The political origin of pension funding

Perotti, E.; Schwienbacher, A.

DOI
10.1016/j.jfi.2008.11.001
Publication date
2009
Document Version
Author accepted manuscript
Published in
Journal of Financial Intermediation

The Political Origin of Pension Funding

Enrico Perotti
University of Amsterdam, NETSPAR and CEPR

Armin Schwienbacher
University of Amsterdam and Université catholique de Louvain

Abstract[*]

The paper seeks to explain the huge cross country variation in private pension funding, shaped by historical choice made when universal pension systems were created after the Great Depression. According to Perotti and von Thadden (2006), large inflationary shocks due to war damage devastated middle class savings in some countries in the first half of the XX century. This shaped political preferences over the role of capital markets and social insurance, and contributed to the Great Reversals documented by Rajan and Zingales (2003). Wealth distribution shocks are indeed strongly related to private pension funding, as a large shock reduces the stock of private retirement assets by 58% of GDP. While the sample size is limited, the results are robust to other explanations, such as legal origin, original financial development, past and current demographics, religion, electoral voting rules, redistributive politics, national experiences with financial market performance, or other major financial shocks that were not specifically redistributive. Corroborating evidence indicates that such redistributive shocks help explain the cross country variation in social expenditures, state ownership of industry, financial development and employment protection measures as predicted by the political shift hypothesis.

Date: 30 October 2008

[*] We thank Lans Bovenberg, Joshua Rauh, Randall Morck, Ron Masulis, Fabio Braggion, Frank de Jong, audiences at NETSPAR, the University of Amsterdam, LSE, LBS, Namur, Paris School of Economics, Tilburg, University College London, Kiel, Antwerp, Copenhagen and the NBER Summer Institute on Social Security for useful comments. We retain responsibility for any errors.

1. Introduction

Few issues are as controversial as pension reforms, made pressing by increased longevity and falling birth rates. To understand the nature of this debate it is important to understand the political determinants of the structure of pension funding structure. While all the countries have both some state and private funding for retirement (even the US has a significant Social Security program), the reliance on capital markets varies considerably. In fact, the cross-country variation in terms of pension funding is even larger than for capital market size, as extensively studied by the literature on financial development (La Porta et al, 1997).[1]

Interestingly, these differences arose over time. The early pension plans, starting in Germany in the 1880s, were private obligations, and remained a private liability until the dramatic expansion of pensions following the Great Depression (except for civil servants and war veterans).[2] Those countries which adopted state funding did so once universal coverage system was set up in the period 1935-1950.[3] The national systems created then, while often revised, are still largely in place. In particular, the historical choice on the extent of state versus private funding has persisted, even as public pension programs share most features (Mulligan and Sala-i-Martin, 2004b).

Why was the government in some countries entrusted with most retirement obligations, while elsewhere private funding was preferred? Why does Finland have so little private pensions in comparison to Denmark or Sweden, or Belgium in comparison to the Netherlands, or Switzerland so much relative to Austria? [4] This paper relates this critical choice to major financial reversals in the interwar period, the Great Reversals identified by Rajan and Zingales (2003).[5] The historical choice on pension funding (and

[1] In the OECD sample we study, average market capitalization in 2004 is 83% of GDP and the ratio of standard deviation over mean of 0.60, while the related ratio for the variation in private pension assets is 1.13.

[2] Cutler and Johnson (2004) find only income and ethnic fractionalization weakly explains the timing of adoption of state pension systems.

[3] This refers to the timing of adoption of national pension systems in democratic countries in our OECD sample, for which the median voter approach is relevant.

[4] Unfunded pension systems (PAYG) have some notional funding, as state pension institutions receive specifically issued public debt. Clearly, these assets exist only on paper, as they are backed by fiscal revenues just as any government liability.

[5] Rajan and Zingales (2003) attribute these shifts to a major political shift in favor of corporate insiders and established firms after the Great Depression, rather than a shift in median voter preferences.

related issues concerning financial markets, investor protection and state ownership) reflected political preferences of a political majority shaped by economic shocks in the tumultuous interwar period.

Our economic interest argument is that when the middle class has a high degree of financial participation in the stock market, it supports investor rights and favors investing pension contributions in capital markets, thus promoting financial development (La Porta et al., 1997, 1998). In contrast, when wealth is concentrated so that the middle class relies mostly on labor income, it prefers corporatist policies in favor of labor protection and against investor protection (Pagano and Volpin, 2005; Perotti and von Thadden, 2006). Accordingly, in these countries a political majority would choose not to entrust pension contributions to capital markets.

While there is no historical data on wealth distribution, this paper studies whether large shocks in some countries causing large financial losses for the middle class were large enough to affect median voter preferences.[6] Our political economy argument is that war shocks leading to extreme inflation affected countries which subsequently underwent major reversals in capital market development in the interwar period (Perotti and von Thadden, 2006). As a result of the loss of their savings, the middle class sought more corporatist policies, aimed at protecting inside labor and social insurance while weakening investor protection. In contrast, political support for capital markets persisted in other countries where the middle class kept its savings.

Pension funding is a natural test of this political economy hypothesis, as in OECD countries all large price shocks occurred before the creation of universal retirement programs.[7] All countries expanded pensions massively while introducing some state funded social programs after the Great Depression, with the US creating Social Security in 1935. Our conjecture is that overall pension funding was deeply affected by political preferences prevailing at that time. We test it by regressing accumulated private pension assets as of today against these shocks in a sample of countries with comparable data. The results indicate a strong economic and statistic effect of wealth shifts. In particular, a

[6] One could extend the current investigation by also focusing on the impact on investor protection directly. Unfortunately, we are constrained by lack of data prior to the income distribution shocks.

single episode of very high inflation reduces the stock of current private retirement assets by 58% of GDP. Importantly, the price shocks did not directly cause the shift, as worker pensions remained private obligations until the Great Depression.

While price shocks occurred a long time ago, political preferences may have persisted through various channels. Economic preferences may become embodied in ideological beliefs which are not reversed even as savings are restored. Second, state pension funding creates a self-reinforcing effect, by reducing middle class participation in financial markets and thus its support for investor protection. Third, reversing major legislative changes may be difficult, especially when the change has created entrenched beneficiaries, such as the elderly, who benefited from intergenerational transfers.

Pension structure is a complex societal issue, so next to the political shift argument we consider legal, financial, cultural, and other political determinants. Market funding may have been chosen in countries with a strong financial orientation. Legal origin, an exogenous country feature associated with investor protection (La Porta et al, 1997, 1998), and historical financial development prior to the shocks may explain subsequent choices. Negative experiences with financial crises, such as the 1929 stock market crash, may have affected attitudes towards security markets, creating demand for state insurance. Average inflation may be more relevant than its extreme values.

An argument common in overlapping generation models is that state pensions were chosen because of the demographic weight of senior citizens at the time. A PAYG system allows to start immediately large payments to the older generation or to allow it to benefit from future population growth (Conesa and Krueger, 1999, Cooley and Soares, 1999, and Tabellini, 2000). Accordingly, we examine the significance of demographic factors for private funding. Also, a population with a poor middle class may prefer state pensions funded by progressive taxation,[8] so we control income inequality at the time of the pension funding decision. Next, there may be a bias toward public spending explained

[7] While many countries experienced major price shocks after WW1, others suffered their worse inflation during civil wars or WW2 (such as Japan, which switched to a bank dominated capital market only after its 1945 hyperinflation).

[8] State funding is not per se more redistributive, in fact the most redistributive systems are those where the state funded component is small and targeted to lowest income groups (such as the UK). In PAYG countries, pensions are usually closely linked to wages. More in general, there is no empirical evidence of larger fiscal redistribution in more unequal democracies.

by electoral rules. Persson and Tabellini (2004) show that public spending is higher in proportional voting regimes, as they rely more on coalition governments.[9]

Finally, we consider persistent components of culture. Religion appears to affect financial development (Stulz and Williamson, 2003), but also preferences for mutuality in risk sharing, with Catholics more likely to favor coinsurance than individualistic Protestants (Cutler and Johnson, 2004). Some cultural explanations for demands for social security relate them to ideological shifts caused by war shocks (Roe, 2006). While it is not simple to separate shifts in economic and ideological preferences, we use a cross-cultural variable from the 1960s, namely uncertainty aversion from Hofstede (2001).[10]

As robustness checks, we verify that these results hold when the sample is expanded to include former Socialist countries, most of which initiated major pension reforms after transition. Finally, we check the consistency of our political shift hypothesis on related political choices. According to the underlying model, countries where the middle class became impoverished would move to support more state ownership over companies and more employment protection. Our results indicate that such countries have indeed more state control over companies, and stronger employment protection. Finally, we provide some evidence on the effect on current financial development.

Our sample is unfortunately quite small, which limits the power of our tests. However, the OECD sample is fairly complete relative to the population of democracies with universal pension programs. Our identification benefits from a large variation of pension funding and inflationary shocks, and the results seem confirmed by the other evidence on related policy choices implied by the political shift hypothesis. Clearly, better and broader data is needed before the evidence may be deemed conclusive.

The next section offers a brief history of private pensions and sketches our hypothesis. Section 3 contains the empirical tests. We conclude in Section 4.

[9] There is evidence that majoritarian systems, where coalitions are less common, have smaller governments and welfare programs relative to proportional systems (Persson and Tabellini, 2004).

[10] This variable measures the average national aversion to operate in highly uncertain and ambiguous situations, such as what arises after a price or war shocks which overwhelms the capacity of normal individuals to adjust. Perhaps wars or hyperinflations had a traumatizing effect on beliefs, leading to deep-seated insecurity and inducing diffuse demands for economic security by the state.

2. A brief history of private pension funding

The earliest pension system was created in Germany under Bismarck, who legislated a mandatory program for some categories of workers, especially in large firms where they were most exposed to socialist ideas. The program relied on worker and firm contributions and enjoyed some fiscal benefits. The pension claims were modest, and could be drawn only upon reaching 70 years of age, at a time where most workers die well before 60 years. The program had no redistributive feature (Lindert, 1994). Pensions remained private liabilities in programs which imitated the German example in subsequent years. Until the Great Depression, most states had no direct role in worker pensions, limiting state pensions to civil servants and war veterans.

In the five decades prior to WW1, the so-called "Victorian" period, the western world was largely at peace. Industrial productivity rose rapidly, albeit with wide swings, and prices were stable or declining. Long-term contracts for house and land rentals were common; long term fixed rate debentures normal. In the UK, government debt included a fair share of perpetual bonds with a fixed nominal rate. While there were sharp stock market crises, occasional bank failures and frequent railway bankruptcies, their financial impact were circumscribed to few wealthy individuals. Price stability ensured financial stability for individuals who had deposits, bonds, rental income or other nominal assets.

The destruction of World War in 1914, after fifty years of peace, caught Europe by surprise. After the war, countries which had suffered heavy damage faced huge costs of reconstruction; others faced massive reparations, or suffered large loss of control over territory. Social demands rose rapidly as veterans came back from the front amid fears of a socialist uprising. This raise in spending often could not be fiscalized due to economic destruction, and governments were forced into money printing, leading to a sharp acceleration in inflation.[11] Austria and Germany experienced devastating hyperinflations, but also winners such as Italy, Belgium and France had massive price jumps. In contrast,

[11] In some occupied countries, such as in Belgium, inflation took off during the war because the occupying forces took control of the printing press to fund their war efforts.

the UK and its non-European allies, such as the US, Canada or Australia, avoided war destruction, just as the Netherlands, Scandinavia and Switzerland.[12]

By most contemporaneous accounts, a large fraction of the middle class in countries hit by very high inflation lost all its financial holdings, small firms were hard hit, and wealth became much more concentrated (Eulenburg, 1924).[13] After 1918, most European countries moved to universal suffrage. In countries where the middle class had been impoverished, a political majority shifted support away from free markets (in extreme case, to less free political institutions) and towards corporatist policies. These included bank dominance over capital markets, and state intervention (Perotti and Thadden, 2006).

At the time of these shocks, modest worker pensions were provided by companies. While price shocks hit pension reserves, the direct effect was limited, as pension claims were very modest. Roe (2006) argues that war destruction led to ideological polarization, and to a strengthening of socialist ideas hostile to capital markets. Lindert (1994) argues that the First World War required mass mobilization, and political elites had to make generous promises to troops which came due after the war. In fact, as no country moved to public funding at the time of the price shocks.[14] Social programs were expanded much more during the Great Depression than after WW1, and state funding for worker pensions did not start anywhere until the late 1930s. When the Great Depression, which affected all countries, induced much stronger support for social programs, an important role for private pension funding persisted in countries where the middle class had managed to keep its savings.

The critical decision on pension funding arose after the Great Depression. While the stock market crash of 1929 hit the moneyed classes, the depression led to corporate insolvencies and massive unemployment, leading to the establishment of major social programs. Mandatory universal pension systems were established in most developed countries between the late 1930s and the early 1950s. Our hypothesis is that in countries

[12] Other countries in our sample suffered sharp inflationary shocks as a result of civil wars or WW2 (such as Greece, Finland and Japan).
[13] Of course, also the poor and the rich classes suffered greatly from war devastation (Piketty et al 2006), but this did not probably alter their policy preferences for redistribution.

where financial markets enjoyed political support, the pension funding choice was to rely predominantly on market funding. In fact, minority investor protection improved in these countries, e.g. with the establishment of the SEC and laws against concentration of financial power in the US, and a revised UK company law after WW2. In contrast, in the affected countries the pension system was entrusted to the state, a visible shift relative to the early pension system.

This paper adds evidence on private pensions to the literature on the political economy of social security systems, examined, among others, by Tabellini (2000), Conesa and Krueger (1999), Cooley and Soares (1999), and Caucutt et al. (2006). Mulligan and Sala-i-Martin (2004a) analyze the political sustainability of social security, while Mulligan, Gil and Sala-i-Martin (2002) establish a surprising lack of structural differences on social security structure among democratic and nondemocratic countries, a result confirmed in our robustness test on social expenditures. We complement this literature by looking at private pension funding. While our data cannot capture any redistributive features such as intergenerational transfers, the finding that political structure plays a role on funded pensions complements the results on social security.

Table 1 presents the timing of major pension decisions in several countries and the timing of major inflationary shocks. Fortunately for our test, the largest inflationary shock in all countries in our sample came before the establishment of the universal retirement system. Interestingly, Japan maintained active stock markets in the interwar period, and did not suffer hyperinflation until the WW2. After the war it established a PAYG pension system, and rejected market oriented reforms by the US occupation forces, choosing instead to orient its financial system towards bank dominance.

3. Empirical analysis

This section describes the sources of data and the construction of the variables and presents the empirical analysis.

[14] Even if inflation had created a shortfall requiring some state subsidy for past obligations, future claims could still be funded with private securities. In fact, many Eastern European and Latin American countries have chosen to combine state pension guarantees for older cohorts with pre-funding for younger workers.

3.1 Data Sources and Description of Variables

Our measure of private pension funding is the ratio of capitalized private pension assets to GDP or to an estimate of pension liabilities. Instead, this measure offers a continuum between fully funded and unfunded programs, to capture the fact that in practice all pension programs observed have aspects of funded and unfunded systems. We use OECD data (OECD Newsletter, 2005) which includes all types of pension plans: occupational, personal, mandatory and voluntary. Asset reserves from social security systems, reflecting government bonds held by the state itself, are excluded. To our knowledge, this is the only dataset with comparable measures of pension assets available. We include all countries where current pension assets reflect a historical choice taken under a democratic government, so we exclude former Communist countries. Given the limited extent to which the OECD collects data, we are left with 24 countries only. The variable PENSION represents the percentage of funded pension assets over GDP in 2004, while PENSION+LIFE also includes accumulated life insurance assets.[15] We also investigate the ratio of pension assets to an estimate of total pension liabilities, under the assumption that regulation ensures adequate funding of private pension liabilities (Barr and Diamond, 2006). This is shown graphically in Figure 2.

Information on price series was collected from the Global Financial Database (from Global Financial Data Corporation) and other sources (Maddison, 1991, Mitchell, 1992, as well as national banks and governmental statistical agencies. We constructed several variables for inflationary shocks, reported in Table 2. The variable SHOCK is a dummy variable equal to one if the country experienced a period of extremely high inflation during 1900- 1970 (in all cases, prior to the establishment of the universal pension program), defined as an annual increase in consumer price index (CPI) of over 400%. HIGH_INFLATION is a dummy variable equal to one if the country's highest annual increase in CPI in the period 1900 to 1970 (but in any case prior to the

[15] We performed the same analysis on pension assets data of 2002, with very similar results. Unfortunately, data on accumulated pension assets are only available for the selected countries since 2002. Moreover, we do not have earlier data on the choice of pension programs that would enable to establish a better identification of the link.

establishment of the pension system) was at least 30%. (No major results are affected if we increase the threshold to 70%). As a final measure, we use the actual highest annual increase in CPI between 1900 and the establishment of the major pension program (denoted MAX_CPI). The year of highest annual CPI increase for each country considered is reported in Table 1. For countries that experienced hyperinflation, we set their value to the highest level for those countries that did not have experience hyperinflation (i.e., to 491.6%, for Italy). Data on annual old age benefits expenditures by governments were obtained from OECD Social Expenditures Database (SOCX).

From La Porta *et al.* (1997) we take the legal origin dummy variable, labeled COMMON_LAW.[16] We further collect from OECD (2004) stock market capitalization in 1913, denoted by MARKET_CAP_1913. The percentage of Catholics in each country and information on the electoral rules are as in Persson, Tabellini and Trebbi (2003).[17]

We examine alternative factors that may have affected preferences or beliefs during the period under consideration. To explore the impact of other financial crises,[18] we construct a variable CRASH1929 which captures the size of the 1929 crash in the domestic stock market (Taylor, 2002). We collect data on demographics, specifically the proportion of older people, at different points in time. The variable POP_ 65+ measures the proportion of the population over 65 years old. The historical values are taken for the year of major pension reform (see Table 1 for exact years). To construct this variable, we use data from Mitchell (1992, 2003a, 2003b).[19] Similarly, we construct the same measure but for the year 2004, labeled POP2004_65+. Data for 2004 are all available from the US Census website (cf. www.census.gov/ipc/www/idbsprd.html). While its current value helps control for the stock of pension liabilities, demographic composition at the time of the pension decision measures the size of a political block presumably favorable to a

[16] Iceland is not included in the study of La Porta *et al*. (1997), but it has Scandinavian legal origin (Iceland is a former Norwegian crown colony, and was later ruled by Denmark until 1814).

[17] We use current information on these variables, as they should not have changed much in the meantime.

[18] Note that some countries experienced their stock market shock already in 1928 (for some countries, the market top is already earlier). See Taylor (2002) for more details on each country's exact date.

[19] Since Mitchell (1992, 2003a, 2003b) only provided population data for intervals of 10 years (roughly), we calculated interpolated (linearly) values. However we only did this when the country was not involved in a major war during the time period between both censuses. Otherwise we used the pre-war or post-war census, depending whether the pension reform took place before or after the war (e.g., if the reform took place after the major war involvement, we use the first census after the war; similarly, if the reform was before the war, we use the last census before the war). Data for Iceland was not available. In this case, we use the closest data available (1974) from the US Census Bureau that also provides international data.

fiscalization of pensions. Population growth may also affect the relative attractiveness to early generations of funded versus unfunded systems (Browning, 1973). We use data from the US Census Bureau on the geometric mean of population growth in each country for 1950-2004. Finally, we use from Forbes (2000) the historical data on income inequality (measured by the Gini coefficient) around the historical pension choice.

We have complete information on 16 countries and partial information on 8 more countries. For all 24 countries, we have historical information on inflation and contemporaneous pension assets. This limitation in the number of countries is largely attributable to the data collection of the OECD, and by the limitation that our hypothesis is best suited to countries that were democratic at the time of the pension decision.

3.2 Descriptive Statistics

Table 2 shows the summary statistics. On average, the ratio of funded pension and life insurance assets over GDP was 61.6% in 2004 (34.3% for pension assets only). There is great dispersion in the sample, with a minimum of 0% for Greece and a maximum of 153% for Switzerland. The median is 54.1%, somewhat lower than the mean. The US had a fraction of funded pension and life insurance assets over GDP of 115%, higher than the sample average but by no means the highest.

Overall, 25% of the countries in our sample experienced a dramatic inflationary shock or hyperinflation during the period considered (the dummy variable SHOCK). Moreover, Table 2 indicates that 62.5% (i.e., 15 countries) had a period of sharply high inflation (at least a 30% increase in CPI in a single year).[20] A quarter of the sample is composed of common law countries. None of these countries have experienced a huge inflationary shock, which is consistent with our observation based on the location of military fighting.

The stock market crashes of 1929-1930s caused huge share price drops around the world, about 65% on average. The dispersion however is relatively low (the standard deviation is 14.3%). The largest decrease in stock prices was experienced in the US, with 86.2%, but other countries had similar drops.

[20] We experiment with higher thresholds (up to 70%) with essentially similar results.

There is very little variation in the historical proportion of older people in the population (POP_65+), with an average of 8.5%. While this suggests that the hypothesis can only have a modest explanation power, it may make a difference at the margin, if senior citizens are politically pivotal.

Figure 1 presents the univariate relationship between PENSION+LIFE and the dummy variable SHOCK graphically. A clear negative link between inflationary shocks and accumulated pension assets suggests that outliers do not drive our results. Both observations, the negative relationship and the absence of outliers, are confirmed by similar graphs using the other inflation variables (not shown here).

3.3 Empirical results

Table 3 gives our basic results. The effect of a hyperinflationary shock on funded assets is very strong, whatever the specifications of the shock. The economic effect is impressive: countries that experienced a hyperinflationary shock have less funded pension assets in 2004 than the rest by an amount equal to 58.5% of GDP. The variable explains 31% of the variation by itself. The hyperinflation variable SHOCK remains significant when estimated together with HIGH_INFLATION (Regression 2), which indicates that the significant impact is not only due to extreme cases. Reassuringly, our results hold using a continuous variable of the highest CPI increase in the period, MAX_CPI (Regression 3). [21]

Regression 4 (Table 3) shows that common law countries do not have a greater propensity to a more privately funded pension system. Legal origin is either not significant or has the wrong sign, while the economic and statistical effect of the inflationary shock remains at the same level of magnitude as in the univariate analysis.

Our sample does not include any common law democracy which experienced a hyperinflation, so we cannot include an interactive term. In its place, we consider the effect of legal origin in the sub-sample of countries that did not experience hyperinflation

[21] It is not possible to estimate SHOCK and MAX_CPI jointly, given their very high correlation (95%).

(Regressions 6 – 9, Table 3). Surprisingly, even in this selected sample legal origin does not contribute in explaining pension funding.[22]

In Table 4, we estimate the basic relationship using alternative measures of private pension funding. In Regressions 1 – 4, we exclude life insurance reserves from the accumulated pension assets (the variable PENSION), obtaining similar results. The main effect is that common law, while insignificant, has no longer a negative coefficient. Next we control for the level of unfunded pension liabilities. Since no OECD data is available, we estimate pension liabilities by capitalizing recent annual old age benefit expenditures in each country.[23] In Regression 5 – 8 (Table 4), we run regressions on similar specifications but using funded pension assets (PENSION+LIFE) as percentage of total pension liabilities (PENSION+LIFE plus estimated unfunded pension liabilities). The effect of inflationary shocks remains strongly significant.

Table 5 focuses on demographics. The variable POP_65+ factors in the percentage of older people in the population at the time of pension creation, which is supposed to result in more support for PAYG. As robustness check, we also examine the fraction of total population in the year of the major pension decision in the age bracket of 15-29 years old.[24] We find no support for a direct role of demography as predicted by Conesa and Krueger (1999), even in a univariate setting. The shocks remain significant. This is also true for population growth. We further investigate whether the shocks may have been felt particularly strongly in countries with a large fraction of older people by including an interactive term. If the shock affected the choice of pension system because of short-term funding needs due to a significant proportion of retired people, the effect may be less severe in countries with a lower proportion. Our results (last regression in Table 5) do not support this argument, suggesting that the relationship was not caused by a short-term need for immediate pension spending in affected countries.

In Table 6, we investigate alternative political explanations. We first test a complementary but distinct political economy view that income inequality (as opposed to

[22] This leaves the question why democratic common law countries did not experience hyperinflation. One simple explanation is that none of them has been subject to military invasion or major war devastation.
[23] We capitalize liabilities by discounting at 5% a perpetual annuity based on current pension payments, which is clearly imprecise but should capture size.
[24] We also use POP2004_65+ as a rough proxy for future liabilities. It measures the fraction of the retired population in 2004.

wealth inequality) is critical to pension funding. This presumes that state pensions are more redistributive, or offer more social insurance. We use the earliest available data on income inequality provided by Forbes (2000), measured by Gini coefficient of income in the 1960s. Interestingly, more unequal society do rely less on state funding, but this effect is less significant than the wealth inequality shifts caused by price shocks. This result complements the negative finding for the size of social security programs in Mulligan, Gil and Sala-i-Martin (2002), suggesting an indirect effect of redistributive factors on the structure of the overall pension system.

We next investigate the role of the electoral voting rule, majoritarian versus proportional (Regressions 4 – 6). While it helps explaining pension assets in a univariate setting, it is insignificant when inflationary shocks are included.

Next we look at whether non-democracies exhibit a different pattern in pension funding choice, as voting models would suggest. We use a dummy variable for countries which were not democratic at the time of the major pension plan, which is the case of Mexico, Portugal, South Korea and Spain. The dummy is highly significant and negative (Regressions 7–8), unlike the results for social security in Mulligan, Gil and Sala-i-Martin (2002). The inflationary shock variables remain highly significant and of the same magnitude (Regressions 9–10).

Alternative financial explanations are considered in Table 7. We add the impact of the stock markets crash of 1929 (CRASH1929), the historical financial orientation before the shocks (market capitalization in 1913), annual real stock market returns from 1950 to 2004 (STOCK_RETURNS) and average inflation over several time periods.[25] The political economy hypothesis predicts that financial development and pension funding is jointly determined by historical political preferences. There is no evidence that countries more financially developed in 1913 chose for more private funding, unlike those which suffered a redistributive shock. Long-run stock market returns are significant determinants of private pension assets (Regression 3), as it may be expected, but they do not affect the significance of the price shocks. While average yearly inflation has an effect (Regressions 4–5), results indicate that large shocks still matter predominantly.

[25] We excluded years of hyper-inflation from the computation of average inflation. Some countries were excluded because of many missing data.

Finally, we seek to measure the effect of persistent cultural characteristics on pension funding (Table 8). First, we control for the percentage of Catholics in the population (in line with arguments developed by Cutler and Johnson, 2004). The variable is not significant, nor does it affect the impact of inflationary shocks.

Next we turn to risk attitudes and attitudes towards social insurance. Ideally, we would decompose the consequences of price and war shocks in a shift in economic interest and a shift in ideological/psychological attitudes towards the role of the state. To measure the second term, we use Hofstede's uncertainty aversion measures from the 1960s. This measures aversion to highly ambiguous situations (unquantifiable risk), which appear strongly correlated at the national level. To the extent that major shocks undermined confidence on self-reliance on a systemic scale, uncertainty aversion could signal a strong preference for state insurance. Indeed, uncertainty aversion is negatively correlated with hyperinflationary episodes, and is significantly and negatively correlated with the stock of pension assets. This is a result of distinct interest, as it confirms a common perception that populations which suffered traumatic shocks may seek a greater role for the state as a form of mutual insurance against systematic instability. The effect of uncertainty aversion loses significance once all price shocks are introduced, and the interactive effect is not significant. In conclusion, uncertainty aversion does not absorb entirely the effect of the shocks, and so cannot be the sole channel for the effect of war and price shocks on the pension funding decision.

3.4 Testing for the exogeneity of shocks

A critical question is whether the variation in inflationary shocks is indeed exogenous. In our sample, all major price shocks came after devastating world and civil war damage which can be reasonably treated as exogenous. We see sudden inflation as the result of a money printing choice forced upon governments by extreme fiscal needs (Sargent and Wallace, 1981). In the aftermath of a major war, those countries which experienced heavy destruction faced urgent demands for public expenditures, just when the ability to rapidly raise fiscal revenues was at its lowest point. In some cases, loss of territory and colonies hit fiscal capacity hard. When spending needs are massive relative

to fiscal capacity, there was little choice but to print money.[26] Moreover, inflation often started during the war in invaded countries, as the occupiers captured money printing for their own needs (e.g. in Belgium). Yet it is possible that, for a given amount of war destruction, some types of government chose to print money, while other limited spending. Inefficient redistribution via inflation is more likely when political institutions are less accountable, e.g. the executive is subject to weak constraints. Accordingly, we verify whether the response of prices to war damage is correlated with the quality of political institutions at the time.

We construct an index of war destruction as the sum of three different variables: Invasion (equal to one if the country was invaded, and territorial control switched hands, during the war prior to the inflationary shock), Intensity of Fighting (equal to one if the country had intensive fighting on its own territory, which is always true for the civil wars in the sample) and Major Losses in Territory (equal to one if the country had important loss of territory as result of to the war prior to the inflationary shock or civil war). This index ranges from 0 to 3, with a larger value implying greater war devastation.

Drawing from historical measures of political institutions from the Polity IV database, we use the composite index POLITY2 at time of the highest inflation level (the year associated with MAX_CPI). This data has been used in studies on the impact of democracy on social security (Mulligan, Gil and Sala-i-Martin, 2002).

Table 9 presents the results of regressing price shocks on war damage, the contemporaneous measure of political institutions, and their interaction. Under our conjecture, only the war shock should be significant. This appears clearly to be the case across all measures of war damage for SHOCK. Political variables, either on their own or in interaction with war damage, are insignificant. This suggests that inflationary shocks were indeed driven by military shocks, rather than reflecting avoidable choices undertaken by countries with poor political accountability. The results are less sharp for the broader inflationary variable represented by HIGH_INFLATION, although war damage is always very significant on its own. We conclude that extreme inflationary

[26] Urgency after both wars will have been encouraged by veterans with recent military training coming to demonstrate in the capital, and the spread of socialist ideas.

episodes in our sample do not seem to reflect poor responses to war circumstances due to weak contemporaneous institutions.

This suggests that our variable of war damage (WAR) can be a good instrument to identify the component of the redistributive shocks attributable to exogenous war shocks. Table 10 presents a two stage regression, with war shocks instrumenting for the price shocks. These IV tests confirm our previous results on the political determinants of pension funding.

3.5 An alternative experiment: the former Socialist countries

An interesting experiment for investigating our empirical prediction is the recent reforms of pension systems in the former Socialist countries, since the fall of the Iron Curtain. Many Eastern European countries experienced significant inflationary shock soon after 1990. Moreover, all countries chose to reform their pension system, most of them in the late 1990s.

Unfortunately, no data on private funding is available for Eastern European countries. Instead we use data on public pension expenditure in 2004 (as percentage of GDP) as measure for the unfunded pension assets, controlling for the number of retirees. The World Bank (2007) compiles data for 13 countries: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia and the Ukraine.[27] According to our hypothesis, we should expect countries that experienced a major inflationary shock to have chosen more public pension funding.

Table 11 reports our main findings, which again support the notion that inflationary shocks favor political support for government pension funding. This finding is robust to using alternative measures of price shock.[28] New democracies emerging from the former socialist block do not seem to be affected differently than other countries. This

[27] All of these countries are formal democracies, and all of them with the exception of Russia have experienced a peaceful transition of power by election. A majority of these countries is now part of the EU.

[28] Note that here we adopt for MAX_CPI another value for countries with hyperinflation (namely 959% for Latvia's highest inflation value instead of Italian one). Constructing the variable HIGH_INFLATION for the sample of Eastern European countries is meaningless, since they almost all experienced an inflationary shock higher than this threshold. For the variable SHOCK, it is equal to one for Croatia (in 1992), Latvia (in 1992), Poland (in 1990), Russia (in 1993), Slovenia (in 1990) and the Ukraine (in 1994). This is about half of the added sample.

reinforces the notion that the decision on pensions is a choice variable unrelated to political preferences before the shock (namely Socialism). Not surprisingly, the importance of public pension expenditure increases with the fraction of population older than 65 years in 2004, which measures the liabilities of governments for current pension payments.

While lack of comparable data hinders any further expansion of our sample, corroborating evidence on the political shift hypothesis may come from related implications for other related policy choice. In particular, the model in Perotti and von Thadden (2006) suggests that redistributive shocks will lead to strong corporatist preferences for more state ownership and more employment protection.

3.6 Employment Protection Legislation

We examine whether past inflationary shocks strengthened legislation on employment protection. The conjecture is that voters who lost their savings came ti rely more on labor income, and thus favored stronger employment protection and higher labor rents. The OECD has collected national data on the so-called Employment Protection Legislation (EPL) index. It is available for most countries in our sample, except Iceland, Mexico and South Korea. The index measures the average of different indicators for regular contracts and short-term contracts in 1990 (Nicoletti, Scarpetta and Boyland, 2000), and a higher value represents stronger labor protection. This index is used by Pagano and Volpin (2005), who verify, as their political model predicts, that proportional electoral laws are associated with more labor protection.[29] To allow for comparability with their study, we also use the average proportionality value for the time period 1986-1990 as a control variable.

Results in Table 12, with and without the proportionality measure, support the hypothesis that significant inflationary shocks leads to tighter regulation of the labor market. The results on proportionality are in line with the findings of Pagano and Volpin (2005), suggesting the compatibility of their model of political coalitions with the

[29] Further details on the construction of this index are provided in the note accompanying Table 13.

corporatist political equilibrium by Perotti and von Thadden (2006) for societies where the pivotal middle class is affected by major shocks.

3.7 State Ownership

As a further robustness check we test for the impact of these shocks on state ownership.[30] Ideally, it would best to use measures of state control before the large scale of privatization sales during the 1980s and 1990s, but such data is not available. Nevertheless, to the extent that historical choices on state ownership take time to be reversed, even current data may provide some insight. We rely on OECD data on "Indicators of Product Market Regulation" (PMR) that measure the degree to which the state holds ownership in the national economy and regulates markets. The measure closest to our conjecture is the overall size of state-owned enterprises relative to the size of the economy. This indicator is constructed using several dimensions (see OECD, 2005, for more detailed description). We use the earliest data available, which is for 1998.

Table 13 reports the effect of price shocks on state ownership. Here we control for the direct counter explanation represented by legal origin (on the evidence on the role of the legal regime on political intervention in the economy, see LaPorta et al, 2008).

The results indicate that the prices shocks are associated with the size of the state sector. All the SHOCK, High Inflation and MAX_CPI variables are all significant at the 5% level, and explain around 42% of the variation. This is a nice result on such a small sample, although once again it is more suggestive than conclusive. Price shocks lose some significance once legal origin is introduced, as expected. Common law countries have significantly less state ownership, and legal origin by itself explain around 28% of the sample variation in state ownership. When both variables are included, they remain significant, but more marginally, reflecting the negative correlation between price shocks and the common law dummy.

[30] The model in Perotti and von Thadden (2006) also has implications for the governance role for banks, for which we have no easy measurement across our sample.

3.8 Financial Development

Finally, we test whether inflationary shocks also had an impact on the size of domestic capital markets. The Perotti-von Thadden model predicts that the middle class in countries affected by large inflationary shocks would withdraw support for investor protection, leading to less developed stock markets. In line with the literature (e.g., La Porta et al., 1998, and Levin and Zervos, 1998), financial development is measured as the ratio of total stock market capitalist over GDP. We use data for 2004 made available by the World Bank (Beck, Demirgüç-Kunt and Levine (2000), limited to our sample for which our measures of inflationary shock are available.

Given the size of the final sample, any result can be seen as suggestive. Yet notwithstanding the small sample, the results support a strong negative effect of price shocks on financial development for all our measures. Importantly, the result remains unchanged once we control for the stock market development in 1913, suggesting that price shocks contributed to changes over time in financial orientation, consistently with the reversals identified by Rajan and Zingales (2003).[31] Common law origin is not significant in this sample, in contrast to the evidence on larger samples which include non democracies (La Porta et al., 1998). The results are supportive of the notion that in democratic countries, middle class financial participation affects political support for capital markets (Perotti, 2008).

4. Conclusions

This paper provides evidence that the funding structure of pension systems nowadays reflects historical political preferences on market orientation and investor protection prevailing at the time of their creation. A preference for a mainly state pension system appears closely related to major war shocks in the early XX century, which may have shaped the economic and governance preferences of the middle class. This shift may have been subsequently rationalized in a diffused ideological view of the role of the state

[31] Unlike in Rajan and Zingales (2003), here the variation in reversal across countries is attributed to independent political shifts and not to differential degree of political capture associated with legal origin.

and capital markets. As continental Europe was particularly affected, it may have contributed to a greater corporatist orientation identified in civil law countries (e.g., LaPorta et al, 2008).[32]

The evidence of a causal role for political shocks on pension funding parallels the history of the Great Reversals in the interwar period (Rajan and Zingales, 2003). In our interpretation, financial development regressed in those continental European countries and in Japan where the middle class was hit hard by major wealth distribution shocks, affecting corporate governance regimes, social insurance and the extent of labor rents (Perotti and von Thadden, 2006). The political consequences of war shocks should not be underestimated, as Keynes stated eloquently in his Political Consequences of the World War (1920). The effect of wealth shocks appear significant also for the degree of state ownership of industry and employment protection, both important indicators of preferences for a corporatist economy, even after controlling for major determinants already identified in the literature.

The initial choice for state funding would have been naturally reinforced over time, as limited exposure to financial markets maintained low support for investor protection (Pagano and Volpin, 2006) even as conditions changed. Political preferences for state insurance after the shocks may have also become crystallized in ideological beliefs (Roe, 2006). Major shocks may have also changed attitudes towards systemic risks, although our evidence suggests that this was not the sole channel influencing preferences for state insurance.

The effect of past shocks, of course, may be reversed over time. Many Continental European capital markets recovered in the last two decades, not least thanks to massive privatization programs, which diffused financial participation and created political support for capital markets (Biais and Perotti, 2002; Pagano and Volpin, 2006). This argument highlights the potential political repercussion of any large financial crisis which significantly weakens the financial holdings of median voters. While evidence from small samples clearly has limited statistical power, the ultimate test of any theory is its predictive power for future events.

[32] Intriguingly, the absence of major price shocks could explain why some civil law countries have maintained a greater market orientation and more labor flexibility, such as Denmark, the Netherlands and Switzerland.

The paper complements a rich literature on social security. In general, our measure (private pension assets) is too simple to allow studying the redistributive and intergenerational issues, which are identifiable in the structure of state funded pensions. Still, our results confirm the diffused impression that pension funding is a highly political issue. As Mulligan and Sala-i-Martin (2004a) point it out, the structure of social security implies that reforms need to take into account the balance of political power across generations. Most reforms aimed at maintaining financial sustainability of pensions suggest some shift to private funding. Accordingly, a more complete picture of all political determinants of pension structure is essential to identify the range of feasible solutions, and to predict to what extent structural features of existing systems, such as solidarity and coinsurance features, will persist.

REFERENCES

Aganin, A. and P. Volpin (2003), The History of Corporate Ownership in Italy, forthcoming in Randall Morck (ed.), The History of Corporate Ownership, University of Chicago Press.

Barr, N. and P. Diamond (2006), *The Economics of Pensions*, Oxford Review of Economic Policy 22 (1), 15-39.

Beck, T., G. Clarke, A. Groff, P. Keefer and P. Walsh (2001), *New Tools and Tests in Comparative Political Economy: The Database of Political Institutions*, World Bank Economic Review 15(1), 165-76.

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

Biais, B. and E. Perotti (2002), *Machiavellian Privatization*, American Economic Review 92, 240-258.

Browning**,** Edgar K. (2003) **"***Social Insurance and Intergenerational Transfers***",** Journal of Law and Economics, Vol. 16, No. 2, pp. 215-237

Caucutt, E., T.F. Cooley and N. Guner (2006), *The Farm, the City, and the Emergence of Social Security*, unpublished manuscript.

Conesa, J.C. and D. Krueger (1999), *Social Security Reform with Heterogeneous Agents*, Review of Economic Dynamics 2, 757-795.

Cooley, T.F. and J. Soares (1999), *A Positive Theory of Social Security Based on Reputation*, Journal of Political Economy 107 (1), 135-160.

Cutler, D.M., and R. Johnson (2004), *The Birth and Growth of the Social Insurance State: Explaining Old Age and Medical Insurance across Countries*, Public Choice 120, 87-121.

Deininger, K. and L. Squire (1996), *A New Data Set Measuring Income Inequality*, World Bank Economic Review 10 (3), 565-591.

Doepke, M., and M. Schneider (2006), *Inflation and the Redistribution of Nominal Wealth*, Journal of Political Economy 114 (6).

Flora, P. (ed.) (1987), Growth to Limits: The Western European Welfare States since World War II .Volume I and II, Walter De Gruyter.

Forbes, K.J. (2000), *A Reassessment of the Relationship between Inequality and Growth*, American Economic Review 90 (4), 869-887.

Hofstede G. (2001), Culture's Consequences; Comparing Values, Behaviors, Institutions and Organizations across Nations. 2nd edition. Sage, Thousand Oaks

Högfeldt, P. (2004), *The History and Politics of Corporate Ownership in Sweden*, unpublished manuscript, Stockholm School of Economics.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. Vishny (1997), *Legal Determinants of External Finance*, Journal of Finance 52 (3), 1131-1150.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. Vishny (1998), *Law and Finance*, Journal of Political Economy 106, 1113-55.

La Porta, R., F. Lopez-de-Silanes, and A. Shleifer (2008), *The Economic Consequences of Legal Origins*, Journal of Economic Literature 46 (2), 285–332.

Levine, R., and S. Zervos (1998), *Stock Markets, Banks, and Economic Growth*, American Economic Review 88 (3), 537-558.

Lindert, P.H. (1994), *The Rise of Social Spending, 1880-1930*, Explorations in Economic History 31, 1-37.

Maddison, A. (1991), Dynamic Forces in Capitalist Development: A Long-Run Comparative View, Oxford University Press.

Meyer, J. (2004), *Inertia Creeps: Reforming the German Public Pension System*, Journal of Australian Political Economy 53, 207-219.

Mitchell, B.R. (1992), International Historical Statistics: Europe 1750-1988, Third Edition, Stockton Press.

Mitchell, B.R. (2003a), International Historical Statistics: Africa, Asia & Oceania 1750-2000, Fourth Edition, Palgrave Macmillan.

Mitchell, B.R. (2003b), International Historical Statistics: The Americas 1750-2000, Fifth Edition, Palgrave Macmillan.

Mulligan, C.B., R. Gil, and X. Sala-i-Martin (2002), *Social Security and Democracy*, NBER Working Paper 8958.

Mulligan, C.B. and X. Sala-i-Martin (2004a), *Political and Economic Forces Sustaining Social Security*, Advances in Economic Analysis & Policy 4 (1).

Mulligan, C.B. and X. Sala-i-Martin (2004b), *Internationally Common Features of Public Old-Age Pensions, and their Implications for Models of the Public Sector*, Advances in Economic Analysis & Policy 4 (1).

Nicoletti, G., S. Scarpetta and O. Boyland (2000), Summary Indicators of Product Market Regulation with an Extension to Employment Protection Legislation, Economics Department Working Papers No. 226.

OECD (2005), "Product Market Regulation in OECD Countries: 1998 to 2003, ECO/WKP(2005)6, Economics Department Working Papers No. 419 (written by Paul Conway, Véronique Janod and Giuseppe Nicoletti).

OECD Newsletter (2005), Pension Markets in Focus, Newsletter December, Issue 2.

Pagano, M. and P. Volpin (2005), *The Political Economy of Corporate Governance*, American Economic Review 95: 1005–30.

Pagano, M. and P. Volpin (2006), *Shareholder Protection, Stock Market Development and Politics*, Journal of the European Economic Association

Persson, T., G. Roland and G. Tabellini (2000), Comparative Politics and Public Finance, *Journal of Political Economy* 108 (6), 1121-1161.

Persson, T. and G. Tabellini (2004), *Constitutional Rules and Fiscal Policy Outcomes*, American Economic Review.

Persson, T., G. Tabellini and F. Trebbi (2003), *Electoral Rules and Corruption*, Journal of the European Economic Association.

Perotti, E., and E.-L. von Thadden (2006), *The Political Economy of Corporate Control and Labor Rents*, Journal of Political Economy.

Perotti, E. (2008), *The Political Economy of Financial Systems: A Review*, mimeo, Unversity of Amsterdam.

Piketty, T., G. Postel-Vinay, J.-L. Rosenthal (2006), *Wealth Concentration in a Developing Economy: Paris and France, 1807-1994*, American Economic Review 96 (1) 236-256.

Rajan, R.G., and L. Zingales (2003), *The Great Reversals: The Politics of Financial Development in the 20th Century*, Journal of Financial Economics 69 (1), 5-50.

Roe, Mark. 2003. *Political Determinants of Corporate Governance: Political Context, Corporate Impact*. New York: Oxford University Press.

Roe, M. (2006), *Legal Origins and Stock Markets in the Twentieth Century*, unpublished manuscript, Harvard Law School.

Stulz, R., R. Williamson (2003), *Culture, Openness, and Finance*, Journal of Financial Economics 70 (3), 313-349.

Tabellini, G. (2000), *A Positive Theory of Social Security*, Scandinavian Journal of Economics 102 (3), 523-545.

Taylor, B. (2002), *Could this Decade be the Next 1930s? A Review of World Stock Markets in the 1920s*, < http://www.globalfinancialdata.com/articles/1929.pdf >.

World Bank (2007), *From Red to Gray: the Third Transition of Aging Populations in Eastern Europe and the Former Soviet Union*, eds: M. Chawla, G. Betcherman and A. Banerji.

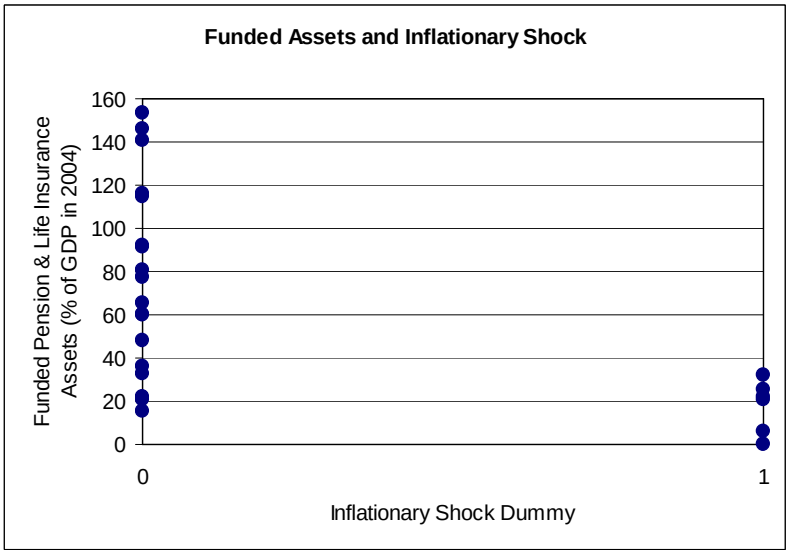

Figure 1 shows total funded pension and life insurance assets as percentage of GDP in 2004 (PENSION+LIFE) on the x-axis and SHOCK dummy on the y-axis.

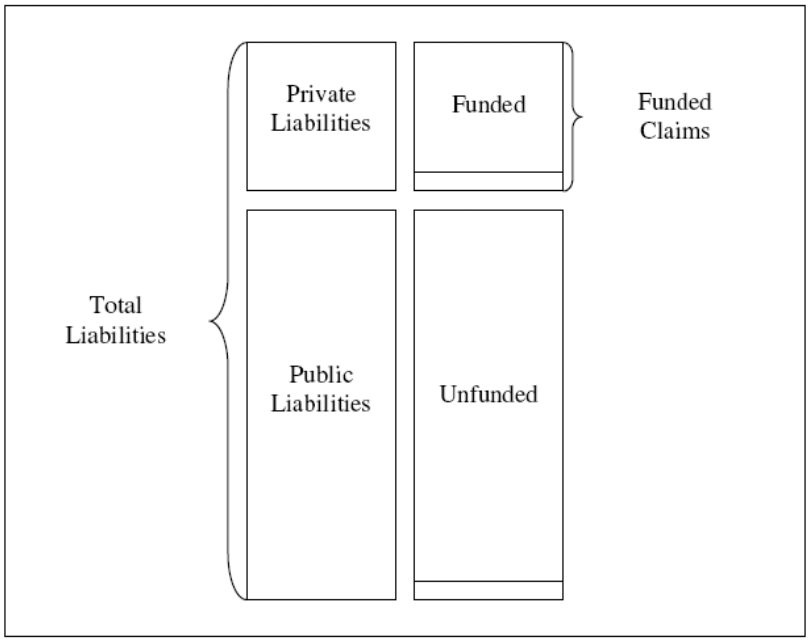

Figure 2 illustrates the idea of using funded pension assets to extract a measure of the percentage reliance on private pension liabilities, under the realistic assumption that private pensions are not too underfunded while state pensions are self funded.

Table 1: Development of Pension Systems in Various Countries

Country	Year of First Program	Year of First Major Program	Year of Highest CPI Increase
Australia	1908	1941	1919
Austria	1909	1935	1922 (HYP)
Belgium	1900	1967	1917
Canada	1927	1966	1917
Denmark	1891	1964	1940
Finland	1937	1956	1945
France	1910	1945	1945-46
Germany	1889	1949	1923 (HYP)
Greece	1934	1978-85	1944 (HYP)
Iceland	1909	1969-70	1917
Ireland	1908	1952	1942
Italy	1919	1969	1944 (HYP)
Japan	1875	1954	1946
South Korea	1960	1973	1951 (HYP)
Mexico	1943-44	1943-44	1917 (HYP)
Netherlands	1913	1957	1918
New Zealand	1898	1938	1918
Norway	1936	1936	1917
Portugal	1919	1935	1918
Spain	1919	1939	1936
Sweden	1913	1962	1917
Switzerland	1946	1946	1918
United Kingdom	1908	1948	1916
United States	1896	1935	1918

NOTE: “Year of First Program” typically involves only a particular group of society (e.g., veterans, war widows, miners). “Year of First Major Program” is based on programs involving "large coverage" of private sector. Main sources of information are: Flora (1987a, 1987b) (for various European countries), the U.S. Social Security Administration (on: Social Security Programs Throughout the World), the Australian Bureau of Statistics, the Financial Report on the Public Pension Plan System (Japan) and the French Observatory of Retirement. The last column gives the year where the highest annual percentage increase in CPI took place prior to each country’s first major pension program. "HYP" means that the increase was more than 400% in a single year.

Table 2: Summary Statistics and Correlation Matrix

Panel A: Summary Statistics

Variables	Mean	Median	Minimum	Maximum	Standard Deviation	Nbr. Obs.
PENSION+LIFE	61.63	54.10	0.00	153.20	46.32	24
PENSION	34.31	12.00	0.00	111.90	38.92	24
SHOCK (Dummy)	0.250	0.000	0.000	1.000	0.442	24
HIGH_INFLATION (Dummy)	0.625	1.000	0.000	1.000	0.495	24
MAX_CPI	173.9	52.6	13.1	491.6	201.7	22
COMMON_LAW (Dummy)	0.250	0.000	0.000	1.000	0.442	24
POP_65+	0.085	0.082	0.031	0.131	0.027	24
POP2004_65+	0.147	0.155	0.055	0.191	0.034	24
MARKET_CAP1913	0.558	0.490	0.160	1.090	0.270	15
CRASH1929	64.8	65.0	39.4	86.2	14.3	16
STOCK_RETURNS	3.129	3.020	-0.120	5.880	1.773	23
% Catholics	37.515	29.545	15.000	96.550	35.507	24

Panel B: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)
(1) PENSION+LIFE	1					
(2) PENSION	0.938 ***	1				
(3) SHOCK Dummy	-0.559 ***	-0.472 **	1			
(4) HIGH_INFLATION Dummy	-0.621 ***	-0.628 ***	0.447 **	1		
(5) COMMON_LAW Dummy	0.268	0.336	-0.333	-0.745 ***	1	
(6) MARKET_CAP	0.648 ***	0.657 ***	-0.445 **	-0.395 *	0.186	1

NOTE: All the variables are defined in Section 3. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 3: The Political Choice of Pension System

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
						Countries without the Largest Shocks (SHOCK = 0 subsample)			
SHOCK	-58.52 ***	-36.83 ***			-36.83 **	NA	NA	NA	NA
	(11.58)	(13.70)			(14.04)				
HIGH_INFLATION		-43.38 **			-73.87 ***	-43.38 **		-73.87 ***	
		(18.68)			(21.29)	(18.53)		(21.29)	
MAX_CPI			-0.15 ***						-0.189 *
			(0.028)						(0.090)
COMMON_LAW				28.10	-45.73 *		9.67	-45.73 *	-12.143
				(18.36)	(22.52)		(20.38)	(22.52)	(24.500)
Nbr. of Obs.	24	24	22	24	24	18	18	18	16
R-squared	31%	48%	45%	7%	57%	26%	1%	38%	10%
Adj. R-squared	28%	43%	42%	3%	50%	21%	X	30%	X

NOTE: The dependent variable is the percentage of funded pension and life insurance assets over GDP in 2004 (PENSION+LIFE). All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable HIGH_INFLATION is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. MAX_CPI gives the highest annual percentage increase in CPI in the years prior to each country's first major pension program. COMMON_LAW is a dummy variable equal to one if the country is a common law country, and zero otherwise. Regressions (6) – (9) are for the subsample SHOCK = 0. Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 4: Alternative Definitions of Pension Funding

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Funded Pension Assets, excluding Life Insurance Reserves				Percentage of Funded Pension Assets (PENSION+LIFE) from Total Liabilities			
SHOCK	-41.55 ***		-35.67 ***	-21.07 *	-0.23 ***		-0.17 ***	-0.12 *
	(9.58)		(13.16)	(12.14)	(0.06)		(0.06)	(0.07)
HIGH_INFLATION		-49.38 ***		-58.38 **		-0.316 ***		-0.19 **
		(13.610)		(26.49)		(0.079)		(0.07)
COMMON_LAW			17.65	-26.13			0.16 **	0.02
			(17.37)	(26.29)			(0.08)	(0.09)
Nbr. of Obs.	24	24	24	24	24	24	24	24
R-squared	22%	39%	27%	48%	29%	51%	43%	53%
Adj. R-squared	19%	37%	19%	40%	26%	49%	38%	46%

NOTE: In Regressions (1) – (4), the dependent variable is the percentage of funded pension assets over GDP in 2004, excluding Life Insurance assets (PENSION). In Regressions (5) – (8), the dependent variable is the percentage of funded pension liabilities/assets (PENSION+LIFE) from total liabilities, i.e., funded liabilities and unfunded public pension liabilities (defined as 20 times old age social expenditures) in 2004. All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable HIGH_INFLATION is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. COMMON_LAW is a dummy variable equal to one if the country is a common law country, and zero otherwise. Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 5: The Effect of Demographics on Pension Funding

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SHOCK					-37.24 **	-35.77 **	-3770 **	-64.49 **	-36.42 **
					(17.42)	(14.61)	(13.87)	(28.33)	(16.87)
HIGH_INFLATION					-42.80 *	-43.15 **	-41.79 **		-43.85 **
					(22.54)	(18.98)	(18.91)		(20.91)
POP2004_65+	-172.09				-20.44				
	(341.43)				(236.55)				
POP_65+		284.73				146.41		141.16	
		(312.66)				(179.86)		(293.28)	
SHOCK * POP_65+								101.01	
								(283.72)	
POP_Young			-297.59				-225.61		
			(303.39)				(233.37)		
Population Growth				341.59					-14.90
				(1929.22)					(1355.57)
Nbr. of Obs.	24	24	24	24	24	24	24	24	24
R-squared	2%	3%	3%	0%	48%	49%	50%	32%	48%
Adj. R-squared	X	X	X	X	41%	41%	43%	22%	41%

NOTE: The dependent variable is the percentage of funded pension and life insurance assets over GDP in 2004 (PENSION+LIFE). All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable HIGH_INFLATION is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. The variable POP2004_65+ measures for the proportion of the total population over 65 years old in 2004, while POP_65+ is the same value but for the year of the pension reform (see Section 3.1 for more details). The variable POP_Young gives the proportion of total population in the age tranche 15-34 in the same year as POP_65+. The variable "Population Growth" is the geometric mean (growth rate) of the population increase from 1950-2004. Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 6: Alternative Political Explanations of Pension Funding

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
									Excluding Non-Democracies (NON-DEMOCRACY = 0 Subsample)	
SHOCK		-40.03 ***	-23.96 ***		-52.48 ***	-36.35 **	-50.07 ***	-33.95 ***	-63.21 ***	44-14 ***
		(9.82)	(8.41)		(14.84)	(14.60)	(11.89)	(12.64)	(12.44)	(15.94)
HIGH_INFLATION			-42.72 ***			-41.94 *		-37.61 *		-33.90
			(13.69)			(22.42)		(19.30)		(20.04)
Income Inequality (Gini Coefficient)	-2.70 ***	-1.91 **	-0.983 *							
	(0.953)	(0.910)	(0.542)							
Majoritarian Electoral Rule Dummy				38.32 **	21.74	4.33				
				(15.07)	(17.45)	(18.77)				
NON-DEMOCRACY Dummy							-38.05 ***	-25.96 **	NA	NA
							(13.65)	(11.51)		
Nbr. of Obs.	21	21	21	24	24	24	24	24	20	20
R-squared	25%	43%	63%	12%	35%	49%	40%	52%	32%	44%
Adj. R-squared	21%	36%	57%	8%	28%	41%	35%	45%	28%	37%

NOTE: The dependent variable is the percentage of funded pension and life insurance assets over GDP in 2004 (PENSION+LIFE). All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable HIGH_INFLATION is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. "Income Inequality" is measured as the Gini coefficient of income as provided by Forbes (2000) for the time period closest to the year of first major pension program. The variable "Majoritarian Electoral Rule" is a dummy variable equal to one if electoral rule is based on majority, and zero otherwise (as in Persson, Tabellini and Trebbi, 2003). The dummy variable NON-DEMOCRACY (i.e., countries that were not democratic at time of first major political decisions on pension system were made) equals one for South Korea, Mexico, Portugal and Spain. Regressions (7) – (9) are for the subsample SHOCK = 0. Regressions (11) and (12) are for the subsample NON-DEMOCRACY = 0. Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 7: Possible Alternative Explanations

Variables	(1)	(2)	(3)	(4)	(5)
SHOCK	-57.98 ***	-54.63 ***	-61.66 ***	-59.44 ***	-57.13 ***
	(13.26)	(12.99)	(13.23)	(13.16)	(11.02)
MARKET_CAP_1913	8.5				
	(38.89)				
CRASH1929		0.16			
		(0.624)			
STOCK_RETURNS			6.85		
			(4.30)		
Average Inflation 1901-1945				-5.58 **	
				(2.54)	
Average Inflation 1920-1945					-3.77 *
					(2.16)
Nbr. of Obs.	15	16	23	15	21
R-squared	33%	25%	39%	39%	42%
Adj. R-squared	x	14%	32%	28%	35%

NOTE: The dependent variable is the percentage of funded pension and life insurance assets over GDP in 2004 (PENSION+LIFE). All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The variable MARKET_CAP_1913 gives the market capitalization of the country's stock markets in 1913. The variables "Average Inflation 1901-1945" and "Average Inflation 1920-1945" give the average annual percentage change of CPI for their respective time period. For the calculation of average inflations, periods of "very high" inflation have been excluded (see Section 3 for more details). Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 8: The Effect of Culture on Pension Funding

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SHOCK		-35.876 ***	-51.416 **		-23.655 ***			-54.69 ***	-34.481 ***
		(8.638)	(19.304)		(6.648)			(12.80)	(12.860)
HIGH_INFLATION				-54.363 ***	-46.669 **	9.136			-41.994 **
				(19.641)	(19.519)	(38.017)			(18.874)
Uncertainty Aversion (UA)	-1.083 ***	-0.813 ***	-0.838 ***	-0.338	-0.265	0.790			
	(0.196)	(-0.179)	(0.208)	(0.2445)	(0.215)	(0.991)			
SHOCK * UA			0.198						
			(0.218)						
HIGH_INFLATION * UA						-1.303			
						(1.006)			
% Catholics							-0.375 *	-0.24	-0.190
							(0.213)	(0.21)	(0.177)
Nbr. of Obs.	23	23	23	23	23	23	24	24	24
R-squared	38%	49%	49%	58%	63%	62%	8%	34%	50%
Adj. R-squared	35%	44%	41%	54%	57%	56%	4%	28%	43%

NOTE: The dependent variable is the percentage of funded pension and life insurance assets over GDP in 2004 (PENSION+LIFE). All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable HIGH_INFLATION is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. The variable "Uncertainty Aversion" is an indicator of uncertainty aversion as defined by Hofstede (1980). The Variable "% Catholics" gives the percentage of total population that is catholic (as in Persson, Tabellini and Trebbi, 2003). Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 9: Effect of War Damage and Political System on Inflationary Shock

Variables	Dependent Variable = SHOCK			Dependent Variable = MAX_CPI		
	(1)	(2)	(3)	(4)	(5)	(6)
War Destruction	0.984 ***	0.960 ***	2.162 **	132.9 ***	116.1 **	111.1 *
	(0.266)	(0.302)	(1.054)	(30.887)	(43.623)	(62.433)
Polity2 Variable		-0.060	0.109		-7.069	-8.016
		(0.055)	(0.136)		(9.946)	(15.761)
Polity2 Variable * War Destruction (Interactive Term)			-0.154			0.762
			(0.110)			(7.620)
Nbr. of Obs.	24	23	23	22	21	21
Wald Chi-squared	13.70 ***	8.70 ***	13.50 ***			
R-squared				42%	44%	44%
Pseudo R-squared	32%	33%	37%			

NOTE: All the estimations are done by Probit regressions. For Regressions (1) – (3), the dependent variable is the dummy variable SHOCK that is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. For Regressions (4) – (6), the dependent variable is MAX_CPI, which gives the highest annual percentage increase in CPI in the years prior to each country's first major pension program. The "War Destruction" variable is an index of three different dummy variables: Invasion (equal to one if the country got invaded during the war prior to the inflationary shock or civil war; for countries that did not experience a shock, we use WW1 as default), Intensity of Fighting (equal to one if the country had intensive fighting on its own territory during the war prior to the inflationary shock or civil war; for countries that did not experience a shock, we use WW1 as default) and Major Loss in Territory (equal to one if the country had important losses of territory from the war prior to the inflationary shock or civil war; for countries that did not experience a shock, we use WW1 as default). The variable "Polity2" (as defined by Polity IV) measures the quality of the political system in each country (within interval -10 to +10) at the time of the inflationary shock or highest inflation (year of MAX_CPI). Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 10: The Political Choice of Pension System (Two-Step Regression)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
SHOCK (IV)	-93.386 ***			-92.403 *		
	(32.728)			(50.196)		
HIGH_INFLATION (IV)		-73.497 ***			-100.170 ***	
		(18.043)			(31.550)	
MAX_CPI (IV)			-0.191 ***			-0.237 **
			(0.053)			(0.097)
COMMON_LAW				0.875	-49.005	-22.778
				(28.220)	(31.200)	(31.573)
Nbr. of Obs.	23	23	21	23	23	21
R-squared	15%	56%	42%	16%	66%	34%
Adj. R-squared	11%	54%	39%	8%	63%	26%

NOTE: All the regressions are two-step regressions. Only results of the second-stage regression are shown. The dependent variable in the second regression is the percentage of funded pension and life insurance assets over GDP in 2004 (PENSION+LIFE). All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable HIGH_INFLATION is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. MAX_CPI gives the highest annual percentage increase in CPI in the years prior to each country's first major pension program. COMMON_LAW is a dummy variable equal to one if the country is a common law country, and zero otherwise. As instrumental variables for the first-step regression, we use WAR and Polity2 (as defined in Table 7). Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 11: The Political Choice of Public Pension Expenditure

Variables	(1)	(2)	(3)	(4)
SHOCK	2.61 ***	2.45 **		
	(0.98)	(1.20)		
MAX_CPI			0.003 **	0.004 ***
			(0.001)	(0.001)
Former Socialist Country (Dummy)	0.22	0.08	0.13	0.65
	(0.86)	(0.79)	(0.92)	(1.20)
SHOCK * Socialist Country Dummy		0.37		-0.001
		(2.07)		(0.003)
POP2004_65+	69.11 ***	68.93 ***	64.26 ***	64.53 ***
	(17.69)	(17.69)	(17.46)	(17.00)
Nbr. of Obs.	37	37	35	35
R-squared	48%	49%	46%	46%
Adj. R-squared	44%	42%	40%	39%

The dependent variable is public pension expenditure as percentage of GDP in 2004. All regressions include a constant. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable "Former Socialist Country" is equal to one for Eastern European countries, and zero otherwise. MAX_CPI gives the highest annual percentage increase in CPI during the period 1990-2000. Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 12: The Political Choice of Employment Protection

Variables	(1)	(2)	(3)	(4)	(5)	(6)
SHOCK	1.30 ***	0.30		0.88 *	0.21	
	(0.46)	(0.41)		(0.48)	(0.46)	
HIGH_INFLATION		1.88 ***			1.55 ***	
		(0.39)			(0.37)	
MAX_CPI			0.004 ***			0.003 ***
			(0.001)			(0.001)
Proportionality				0.56 ***	0.36 **	0.49 ***
				(0.17)	(0.13)	(0.14)
Nbr. of Obs.	21	21	19	21	21	19
R-squared	17%	65%	36%	47%	75%	63%
Adj. R-squared	13%	61%	32%	41%	71%	58%

NOTE: The dependent variable is the Employment Protection Legislation (EPL) index, measured as the average of indicators for regular contracts (procedural inconveniences, notice and severance pay for no-fault individual dismissals, difficulty of dismissal) and short-term contracts (fixed-term and temporary) in 1990; cf. Nicoletti, Scarpetta and Boyland (2000). A higher index value represents stronger protection. All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable HIGH_INFLATION is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. MAX_CPI gives the highest annual percentage increase in CPI in the years prior to each country's first major pension program. The variable Proportionality is an index between 0-3 based on the degree of which seats are assigned through a proportional rule; data are drawn from the World Bank Database of Political Institutions 2000, and defined in Beck et al. (2001). Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 13: The Political Choice of State Ownership (Size of public enterprise sector)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SHOCK	1.45 ***		0.78		1.02 **		0.78		
	(0.37)		(0.50)		(0.44)		(0.51)		
High Inflation		1.66 ***	1.35 **			1.31 *	0.99		
		(0.45)	(0.57)			(0.65)	(0.76)		
MAX_CPI				0.003 **				0.001	
				(0.001)				(0.001)	
Common Law Dummy					-1.27 **	-0.53	-0.53	-1.42 **	-1.62 ***
					(0.57)	(0.70)	(0.72)	(0.59)	(0.49)
Nbr. of Obs.	24	24	24	22	24	24	24	22	24
R-squared	22%	37%	42%	16%	38%	38%	43%	33%	28%
Adj. R-squared	19%	34%	36%	12%	32%	32%	35%	25%	25%

NOTE: The dependent variable measures the overall size of state-owned enterprises relative to the size of the economy in 1998 (OECD, 2005, for more detailed description). All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable HIGH_INFLATION is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. MAX_CPI gives the highest annual percentage increase in CPI in the years prior to each country's first major pension program. COMMON_LAW is a dummy variable equal to one if the country is a common law country, and zero otherwise. Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 14: The Political Choice of Stock Market Development

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SHOCK	-0.58 ***			-0.52 ***		- 0.69 ***	-0.59 **	
	(0.13)			(0.15)		(0.21)	(0.24)	
High Inflation		-0.48 **						-0.62 **
		(0.22)						-0.24
MAX_CPI			-0.001 ***		-0.001 ***			
			(0.0004)		(0.0004)			
Common Law Dummy				0.16	0.01		0.35	
				(0.27)	(0.30)		(0.27)	
Stock Market Capitalization in 1913						0.60 *	0.50	0.68 *
						(0.33)	(0.32)	(0.37)
Nbr. of Obs.	24	24	22	24	22	15	15	15
R-squared	26%	22%	34%	28%	34%	40%	47%	47%
Adj. R-squared	23%	18%	30%	21%	27%	30%	33%	38%

NOTE: The dependent variable measures the ratio of stock market capitalization over GDP in 2004, as discussed in Beck, Demirguc-Kunt and Levine (2000) and kept up-to-date in the World Bank database. All the regressions include a constant, whose coefficient is not reported. The dummy variable SHOCK is equal to one if the country experienced an increase in its Consumer Price Index (CPI) of 400% or more in a single year, and zero otherwise. The dummy variable HIGH_INFLATION is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. MAX_CPI gives the highest annual percentage increase in CPI in the years prior to each country's first major pension program. COMMON_LAW is a dummy variable equal to one if the country is a common law country, and zero otherwise. The variable "Stock Market Capitalization in 1913" is scaled by GDP, as provided by Rajan and Zingales (2003). Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.