. In total, nine countries adopted a means-tested social pension, while eight abandoned it.<sup>13</sup> The largest increase of targeted social pensions is observed in Latin America, where seven countries (Bolivia, Chile, Columbia, Cuba, Guyana, Mexico and Venezuela) established this retirement system. Ecuador implemented and abandoned the means-tested pension scheme in 2006 and 2010 and Nicaragua abandoned it in 2011. In total, over 54 percent of countries in Latin-America provide a social pension to their older population which is the largest share per region, after North America, with a full provision worldwide. In Middle East and North Africa, Malta has had a means-tested pension since 2003, and in North America, Canada has had one since 2010. In South Asia, Bangladesh reformed its system in 2005, abandoning a mere flat-rate transmission of cash. India established a means-tested social pension in addition to the existing provident fund and employment-related schemes in 2003. In Sub-Saharan Africa, no net effect is observed over time due to the fact that in Senegal this form of social pension was abandoned in 2006 and in Swaziland it was implemented in 2008.

The number of universal or demogrant funds has increased in Europe, Central Asia, South Asia (Denmark 2003 and Georgia 2011), and in Latin-America in Bolivia (2004), in South Asia in Nepal (2003) and in Sub-Saharan Africa in the Seychelles (2010). The provision of a uniform minimum pension provided by the government is scarce in general and no major changes have been observed. Overall, only four countries in 2001 and seven countries in 2012 offer this kind of social pension. In Europe and Central Asia only Poland establishes a general minimum pension permanently, whereas Kazakhstan implemented this form of so-

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<sup>12</sup> In the appendix we provide a yearly overview of social pension development (table A1).

<sup>13</sup> Reforms took place in Armenia, Austria, Estonia, Guernsey, Greece, Lithuania, the Netherlands, Slovenia and Uzbekistan; abolish in Denmark, Georgia, Kazakhstan, Kyrgyz Republic, Latvia, Slovak Republic, Turkmenistan and Turkey.

cial pension in 2003 and abandoned it in 2007. In Latin America, Bolivia, in addition to the universal coverage of its pension, has also provided a universal minimum pension since 2012 based on residency. In Peru, the minimum unconditional cash transfer is the sole pension, which has been available to the elderly since 2004. The third universal transfer, a recoverable universal pension, was implemented in Brunei (East Asia) in 2009 as an addition to the universal government-provided transfers. In Europe and Central Asia, a major increase in this form of pension is observed. In total, eight countries established a recoverable social retirement scheme.<sup>14</sup> These are mainly transition countries in the region such as Kazakhstan, Kyrgyzstan, Serbia, and the Slovak Republic. Two countries decided to abolish this form of pension. Georgia established a universal state funded pension in 2011 instead and Poland has only provided a universal minimum pension since 2011. In Latin America and in Sub-Saharan Africa, Argentina implemented this kind of social pension in 2006 and Seychelles abandoned it in 2010.

Overall the distribution and development of social pensions worldwide is illustrated in Figure 1 and 2. Comparing both figures, obviously the number of countries with social pension increases worldwide. Major trends are apparent in Latin America where a sharp increase has been observed; alternatively, no changes are evident on the African continent. Considering the detailed discussion of trends, countries in Latin America concentrate their reforms on means-tested pensions whereas in transition countries, the provision of universal recoverable systems is most prevalent.

In what follows, we analyze the determinants of the adoption and implementation of social pension programs worldwide and detail to what extent this is driven by demographic, economic, and political economy factors. Subsequently, we systematically test whether it makes a difference if we only consider means-tested and universal components. What we observe in the last decade is that means-tested social pensions are more popular worldwide, although on average more universal schemes have been established in the last 12 years. In absolute terms, an additional 12 countries have a means-tested social pension, whereas 15 countries introduced universal pensions.

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<sup>14</sup> Reform took place in Azerbaijan, Iceland, Kazakhstan, Kyrgyz Republic, San Marino, Serbia, Slovak Republic and Sweden.

### III. Determinants of social pension adoption

The Universal Declaration of Human Rights<sup>15</sup> and the International Covenant on Economic, Social, and Cultural Rights<sup>16</sup> establish social security as a basic human right. This rights-based approach requires states and the international governance structure to provide a cash income in form of old-age pension on a regular and predictable basis to the elderly (Bloom and McKinnon 2013, Barrientos and Hulme 2009). The nature of social non-contributory pension schemes is different to contributory pension schemes in that they are largely funded through general governmental revenues. Besides the presumed cost-intensity of social pensions (especially of universal pensions where the sole eligibility criterion is age) critics often regard the redistribution of resources between young and old (and rich and poor) as unjust. They warn that traditional support systems such as intra-family transfers or work-ethics might be crowded out (Willmore 2007, Hugo and Cook 2012). In order to motivate the implementation of such a program and increase government spending, general societal agreement is needed for the programs to be realized and persistent. Several formal considerations and empirical tests predict different determinants:

Positive theories, on the one hand, only consider the efficiency of social security as an important factor for the realization of the programs (Sala-i-Martin 1996, Tabellini 2000). They suggest that efficiency concerns are the sole driver of social security provision, and thus social pension reform and continuation. Accordingly, the key explanatory variables are economic and demographic ones, since those are core variables determining efficiency in the expansion of government spending (Mulligan and Sala-i-Martin 1999).<sup>17</sup> We use per capita income as major economic factor and measure of standard of living. Demographic variables

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<sup>15</sup> Adopted by the UN General Assembly Resolution 217A (III) of 10 December 1948; Articles 22 and 25. Article 22: Everyone, as a member of society, has the right to social security and is entitled to realization, through national effort and international co-operation and in accordance with the organization and resources of each State, of the economic, social and cultural rights indispensable for his dignity and the free development of his personality.

Article 25: (1) Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing, and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control. (2) Motherhood and childhood are entitled to special care and assistance. All children, whether born in or out of wedlock, shall enjoy the same social protection.

<sup>16</sup> Adopted by the UN General Assembly Resolution 2200A (XXI) of 16 December 1966; Article 9.

Article 9: The States Parties to the present Covenant recognize the right of everyone to social security, including social insurance.

<sup>17</sup> Mulligan and Sala-i-Martin (1999) discuss in detail positive theories of social security provision.

are proxied by fertility rate and life-expectancy since they shape the demographic trends of countries.

On the other hand, political economy models of voting focus on the power of interest groups in the process of political decision making. The voting power of the affected population increases with its size within society. Voting models predict that social security reforms are successful if the old and the middle aged form a majority voting coalition which cannot be defeated by younger generations regardless of the costs (e.g., Cooley and Soares 1999, Shoven and Slavov 2006). These models suggest that the size of the elderly population is decisive for a social pension reform to be successful. Mulligan et al. (2010) show that the share of elderly population is a robust determinant of social security spending.

Using a median voting model on the political viability of social security, Tabellini (2000) emphasizes that also the income distribution of the country is an important determinant. Larger income inequality in a country leads to the formation of a coalition between the elderly and the poor. With increasing poverty among the elderly this power coalition has increased in the last decades. His empirical findings show that cross-country differences in social security spending are determined by the skewness of the taxable income distribution and the size of the affected population.

Mulligan and Shleifer (2005) show theoretically and empirically in a fixed cost theory of regulation that social security expenditures are driven by the size of the affected population and implementation costs. They argue that regulatory costs may be reduced if a precedent similar jurisdiction is already in place. Hugo and Cook (2012) hypothesize that the process of social pension reform depends on the existence of formal pension provision and their reform. Thus the existence of contributory pension schemes may shape the reform processes of social pension implementation and lead to persistence of programs. Countries with an earnings-related or provident funded pension scheme also adopt social non-contributory pension.

Hugo and Cook (2012) argue based on case studies from Asia that the political system is important in the provision of social pension. However, Mulligan et al. (2004) find that there is no difference in the provision of different public policies in general in the two systems. Mulligan et al. (2010) test whether the provision of social security spending is different in de-

mocracies and non-democracies and show that the size of retirement programs does not differ ones they control for economic and demographic factors. However, with regard to the probability of implementation and the survival of social pensions separately there might still be a difference between democratic and non-democratic regimes. If social agreement is reached in a democracy the survival of a redistributive scheme might be more likely. As a larger share of the voting population grows old, countries might be under pressure to reduce old age income insecurity.

Next, the likelihood of social pension provision could also be related to the conviction and attitudes of those responsible. Partisan theories predict that redistribution policies and the size of government spending are influenced by party ideology (Alan and Scruggs 2004). Socialist governments are rather in favor of state interventions and redistribution in order to reduce income inequality (Keefer and Milanovic 2014).<sup>18</sup> Increasing poverty among the elderly thus calls for greater redistribution and implementation of social pension. Considering the continuation of the program the predictions are less clear.

Additionally, international forces influence national political decision-making processes. The diffusion of global norms through the international community promoted by international organizations, such as the World Bank, has been documented in political constructivism and coercion theory (for an overview see Dobbin et al. 2007). Powerful players exercise influence over other countries (e.g., Williamson 1993, Gore 2000). Dobbin et al. (2007, 451) emphasize that countries which are subject to leverage, such as trade, aid or security concerns, are more likely to adopt reforms promoted by powerful actors. This could increase government's budgets and lead to the expansion of national government spending. Additionally, aid could include technical assistance in form of expertise and knowledge on the implementation, program design and sustainability. On the other hand, if aid is rather politically motivated and/or is tied to conditions including social security reforms, the country might be

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<sup>18</sup> Several studies empirically show that party ideology matters in OECD countries in the allocation of grant aid to least developed and middle-income countries (Brech and Portrafke 2014), and in German aid allocation (Dreher, Nunnenkamp and Schmaljoahnn forthcoming). However, Fuchs et al. (2013) do find effects in a worldwide sample of countries.

forced to implement social pension even if internal conditions do not constitute a demand.<sup>19</sup> The effect on the continuation of the program is a priori not clear.

These formal considerations are the basis for our empirical analysis. We test seven hypotheses using the data on social pension continuation and reform in the last decade provided by the SSPTW data base.

*H1: Economic and demographic variables are the main drivers of social pension adoption and drive the persistence of the programs.*

*H2: The larger the affected population the larger the probability that the country has a social pension in place or adopts one.*

*H3: The larger inequality within countries the more likely is the continuation or the adoption of a social pension.*

*H4: The existence of contributory systems reduces implementation and reform costs and thus increases the probability of social pension provision.*

*H5: In democracies social pension is more likely to be adopted and consequently more persistent.*

*H6: Party ideology matters in the form that left-wing governments will be more likely to implement social pension reforms.*

*H7: International forces through leverage effects in trade and aid allocation lead to social pension adoption and continuation of the program.*

#### **IV. Empirical analysis: data and method**

Based on the deliberations in the last section our empirical analysis focuses on four different types of variables: the main dependent variable is a binary indicator of whether or not a country has a social pension. Given the structure of the data we have six bi-annual periods leading to a maximum of 1,014 observations, depending on the availability of the control variables. These are economic, demographic, political economy and international influence variables. We investigate what drives the implementation of social pension programs and their continuation in the 2000s. In addition, we investigate whether drivers differ in developing countries compared to the overall sample and between the adaption of universal or targeted social pensions by looking separately at both forms.

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<sup>19</sup> Politically motivated aid has been shown to be attached to less conditions in IMF programs (Dreher et al. 2009) and that it is less effective to increase economic growth (Dreher et al. 2014).

Borrowing from the literature on political economy of conflict we use a first order Markov transition probit model to account for the state dependence in social pension systems (Beck et al. 2001, Jackman 2000; Przeworski et al. 2000, Przeworski and Vreeland 2002, Ahlquist and Wibbels 2012).<sup>20</sup> By using the transition model we estimate the conditional probability of the change in the binary social pension variable from one state to another in the current year given the state of the social pension program in the year before. Thereby we are able to distinguish between the probability of social pension continuation, adoption and abolition. This is relevant given that we observe three groups of countries: first, countries that have a social pension in place; second, countries adopting social pension, and third countries abandoning social pension. We estimate the following first order Markov equation:

$$P(Social_{i,t} = 1) = \text{Probit}(X_{i-1,t}\beta + Social_{i,t-1}\delta + Social_{i,t-1}X_{i,t-1}\gamma + \mu_r + \lambda_t) \quad (1)$$

where the parameter  $\beta$  is our reform coefficient measuring the impact of our covariates on the probability of adopting a social pension (i.e., the country has no social pension in the last period);  $\delta$  is the impact of a social pension last period on the probability of social pension persistence next period, and  $\gamma$  is the difference of the impact of each covariate on social pension adoption when such a system is already in place, as compared to when no reform takes place. Thus,  $\gamma$  gives us an indication on whether the hypothesized influences have differing effects depending on the starting state. We control for unobserved regional characteristics by including regional controls ( $\mu_r$ ). Given that we observe similarities among countries in different regions, these serve to control for effects that are typical of certain regions without being captured by other controls in the model. Period effects ( $\lambda_t$ ) capture time trends in general. All explanatory variables are lagged by one period to mitigate the problem of endogeneity. Compared to linear models the estimation of coefficients in non-linear models with an interaction effect cannot be interpreted directly (Ai and Norton 2003). We report marginal effects and distinguish between the effect on the probability of reform/adoption of a social pension program and the persistence/duration of the existent social pension.

The covariates include all variables that proxy for our hypotheses developed in the last section.<sup>21</sup> We control for (log) GDP per capita in international Purchasing Power Parity (PPP)

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<sup>20</sup> Mc Grath (2014) shows that the Markov transition model is the appropriate model to estimate state dependent variables.

<sup>21</sup> A detailed description of variables and sources is provided in table 7.

from the World Bank Development Indicators (WDI, WB 2014) to account for the general economic situation of each country. Given the large coverage in OECD countries, the relationship between the income level and social pension is likely to be non-linear with a lower probability of implementation at higher levels of income. Additionally, this could be an indicator for the persistence of social pension (Jung and Tran, 2012). We use the natural logarithm of GDP per capita squared to capture non-linearity. To measure income inequality we use the Gini coefficient (WB 2014).<sup>22</sup>

Demographic variables include fertility rate and life expectancy rate. Decreasing fertility and increasing life expectancy are indicators of aging of societies. In general, the provision of old age retirement income is positively related to the demographic composition of countries, because it determines the potential number of contributors and pensioners (Pallares et al., 2012). In countries with high fertility rates the need for social pension provision might therefore be less pressing (Entwisle and Winegarden, 1984).<sup>23</sup> Instead of life expectancy and to test hypothesis two we use the share of the population that is 65 years old or older. All three variables are taken from the WDI data base (WB 2014).

Considering the costs of implementation we test whether the existence of contributory systems increase the probability of social pension implementation (H3). We employ an indicator of whether there is an earnings-related or provident funded pension implemented in the country to cover both contribution-based systems (SSPTW 2014). The existence of relevant jurisdiction and pension infrastructure gives an indication of how much effort is still needed and how much costs might accrue to implement social pension (Mulligan and Shleifer 2005).

We employ the democracy dummy of Cheibub et al. (2010) that is available for the 2000-2008 period. The dummy distinguishes between democratic regimes with electoral voting schemes to establish executive and legislative offices and autocratic regimes where this is not the case. We also test the results by using the measure of democracies and non-democracies of the Polity IV data set provided by Marshall et al. (2014). This variable is a crude measure of democratic systems and does not distinguish between differences in de-

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<sup>22</sup> Due to the low number of observations we interpolate the indicator.

<sup>23</sup> Another potential demographic factor influencing the population composition of countries is migration. However, this is still only a minor factor according to Pallares et al. (2012) depending heavily on the age structure of the migrants. Given the still low quality of migration data especially in a multi-country context we do not include it in our analysis.

mocracies. However, it is widely available and highly correlated with the former indicator. It is scaled between 10 and 0 with higher values indicating the prevalence of sound democratic institutions to a larger extent. We generate a dummy variable that is one for values six or larger. This cutting value is suggested by the authors of the indicator and has been used in the literature before.

Additionally, as detailed above attitudes and convictions of responsible parties are a potential determinant. We use the measure on the party orientation of the chief executive provided by the Database of Political Institutions (Beck et al., 2001 updated 2013), which distinguishes between right, left and centric orientation on a three scale indicator. We generate a dummy variable that turns one for right oriented governments and zero for left or center oriented governments. Thus the effect of the variable compares the difference between right oriented governments and other orientations. In general we would expect that more socialist governments have a higher probability to provide social pension.

To turn to the hypothesis that international factors also support the adoption and persistence of social pension reform we test for the influence of external drivers through trade relations. Countries that are more open are supposed to be more exposed to the transmission of ideas (Hugo and Cook, 2012). Palacios and Sluchynsky (2006) show that, particularly in the area of pension peer effects through policy transfer seem to lead to introduction of mandatory contributory schemes in Latin America, Africa, the Middle East and Asia. This might also hold for non-contributory schemes. We test this channel by using the ration of exports minus imports to GDP sourced from the WDI database (WB 2014). Another channel through which international actors could influence countries in their pursuit to provide social pension is international development assistance. Especially, the traditional donors such as the DAC donors and large multilateral donors such as the World Bank or the IMF often bound their financial support to conditions or specific projects (e.g., Dreher et al. 2009). Given the importance of social pension on the global policy agenda in recent years, foreign aid could support countries in the establishment and continuation of social pension. All aid variables used are from the WDI data base (WB 2014).

## V. Results

We present the results for the determinants of adoption (reform) and continuance of social pension before we turn to the analysis of the targeted and universal pension programs separately. We refer to reform of social pension to the adoption or onset of social pension in the country and to persistence (duration) in the case where countries had a social pension in the previous period. By only looking at developing countries we are able to give an intuition on whether different impacts are important in the specific country group where the fight against old age poverty is more pressing. All tables show marginal effects. The upper part of the tables reports the influence of each control on the reform probability of adopting a social pension and the lower panel reports the influence the control on the probability of keeping a social pension program.

### 5.1 Determinants of social pension

#### *Overall social pension schemes*

Table 3 reports the different specifications of the dynamic first order Markov transition model for the economic and demographic variables. The number of observations varies between 350 and 760 depending on the choice of controls. Thus we are able to look at a sample of up to 154 countries covering the most extensive sample possible.

The top panel shows the effect of the economic and demographic determinants on the probability of social pension adoption in our sample. Neither economic variables, such as GDP per capita or GDP per capita squared, nor cost factors proxied by the existence of contributory systems, have an effect different from zero on the probability of adopting a social pension. The general economic situation of countries seems not to influence the probability of adoption of social pension schemes and has also been observed by Mulligan and Shleifer (2005) who proxy fixed costs by the regulatory framework.

The main drivers are demographic variables. A decrease in the fertility rate increases the probability to adopt a social pension program and provide against old age poverty by public funds. The effect is negative and significant on the 1 percent level across specifications. The impact of life expectancy on the probability is also negative and significant on the 10 percent level in all specification except in column (5) where the number of observations drops con-

siderably. High fertility levels and similarly high life expectancy lower the probability of social pension reform, *ceteris paribus*. This is in line with research from Entwisle and Winegarden (1984) who show that public pension and fertility rates and life expectancy are inversely correlated. Given the projections of an ongoing decrease of fertility and increase of life expectancy (Pallares et al. 2012) this relationship shows that the increase in demand for social pension is an important driver of social pension provision.

The lower part of the table shows the probability on the continuation of social pension programs. The results show that economic factors are the main drivers of social pension persistence. Having a social pension in the year before increases the probability that the system is sustainable in the next year. The marginal effect is positive and highly significant. Increasing income decreases the probability of the survival of social pension programs. This effect seems to be non-linear since GDP squared is positive and significant on the one percent level in all specifications. This finding could imply that in countries with a certain level of income may be able to supply for old age state funded, non-contributory pension and keep the system in place.

The existence of a contributory system reduces the probability of social pension persistence (column 6). It might be easier for countries to switch from cost intensive public funded pensions to privately funded pensions if a system of earnings-related pension or provident funds is in place. Overall, economic and cost as well as demographic factors seem to matter for different stages of the social pension adoption or persistence of the program. Inequality has no impact in column 5, but the number of observations drops considerably given the availability of the data.

In Table 4 we report the results for our hypotheses five to seven. Controlling for economic and demographic factors the political economy variables, the political system and ideology have no impact on social pension reform (columns 1 to 4). The results suggest that the political system matters for the duration of social pension, but only if we use the measure provided by Cheibub et al. (2010). If the country is a democracy defined by this dummy the probability is lower that the social pension persists compared to autocracies. This is in contrast to Mulligan and Shleifer (2005) who do not find a different effect between the two state forms.

This finding is not robust to a different specification of the variable according to the Polity 2 measure. We also do not find a different effect of party orientation.

International drivers seem to matter. The probability of social pension reform is reduced the more open the country (column 5). This is in contrast to expectations. This might either be due to the fact that there are indeed no policy transfer effects regarding non-contributory pension compared to contributory pension. The same holds the larger is the aid budget in government expenses controlled for the trade openness of countries. This suggests that donors and international investors have a decelerating effect on social pension reform. There is no effect on the persistence of social pension programs.

Looking at developing countries only (table 5) we find that also in this group of countries the main drivers of social pension reform are demographics. Changes in traditional support systems provided by large families seem to pressure states to provide against old-age poverty. Again international connectedness in the form of trade openness and receiving of aid reduces the probability of social pension reform. The determinants of the persistence of social pension programs seem to be driven by efficiency, whereas political economy and international factors are not different from zero.

### *Targeted social pensions*

The sole determinant of social pension reform of a means-tested social pension program seems to be the fertility rate. This variable is negative and highly significant on the one percent level in all columns of table 6. We do not find any effect on the probability of social pension adoption of other economic factors, the political system or international factors. However, the persistence of targeted pensions is determined by demographic and economic as well as cost factors. The existence of a universal system also increases the probability of means-tested pension. This finding indicates that countries provide both social pension forms in the long run.

### *Universal social pensions*

For universal social pension programs that are solely dependent on age and residency we find some interesting changes to the observations on overall social and targeted pension programs. If the country has a contributory system the probability of universal social pension is reduced controlled for economic and demographic factors. Note that the effect of open-

ness to trade turns positive and significant. However, the effect is zero. Aid as share of government expenses increases the probability of old-age universal pension adoption and persistence. In both parts of the table we find a positive and significant marginal effect. Persistence also influenced by income positively, but after a certain threshold this effect turns negative. Increasing life expectancy also increases the probability of universal pension program persistence. A large share of the elderly increases the probability of countries providing universal social pension over some years.

## 5.2 Extension and Robustness

### *Other data sets*

As mentioned before there have been several attempts to measure social pension adoption worldwide. The SSA reports data can be criticized because although the reports follow a comprehensive design there might still be information gaps regarding the details of the programs and coding. To test the reliability of the provided information we compare our results with the results obtained by using data collected by two different entities on social pension, namely the World Bank Human Development Network and HelpAge an international NGO. Table 7 presents the results for these comparisons. In columns (1) - (2) and (7) - (8) the results for the main SSPTW data set are repeated. WB is the data on social pension gathered by the World Bank Human Development Network on the modality of pension pillars (pillar 0, pillar 1 and pillar2) in different countries.<sup>24</sup> The data set shows recent international coverage provided in 2013 without considering developments over time, but allows the coding of an earnings-related, provident-funded and social pension. The second additional source of information comes from the HelpAge International Pension Watch Database. This data base covers 107 countries with detailed information on the names of social protection schemes, the year of introduction, benefit levels, target groups and coverage rates. It does not provide

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<sup>24</sup> Definition of the three pillars: Pillar 0: Often called “social pensions” in recognition of their social-policy goal of offering a safety-net, minimum income in old age: 1) Targeted programs, that pay benefits only to those with the lowest old age income, 2) Basic pensions refer to either flat rate or it only depends on years of work and 3) Universal: social pension non-contributory, non-earning related for all the population above certain age. Pillar 1: Mandatory publicly managed schemes. 1) Defined-benefit schemes (DB) have a formula directly relating retirement incomes to individual earnings. 2) Notional defined-contribution schemes (NDC), benefits depend on the amount of contributions made and notional interest credited to individual accounts. and 3) Provident Funds/Publicly managed defined-contribution schemes (PF), where benefits depend on the amount of contributions and the investment returns they earn. (WB, 2013c).

any information on other pension programs. We use the SSPTW data on earnings-related and provident-funded pensions together with this independent variable. Overall we see similar results for both data sets compared to the SSPTW data. The results again suggest that the fertility rate is the most robust determinant of social pension provision regardless of the independent variable or model used. We conclude that given the structure of the SSPTW data it is the most suitable source to analyze the determinants of social pension adoption. It allows for the control of unobserved country heterogeneity and investigation of the development over time. Additionally, these results suggest that the SSPTW data is not contradicting to other measures of social pension.

An advantage of the Pension Watch data base is that it also provides information on the share of people that is older than 60 and covered by a social pension as well as the share of the eligible population covered. These shares are different to each other in countries where the age of eligibility is higher than 60 (e.g., Argentina with an age of eligibility of 70). Again the data is only available for 2013. Estimating the same equations using this information as independent variables by OLS or Tobit regressions (both variables are bound at zero) we see similar results (displayed in table 8). The fertility rate is robustly related to the share of people covered, *ceteris paribus*. Overall, this supports our earlier findings of the importance of demographic trends rather than economic or political economy factors.

## **VI. Conclusion**

This paper investigates the determinants of social pension adoption and persistence worldwide in a comprehensive data set on social pension adoption since 2000. To the best of our knowledge we are the first to describe global trends rather than focusing on OECD countries or single regions only. We are therefore able to look at a broad range of developing countries and compare trends between continents and countries. The descriptives show that although in general on the rise, some social pension programs have also been abandoned over the last decade. The increase is mainly due to the adoption in Latin America whereas we see no increase or reform programs in Sub-Saharan Africa. Nevertheless, only 50 percent of countries world wide have a social pension in place to fight old age poverty which, given demographic trends and projection of share of elderly population of 2 billion by 2050 (Pallares et al. 2012), seems to be alarming.

By employing a first order Markov transition model to test for the different effect on the probability of social pension adoption and persistence we find that demographic factors are the most robust factors in the probability of the reform (which we refer to as adopting such a system) of social pension schemes. In countries where traditional support structures break due to increased life expectancy and decreasing fertility public old age support systems are more likely to be implemented. International drivers matter especially in the initiation of the reform process of universal pension programs given that the probability increases the more open countries are and the higher their share of aid received.

This provides policy makers with new insights and offers the possibility to adjust anti-poverty programs to fight old-age poverty. Also in the debate on aid effectiveness the results provide evidence that aid is effective in increasing the probability of social pension provision and to expand anti-poverty programs in developing countries based on universal provision. Open questions are still whether this holds for all kinds of aid and whether earmarked funds have a different effect. Further research is needed in the analysis of the effectiveness of social pension. Given the structure of the data we are only able to analyze the expansion of programs around the world a next step is to analyze coverage rates and whether the programs reach old people and reduce their vulnerability to poverty.

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## Tables and Figures

Table 1: Pension systems by region

	Earnings-related pension				Provident funded pension				Social pension				
Region	2001/2002	Share	2011/2012	Share	2001/2002	Share	2011/2012	Share	2001/2002	Share	2011/2012	Share	N
East Asia & Pacific	8	33.3	10	41.7	9	37.5	9	37.5	8	33.3	10	41.7	24
Europe & Central Asia	42	85.7	42	85.7	0	0.0	0	0.0	35	71.4	38	77.6	49
Latin America & Caribbean	32	97.0	32	97.0	0	0.0	0	0.0	18	54.5	21	63.6	33
Middle East & North Africa	15	93.8	15	93.8	0	0.0	0	0.0	2	12.5	2	12.5	16
North America	2	66.7	2	66.7	0	0.0	0	0.0	3	100	3	100	3
South Asia	2	40.0	2	40.0	3	60.0	3	60.0	1	20.0	3	60.0	5
Sub-Saharan Africa	33	84.6	32	82.1	5	12.8	4	10.3	6	15.4	6	15.4	39
World	134	71.6	135	72.4	17	15.8	16	15.4	73	43.9	83	53.0	169

Source: SSPTW (various issues)

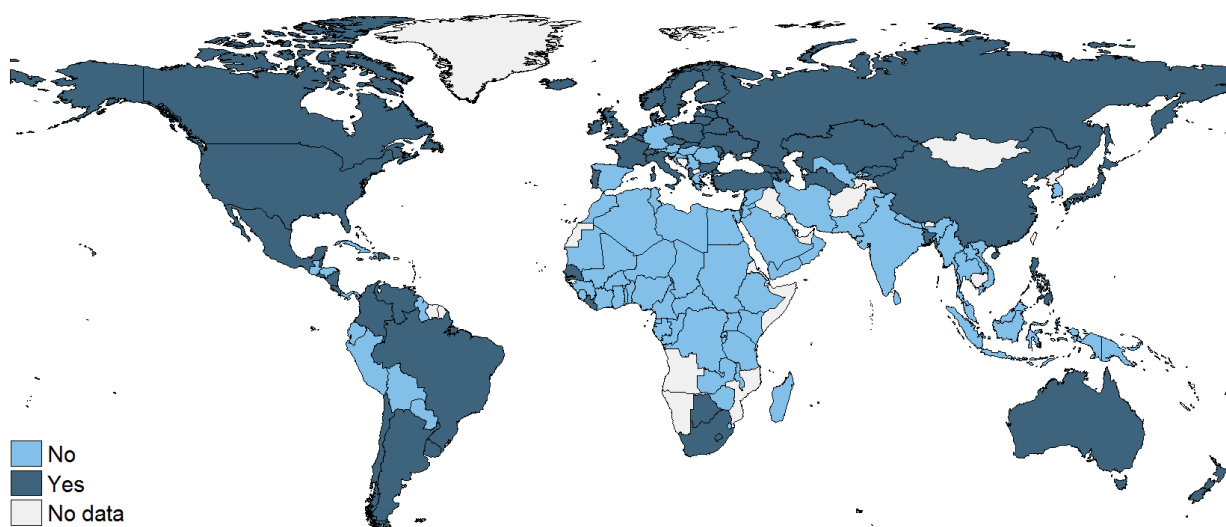
Note: Tanzania had a provident fund in 2002, but since 2004 has no such pension anymore.

Table 2: Social Pension components

	Means-tested				Universal pension				Universal minimum pension				Recoverable universal pension				
Region	2001/2002	Share	2011/2012	Share	2001/2002	Share	2011/2012	Share	2011/2012	Share	2011/2012	Share	2001/2002	Share	2011/2012	Share	N
East Asia & Pacific	3	12.5	5	20.8	4	16.7	4	16.7	0	0	0	0	3	12.5	4	16.7	24
Europe & Central Asia	25	51.0	25	51.0	1	2.0	3	6.1	0	0	1	2.0	15	30.6	21	42.9	49
Latin America & Caribbean	12	36.4	18	54.5	0	0.0	1	3.0	4	12.1	6	18.2	2	6.1	3	9.1	33
Middle East & North Africa	1	6.3	2	12.5	0	0.0	0	0.0	0	0	0	0	2	12.5	2	12.5	16
North America	2	66.7	3	100	1	33.3	1	33.3	0	0	0	0	1	33.3	1	33.3	3
South Asia	0	0.0	2	40.0	0	0.0	1	20.0	0	0	0	0	0	0.0	0	0.0	5
Sub-Saharan Africa	3	7.7	3	7.7	2	5.1	3	7.7	0	0	0	0	1	2.6	0	0.0	39
World	46	25.8	58	40.9	8	8.17	13	12.4	4	1.73	7	2.89	24	13.9	31	16.3	169

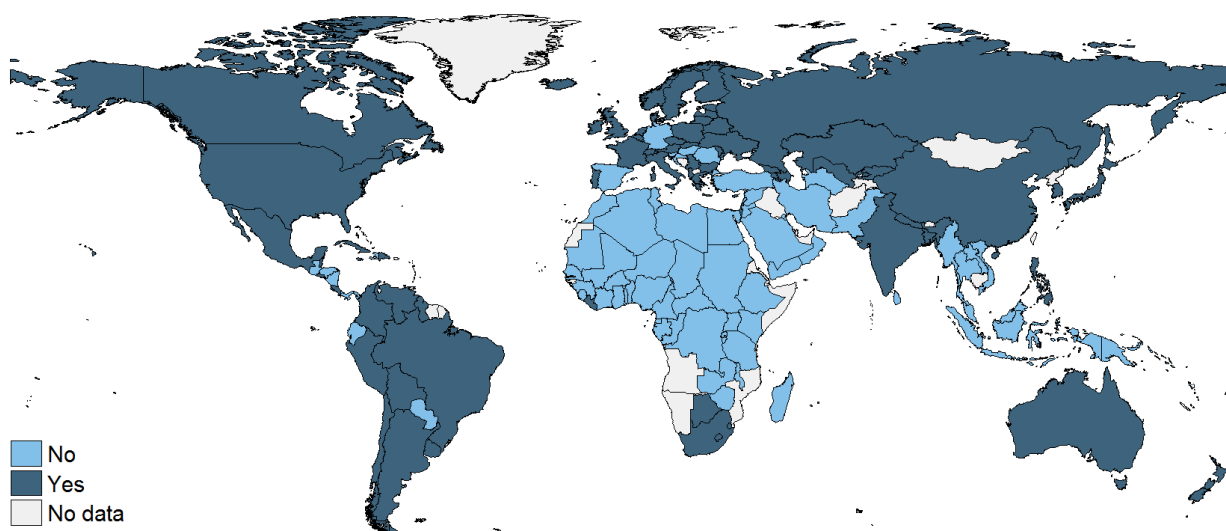
Source: SSPTW (various issues)

Figure 1: Distribution of social pension 2001/2002



Source: SSPTW (2001/2002)

Figure 2: Distribution of social pension 2011/2012



Source: SSPTW (2011/2012)

**Table 3: Economic and demographic determinants of social pension (2001-2012)**

		(1)	(2)	(3)	(4)	(5)	(6)
<b>Reform</b>	(ln) GDP pc	0.001 (0.921)	0.023 (0.863)	0.200 (0.216)	0.047 (0.742)	0.506 (0.292)	0.049 (0.860)
	Fertility rate	-0.045*** (0.001)	-0.042*** (0.005)		-0.037** (0.031)	-0.160* (0.080)	-0.097*** (0.006)
	Life expectancy rate	-0.004* (0.051)	-0.004** (0.016)		-0.005** (0.024)	-0.016 (0.220)	-0.009** (0.035)
	(ln) GDP pc squared		-0.001 (0.889)	-0.011 (0.228)	-0.002 (0.751)	-0.027 (0.299)	-0.002 (0.886)
	Share of >65 Population			0.005 (0.210)	0.003 (0.559)		
	Gini					0.008 (0.200)	
	Contributory pension						-0.152 (0.129)
<b>Persistence</b>	SP last period	0.939*** (0.000)	0.951*** (0.000)	0.940*** (0.000)	0.951*** (0.000)	0.861*** (0.000)	0.849*** (0.000)
	(ln) GDP pc	0.019 (0.132)	-0.299** (0.044)	-0.218** (0.036)	-0.312** (0.043)	-1.045 (0.144)	-0.562* (0.077)
	Fertility rate	0.001 (0.941)	-0.009 (0.537)		-0.011 (0.497)	-0.004 (0.842)	-0.018 (0.525)
	Life expectancy rate	-0.000 (0.800)	-0.001 (0.311)		-0.002 (0.270)	-0.006 (0.124)	-0.002 (0.579)
	(ln) GDP pc squared		0.017** (0.037)	0.013** (0.027)	0.018** (0.039)	0.056 (0.143)	0.032* (0.067)
	Share of >65 Population			0.000 (0.944)	-0.000 (0.989)		
	Gini					-0.000 (0.931)	
	Contributory pension						-0.376** (0.014)
#Obs		760	760	758	758	350	760
#Countries		154	154	152	152	92	154
pseudo R-squared		0.83	0.83	0.82	0.83	0.84	0.84
Wald test		462.60	478.81	497.46	493.14	407.09	2111.53
Log Likelihood ratio		-91.91	-89.74	-93.14	-89.40	-38.28	-85.84

Note: Dependent variable is a binary indicator, whether or not the country has a social pension. Odds ratio reported and cluster robust standard errors in parenthesis; significance levels: \* p<0.1, \*\* p<0.05, \*\*\*p<0.01; SP[t-1]= social pension in last period. All models include time-period fixed effects and regional dummies (World Bank region classification). Explanatory variables lagged by one period.

**Table 4: Political economy determinants of social pension (2001-2012)**

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Reform</b>	(ln) GDP pc	-0.289 (0.343)	0.141 (0.709)	-1.171 (0.146)	-1.330 (0.139)	-0.029 (0.922)	-0.272 (0.422)	-0.241 (0.496)
	(ln) GDP pc squared	0.017 (0.325)	-0.008 (0.716)	0.065 (0.135)	0.072 (0.139)	0.004 (0.822)	0.014 (0.483)	0.013 (0.516)
	Fertility rate	-0.116*** (0.006)	-0.136*** (0.001)	-0.165** (0.046)	-0.216** (0.023)	-0.111*** (0.003)	-0.150*** (0.000)	-0.157*** (0.000)
	Life expectancy rate	-0.008 (0.135)	-0.010** (0.026)	-0.015 (0.136)	-0.015 (0.214)	-0.012** (0.029)	-0.012** (0.023)	-0.015** (0.025)
	Contributory pension	-0.211* (0.051)	-0.203* (0.053)	-0.274 (0.148)	-0.301 (0.131)	-0.185** (0.042)	-0.263** (0.011)	-0.271*** (0.006)
	Democracy	-0.002 (0.981)						
	Democracy (Polity)		-0.031 (0.584)		-0.018 (0.799)			
	Right party orientation			-0.063 (0.390)	-0.044 (0.634)			
	Trade share					-0.001** (0.011)		-0.001** (0.021)
	(ln) AID/Gov.exp.						-0.024 (0.106)	-0.028* (0.054)
<b>Persistence</b>	SP last period	0.849*** (0.000)	0.711*** (0.000)	0.771*** (0.000)	0.699*** (0.000)	0.829*** (0.000)	0.761*** (0.000)	0.756*** (0.000)
	(ln) GDP pc	-0.722** (0.044)	-1.153** (0.011)	-0.587* (0.055)	-0.730** (0.043)	-0.946** (0.011)	-0.614* (0.062)	-1.177** (0.010)
	(ln) GDP pc squared	0.038** (0.047)	0.064*** (0.009)	0.033** (0.048)	0.038** (0.046)	0.053** (0.011)	0.035* (0.055)	0.067*** (0.009)
	Fertility rate	-0.019 (0.246)	-0.076* (0.061)	-0.010 (0.597)	-0.018 (0.192)	-0.046* (0.082)	-0.026 (0.373)	-0.070 (0.131)
	Life expectancy rate	0.010*** (0.002)	-0.006 (0.235)	-0.001 (0.753)	0.009*** (0.003)	-0.003 (0.410)	-0.002 (0.469)	-0.006 (0.199)
	Contributory pension	-0.197*** (0.000)	-0.880*** (0.000)	-0.338*** (0.002)	-0.187*** (0.000)	-0.639*** (0.000)	-0.387** (0.014)	-0.625*** (0.000)
	Democracy	-0.388*** (0.000)						
	Democracy (Polity)		-0.022 (0.639)		0.001 (0.983)			
	Right party orientation			0.031 (0.462)	0.023 (0.568)			
	Trade share					0.000 (0.959)		-0.001 (0.454)
	(ln) AID/Gov.exp.						0.006 (0.721)	0.009 (0.637)
#Obs		601	670	416	371	746	670	667
#Countries		153	135	101	92	153	150	150
pseudo R-squared		0.88	0.83	0.80	0.79	0.84	0.84	0.85
Wald test		4761.41	2918.10	848.36	2284.92	1076.61	1106.12	1201.37
Log Likelihood ratio		-50.68	-77.26	-55.97	-51.47	-80.21	-75.35	-70.04

Note: Dependent variable is a binary indicator, whether or not the country has a social pension. Odds ratio reported and cluster robust standard errors in parenthesis; significance levels: \* p<0.1, \*\* p<0.05, \*\*\*p<0.01; SP[t-1]= social pension in last period. All models include time-period fixed effects and regional dummies (World Bank region classification). Explanatory variables lagged by one period.

**Table 5: Determinants of social pension in developing countries only (2001-2012)**

		(1)	(2)	(3)	(4)	(5)
<b>Reform</b>	(ln) GDP pc	0.879 (0.161)	1.091 (0.210)	0.842 (0.278)	0.903* (0.071)	0.924 (0.197)
	(ln) GDP pc squared	-0.052 (0.158)	-0.065 (0.202)	-0.049 (0.287)	-0.061** (0.049)	-0.060 (0.166)
	Fertility rate	-0.071** (0.030)	-0.121*** (0.006)	-0.084** (0.016)	-0.119*** (0.000)	-0.115*** (0.001)
	Life expectancy rate	-0.007** (0.021)	-0.009** (0.024)	-0.010** (0.036)	-0.007* (0.053)	-0.009* (0.082)
	Contributory pension	-0.103 (0.199)	-0.168* (0.093)	-0.116* (0.088)	-0.238*** (0.000)	-0.195*** (0.005)
	Democracy (Polity2)		-0.069 (0.227)			
	Trade share			-0.001** (0.025)		-0.001* (0.089)
	(ln) AID/Gov.exp.				-0.034** (0.024)	-0.029** (0.037)
<b>Persistence</b>	SP last period	0.852*** (0.000)	0.710*** (0.000)	0.825*** (0.000)	0.661*** (0.000)	0.668*** (0.000)
	(ln) GDP pc	-0.793 (0.135)	-2.902*** (0.000)	-1.069** (0.035)	-1.777*** (0.007)	-1.815*** (0.009)
	(ln) GDP pc squared	0.046 (0.144)	0.163*** (0.000)	0.061** (0.035)	0.102*** (0.007)	0.104*** (0.009)
	Fertility rate	-0.044 (0.335)	-0.208*** (0.000)	-0.058 (0.163)	-0.127*** (0.000)	-0.135*** (0.000)
	Life expectancy rate	-0.003 (0.530)	-0.017*** (0.001)	-0.003 (0.592)	-0.010** (0.048)	-0.009* (0.060)
	Contributory pension	-0.450** (0.016)	-0.713*** (0.000)	-0.465*** (0.000)	-1.203*** (0.000)	-1.111*** (0.000)
	Democracy (Polity2)		0.059 (0.354)			
	Trade share			0.001 (0.282)		0.000 (0.791)
	(ln) AID/Gov.exp.				0.014 (0.394)	0.011 (0.487)
#Obs		474	420	462	428	425
#Countries		96	85	95	92	92
pseudo R-squared		0.83	0.84	0.84	0.85	0.87
Wald test		1477.35	897.46	2493.08	2625.49	3026.26
Log Likelihood ratio		-54.59	-45.59	-48.30	-42.10	-37.51

Note: Dependent variable is a binary indicator, whether or not the country has a social pension. Marginal effects reported and cluster robust standard errors in parentheses; significance levels: \* p<0.1, \*\* p<0.05, \*\*\*p<0.01; SP[t-1]= social pension in last period. All models include time-period fixed effects and regional dummies (World Bank region classification). Explanatory variables lagged by one period.



**Table 6: Determinants of targeted social pension (2001-2012)**

		(1)	(2)	(5)	(6)	(7)
<b>Reform</b>	(ln) GDP pc	-0.054 (0.788)	0.001 (0.997)	-0.072 (0.729)	-0.315 (0.174)	-0.324 (0.177)
	(ln) GDP pc squared	0.003 (0.757)	0.001 (0.964)	0.004 (0.684)	0.016 (0.160)	0.017 (0.165)
	Fertility rate	-0.081*** (0.003)	-0.098*** (0.001)	-0.077*** (0.005)	-0.112*** (0.001)	-0.107*** (0.002)
	Life expectancy rate	-0.004 (0.213)	-0.005 (0.148)	-0.004 (0.277)	-0.005 (0.164)	-0.005 (0.225)
	Contributory pension	-0.079 (0.143)	-0.101* (0.069)	-0.079 (0.151)	-0.095 (0.110)	-0.094 (0.118)
	Universal pension	0.000 (0.993)	-0.036 (0.213)	-0.000 (0.999)	-0.005 (0.862)	-0.002 (0.941)
	Democracy (Polity2)		-0.054 (0.134)			
	Trade share			-0.000 (0.432)		-0.000 (0.448)
	(ln) AID/Gov.exp.				-0.011 (0.251)	-0.013 (0.198)
<b>Persistence</b>	TP [t-1]	0.830*** (0.000)	0.789*** (0.000)	0.837*** (0.000)	0.806*** (0.000)	0.809*** (0.000)
	(ln) GDP pc	-1.354*** (0.006)	-1.952*** (0.000)	-1.286*** (0.008)	-1.718*** (0.004)	-1.595*** (0.006)
	(ln) GDP pc squared	0.077*** (0.005)	0.111*** (0.000)	0.073*** (0.006)	0.095*** (0.003)	0.089*** (0.006)
	Fertility rate	-0.082** (0.043)	-0.110*** (0.010)	-0.082** (0.042)	-0.098** (0.024)	-0.100** (0.029)
	Life expectancy rate	-0.010** (0.017)	-0.014*** (0.002)	-0.009** (0.024)	-0.010** (0.024)	-0.010** (0.035)
	Contributory pension	0.056 (0.395)	0.100 (0.306)	0.061 (0.327)	0.042 (0.570)	0.060 (0.432)
	Universal pension	0.160** (0.039)	0.288** (0.028)	0.157** (0.037)	0.164** (0.038)	0.165** (0.042)
	Democracy (Polity2)		-0.020 (0.694)			
	Trade share			-0.000 (0.357)		-0.001 (0.278)
	(ln) AID/Gov.exp.				-0.013 (0.479)	-0.010 (0.602)
#Obs		775	680	756	680	677
#Countries		157	137	155	152	152
		0.77	0.76	0.77	0.76	0.76
Wald test		574.61	.	573.35	566.54	537.30
Log Likelihood ratio		-116.03	-104.97	-112.69	-106.57	-102.56

Note: Dependent variable is a binary indicator, whether or not the country has a targeted pension. Marginal effects reported and cluster robust standard errors in parentheses; significance levels: \* p<0.1, \*\* p<0.05, \*\*\*p<0.01; TP[t-1]= targeted pension in last period. All models include time-period fixed effects and regional dummies (World Bank region classification). Explanatory variables lagged by one period.

**Table 7: Determinants of universal social pension (2001-2012)**

		(1)	(2)	(3)	(4)
<b>Reform</b>	(ln) GDP pc	0.030 (0.811)	0.052 (0.679)	0.027* (0.056)	0.032** (0.027)
	(ln) GDP pc squared	-0.001 (0.877)	-0.002 (0.748)		
	Fertility rate	0.009 (0.446)	0.022** (0.026)	0.017* (0.072)	0.015 (0.138)
	Life expectancy rate	-0.002 (0.426)	-0.002 (0.444)	-0.004 (0.151)	-0.004 (0.110)
	Contributory pension	-0.078*** (0.010)	-0.071*** (0.002)	-0.056*** (0.002)	-0.055*** (0.003)
	Means tested	-0.006 (0.711)	-0.009 (0.553)	-0.009 (0.583)	-0.008 (0.615)
	Trade share		0.000** (0.019)		-0.000 (0.667)
	(ln) AID/Gov.exp.			0.011* (0.057)	0.013** (0.017)
<b>Persistence</b>	1.universal_l	0.762*** (0.000)	0.722*** (0.000)	0.660*** (0.000)	0.650*** (0.000)
	(ln) GDP pc	1.299*** (0.000)	1.975*** (0.000)	0.204*** (0.000)	0.199*** (0.000)
	(ln) GDP pc squared	-0.068*** (0.000)	-0.105*** (0.000)		
	Fertility rate	0.023 (0.500)	0.013 (0.575)	-0.020 (0.255)	-0.016 (0.448)
	Life expectancy rate	0.010*** (0.000)	0.015*** (0.000)	0.007*** (0.000)	0.007** (0.012)
	Contributory pension	-0.024 (0.323)	-0.021 (0.232)	-0.045 (0.199)	-0.051 (0.159)
	Means tested	-0.303*** (0.006)	-0.409*** (0.000)	-0.356*** (0.000)	-0.320*** (0.000)
	Trade share		-0.000** (0.037)		-0.000 (0.175)
	(ln) AID/Gov.exp.			0.056*** (0.000)	0.052*** (0.000)
	#Obs	775	756	680	677
	#Countries	157	155	152	152
	pseudo R-squared	0.89	0.89	0.89	0.89
	Wald test	1342.03	753.97	615.77	1107.20
	Log Likelihood ratio	-50.21	-48.55	-40.34	-39.58

Note: Dependent variable is a binary indicator, whether or not the country has a universal social pension. Marginal effects reported and cluster robust standard errors in parentheses; significance levels: \* p<0.1, \*\* p<0.05, \*\*\*p<0.01; UP[t-1]= targeted pension in last period. All models include time-period fixed effects and regional dummies (World Bank region classification). Explanatory variables lagged by one period.

**Table 8: Recipient Data Help Age Pension Watch data base**

Variables	Share > 60		Share eligible		Share > 60		Share eligible	
	OLS (1)	Tobit (2)	OLS (3)	Tobit (4)	OLS (5)	Tobit (6)	OLS (7)	Tobit (8)
Earnings related pension	-0.241** (0.095)	-0.396*** (0.125)	-0.344** (0.137)	-0.569*** (0.181)	-0.164 (0.107)	-0.256* (0.136)	-0.222 (0.149)	-0.349* (0.191)
Provident fund	-0.166 (0.103)	-0.077 (0.159)	-0.231 (0.152)	-0.107 (0.233)	-0.184 (0.124)	-0.089 (0.165)	-0.261 (0.176)	-0.127 (0.233)
(log) GDP pc	0.387 (0.302)	1.332 (0.846)	0.549 (0.435)	1.888 (1.195)	0.713 (0.514)	0.798 (1.057)	0.982 (0.725)	0.962 (1.456)
(log) GDP pc squared	-0.018 (0.016)	-0.066 (0.046)	-0.024 (0.023)	-0.092 (0.065)	-0.034 (0.030)	-0.040 (0.058)	-0.044 (0.042)	-0.047 (0.081)
(log) Population	-0.019 (0.016)	0.009 (0.026)	-0.024 (0.024)	0.018 (0.037)	-0.026 (0.023)	-0.026 (0.037)	-0.032 (0.032)	-0.037 (0.052)
Urban population	-0.001 (0.002)	-0.002 (0.003)	-0.001 (0.003)	-0.003 (0.005)	0.001 (0.002)	0.003 (0.004)	0.001 (0.004)	0.003 (0.005)
Share of >65 Population	-0.012 (0.007)	-0.018 (0.015)	-0.017 (0.011)	-0.026 (0.021)	-0.020* (0.012)	-0.027 (0.019)	-0.030* (0.016)	-0.040 (0.027)
Fertility rate	-0.099*** (0.032)	-0.178*** (0.048)	-0.152*** (0.049)	-0.271*** (0.071)	-0.110*** (0.033)	-0.136*** (0.049)	-0.171*** (0.049)	-0.211*** (0.070)
Life expectancy rate	0.001 (0.006)	0.003 (0.009)	-0.002 (0.008)	0.001 (0.013)	0.001 (0.005)	0.008 (0.008)	-0.002 (0.007)	0.010 (0.012)
Labor force participation	0.004 (0.003)	0.011* (0.006)	0.005 (0.004)	0.015* (0.008)	0.009** (0.005)	0.013* (0.007)	0.013** (0.006)	0.018* (0.010)
Trade share	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.002)	-0.000 (0.001)	-0.001 (0.002)	-0.000 (0.001)	-0.001 (0.002)
Savings	-0.001 (0.002)	-0.001 (0.005)	-0.002 (0.003)	-0.002 (0.007)	-0.002 (0.003)	-0.001 (0.005)	-0.003 (0.004)	-0.002 (0.007)
Democracy	0.005 (0.008)	0.024 (0.016)	0.007 (0.011)	0.034 (0.023)	0.009 (0.009)	0.026 (0.020)	0.012 (0.013)	0.034 (0.028)
East Asia & Pacific	-0.200 (0.141)	-0.379* (0.203)	-0.293 (0.214)	-0.551* (0.302)	-0.274* (0.141)	-0.446** (0.204)	-0.408* (0.221)	-0.685** (0.309)
Europe & Central Asia	-0.356** (0.146)	-0.566*** (0.211)	-0.529** (0.225)	-0.835*** (0.318)	-0.411** (0.179)	-0.596** (0.243)	-0.622** (0.277)	-0.917** (0.362)
Latin America & Caribbean	-0.211 (0.152)	-0.253 (0.208)	-0.288 (0.229)	-0.338 (0.305)	-0.412*** (0.142)	-0.555** (0.230)	-0.588** (0.223)	-0.829** (0.346)
Middle East & North Africa	-0.356** (0.145)	-0.593** (0.294)	-0.515** (0.219)	-0.846** (0.423)	-0.290 (0.202)	-0.505 (0.334)	-0.438 (0.307)	-0.779 (0.488)
North America	-0.111 (0.282)	-0.244 (0.313)	-0.185 (0.414)	-0.381 (0.464)	-0.241 (0.287)	-0.354 (0.311)	-0.395 (0.426)	-0.584 (0.455)
South Asia	-0.214 (0.144)	-0.411* (0.227)	-0.321 (0.219)	-0.606* (0.337)	-0.117 (0.168)	-0.321 (0.273)	-0.190 (0.253)	-0.515 (0.401)
ODA/Gov. expenditure					0.000 (0.000)	-0.003 (0.003)	0.000 (0.000)	-0.006 (0.004)
Constant	-1.010 (1.517)	-6.392 (4.432)	-1.310 (2.191)	-8.935 (6.269)	-2.984 (2.573)	-3.893 (5.551)	-4.015 (3.627)	-4.519 (7.640)
Sigma		0.308*** (0.032)		0.445*** (0.047)		0.271*** (0.032)		0.382*** (0.045)
#Obs	125	125	125	125	85	85	85	85
adj., pseudo R-squared	0.30	0.48	0.31	0.38	0.37	0.53	0.38	0.42

Note: Dependent variable is a share of recipients. Standard errors in parenthesis; Significance levels: \* p<0.1, \*\* p<0.05, \*\*\*p<0.01; All explanatory variables are lagged by one period. Base category for the region indicators is Sub-Saharan Africa.

Table 4: Variables and Sources

Variable	Description	Source
Social pension	Dummy variable that takes the value 1 if the country has a social (non-contributory) pension, 0 otherwise	SSPTW (2001-2013)
Universal pension	Dummy variable that takes a value of 1 if the country has a universal social pension (covering the entire elderly population); 0 otherwise	SSPTW (2001-2013)
Means-tested pension	Dummy variable that takes a value of 1 if the country has a targeted social pension; 0 otherwise	SSPTW (2001-2013)
Contributory pension	Dummy variables that takes a value of 1 if the country has a retirement scheme based on earnings and contribution or a provident funds; 0 otherwise	SSPTW (2001-2013)
(log) GDP per capita	Natural logarithm of real GDP per capita at chained Purchasing Power Parities (const 2011 US\$)	WDI (2014)
(log) Population	Natural logarithm of total population	WDI (2014)
Share of >65 Population	Total population 65 and older as share of total population	WDI (2014)
Fertility rate	Fertility rate is the rate of all births per woman	WDI (2014)
Life expectancy rate	Life expectancy at birth, total (years)	WDI (2014)
Trade share	Trade is the sum of exports and imports of goods and services measured as share of GDP.	WDI (2014)
Democracy	Dummy variable that is one if electoral determination of executive and legislative offices are existent; 0 otherwise.	Cheibub et al. 2010
Democracy (Polity)	Dummy variable that is one if the institutionalized democracy variable is larger six, and 0 otherwise.	Marshall et al. (2014)
Right party orientation	Dummy that is one for a right oriented government and zero if left or center oriented. Based on Chief Executive Party Orientation; Right (1); Left (3); Center (2); No information (0);	Beck, Clark et al. (2001) updated Jan. 2013
(log) AID/Gov. expenditure	Natural log of net official development assistance and official aid received as share of total governments expense. [Measure of recipient country's dependency on aid.]	WDI (2014)
East Asia & Pacific	Dummy variables that take a value of 1 if the country is located within the region (World Bank classification of Regions); 0 otherwise	WDI (2014)
Europe & Central Asia		
Latin America & Caribbean		
Middle East & North Africa		
North America		
South Asia		
Sub-Saharan Africa		

## Appendix

Table A1: Provision of social pension over time (absolute numbers)

Region	Means						Universal pension						N
	2001/2002	2003/2004	2005/2006	2007/2008	2009/2010	2011/2012	2001/2002	2003/2004	2005/2006	2007/2008	2009/2010	2011/2012	
EAP	3	3	3	4	4	5	4	4	3	3	4	4	24
ECA	25	24	30	30	30	25	1	2	2	2	2	3	49
LAC	12	13	15	15	16	18	0	1	1	1	1	1	33
MENA	1	2	2	2	2	2	0	0	0	0	0	0	16
NA	2	2	2	2	3	3	1	1	1	1	1	1	3
SA	0	1	2	2	2	2	0	1	1	1	1	1	5
SSA	3	3	2	3	3	3	2	2	2	2	3	3	39
All	46	48	56	58	60	58	8	11	10	7	12	13	169

Region	Universal minimum pension						Recoverable universal pension						N
	2001/2002	2003/2004	2005/2006	2007/2008	2009/2010	2011/2012	2001/2002	2003/2004	2005/2006	2007/2008	2009/2010	2011/2012	
EAP	0	0	0	0	0	0	3	3	3	3	4	4	24
ECA	0	2	2	2	1	1	15	15	15	15	16	21	49
LAC	4	5	5	5	5	6	2	2	3	3	3	3	33
MENA	0	0	0	0	0	0	2	2	2	2	2	2	16
NA	0	0	0	0	0	0	1	1	1	1	1	1	3
SA	0	0	0	0	0	0	1	1	0	0	0	0	5
SSA	0	0	0	0	0	0	1	1	1	1	0	0	39
All	4	7	7	7	6	7	25	25	25	25	26	31	169

Source: SSPTW reports (various issues).

**Table A2: List of countries per region (N = 169)**

Region	Country	Region	Country	Region	Country	Region	Country
Europe & Central Asia	Albania	Latin America & Caribbean	Antigua and Barbuda	Sub-Saharan Africa	Benin	East Asia & Pacific	Australia
	Andorra		Argentina		Botswana		Brunei Darussalam
	Armenia		Bahamas, The		Burkina Faso		China
	Austria		Barbados		Burundi		Fiji
	Azerbaijan		Belize		Cabo Verde		Hong Kong SAR, China
	Belarus		Bolivia		Cameroon		Indonesia
	Belgium		Brazil		Central African Republic		Japan
	Bulgaria		Chile		Chad		Kiribati
	Croatia		Colombia		Congo, Dem. Rep.		Korea, Rep.
	Cyprus		Costa Rica		Congo, Rep.		Lao PDR
	Czech Republic		Cuba		Cote d'Ivoire		Malaysia
	Denmark		Dominica		Equatorial Guinea		Marshall Islands
	Estonia		Dominican Republic		Ethiopia		Micronesia, Fed. Sts.
	Finland		Ecuador		Gabon		Myanmar
	France		El Salvador		Gambia, The		New Zealand
	Georgia		Grenada		Ghana		Palau
	Germany		Guatemala		Guinea		Papua New Guinea
	Greece		Guyana		Kenya		Philippines
	Hungary		Haiti		Liberia		Samoa
	Iceland		Honduras		Madagascar		Singapore
	Ireland		Jamaica		Malawi		Solomon Islands
	Isle of Man		Mexico		Mali		Thailand
	Italy		Nicaragua		Mauritania		Vanuatu
	Kazakhstan		Panama		Mauritius	North America	Vietnam
	Kyrgyz Republic		Paraguay		Niger		Bermuda
	Latvia		Peru		Nigeria		Canada
	Liechtenstein		St. Kitts and Nevis		Rwanda	South Asia	United States
	Lithuania		St. Lucia		Sao Tome and Principe		Bangladesh
	Luxembourg		St. Vincent and the Grenadines		Senegal		India
	Moldova		Trinidad and Tobago		Seychelles		Nepal
	Monaco		Uruguay		Sierra Leone		Pakistan
	Netherlands		Venezuela, RB		South Africa		Sri Lanka
	Norway		Virgin Islands (U.S.)		Sudan		
	Poland	Middle East & North Africa	Algeria		Swaziland		
	Portugal		Bahrain		Tanzania		
	Romania		Egypt, Arab Rep.		Togo		
	Russian Federation		Iran, Islamic Rep.		Uganda		
	San Marino		Israel		Zambia		
	Serbia		Jordan		Zimbabwe		
	Slovak Republic		Kuwait				
	Slovenia		Lebanon				
	Spain		Libya				
	Sweden		Malta				
	Switzerland		Morocco				
	Turkey		Oman				
	Turkmenistan		Saudi Arabia				
	Ukraine		Syrian Arab Republic				
	United Kingdom		Tunisia				
	Uzbekistan		Yemen, Rep.				

Note: Classification according to the World Bank (WB 2014).