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Economic Crises and Globalisation as Drivers of Pension Privatisation: An Empirical Analysis

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Markus Leibrecht
Henley Business School, Malaysia Campus, Kota Ilmu,
Educity 79200 Iskandar Puteri Johor, Malaysia

Joelle H. Fong
Nanyang Business School, Nanyang Technological University,
Singapore

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Abstract

Pension systems are core institutional arrangements that are expected to be stable and reliable over consecutive generations. Nevertheless, reforms in pension provision intensified over the past decades, with several countries opting for privatisation of their pension system. We ask which factors lead governments to privatise pension systems and focus on economic crises and different facets of increased global pressures. We conduct duration analyses on a cross-section of nearly 100 economies among which 28 privatise their pension system between 1981 and 2012. Consistent with the crisis-begets-reform hypothesis, we find that severe economic crises speed up reform implementation. Likewise, high growth in economic and political globalisation is conducive for pension privatisation. These findings are robust to a variety of alternations in the empirical methodology.

Contacts

Markus Leibrecht, Henley Business School, Malaysia Campus, Malaysia
m.leibrecht@reading.ac.uk

Joelle H. Fong, Nanyang Business School, Nanyang Technological University, Singapore
joelle.fong@ntu.edu.sg

1   Introduction

Social security systems - being deeply rooted in the public perception of societies - traditionally belong to a set of core institutional arrangements that are expected to be stable and reliable over consecutive generations. Nevertheless, reforms in social insurance systems have intensified over the past decades with reform activity being not only prevalent in developing countries, but also in advanced and developed countries (see, for example, Schludi, 2005; Holzmann, 2013; Spruk and Verbĭc, 2016). Whether and to what extent a pension system elects to reform bears important implications for the nation's capital accumulation and related capital flows in financial markets, retirement provision, old-age poverty levels and, thus, economic welfare and development.

Concerning the extent of pension reforms, we see that countries frequently conduct incremental changes of a given pension system, like increases in retirement age or of contribution rates. Structural changes of the entire pension system, notably from a traditional pay-as-you-go system (PAYGO) to a system based on individual saving accounts, are relatively rare events.

A growing body of literature focuses on the political economy of pension reforms, regulatory changes in pension systems and on the reasons why reform efforts have succeeded or failed. Several studies highlight the importance of contextual factors such as political institutions and political constraints (Spruk and Verbĭc, 2016; Levy, 2002); degree of democratization (Mesa-Lago and Müller 2002); demographic aging (Góra 2013); economic stagnation and unemployment (Jensen and Richter, 2004); levels of external and internal debts (Müller, 2001; James and Brooks 2001); social dialogue and access to information (Sarfati and Ghellab, 2012; Boeri and Tabellini, 2012); peer adoption (Brooks 2005, 2007a); globalisation (Lesay, 2006; Brooks, 2007b) and cultural diffusion (Williamson et al., 2006). Influence exerted by external actors and their strategies such as the International Monetary Fund, World Bank, European Union and OECD may also shape pension reform discussions (Hering, 2006; Müller, 2003a; Huber and Stephens, 2000).

Despite this inventory of possible determinants, relatively few studies have sought to investigate econometrically the determinants of pension reforms. A recent empirical study which tries to narrow this gap is Spruk and Verbĭc (2016). Using a dataset of 36 high-income countries, these authors examine the political and institutional factors influencing pension reform efforts. Applying a fixed effects logit approach, Spruk and Verbĭc (2016) find that countries with stronger constraints on the chief executive as well as greater political competition and fiscal

federalism are significantly more likely to reform. Notably, Spruk and Verbĭc (2016)'s definition of reform pertains either to reforms of old-age social security legislation facilitating changes in PAYGO pension schemes or to supplementary reforms aiming at strengthening the third pension pillar (cf. Section 2.1 on the various pension pillars) rather than the privatisation of the pension system.

In contrast, Brooks (2005) explicitly focuses on pension privatisations. Brooks (2005) utilizes panel data from a range of countries. She applies Cox-duration analysis and focuses on the role of peer effects for structural market-oriented pension reforms.[1] Brooks (2005) finds that demographic aging, democracy, international financial pressure and domestic financing constraints are crucial factors that shape the pension reform decision, in addition to peer dynamics. A follow-on study (Brooks, 2007a) further reveals that peer adoption effects tend to matter more in developing middle-income countries than among advanced industrial nations (Brooks 2007a). This study is based upon a bivariate Probit analysis and a large panel of country-year observations. Interestingly, most of the control variables which are significant in Brooks (2005) cease to have a significant impact on structural market-oriented pension reforms in Brooks (2007a). This may signal that determinants of reform hazard are different from drivers of reform likelihood.

In this paper, we, too, explore drivers of pension privatisations. We consider structural differences in a broad range of economic, political and cultural determinants across reforming and non-reforming countries. Using a dataset comprising almost 100 economies around the world, we quantify the accelerating and decelerating effects, respectively, various external and internal factors exert on a country's time until it fully or partially privatises its pension system.

We define pension privatisation as the implementation of a mandatory, fully-funded and privately-managed pension scheme in an economy either through legislation or other official action. Such a scheme is also known as a "second-pillar" under the World Bank's 1994 multi-pillar pension classification system (World Bank, 1994). Technically, a second-pillar scheme may provide payments based on either defined contributions (DC) or defined benefits (DB) although the former is much more predominant.[2] For the purposes of this paper, we focus solely on the adoption of second-pillar pension schemes that are of the DC type. Thus, pension privatisation comprises the implementation of (i) a fully-funded pension scheme, which (ii) is administered by private entities and where (iii) retirement benefits are provided based on defined

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[1] Peer effects capture systematic ties between the likelihood of adopting an innovation in one location and the number or proportion of relevant prior adopters in a social system.

[2] Three countries (the Netherlands, Switzerland and Iceland) implement a second-pillar of the DB type while more than 30 countries introduce a second-pillar of the DC type (cf. section 2.1).

contributions (DC, i.e., the pension pot depends on contributions and the interest earned on them).

The paper contributes to the current literature in several ways. While prior studies have provided qualitative discussions of how economic crises may be linked to structural market-oriented pension reforms, to the best of our knowledge, our paper is the first to econometrically assess the impact of economic crises on pension privatisations. Another contribution is that we explore the effects different facets of globalisation on the speed of pension privatisations. Although Brooks (2005 and 2007a) include foreign direct investment and trade flows to control for global pressures, these variables only capture one of several facets of globalisation, namely economic globalisation (e.g., Dreher, 2006). Besides economic globalisation, also political and social globalisation may spur pension privatisations. Finally, we directly model the determinants of time until pension privatisation is implemented. Our focus on the speed of pension privatisation, thus, usefully complements existing studies which have largely emphasised the likelihood of pension reforms.

The remainder of the article is organized as follows. Section 2 provides an overview of pension privatisations worldwide and it outlines why economic crises and increased global forces may determine such reforms. Section 3 presents data and methodology. Section 4 evaluates the effect of various determinants on time until pension privatisation is implemented. The last section summarises and concludes the study.

2   Institutional and theoretical background

2.1   Pension reform landscape

The World Bank multi-pillar approach to old-age security initially comprises three key pillars (World Bank, 1994). The "first-pillar" is a publicly-managed and tax-financed scheme, the "second-pillar" is a mandatory, fully funded and privately-managed scheme. The "third-pillar" is voluntary retirement savings. Holzmann and Hinz (2005) later refined the classification system proposing a multi-pillar pension system composed of some combination of five basic elements: (i) a non-contributory "zero pillar" social assistance scheme that provides a minimal level of protection; (ii) a "first-pillar" contributory scheme that is linked to varying degrees to earnings and seeks to replace some portion of income; (iii) a "second-pillar" that typically comprises of individual savings accounts that are mandatory; (iv) a voluntary savings-based "third-pillar" and (v) a non-financial "fourth-pillar" comprising access to formal social programs and informal support. In characterizing the nature of risks under each element, Holzmann and Hinz (2005)

note that "second-pillar" schemes can better insulate individuals from political risks than "first-pillar" schemes since the former are *privately-managed* while the latter are *publicly-managed*. The downsides of "second-pillar" schemes, however, are the risks of financial market volatility and higher transaction costs.

The United Kingdom and the United States are among the countries classified by the World Bank as having a first-pillar and no second-pillar. The UK's public pension scheme comprises two tiers, namely a flat-rate basic pension called the Old Age Pension and an additional pension available to employees paying National Insurance contributions. In the United States, the dominant pension scheme is the Social Security - a DB type PAYGO plan legislated in 1935 and administered by the US federal government.[3] In contrast, Hong Kong (PRC) and Australia are classified as having a second-pillar and no first-pillar. Both these countries have a system of privately-managed, mandatory, occupational retirement schemes that are primarily DC in nature. Countries classified as having both first- and second-pillars include Armenia, Estonia, Ghana, Norway, Peru and Sweden.

A catalogue of countries with "second-pillar" pension schemes is available from the World Bank Pension Database, which contains data for mandatory pension systems for more than 180 countries around the world. The database provides rich information on the various retirement income schemes in each country, including the type of scheme operating under the first three pillars, scheme contribution rates, design parameters, scheme coverage and pensions spending.

As at 2012, there are 30 economies listed as having a second-pillar scheme of DC type. From related source (Pallares-Miralles et al., 2012), we uncover another three economies (Argentina, Bolivia and Hungary) that had similar schemes in the 1990s but which have been closed very recently. Due to lack of data we remove Ukraine and Ghana from our sample.[4] This yields a list of 31 countries in total for which the year of implementation of the second-pillar scheme of DC type is available (see Table A1).

Chile is the first-mover in pension privatisation. The new Chilean system starts operating on May 1st, 1981. Chile dramatically reforms its retirement system by replacing its insolvent PAYGO, DB system with a fully-funded mandatory individual savings accounts scheme. Workers are required to contribute about 10 percent of their monthly earnings, up to a maximum of 60 Unidades de

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[3] Another country that falls into the same category is Singapore, which hosts a government-run national DC provident fund scheme.

[4] The World Bank Pension Database has missing values for the year of scheme implementation for Ukraine, Ghana and Sweden. For Sweden, however, we are able to impute the implementation year based on information from public sources. Sweden's second-pillar occupational pension scheme (primarily with reference to the new ITP1 plan) switched from a DB to DC plan in 2007 (see, OECD, 2013, p. 345).

Fomento (approximately US$2,400) per month to their individual accounts (see OECD, 2011 for details). This structural change in the Chilean pension system plays a key role in Chile's economic development. In particular, the reform has been successful in improving the long-term sustainability of Chile's pension system and in promoting the development of capital markets (Iglesias-Palau, 2009).

Several other countries within the Latin America region also implement second-pillar pension schemes. Peru introduces a second-pillar in 1993, Argentina and Columbia in 1994, Uruguay in 1996, Mexico in 1997, Bolivia and El Salvador in 1998, Costa Rica in 2001, Dominican Republic in 2003 and Panama in 2008. And, the Chilean pension system has since become a model for pension reformers around the world, not least as it is held up by international organisation like the World Bank as an example to follow.

The pattern of pension privatisations is visualized by Figure 1 which displays the cumulative number of countries with second-pillar DC schemes in the world over time. Given this pattern, in the empirical analysis we set 1980 as $t = 0$ and evaluate time at risk for reform starting from year 1981.

<Figure 1 here>

2.2 Economic crises and global pressures as drivers of pension privatisations

2.2.1 Economic crises

Economic crisis can lead to economic reform in case they make aware the need for reform and in case they weaken the political power of antireform vested interests (Mahmalat and Curran, 2017; Drazen, 2010; Brooks and Kurtz, 2007).

Table A1 shows that pension privatisations are concentrated in Latin America as well as Eastern Europe and Central Asia. Countries in these regions are hit by severe economic crises in the 1980s and 1990s. Several scholars (e.g., Mesa-Lago, 1993; Müller, 2000, 2001, 2003b and 2008; Madrid, 2002) suggest that this severe economic turmoil may have acted as driver of pension privatisation. For instance, according to Mesa-Lago (1993), the economic crises of the 1980s aggravated the financial problems of social security in many Latin American countries. Revenues declined because of increasing rates of unemployment and informality of the labour force. In addition, skyrocketing inflation stimulated employers' evasion and payment delays and led to a sharp drop in real capital returns. At the same time expenditures increased not least as pensions were adjusted to inflation. Against this background, the need for social security reform was

imperative. And, given the success of the radical Chilean pension reform, pension privatisation became a relevant option (Mesa-Lago, 1993, pp. 3).

Likewise, several East European and Central Asian countries witnessed severe economic crises before embarking on pension privatisation (Müller, 2003b and 2008). These economic crises manifested structural and institutional weaknesses of the former communist countries (e.g., EBRD, 1998). The need to signal investors the commitment to cope with these structural weaknesses was imperative. Pension privatisations were seen by policymakers as one means for this end (e.g., Müller, 2003b and 2008).

But economic crises might have ignited pension privatisations also in developed economies. Specifically, Gronwald (2012, pp 175) explicates that when Sweden faces its heaviest post-war economic crisis in the early 1990s, a major pension reform plan is launched which leads to profound changes of the pension system by introducing a higher degree of individualisation and commercialisation. Gronwald (2012, pp 192) notes that the economic crisis in the early 1990s leads to severe problems in financing public pension expenditures via the public budget. To combat the shortfall in revenues, considerable increases of contributions rates and taxes would be necessary according to Sweden's National Social Insurance Board. But, contribution rates are already high in the early 1990s and, thus, further increases in contribution rates are deemed to be unfeasible. More far-reaching pension reform ideas, like pension privatisation, are borne and implemented. Likewise, Coates (2002) mentions that rising debt and current account deficits played a certain role in the decision to privatise the pension system in Australia.

This descriptive evidence is consistent with the view that economic crises indeed trigger *an awareness* for the *need* for pension *reform*, including the option of pension privatisation. By considering that economic crises shift the power dispersion in the political sphere, Drazen and Grilli (1993) pinpoint one mechanism why economic crises lead to *implementation of reforms*.

Their key message is that an economic crisis makes interest groups "more amenable to reform" (Drazen, 2010, p. 13). Drazen and Grilli (1993) use the war of attrition model of Alesina and Drazen (1991) which postulates that political conflict about the distribution of costs of an economic reform delays the implementation of the latter (Alesina et al., 2006; Lora and Olivera, 2004). Over time a political group may realize that costs of non-reforming likely outweigh the costs from reforming it faces. Thus, "[a]t some point, one of the groups finds it too costly to wait, and it concedes…" (Alesina et al., 2006, p. 5). Drazen and Grilli (1993) argue and show that an

economic crisis - by increasing costs of non-reforming - reduces time until an economic reform is implemented.[5]

Drazen and Grilli's (1993) approach is suitable for sketching the role economic crises play in pension privatisation. According to the war of attrition model, especially those reforms are delayed which imply a change in entitlements and are subject to extensive political debate (Mahmalat and Curran, 2017; Lora and Olivera, 2004). Put differently, for such reform projects, economic crises are especially conducive for hasting implementation.

Pension privatisation is an example of politically disputed reform, not least as converting traditional PAYGO systems into systems based on a higher degree of individualisation and commercialisation imply a radical change in the core institutional environment. And, pension privatisation creates significant winners, like high income-earners or financial service companies, and losers, especially lower-income earners and women with broken employment histories (Orenstein, 2011). Without economic crises hitting an economy, pension privatisations are prone to be substantially delayed.

Consistent with the Drazen and Grilli (1993) model, Mesa-Lago and Müller (2002) as well as Müller (2008) stress that economic crises result in significant shifts in the constellation of political actors in the pension reform arena: Ministries of Finance, staffed by more liberal economists, gain relative power over Ministries for Social Policies. Mesa-Lago and Müller (2002) as well as Müller (2008) conclude that the economic crisis-induced shift in political power dispersion has enabled pension privatisation in Latin America as well as in Central and Eastern Europe, the country groups where the vast majority of pension privatisations take place.

Based on this discussion, we hypothesise that economic crises decrease time until pension privatisations are implemented.

2.2.2 Global pressures

Discussing the role increasing global pressures play for structural market-oriented pension reforms, Brooks (2007b) stresses that "...global economic forces came to be seen by many analysts as an important catalyst behind the adoption of market-oriented pension reforms." (p. 33) One reason for this prominent role is that increasing economic globalisation, made possible

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[5] Economic crises ease reform implementation as they lead people to accept the uncertainty associated with reforms (Drazen, 2010). In addition, Heinemann and Grigoriadis (2016) mention that deep economic crises weaken status quo biases, which is important when it comes to radical institutional changes, and they "help politicians to communicate institutional change as a project not driven by particular interest groups but by mere necessity." (p. 672f) Thus, economic crises are a "political window of opportunity" for far reaching institutional change (e.g., Roberts and Saeed, 2012, p 53).

due to rapid economic liberalisation, acts as a restraint on governments (see e.g., Wilson and Wildasin, 2004 on tax competition). Specifically, with increasing global integration some governments may not be able to finance extensive social security safety nets and financial needs of traditional PAYGO pension systems via taxes partly borne by mobile capital (e.g., payroll taxes). Governments may opt to privatise the pension system to cope with these new realities.

And, with increasing economic globalisation, the bargaining power of immobile production factors, notably low-skilled labour, weakens (Brooks, 2007a). This group of workers likely is favouring PAYGO schemes over individual accounts as from a macroeconomic perspective state-run PAYGO schemes are similar to other public income transfers (Barr and Diamond, 2006). In an environment which increasingly favours mobile factors (capital) governments may not only see the need to privatise, but they may also see the opportunity to privatise pension systems. Furthermore, pension privatisations may send a credible policy signal to investors that a country, which has recently opened borders for mobile capital, is committed "to playing by the market rules" (Brooks, 2007b, p. 39). Thus, rapid economic globalisation should accelerate the speed pension systems are privatised.

However, globalisation is a multi-faceted phenomenon. Besides economic globalisation, also political and social globalisation may spur economic reforms. Specifically, political globalisation means that a country increasingly interacts with other countries, for instance in form of joining international organizations or by signing international treaties (see Dreher et al., 2008). Increasing political globalisation, thus, may be paired with international organizations exerting increased "soft power" (Brooks, 2007b, p. 37) on governments to implement economic reforms, including those of the pension system. Likewise, social globalisation, for instance in form of increasing levels of tourism and foreign workers in a country or access to the internet (see Dreher et al., 2008), may lead to increased reform pressures from voters who increasingly exchange information with citizens from foreign nations.

Given this discussion, we hypothesise that increased exposure to global forces reduces time until pension privatisation is implemented. Yet, while this negative relation between speed of globalisation and time until reform is expected to apply for all facets of globalisation (economic, political or social), it is an empirical question which facets play the most prominent role.

3   Variables and Methodology

3.1   Independent variables of main interest

A variety of indicators has been suggested for economic crisis in prior literature (see e.g., Pitlik and Wirth, 2003; Agnello et al., 2015). For crisis to trigger reform, the latter should be directly linked to the crisis (Drazen, 2010; Brooks and Kurtz, 2007). From our discussion in Section 2.2.1 we expect that pension privatisation is directly related to skyrocketing inflation: Hyperinflation is a key cause of the severe crisis many PAYGO pension systems faced in the 1980s and 1990s. In addition, Mesa-Lago and Müller (2002) as well as Müller (2008) stress that pension privatisations are used by governments to credibly signal the commitment to market-oriented structural reforms. The need for the latter is often indicated by very weak or even negative real economic growth (e.g., Lipton, 2016). And, as outlined for instance by Roberts and Saeed (2012) and Orenstein (2011), high public indebtedness facilitate privatisations.[6] Thus, besides inflation crises and crises in macroeconomic growth also public debt crises may be conducive for pension privatisation.

However, as argued and shown by Drazen and Easterly (2001), the magnitude of an economic crisis is relevant for analysing the role crises play for economic reform. They show that an economic crisis must be severe enough for incentivising legislatures to implement economic reform ("strong crises-induce-reform hypothesis"). This point has implications for the operationalisation of an economic crisis as it introduces the need for defining a threshold which separates "true" crisis episodes from more benign values of crisis indicators (Waelti, 2015).

Against this background, we use the following variables to operationalise severe economic crises:

1) a dummy variable indicating mean yearly inflation rate > 100 percent (*Extreme Inflation*); here we follow Drazen and Easterly (2001, Table 1) who show that a median inflation rate of 94 percent is needed to see a significant drop in inflation rates after five years; however, as a 100 percent threshold is very strict, we also apply the more lenient crisis definition of a mean inflation rate >= 20 percent (*Inflation>=20*) used by Reinhart and Rogoff (2009)[7]; in addition, we also calculate a variable which measures by how much

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[6] This view is corroborated, for instance, by privatisation efforts in many European countries during the running-up to the introduction of the Euro (e.g., Parker, 2003).

[7] In our sample episodes of deflation are rare and are also of comparably minor extent. In the construction of averages, we nevertheless take the absolute value of consumption price changes to avoid cancelling of episodes with inflation and deflation.

the inflation rate of a particular country in a particular year is larger than the average inflation rate of the country-group the country belongs to; this variable bases the inflation crisis threshold on the deviation from the region-specific average (*Inflation>region average*); it is, thus, an example of a relative crisis measure (see Mahmalat and Curran, 2017 on this issue);

2) a variable capturing the importance of years with *negative growth rates in real GDP* <-0.2% in total years at risk; we follow Bjørnskov (2016) and opt for the stricter rule of <-0.2% instead of a 0%-benchmark as a zero growth rate in real GDP may simply arise due to imprecise measurement of national accounts in poor countries and due to revisions which tend to smooth out GDP volatility; thus, using a real growth rate of 0% as threshold-value may introduce measurement error (see Bjørnskov, 2016 on this issue);[8]

3) an indicator for the importance of *sovereign debt crises* and debt restructuring in the Laeven and Valencia (2012) definition in total years at risk; we opt for sovereign debt crises rather than an indicator directly based on public debt-to-GDP ratios as debt crisis may arise at very different levels of public debt (due to differing degrees of "debt intolerance"; Reinhart et al., 2003; Mahmalat and Curran, 2017).

We expect that time until reform is shorter in countries which frequently experience severe economic crises.

To capture increases in global pressures, we use the growth rate in the KOF Index of Globalisation (*Globalisation (overall)*); Dreher, 2006; Dreher et al., 2008). One advantage of this index is that it incorporates economic, social and political dimensions.

1) *Economic globalisation* is measured by the actual flows of trade, foreign direct investment and portfolio investment;

2) *Social globalisation*, being the spread of ideas, information, images and people, is estimated by personal contacts (e.g. transfers, tourism), information flows (e.g. internet users, television ownership) and cultural proximity (e.g. number of McDonald's restaurants);

3) *Political globalisation* is characterized by the degree of political cooperation. It is measured by the number of embassies, membership in international organizations,

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[8] Results using the 0%-benchmark and the -1%-benchmark are very similar to those presented in Section 4. The statistical significance of coefficients is slightly lower (p-values <0.1 instead of <0.05) in case of the 0%-benchmark.

participation in UN Security Council missions and number of international treaties signed.

We expect that a higher pace with which a country opens its borders to foreign capital, goods, people, services and ideas will reduce time until a structural market-oriented pension reform is implemented.

3.2 Control variables

We use a representative set of economic, political and cultural control variables derived from previous studies (e.g., Brooks 2005 and 2007b). *GDP per capita* and *population size* capture economic development and the size of a country, respectively. The *share of working age persons* (15-64 years) controls for the urgency to reform traditional PAYGO pension systems. A higher share of working population is conducive for having a sustainable PAYGO system in force and should delay pension reform. A higher level of *democracy* is frequently shown to increase scope and likelihood of economic liberalization and deregulation (e.g., Giuliano et al., 2013). From this we hypothesise that for more democratic societies also the time to implementation of a pension privatisation will be shorter. We also include dummy variables to control for *regional groupings* and group fixed effects: Latin America; Eastern Europe and Central Asia (EECA); and others.

3.3 Empirical methodology

Following Berggren et al. (2016), we implement parametric survival models of the accelerated failure time (AFT) type. The dependent variable is the (log of) years at risk of reforming. Thus, parameters measure the effect of the covariates directly on the mean survival time (time until reform) which allows for an easy interpretation of coefficients.

Formally, the log-linear form of the AFT model with respect to time is given by (Rabe-Hesketh and Skrondal, 2012):

$$T_i = \exp(\beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n)\exp(\alpha + \varepsilon_i) \qquad (1a)$$

or

$$\log T_i = \alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n + \varepsilon_i \qquad (1b)$$

where T_i is time until reform for country *i*. Unlike a standard linear regression model, the maximum-likelihood based AFT-estimator controls for censoring. As a type of parametric survival approach, the AFT-estimator assumes a specific distribution for $\exp(\alpha + \varepsilon_i)$. Conditional on a correct distributional assumption, the AFT-estimator is consistent and efficient.

Standard information criteria are applied to determine the optimal parametric distribution for survival time.

By default, the first year of risk is set at 1981 which is the year Chile implements the first-ever second-pillar scheme. For former communist countries, however, the first year at risk is adjusted to the year in which the country gained independence (mostly around 1992).

We use mean values of time-varying independent variables to capture structural differences across countries: for reforming countries (event = 1), the average is taken from the first year at risk until the year prior to reform. For non-reforming or censored countries (event = 0), the mean is taken from the first year at risk until the year prior to censorship i.e. 2011.

Our initial sample comprises a total of 98 countries with GDP per capita (in constant 2005 US$) of at least $670 in 1980. This threshold reflects Egypt's GDP per capita in 1980, which is the lowest among the list of 31 reforming countries identified per Table A1. After excluding Hong Kong (PRC) and Kosovo for which data on several key variables are lacking, we are left with a final analytical sample of 96 countries of which 28 implemented a second-pillar DC scheme between 1981 and 2012.

To reduce the influence of heteroscedasticity, independent variables with strictly positive values enter our regressions in logged form. Because of the somewhat small number of observations, we start with a parsimonious model which comprises the key explanatory variables identified above: *GDP per capita*, *population size*, *share of working age persons*, *level of democracy*, *regional dummies*, indicators for *economic crisis* and for *globalisation*. Table 1 provides descriptive statistics and further information on sources for the variables used in the analysis.

<Table 1 here>

4 Results

4.1 Equality of means of economic crises and globalisation variables

Table 2 contains mean values of our independent variables of main interest for reforming (event = 1) and non-reforming countries (event = 0). Means are larger for reforming countries. For example, 29 percent of reforming nations experience extreme inflation, while only four percent of non-reformers face a mean inflation rate > 100 percent. Thus, economic crises are more likely in reforming countries and they globalise more rapidly. For most cases means are also statistically different at conventional significance levels. These results provide a first support

for our assertions that economic crises and increased global pressures drive pension privatisations.

<Table 2 here>

4.2 Duration analysis

Table 3 reports findings with respect to the appropriate distributional assumption for $\exp(\alpha + \varepsilon_i)$. It contains information criteria for five different distributional assumptions and for models including and excluding independent variables of main interest. Two aspects are relevant. First, according to the information criteria (AIC and BIC) the log-logistic model fits the data best. Thus, remaining estimations are based upon this distribution. Second, adding variables of main interest substantially lowers AIC and BIC which is another indication that these variables matter for pension privatisation.

<Table 3 here>

Table 4 presents the estimation results for our base model with the various crisis and globalisation variables. In Columns (1) - (6), we explore the effects of alternative measures of economic crisis on reform speed. In Column (7), the overall globalisation growth variable is split into its sub-components to individually assess the effects of economic, political and social globalisation on reform speed.

Results generally support our hypothesis on the positive relationship between economic crisis and speed of pension privatisation. Severe inflation crises and negative growth in real GDP <-0.2% significantly accelerate pension privatisations. In particular, the mean time till reform for an economy with extreme inflation is about 69 percent $[0.69 = \exp(-0.374)]$ that of a country without extreme inflation, all else equal. For *Inflation>=20* the effect is similar. And for mean growth in real GDP < -0.2% the semi-elasticity is -1.1.

However, frequent exposure to sovereign debt crises and debt restructuring does not speed up pension privatisation (Column 6). In case of pension privatisation one must bear in mind that a privatising country likely faces high "transitional costs" from privatisation: Two different pension systems, the old and the new second-pillar type system, will be in force at the same time (James and Brooks, 2001). These transitional costs likely require even higher public debt commitments. Governments facing severe debt problems may not be able or willing to afford these transitional costs, which may explain the insignificant impact of *Sovereign debt crises*.

When we additionally include a dummy variable capturing "medium high" average rates of inflation (variable *Moderate Inflation* defined as 10% < mean inflation rate < 100%) in model (1), this variable falls short of statistical significance (*cf*. Column 6). The result supports Drazen and Easterly's (2001, p. 131) finding that economic reforms are induced by extremely bad economic situations, but not "medium" bad situations.

Turning to the effects of growth in globalisation, Table 4 suggests that a higher pace of globalisation generally hastens market-based pension reforms. All models estimated show a negative significant effect (at least at the 5% level) of overall globalisation growth on the time until reform. For example, Column (1) indicates that a one standard deviation increase in *Growth globalisation (overall)* reduces mean time to reform by 28 percent (0.72 = exp(-0.217*1.46)). The breakdown by sub-components in Column (7) reveals that much of explanatory power stems from economic and political globalisation growth while social globalisation is statistically insignificant. These results signal that both, foreign investors and international organisations are successful in exerting pressure on national governments to privatise pension systems.

With regards to control variables, Table 4 signals that time until reform is substantially lower in Latin America and EECA than in the rest of the world, a finding that fits the descriptive picture in Table A1. Countries with a high share of people between 15 to 64 years of age reform later. This is consistent with the view that reforming traditional PAYGO, DB-type pensions systems is not of predominant importance in such environments. And, according to our results, survival time is lower in richer countries. This may signal that low-income countries lack the financial infrastructure necessary to privatise pension systems (Madrid, 2002).

In contrast, we are not able to verify that more democratised countries privatise pension systems quicker. While the coefficient is negatively signed as expected, it also falls short of statistical significance. Results also imply that a country's size does not have any significant impact on speed of reform.

<Table 4 here>

Note that we re-run the regression in Column (1) using globalisation *level* in lieu of overall globalisation growth. Results confirm that it is the pace of globalisation that matters for reform, rather than the average attained level of globalisation. This is consistent with the notion that

globalisation is most conducive for pension privatisations in the early years a country opens its borders for foreign capital, goods, services, people and ideas.[9]

4.3   Sensitivity analysis

4.3.1   Additional control variables

In the literature on reform drivers a broad range of additional variables finds interest. One is *World Bank loans as percentage of GDP*. Specifically, the 1994 World Bank blueprint for multi-pillar pension reform is influential among developing countries. Conditions under which loans are granted by international organizations such as the World Bank may also shape public policies in recipient countries (e.g., Holzmann 1999; Orenstein, 2011).

High degrees of ethnic and *legislative fractionalisation*, due to different views on the "optimal" economic policy, may lead to stalemate in political decisions making which increases time until economic reforms are implemented (e.g., Agnello et al., 2015). Ethnic fractionalisation is also among the better predictors of interpersonal trust in a country (Bjørnskov, 2007). A high degree of ethnic fractionalisation signals low levels of interpersonal trust. The latter, in turn, has been shown to be conducive for economic deregulation and speed of reform (e.g., Berggren et al., 2016; Heinemann and Tanz, 2008).

However, concerning legislative fractionalisation, Campos et al. (2010) point out that high fractionalisation can help reform not least as it provides "incentives for exploring new coalitions and bases for agreement on burden-sharing (and thus more ways out of the impasse over reform)". (p. 1677). Thus, the impact of *legislative fractionalisation* on time until reform is ambiguous *a priori*. Furthermore, Campos et al. (2010) interpret party fractionalisation as a measure of political crisis as it reflects challenges in putting together a governing coalition and thereby to stay in power for any significant period of time. Thus, by including *legislative fractionalisation* in our analysis, we are also able to indicate whether economic or political - or both - crises matter for pension privatisations.

Government size may also shape speed of privatisation in a country. On the one hand, countries with larger governments have a larger potential to privatise (e.g., Roberts and Saeed, 2012). This larger potential for reform may lead to faster implementation of pension privatisations. On the other hand, large and strong governments may also be reluctant to give up political power by

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[9] We also run regressions which include the statistically significant crisis indicators (i.e., Inflation crisis and negative growth in real GDP) jointly in the empirical model. Both coefficients are still negatively signed but they fall short of statistical significance with p-values around 0.15. This is not unexpected given the rather high point biserial correlation coefficients of >0.5.

reforming, and a large government may simply be an indication for societies having preference for public sector intervention, including the direct public management of pension systems (e.g., James and Brooks, 2001). The impact of a government's size and involvement on speed of structural pension reform is, thus, ambiguous *a priori*.

Low levels of *domestic savings* as percent of GDP may be conducive for switching from a traditional PAYGO, DB-type system to a pension savings arrangement based on individual accounts for the latter may be a means to increase future savings levels (e.g., James and Brooks, 2001; Roberts and Saeed, 2012).[10] As alternative to *domestic savings* we also use a variable measuring *financial market development* in a country. We use deposit money bank assets to GDP as an indicator for the development of the banking sector and stock market capitalisation to GDP as proxy for the development of financial markets (Demirgüç-Kunt and Maksimovic, 1998). *Financial market development* is measured as sum of these two variables.[11]

The speed of pension reform may also be accelerated in case a neighbouring country has already implemented a similar reform, as a country can learn about reforms and how they work in similar environments (Brooks, 2005; Berggren et al., 2016). To capture possible *neighbouring country effects*, we include a dummy variable with entry 1 in case at least one neighbouring country has already implemented a second-pillar scheme.[12] Following Brooks (2005), we also include the interaction terms of this variable with the regional dummy variables used in our analysis. This way it is possible to isolate whether neighbouring country effects are of equal importance in the two regions were market-oriented pension reforms predominately are taking place between 1981 and 2012 (i.e., Latin America and EECA).

Moreover, it is conceivable that time until pension privatisation, a specific kind of market-oriented reform, is shorter in environments generally conducive to market-oriented reform. To cope with this issue, we use the growth rate in Fraser Institute's Economic Freedom of the World Index (Gwartney et al, 2014) to proxy for speed of market-oriented reforms in a country (*General*

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[10] Whether a switch to full funding of pension systems indeed increases domestic savings depends on how private voluntary savings and government savings react to changes in funding (Barr and Diamond, 2006).

[11] Note, that due to missing data on *Financial market development* we lose 13 observations.

[12] We also calculated a peer variable along the lines outlined in Brooks (2007a). This variable captures the share of peer countries which have reformed until t-1. However, in our sample this variable shows a very high positive correlation with our dependent variable (time until reform). The correlation coefficient between time until reform and this peer variable is close to 1 within each country group considered. By construction, the value of the peer variable increases with survival time. This mechanically results in a strong positive correlation of our dependent variable and the peer variable within each country group (Latin America, EECA).

reform intensity).[13] Finally, we also consider the growth rate in population (*Population growth*) as a high population growth rate may help to make an existing PAYGO system more sustainable.

From Table 5 we see that signs and magnitudes of the coefficients for *Extreme Inflation*, *economic* and *political globalisation* remain virtually unchanged when new variables are individually introduced into the base model. Most additional variables are statistically insignificant. However, there are two exceptions: The positive coefficient of *Government size* implies that countries with larger government sectors implement pension privatisations earlier; the negative coefficient on *General reform intensity* signals that pension privatisations happen earlier in environments with generally high market-oriented reform activity. From Column (5) of Table 5b we see that once we include both variables, *Government size* and *General reform intensity*, jointly in the estimations only the former is statistically significant.

<Table 5 here>

Results in Tables 5a and 5b support our main findings. Moreover, in case we follow Campos et al. (2010) and consider *legislative fractionalisation* as a good measure for political risk, results also imply that it is economic rather than political crises which matter for speed of pension privatisation.

4.3.2   Measurement of variables and sample size

In a second sensitivity check, we re-run our base model regression in Column (7) of Table 4 using five-year averaged variables in lieu of the mean values from first year at risk till reform (or censorship). Using mean values from first year at risk till reform relates pension privatisation to all crisis episodes a country faces while at risk. Using five-year averaged variables shows how recent crisis episodes impact on speed of pension privatisation.

Results displayed in Table 6 indicate that the relationship between economic crisis and reform speed, as well as globalisation and reform speed, still hold. Only recent macroeconomic growth crises are statistically insignificant (see Table 6, Columns (1) to (4)). Interestingly we find that *Level of democracy* becomes statistically significant when five-year averaged explanatory variables are used. We interpret this increase in statistical significance of democracy as evidence for its importance as driver of speed of reform. Specifically, for newly democratised countries the average value of democracy across all available years of being at risk is lower than the average value across the five years prior to reform. And, given information contained in Table A1, we see that pension privatisations are predominantly implemented in newly democratised countries

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[13] Until 2000 the index is available with five-year gaps. Yearly growth rates are calculated by dividing the five-year growth rate by five.

(see Brender and Drazen, 2005 for a list of newly democratised countries). Thus, using averaged values across all available years may underestimate the importance of democracy on speed of structural pension reforms.[14]

<Table 6 here>

Column (5) contains regressions using democracies only.[15] We exclude autocracies from our sample as the manner of political mediation of reform during economic crises likely differs between democracies and autocracies. From Column (5) we see that *Democracy* turns out with a positive but also highly statistically insignificant coefficient. More importantly, however, findings regarding our variables of main interest remain unaltered.

4.3.3 Alternative estimator

Table 7 displays results derived using the semi-parametric Cox-estimator instead of the parametric AFT-estimator. The Cox-estimator models determinants of reform hazard ($h(t)$):

$$h(t/x_i) = h0(t)\exp(\beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n) \qquad (2a)$$

or

$$\log h(t/x_i) = \log(h0(t)) + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n \qquad (2b)$$

where $h(t/x_i)$ is the hazard function and $h0(t)$ is the baseline hazard. In contrast to $\exp(\alpha + \varepsilon_i)$ in the AFT-estimator, no parametric shape is assumed for $h0(t)$ which renders the Cox-estimator semiparametric in nature. The hazard rate measures the conditional probability an event (reform) will occur at t given that it has not occurred before (e.g., Rabe-Hesketh and Skrondal, 2012). Thus, a positive (negative) coefficient is consistent with acceleration (deceleration) of reform speed.

From Table 3 we conclude that the substantive results are robust to variations in the estimator applied. In addition, in the last row of the Table, the p-value of testing the null hypothesis of validity of the proportional hazard assumption, which underlies the Cox-estimator, is given. The null hypothesis is never rejected. Taken together, these results support the reliability of our findings that severe economic crises and a high pace of economic and political globalisation shape the speed with which pension privatisations are implemented.

<Table 7 here>

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[14] Note that, using the mean over the last five years before reforming (censorship) for *legislative fractionalisation* does not turn the coefficient statistically significant.
[15] Our classification for democratic societies is based on Cheibub et al. (2010). We classify 29 countries out of the total sample as being non-democratic.

4.3.4 Reforming countries only

Privatisation of pension schemes is one type of market-oriented pension reform among others. Specifically, countries may introduce a third-pillar, a second-pillar of the DB type instead of a second-pillar DC type or they may reform the PAYGO-system "from within". Not considering that non-reforming countries do have these alternatives to a second-pillar DC scheme may bias our estimates. However, due to data limitations, it is not possible to fully consider such reforms in our empirical analysis.[16]

Table 8, Column (1) shows results for the sample excluding the three countries which introduced a second-pillar of the DB-type. The remaining columns include findings in case we restrict the sample to reforming countries.[17] Excluding countries implementing DB-type second-pillars from the analysis does not change our conclusions.

Coefficients mostly keep their signs but some lose statistical significance in case we exclude all non-reformers. Yet, each indicator for economic crisis remains statistically significant with a negative impact on time until reform. In addition, proxy variables for pace of globalisation keep their negative sign and, in several cases, also their statistical significant impact. While these results do not fully cope with the omitted variable bias issue, they are reassuring: Even in this very limited sample, economic crises and growth in globalisation matter for speed of pension privatisation.

<Table 8 here>

5   Summary and conclusions

In this paper, we econometrically study determinants of pension privatisations, defined as the implementation of a pillar-2 DC-type pension scheme. We focus on the role severe economic crises and facets of globalisation play for the speed pension privatisations are implemented.

Our results generally support the view that crisis-begets-reform. For example, the mean time until reform implementation for an economy with extreme high inflation is about 70 percent that of a country without extreme inflation, all else equals. Moreover, by defining legislative fractionalisation as a measure of political crisis (e.g., Campos et al., 2010), our results indicate that it is economic rather than political crises which matter for speed of pension privatisation.

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[16] Neither sufficient data on years of implementations of third-pillar pension scheme nor of market-oriented reforms within PAYGO-systems are available.

[17] Estimates are derived using OLS with robust standard errors. We exclude the two variables, *Level of Democracy* and *Population size*, which are mostly insignificant in our estimation to increase degrees of freedom.

We also find evidence suggesting that global forces serve as an important catalyst for market-oriented pension reforms. Specifically, our findings are consistent with the view that increased mobility of capital, due to financial market liberalisation, and increased exposure to trade systematically reduce the ability of governments to finance large social insurance schemes and exert downward pressure on state intervention in pension programs. While this result has already been unveiled by prior studies (e.g., Brooks, 2005), we also find that growth in political globalisation speeds up implementation of pension privatisations. We interpret this finding to highlight the distinctive importance of "soft power" exercised by foreign nations and international financial institutions on speed of structural pension reform.

Our finding that crisis-begets pension privatisation is at odds with parts of the empirical literature dealing with the determinants of privatisation of state-owned assets in general. This literature frequently finds that privatisations occur in good economic times (e.g., Roberts and Saaed, 2012). Our result of crises-beget pension privatisation signals that the determinants of privatisations differ across sectors. Specifically, those sectors which belong to a set of core institutional arrangements and that are expected to be stable and reliable over consecutive generations, like pension systems, need severe economic turmoil to see radical reforms. Moreover, privatisation of pension system is not directly linked to revenues for the public sector. This likely reduces political incentives for pension privatising in good economic times. In contrast, for other types of state-owned assets, privatising in good economic times lead to higher revenues as state-owned assets likely face higher demand.

Pension systems are in constant flux and their reforms are driven by shifting objectives and needs, amidst a backdrop of changing enabling environments. While some governments opt to deal with pension systems problems by altering current design parameters or pledging more financing from general revenues, some choose the path of a full-fledged structural reform. While the introduction of a second-pillar mandated privately-managed scheme is a defining component of the multi-pillar approach to old-age security, it also signals a shift of risk bearing from the government and corporate sectors to individuals. From our analysis, we can conclude that severe economic crises as well as external economic and political pressures are conducive for incentivising legislatures to implement such politically rather risky reforms.

However, whether and to what extent these reforms are welfare improving needs further academic scrutiny. Thereby a specific focus could be put on the distributional consequences of the far-reaching structural market-oriented pension reforms the world has been seeing during the last three decades.

Another interesting avenue for further research is to shed some more light on the issue whether and why the recent global financial crisis has changed governments' attitudes to individualise and commercialise pension provision or to even renationalise the pension system (see, e.g., Ebbinghaus, 2015, Orenstein, 2011).

References

Agnello, L., Castro, V., Jalles, J. T. and R. M. Sousa, 2015, What determines the likelihood of structural reforms?, European Journal of Political Economy, Elsevier, 37(C): 129-145.

Alesina, A. and A. Drazen, 1991, Why Are Stabilizations Delayed?, American Economic Review, 81(5): 1170-1188.

Alesina, A., Ardagna, S. and F Trebbi, 2006, Who Adjusts and When? On the Political Economy of Reforms, IMF Staff Papers 53: 1-29.

Barr, N., and P. Diamond, 2006, The economics of pensions, Oxford Review of Economic Policy, 22 (1): 15-39.

Beck, T., Demirgüç-Kunt, A., and R. Levine, 2000, A New Database on Financial Development and Structure, World Bank Economic Review, 14: 597-605.

Berggren, N., Daunfeldt, S.-O. and J. Hellström, 2016, Does social trust speed up reforms? The case of central-bank independence, Journal of Institutional Economics, 12(2): 395-415.

Bjørnskov, C., 2007, Determinants of generalized trust: A cross-country comparison, Public Choice, 45: 1-21.

Bjørnskov, C., 2016, Economic freedom and economic crisis, European Journal of Political Economy, 130(1): 11-23.

Boeri, T., and G. Tabellini, (2012) Does Information Increase Political Support for Pension Reform? Public Choice 150(1): 327-362.

Brender, A., and A. Drazen, 2005, Political budget cycles in new versus established democracies, Journal of Monetary Economics, 52(7): 1271-1295.

Brooks, S. M., 2007a, When does diffusion matter? Explaining the spread of structural pension reforms across nations, Journal of Politics, 69(3), 701-715.

Brooks, S. M., 2007b, Globalization and pension reform in Latin America, Latin American Politics and Society, 49(4), 31-62.

Brooks, S., 2005, Interdependent and Domestic Foundations of Policy Change: The Diffusion of Pension Privatization around the World, International Studies Quarterly, 49(2): 273-294.

Brooks, S., and M. J. Kurtz, 2007, Capital, Trade, and the Political Economies of Reform, American Journal of Political Science, 51(4): 703-720.

Campos, N. F., Hsiao, C. and J. B. Nugent, 2010, Crises, What Crises? New Evidence on the Relative Roles of Political and Economic Crises in Begetting Reforms, Journal of Development Studies, 46(10): 1670-1691.

Cheibub, J. A., Gandhi, J. and J. R. Vreeland, 2010, Democracy and Dictatorship Revisited, Public Choice, 143 (2-1): 67-101.

Coates, N., 2002, Pension funds and the internationalisation of insurance companies: An Australian example, NFT I/2002: 77-88.

Demirgüç-Kunt, A., and V. Maksimovic, 1998, Law, Finance, and Firm Growth, Journal of Finance, 53: 2107-2137.

Drazen, A., and V. Grilli, 1993, The Benefit of Crises for Economic Reforms, American Economic Review 83: 598-607.

Drazen, A., and W. Easterly, 2001, Do Crisis Induce Reform? Simple Empirical Tests of Conventional Wisdom, Economics and Politics, 13(2): 129-157.

Drazen, A., 2010, Financial market crisis, financial market reform: Why hasn't reform followed crisis? ECFIN Economic Brief, Issue 6, February 2010.

Dreher, A., 2006, Does Globalization Affect Growth? Empirical Evidence from a new Index, Applied Economics 38(10): 1091-1110.

Dreher, A., Gaston, N. and P. Martens, 2008, Measuring Globalization - Gauging its Consequences, New York: Springer.

Ebbinghaus, B., 2015, The Privatization and Marketization of Pensions in Europe: A Double Transformation Facing the Crisis, European Policy Analysis 1(1): 56-73.

Giuliano, P., Prachi, M. and A. Spilimbergo, 2013, Democracy and Reforms: Evidence from a New Dataset, American Economic Journal: Macroeconomics, 5(4): 179-204.

Gronwald, M, 2012, Reforming Old Age Security Systems. A Comparative Analysis of Institutional Change in France, Germany and Sweden, PhD-Thesis, University of Mannheim, https://ub-madoc.bib.uni-mannheim.de/36584/1/Dissertation__Gronwald_MADOC.pdf

EBRD, 1998, Transition Report 1998 - Financial sector in transition, European Bank for Reconstruction and Development.

Góra, M., 2013, Political economy of pension reforms: selected general issues and the Polish pension reform case, IZA Journal of Labor & Development, 2(2), 1-31.

Gwartney, J., Lawson, R., and J. Hall, 2014, Economic freedom of the world: 2014 annual report. Fraser Institute.

Heinemann, F. and B. Tanz, 2008, The impact of trust on reforms, Journal of Economic Policy Reform, 11(3): 173-185.

Heinemann, F. and T. Grigoriadis, 2016, Origins of reform resistance and the Southern European regime, Empirica, 43: 661-691.

Hering, M., 2006, The politics of structural pension reform in Western Europe: Does the EU matter. In Fifteenth International Conference of the Council for European Studies. March.

Holzmann, R., 1999, A World Bank perspective on pension reform, Social Protection and Labor Policy and Technical Notes 20050, The World Bank.

Holzmann, R., 2013, Global pension systems and their reform: Worldwide drivers, trends and challenges, Int Soc Secur Rev, 66: 1-29.

Holzmann, R., and R. Hinz, 2005, Old-Age Income Support in the Twenty-first Century: An International Perspective on Pension Systems and Reform, Washington, DC: World Bank.

Huber, E., and J.D. Stephens, 2000, The political economy of pension reform: Latin America in comparative perspective (No. 7), Geneva: United Nations Research Institute for Social Development.

Iglesias-Palau, A., 2009, Pension Reform in Chile Revisited, OECD Social, Employment and Migration Working Papers No. 86.

James, E. and S. Brooks, 2001, The Political Economy of Structural Pension Reform, in: New Ideas About Old Age Security: Toward Sustainable Pension Systems in the 21st Century, Holzmann, R. and J. Stiglitz (eds.), Washington DC: World Bank.

Jensen, R. T., and K. Richter, 2004. The health implications of social security failure: Evidence from the Russian pension crisis, Journal of Public Economics, 88, 209?236.

Laeven, L. and F. Valencia, 2012, Systemic Banking Crises Database: An Update, International Monetary Fund WP/12/163.

Lesay, I., 2006, Pension reform in Slovakia: the context of economic globalisation. European Trade Union Institute for Research, Education and Health and Safety (ETUI-REHS).

Levy, J.D., 2002, Vice into Virtue? Progressive Politics and Welfare Reform in Continental Europe. Politics and Society 28(2): 239-273.

Lipton, G., 2016, Getting into Higher Gear: Why Structural Reforms Are Critical for Revving Up Global Growth, IMF Blog, 25th July 2016.

Lora, E. and M. Olivera, 2004, What makes reforms likely: Political economy determinants of reforms in Latin America, Journal of Applied Economics, 7: 99-135.

Madrid, R., 2002, The Politics and Economics of Pension Privatization in Latin America, Latin American Research Review, 37(2): 159-182.

Mahmalat, M and D. Curran, 2017, Do Crises Induce Reform? A critical review of conception, methodology and empirical evidence of the "Crisis Hypothesis", Journal of Economic Surveys, doi: 10.1111/joes.12209.

Mesa-Lago, C., 1993, Social Security and Pension Reform in Latin America: Importance and Evaluation or Privatization Approaches, Seminar on the Economic and Social Impact of Privatization in Latin America, Institute of the Americas, La Jolla, California, January 28-29, 1993.

Mesa-Lago, C. and K. Müller, 2002, The Politics of Pension Reform in Latin America, Journal of Latin American Studies 34(3): 687-715.

Müller, K., 2000, Pension Privatization in Latin America, Journal of International Development, 12: 507-518.

Müller, K., 2001, The Political Economy of Pension Reform in Eastern Europe, International Social Security Review, 54: 57-79.

Müller, K., 2003a, Privatizing Old-Age Security: Latin America and Eastern Europe Compared. Aldershot: Edward Elgar.

Müller, K., 2003b, Pension Reform in the East European Accession Countries, European Journal of Social Security, 5(1): 7-35.

Müller, K., 2008, Pension privatization and economic development in Central and Eastern Europe: A political economy perspective, Paper prepared for UNRISD project on Financing Social Policy: Pension Funds and Economic Development, UNRISD - United Nations Research Institute for Social Development, 15 November.

OECD, 2011, Chile: Review of the Private Pension System, OECD, Paris.

OECD, 2013, Pensions at a Glance, OECD, Paris.

Orenstein, W., 2011, Pension privatization in crisis: Death or rebirth of a global policy trend?, International Social Security Review, Vol. 64(3): 65-80.

Pallares-Miralles, M., Romero, C. and E. Whitehouse, 2012, International Patterns of Pension Provision II, A Worldwide Overview of Facts and Figures, Social Protection and Labor Discussion Paper No. 1211, The World Bank.

Parker, D., 2003, Privatization in the European Union, in: International Handbook on Privatization, Parker, D. (ed), London: Edward Elgar.

Pitlik, H. and S. Wirth, 2003, Do crises promote the extent of economic liberalization?: an empirical test, European Journal of Political Economy, 19(3): 565-581.

Rabe-Hesketh, S. and A. Skrondal, 2012, Multilevel and Longitudinal Modeling Using Stata, Third Edition, Volume II: Categorical Responses, Counts, and Survival, Stata Press.

Reinhart, C. M. and K. S. Rogoff, 2009, This Time It's Different: Eight Centuries of Financial Folly, Princeton: Princeton University Press.

Reinhart, C. M., Rogoff, K. S. and M.A. Savastano, 2003, Debt Intolerance, Brookings Papers on Economic Activity, Economic Studies Program, The Brookings Institution, vol. 34(1):1-74.

Roberts, B.M. and M.A. Saeed, 2012, Privatizations around the world: Economic or Political Determinants?, Economics & Politics, 24(1): 47-71.

Sarfati, H. and Y. Ghellab, 2012, The political economy of pension reforms in times of global crisis: State unilateralism or social dialogue? International Labour Organization, Working Paper No. 468575.

Schludi, M., 2005, The Reform of Bismarckian Pension Systems: A Comparison of Pension Politics in Austria, France, Germany, Italy and Sweden. Amsterdam: Amsterdam University Press.

Spruk, R. and M. Verbĭc, 2016, Political Economy of Pension Reform: An Empirical Investigation, Working Paper, University of Ljubljana, Slovenia.

Teorell, J., Dahlberg, S., Holmberg, S., Rothstein, B., Khomenko, A. and R. Svensson, 2016, The Quality of Government Standard Dataset, version Jan16, University of Gothenburg: The Quality of Government Institute.

Waelti, S., 2015, Financial crisis begets financial reform? The origin of the crisis matters, European Journal of Political Economy, 40: 1-15.

Williamson, J. B., Howling, S. A., and M.L. Maroto, 2006, The political economy of pension reform in Russia: Why partial privatization?, Journal of Aging Studies, 20(2), 165-175.

Wilson, J.D. and D.E. Wildasin, 2004, Capital tax competition: bane or boon, Journal of Public Economics, 88(6): 1065-1091.

World Bank, 2014, Pensions: Data, www.worldbank.org/en/topic/socialprotection labor/brief/pensions-data. Last updated Jun 23, 2014.

World Bank, 1994, Averting the Old Age Crisis. Washington, DC: World Bank.

Figures and tables

Figure 1. Evolution of number of countries with second-pillar schemes as of 2012

Source: Authors' own constructed based on data from World Bank (2014).

Table 1. Descriptive statistics

Explanatory Variable	Obs	Mean	SD	Min	Max	Data Description
GDP per capita	96	11,788	14,478	323	61,080	In constant 2005 USD, variable wdi_gdppccon.
Share of working age persons	96	62.52	5.77	50.12	74.11	Persons age 15-64 as % of total population, variable wdi_pop_65.
Population size	96	23.7	40.3	0.3	269	Population (in millions), variable wdi_pop.
Level of democracy	96	6.80	2.86	0.25	10.00	Range 0-10, with 0 being least democratic, variable fh_ipolity2.
Regions:						
Eastern Europe & Central Asia	96	0.25	0.44	0	1	variable ht_region.
Latin America	96	0.20	0.40	0	1	
Others	96	0.55	0.50	0	1	
Various crisis indicators:						
Extreme inflation	96	0.11	0.32	0	1	Dummy variable=1 if average inflation > 100, variables imf_inflch & wdi_inflation.
Inflation >=20	96	0.354	0.48	0	1	Dummy variable=1 if average inflation >=20, variables imf_inflch & wdi_inflation.
Inflation>region average	96	37.38	131.41	0	911.13	Variable which measures by how much the inflation rate of a particular country in a particular year is larger than the average inflation rate of the country-group the country belongs to; variables imf_inflch & wdi_inflation.
Sovereign debt crisis	90	0.04	0.05	0	0.19	Sum of years with sovereign debt crisis divided by total years at risk, source: Laeven and Valencia (2012).
Negative growth in real GDP	96	0.19	0.13	0.00	0.67	Sum of years with real economic growth < -0.2% divided by total years at risk, variable wdi_gdpgr.
Globalisation level	96	56.38	14.93	28.28	86.87	KOF index with range 0-100,
Growth Globalisation (overall)	96	1.95	1.46	0.23	6.30	Relative change in KOF index,

Explanatory Variable	Obs	Mean	SD	Min	Max	Data Description
Subcomponents of globalisation growth:						
Economic	96	1.80	1.42	-0.75	6.47	Relative change in KOF sub-indices.
Political	96	3.05	3.76	-0.17	18.06	
Social	96	2.13	1.71	-0.99	7.31	
Government size	92	5.91	1.29	2.31	8.27	Fraser Institute's index with range 0-10, with 0 being large size, variable fi_sog.
Domestic savings	95	20.30	7.93	-14.35	43.53	As % of GDP, variable imf_gns.
World Bank loans (as % of GDP)	96	4.30	7.72	0	54.85	As % of GDP, source: World Bank. We impute missing values for developed countries with 0.
Legislative fractionalisation	96	0.59	0.20	0	0.88	Probability that two deputies picked at random from the legislature will be of different parties per Beck et al. (2001), variable dpi_tf.
Ethnic fractionalisation	96	0.39	0.24	0	0.91	Probability that two randomly selected people from a given country will not share the same ethnicity per Alesina et al. (2003), variable al_ethnic.
Neighbouring country dummy	96	0.42	0.50	0	1	Dummy variable=1 if a country has at least one neighbouring country which implemented pillar 2 reform, source: authors' own calculations.
Financial market development	83	4.19	0.88	2.11	5.62	Sum of bank assets and stock market capitalisation to GDP; Beck et al (2000).
General reform intensity	92	1.32	1.86	-4.32	9.94	Growth in Economic Freedom of the World Index; Fraser Institute.
Population growth	96	1.24	1.34	-1.35	7.01	Population growth rate; variable une_popgr.

Note: The full sample is *N=96*. Mean values are calculated over the time being at risk of reform, i.e. for reforming countries (event = 1), the average is taken from the first year at risk until the year prior to reform. For non-reforming or censored countries (event = 0), the mean is taken from the first year at risk until the year prior to censorship i.e. 2011. Data is sourced from the Quality of Government standard dataset 2016 (Teorell et al. 2016) unless otherwise stated.

Table 2. Equality of means

Mean of Variable	Event = 1	Event = 0	Difference in means p-value
Extreme Inflation	0.29	0.04	<1%
Inflation>=20	0.71	0.21	<1%
Inflation>region average	90.85	15.36	<30%
Sovereign Debt Crisis	0.05	0.02	<15%
Negative Growth in real GDP	0.25	0.16	<5%
Growth Globalisation (overall)	2.91	1.56	<1%
Growth Economic Globalisation	2.84	1.38	<1%
Growth Political Globalisation	4.66	2.38	<20%
Growth Social Globalisation	2.99	1.77	<5%

Note: The table shows mean values of variables for reforming (event = 1) and non-reforming (event = 0) countries; the p-value is for a Two-sample Wilcoxon Rank-sum test (Mann-Whitney test).

Table 3. Akaike and Bayesian information criteria for different distributional specifications

	Exclude crisis & globalisation		With crisis & globalisation	
Distribution	**Akaike (AIC)**	**Bayesian (BIC)**	**Akaike**	**Bayesian**
Generalized gamma	109.23	132.31	103.77	131.98
Log-logistic	107.88	128.39	**101.24**	**126.88**
Lognormal	107.51	128.03	102.33	127.97
Weibull	113.00	133.52	102.73	128.38
Exponential	132.01	149.96	130.44	153.52

Note: crisis variable included is Extreme Inflation; Globalisation variable included is Globalisation growth (overall)

Table 4. Duration analysis: main results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP per capita	-0.232** (0.026)	-0.244** (0.029)	-0.241** (0.020)	-0.235** (0.022)	-0.231** (0.045)	-0.254** (0.020)	-0.257** (0.010)
Share of working age persons	4.238** (0.014)	4.122** (0.020)	3.856** (0.023)	4.092** (0.016)	4.126** (0.023)	4.220** (0.017)	3.436** (0.037)
Population size	-0.039 (0.430)	-0.051 (0.302)	-0.062 (0.206)	-0.050 (0.297)	-0.071 (0.203)	-0.037 (0.452)	-0.036 (0.498)
Region: Eastern Europe & Central Asia	-0.937** (0.030)	-0.977** (0.029)	-0.967** (0.020)	-0.947** (0.029)	-1.053** (0.017)	-0.942** (0.034)	-0.704* (0.081)
Region: Latin America	-0.639*** (0.002)	-0.573** (0.011)	-0.645*** (0.003)	-0.673*** (0.001)	-0.734*** (0.001)	-0.519** (0.034)	-0.563*** (0.005)
Level of democracy	-0.048 (0.218)	-0.052 (0.202)	-0.039 (0.313)	-0.057 (0.166)	-0.045 (0.325)	-0.047 (0.234)	-0.022 (0.577)
Crisis: Extreme Inflation	-0.374** (0.028)					-0.575** (0.041)	-0.613*** (0.001)
Crisis: Inflation>=20		-0.386** (0.047)					
Crisis: Inflation>region average			-0.001** (0.025)				

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crisis: Negative growth in real GDP				-0.011** (0.026)			
Crisis: Sovereign debt crisis					-0.003 (0.820)		
Moderate Inflation						-0.226 (0.359)	
Globalisation growth (overall)	-0.217** (0.015)	-0.165* (0.081)	-0.235*** (0.008)	-0.212** (0.019)	-0.227** (0.015)	-0.177* (0.077)	
Economic							-0.183*** (0.006)
Political							-0.052** (0.017)
Social							0.001 (0.982)
Constant	-10.086 (0.115)	-9.285 (0.155)	-8.113 (0.199)	-9.060 (0.153)	-9.099 (0.175)	-9.865 (0.131)	-6.815 (0.263)
AIC	101.240	101.665	101.417	101.092	105.121	102.371	98.876
N	96	96	96	96	96	96	96

Notes: * p<0.10, ** p<0.05, *** p<0.01, p-values in parenthesis; AIC = Akaike information criterion

Table 5a. Sensitivity check: Additional explanatory variables

	(1)	(2)	(3)	(4)	(5)
Crisis: Extreme Inflation	-0.592*** (0.001)	-0.610*** (0.000)	-0.607*** (0.001)	-0.459*** (0.008)	-0.614*** (0.001)
Globalisation growth:					
Economic	-0.175*** (0.010)	-0.178*** (0.005)	-0.180*** (0.008)	-0.224*** (0.001)	-0.187*** (0.006)
Political	-0.050** (0.022)	-0.052** (0.011)	-0.054** (0.016)	-0.058*** (0.009)	-0.051** (0.021)
World Bank loans	0.014 (0.491)				
Legislative Fractionalisation		0.705 (0.142)			
Ethnic fractionalisation			0.037 (0.679)		
Government size				0.737*** (0.008)	
Domestic savings					0.009 (0.389)
AIC	98.362	96.839	98.711	87.255	98.087
N	96	96	96	92	95

Table 5b. Sensitivity check: Additional explanatory variables

	(1)	(2)	(3)	(4)	(5)
Crisis: Extreme Inflation	-0.568*** (0.002)	-0.532*** (0.001)	-0.371** (0.049)	-0.599*** (0.001)	-0.368** (0.041)
Globalisation growth:					
Economic	-0.189*** (0.003)	-0.241*** (0.000)	-0.176*** (0.006)	-0.181*** (0.008)	-0.203*** (0.002)
Political	-0.056*** (0.005)	-0.029 (0.152)	-0.038* (0.063)	-0.046* (0.053)	-0.053** (0.014)
Neighbouring country *effects*	0.109 (0.678)				
Neighbouring country effects × Latin America	0.123 (0.716)				
Neighbouring country effects × EECA	0.269 (0.419)				
Financial market development		0.132 (0.189)			
General reform intensity			-0.095** (0.020)		-0.063 (0.248)
Population growth				0.065 (0.599)	
Government size					0.563* (0.057)
AIC	97.674	79.829	88.707	98.593	87.095
N	96	83	90	96	96

Notes: * p<0.10, ** p<0.05, *** p<0.01, p-values in parenthesis; AIC = Akaike information criterion.

Only partial results are shown here; other controls per Column (1) in Table 3 are included in these regressions.

Table 6. Sensitivity check: Alternative measurement of variables and sample size

	FiveYA	FiveYA	FiveYA	FiveYA	Democ
GDP per capita	-0.079	-0.056	-0.061	-0.055	-0.052
	(0.265)	(0.372)	(0.395)	(0.476)	(0.734)
Share of working age persons	2.815***	2.590***	2.710***	2.894***	0.484
	(0.007)	(0.005)	(0.009)	(0.008)	(0.810)
Population size	-0.061**	-0.016	-0.056*	-0.063*	0.056
	(0.047)	(0.621)	(0.072)	(0.059)	(0.412)
Region: Eastern Europe & Central Asia	-0.861***	-0.789***	-0.867***	-0.903***	-0.056
	(0.000)	(0.000)	(0.000)	(0.000)	(0.412)
Region: Latin America	-0.353**	-0.187	-0.336**	-0.394***	-0.833***
	(0.016)	(0.181)	(0.024)	(0.009)	(0.001)
Level of democracy	-0.057*	-0.066**	-0.064**	-0.061*	0.091
	(0.066)	(0.014)	(0.048)	(0.061)	(0.209)
Crisis: Extreme Inflation	-0.379**				-0.427**
	(0.018)				(0.045)
Crisis: Inflation>=20		-0.348***			
		(0.002)			
Crisis: Inflation>region average			-0.000**		
			(0.021)		
Crisis: Negative growth in real GDP				-0.101	
				(0.693)	
Globalisation growth:					
Economic	-0.068***	-0.053***	-0.064***	-0.068***	-0.230***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)
Political	-0.047***	-0.047***	-0.045***	-0.046***	-0.069***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)
Social	-0.044**	-0.029*	-0.051***	-0.043**	
	(0.022)	(0.063)	(0.009)	(0.035)	
Government size	0.348*	0.173	0.367*	0.414**	1.440***
	(0.077)	(0.357)	(0.064)	(0.049)	(0.002)
Constant	-6.249	-5.953*	-6.044	-6.806*	-1280
	(0.105)	(0.086)	(0.119)	(0.094)	(0.861)
AIC	60.852	57.352	61.300	65.410	74.865
N	92	92	92	92	67

Notes: * $p<0.10$, ** $p<0.05$, *** $p<0.01$, p-values in parenthesis; FiveYA = five-year averaged explanatory variables; Democ = democracies only; classification for democratic societies is based on Cheibub et al. (2010); AIC = Akaike's information criterion.

Table 7. Sensitivity check: Cox-estimator

	(1)	(2)	(3)	(4)
GDP per capita	0.604*	0.452	0.555	0.554
	(0.100)	(0.196)	(0.118)	(0.114)
Share of working age persons	-8.462	-8.153	-7.141	-9.699*
	(0.116)	(0.152)	(0.195)	(0.092)
Population size	0.141	0.190	0.211	0.322*
	(0.496)	(0.331)	(0.290)	(0.093)
Region: Eastern Europe & Central Asia	1.253	1.484	1.256	1.661
	(0.352)	(0.284)	(0.352)	(0.211)
Region Latin America	2.503***	2.184***	2.640***	2.500***
	(0.001)	(0.005)	(0.001)	(0.001)
Level of democracy	-0.043	0.027	-0.064	0.069
	(0.780)	(0.860)	(0.678)	(0.678)
Crisis: Extreme Inflation	1.313*			
	(0.065)			
Crisis: Inflation>=20		1.020*		
		(0.099)		
Crisis: Inflation>region average			0.003**	
			(0.034)	
Crisis: Negative growth in real GDP				3.456*
				(0.070)
Globalisation growth:				
Economic	0.671***	0.471**	0.679***	0.548***
	(0.002)	(0.023)	(0.003)	(0.007)
Political	0.162**	0.128*	0.151**	0.195**
	(0.034)	(0.094)	(0.042)	(0.015)
Social	0.087	0.080	0.184	0.047
	(0.621)	(0.634)	(0.286)	(0.779)
Government Size	-3.135***	-3.332***	-3.506***	-3.316***
	(0.002)	(0.001)	(0.001)	(0.001)
AIC	193.953	194.257	193.625	193.913
N	92	92	92	92
PH-assumption (p-value)	0.597	0.599	0.658	0.246

Notes: * p<0.10, ** p<0.05, *** p<0.01, p-values in parenthesis; AIC = Akaike information criterion¸ PH-assumption = test on validity of proportional hazard assumption based on Schoenfeld residuals as implemented in Stata 12 (phtest); coefficients instead of time ratios or hazard ratios presented.

Table 8. Sensitivity check: Reforming countries

	(1)t	(2)	(3)	(4)	(5)
GDP per capita	-0.150	-0.103*	-0.101	-0.071	-0.072
	(0.110)	(0.051)	(0.132)	(0.234)	(0.198)
Share of working age persons	1.894	0.293	0.096	-0.354	0.033
	(0.209)	(0.809)	(0.947)	(0.793)	(0.978)
Population size	-0.032				
	(0.552)				
Region: Eastern Europe & Central Asia	-0.313	-0.215	-0.332	-0.322	-0.228
	(0.388)	(0.471)	(0.295)	(0.300)	(0.453)
Region Latin America	-0.686***	-0.256	-0.300	-0.328	-0.367*
	(0.001)	(0.196)	(0.138)	(0.119)	(0.057)
Level of democracy	0.008				
	(0.836)				
Crisis: Extreme Inflation	-0.465***	-0.303***			
	(0.007)	(0.004)			
Crisis: Inflation>=20			-0.225*		
			(0.060)		
Crisis: Inflation>region average				-0.0004**	
				(0.021)	
Crisis: Negative growth in real GDP					-0.007**
					(0.010)
Globalisation growth:					
Economic	-0.224***	-0.083*	-0.030	-0.061	-0.043
	(0.001)	(0.058)	(0.337)	(0.158)	(0.247)
Political	-0.057**	-0.024*	-0.013	-0.019	-0.029**
	(0.011)	(0.079)	(0.396)	(0.207)	(0.030)
Government Size	0.721**	0.117	0.219	0.233	0.338
	(0.010)	(0.599)	(0.393)	(0.374)	(0.169)
Constant	-2.899	2.830	3.404	4.990	3.313
	(0.603)	(0.566)	(0.556)	(0.369)	(0.496)
AIC	86.949	2.939	7.024	6.564	4.599
N	89	27	27	27	27

Notes: * $p<0.10$, ** $p<0.05$, *** $p<0.01$; p-values in parenthesis; AIC = Akaike information criterion; Column (1) based on AFT-estimator; Columns (2) – (6) derived using OLS with robust standard errors.

Appendix Tables

Table A1. Countries which Implemented Second Pillar DC Schemes

s/n	Economy	Year Implemented	Region
1	Chile[a]	1981	Latin America & Caribbean
2	Australia	1992	East Asia & Pacific
3	Peru	1993	Latin America & Caribbean
4	Colombia	1994	Latin America & Caribbean
5	Argentina	1994	Latin America & Caribbean
6	Uruguay	1996	Latin America & Caribbean
7	Mexico	1997	Latin America & Caribbean
8	Kazakhstan	1998	East Europe & Central Asia
9	El Salvador	1998	Latin America & Caribbean
10	Bolivia	1998	Latin America & Caribbean
11	Hungary	1998	East Europe & Central Asia
12	Poland	1999	East Europe & Central Asia
13	Hong Kong SAR[b]	2000	East Asia & Pacific
14	Latvia	2001	East Europe & Central Asia
15	Costa Rica	2001	Latin America & Caribbean
16	Bulgaria	2002	East Europe & Central Asia
17	Croatia	2002	East Europe & Central Asia
18	Estonia	2002	East Europe & Central Asia
19	Kosovo[b]	2002	East Europe & Central Asia
20	Norway	2002	West Europe
21	Russian Federation	2003	East Europe & Central Asia
22	Dominican Republic	2003	Latin America & Caribbean
23	Lithuania	2004	East Europe & Central Asia
24	Slovak Republic	2005	East Europe & Central Asia
25	Nigeria	2005	Sub-Saharan Africa
26	Macedonia, FYR	2006	East Europe & Central Asia
27	Sweden	2007	West Europe
28	Romania	2008	East Europe & Central Asia
29	Panama	2008	Latin America & Caribbean
30	Kyrgyz Republic	2010	East Europe & Central Asia
31	Egypt	2012	Middle East & North Africa

Source: World Bank (2014).

a Chile is not in the sample as it defines t=0.

b These countries are excluded from the sample due to several missing explanatory variables; see text.