The Political Origin of Pension Funding

Enrico Perotti
University of Amsterdam, NETSPAR and CEPR

Armin Schwienbacher
University of Amsterdam and Catholic University of Louvain

Abstract[*]

This paper argues that historical political preferences on the role of capital markets shaped national choices on the reliance on private funding for the pension system. Under democratic voting, a majority will support investor protection and a predominantly privately funded pension system when the middle class has significant financial participation, while high wealth concentration favors a state-funded retirement system and weak investor rights. We present evidence that pension funding is well explained by wealth distribution shocks in the first half of the XX century, which occurred before the establishment of universal pension systems after the Great Depression. The effect is very significant: a large shock reduces the stock of private retirement assets by 58% of GDP. The results stand after controlling for complementary explanations, such as original financial development, legal origin, past and current demographics, religion, electoral voting rules, national experiences with financial market performance, or other major financial shocks that were not specifically redistributive.

Date: 8 March 2007

[*] We thank Randall Morck, Fabio Braggion, audiences at the University of Amsterdam, Paris School of Economics, the 2006 CEPR Annual Conference on Public Economics (Kiel), the "Workshop on Long-Term Perspectives on Institutions, Business and Finance" (Antwerp), and the "Workshop on the Politics of Corporate Governance" (Copenhagen) for useful comments. We retain responsibility for any errors.

1. Introduction

Few issues are as controversial at present as the issue of pension funding. Increased longevity and declining birth rate have affected the ability of pension systems to cover pension liabilities. The debate on pension reform is particularly intense in countries which historically chose to establish a pay-as-you-go system, where it is an open question how the financial consequences of the large projected shortfalls should be distributed across social groups. It appears therefore important to understand the determinants of the original choice on pension funding structure.

The earliest pension plans, starting in Germany in the 1880s, were funded, and most worker pensions remained privately invested for decades (although governments granted state pensions to civil servant and war veterans). Current retirement systems in developed countries were adopted soon after the Second World War, and vary considerably on their reliance on a state guarantee, versus private funding on capital markets. While most systems share both features (even the US has a significant Social Security component), private funding across OECD countries varies by far more than the development of their capital markets.

When was the government entrusted with most retirement liabilities in some countries, while elsewhere private funding was preferred? Cutler and Johnson (2004) find hardly any explanatory variable for the timing of adoption of state pension systems, besides income and ethnic fractionalization. Some differences across similar countries are particularly surprising. Why does Finland have so little pension assets in comparison to Denmark or Sweden? Why does Belgium have so little pre-funding in comparison to the Netherlands, or Switzerland so much in comparison to Austria? [1]

This paper argues that pension funding choices after the Second World War reflected national political preferences on financial markets shaped by the experience of the middle class during the tumultuous interwar period. Moreover, this historical choice had a self-reinforcing effect, as voters support investor protection only to the extent that they hold security claims on the private sector.

[1] Of course, 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.

The political economy literature on capital market orientation shows that when the middle class has a high degree of financial participation, it supports minority investor protection, which in turn ensures better financial returns and more financial development. In contrast, in a country where wealth is very concentrated, the middle class relies mostly on labor income. In this case, a political majority will seek a corporatist economic structure which protects inside labor and inside capital, favoring high labor rents and weaker investor protection (Pagano and Volpin, 2005; Perotti and von Thadden, 2006).[2] In turn, investor protection had a persistent effect on financial development (La Porta et al, 1997, 1998). As a result, at the time of the choice on pension funding, the middle class eschews capital market investments and seeks a state guarantee. Thus wealth inequality shocks can have a persistent effect on both capital market development and pension funding.

Testing the political economy explanation directly requires historical measures of wealth distribution, for which hardly any reliable historical data is available. In this paper we adopt a proxy measure suggested in Perotti and von Thadden (2006), namely the dramatic inflationary shocks that hit some countries in the interwar period and caused major wealth losses.[3] Their model suggests that such shocks may explain major financial shifts, identified by Rajan and Zingales (2003) as the Great Reversal. As a result of the loss of their savings, the middle class came to depend more on its labor income and sought more corporatist policies. Subsequent enforcement and regulatory choices weakened control rights for minority investors, granting control to banks, the state and large, undiversified shareholders and reducing significantly the attractiveness of security investments. In contrast, countries where the middle class had managed to keep its savings, it maintained its support for investor protection.

The creation of universal social insurance programs, including the universal retirement system, came after the Great Depression. While almost all countries introduced some state funded social programs at the time (even the US introduced Social

[2] Pagano and Volpin (2006) model how better initial investor protection induces companies to issue more equity and thereby leads to more equity issuance, which in turn expands the shareholder base and increases support for shareholder protection. They offer evidence of such a virtuous cycle in equity issuance in recent years, confirmed by increasing political acceptance of takeovers.

[3] Doepke and Schneider (2006) simulate the impact of inflationary shocks in the US nowadays and obtain large redistributive effects.

Security in 1935), we argue that the decision on overall pension funding was deeply affected by the prevailing preferences on investor protection, and the bulk of pension contributions in countries which retained support for investor protection remained privately invested..

We test this political economy view by regressing accumulated private pension assets in a sample of democracies against these shocks, along with complementary and competing explanations. The results indicate a strong economic and statistic effect of wealth shifts. In particular, a single episode of very high inflation reduces the stock of current private retirement assets by 58% of GDP. The result is robust to controls for causes related to historical and current demographics, formal political institutions such as electoral voting rules, religion, legal origin or other independent determinants of financial development, and the national experience with average inflation and financial returns.

This paper relates to the growing literature on pension programs and their sustainability. The political economy of pension and social security systems have been examined, among others, by Conesa and Krueger (1999), Cooley and Soares (1999), and Tabellini (2000). The development of social security programs has wide-spread around the world in early 20th century as a result of demographic and democratic changes as well as urbanization (Lindert, 1994, Caucutt et al., 2006). Lindert (1994) finds that changes in income growth had little impact on the rise of social security spending. While public spending on pensions did not exceed 1% of GDP for most developed countries, in 2001 public spending on old age benefits amounted to 7.6% on average in the OECD countries. Overall, the rise in social spending and pension programs has a large component which appear exogenous to political orientations. Taking a long-term perspective, Mulligan, Gil and Sala-i-Martin (2002) address the relationship between social security spending and democracy. We seek to contribute by identifying the determinants of the relative share of private to state pension funding.

Our sample is small but exhaustive relative to the population of representative democracies with a history of universal pension programs. Our identification benefits from large variation, both in terms of pension funding and of inflationary shocks. In fact, the cross country variation in pension funding dwarfs the variation in financial development (although our theoretical argument applies to democracies).

The paper is structured as follows. The next section sketches our hypotheses. Section 3 contains the empirical tests. We conclude in Section 4. The Appendix presents a simple model of political support for investor protection, drawn from Perotti and von Thadden (2006).

2. History and causes of 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 (Lindert, 1994, and Cutler and Johnson, 2004). The program relied on worker and firm contributions and enjoyed some fiscal benefits. The pension claims were extremely modest, and could be drawn only upon reaching 70 years of age, at a time where most workers die well before 60 years. Interestingly, the contributions were invested in financial securities, just as the programs which imitated the German example in subsequent years in other European countries. The program had no redistributive feature (Lindert, 1994). 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 railway bankruptcies, their financial impact were circumscribed to few wealthy individuals, while 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 seen heavy fighting on their territory faced huge costs of reconstruction, while the loser countries faced massive reparations and suffered large losses of control over territory or industry. Social demands rose rapidly as veterans came back armed amid fears of a socialist uprising. These urgent spending

needs often could not be fiscalized given the economic destruction, and governments were forced into rapid money printing, leading to a sharp acceleration in inflation.[4] Austria and Germany experienced devastating hyperinflations, but also winners such as Italy, Belgium and France had massive price jumps. In contrast, the UK, which escaped invasion and direct damage, managed to finance its war expenditures by running down its large stock of private foreign assets against newly issued public debt. Its non European allies, such as the US or Australia, were far from the area of war destruction and could also redistribute the war cost over time. Within Continental Europe, the Netherlands, Scandinavia and Switzerland were also spared. Some other countries which were not drawn in WW1, suffered sharp inflationary shocks as a result of civil wars.

The devaluation of long-term nominal contracts, diffused after a long price stability, hit all social classes, and hit hard the middle and lower middle class which relied on monetary savings or rental income. Many were reduced to sell real property to survive. By most contemporaneous accounts, a large fraction of the middle class lost all its financial holdings, small firms were hard hit, and wealth became much more concentrated (Eulenburg, 1924). Other classes suffered greatly from the economic devastation, but this did not alter their policy preferences, e.g. for redistribution.[5]

The inflationary shocks had a seismic effect because it hit a class which became politically critical after 1918, when most European countries moved to universal suffrage. In countries where the middle class had been impoverished, a political majority shifted support to less market-friendly policies (in extreme case, such as in Italy, Germany, Spain, also to less democratic institutions) and to a greater role for corporatist policies, bank dominance over capital markets, and state intervention (Perotti and Thadden, 2006). Corporatist policies, with higher labor protection, weaker competition, and nationalistic policies, found support among both inside labor and inside capital. [6]

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

[5] Piketty et al (2006) show that many very rich renters in France were financially devastated by the post WW1 inflation, reducing wealth inequality at the very top of the distribution.

[6] Roe (2006) argues that ownership concentration increased because capitalists sought to resist increased labor activism. Unfortunately the scarce data on ownership makes it hard to assess whether larger control blocks emerge in left oriented systems, with the visible exception of Sweden.

At the time of these major shocks, pensions were still provided mostly by companies, and pension payments were minimal. Since companies largely survived well the shocks, there was no major difficulty to sustain their funding, and no country moved to a publicly funded retirement system in this period. The critical decision on pension funding arose after the Great Depression. The stock market crash of 1929 hit hard mostly the moneyed classes, but the depression led to massive unemployment in all countries, leading to the establishment of social programs with some state funding. Mandatory universal pension systems were established in most developed countries between the late 1930s and the early 1950s. Our hypothesis is that in countries where financial markets enjoyed political support, the choice was to rely predominantly on market funding.[7] In contrast, in the affected countries the pension system was entrusted to the state, a choice which represented a shift relative to a early history of privately funded pension systems.

Fortunately for our test, the largest inflationary shock in all countries in our sample came before the establishment of the universal retirement system.[8] For most countries the establishment of the major social security program (defined as a comprehensive retirement program covering most production workers) came after WW2. Table 1 provides an overview of the estimated timing of major pension initiatives across countries, and suggests that the structural decisions on pension structure took place after the major financial crises of the interwar period.

Alternative causes of pension structure

One simple objection is that inflationary shocks may have had a mechanical effect on pension funding, by destroying the stock of pension assets, and thus forcing public funding to maintain payments. Yet while high inflation certainly caused losses to firms' pension reserves, pension claims were minimal at that time, life expectancy was low and entitlement required working until the age of 70. Even if some subsidy had been needed to cover an immediate shortfall, adequate funding for future claims could be built up by

[7] 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.
[8] Japan suffered hyperinflation just after WW2, and subsequently experienced a major reorientation of its financial system with increasing insider and bank dominance, coupled with better labor protection.

contributions. In fact, neither in France nor in Germany there was a state bailout of the enterprise-based pension system after the First World War.[9] In contrast, pension funding by firms became threatened in the Great Depression, where failures became common.

An alternative explanation is that market funding was chosen in countries with a high level of capital market development. Indeed there is correlation between pension funding and current market capitalization, but the direction of causation is ambiguous.[10] Accordingly, we test whether financial development in 1913 has any explanatory power, and control for legal origin, an exogenous country feature associated with investor protection (LaPorta et al, 1997, 1998).

A simpler political economy explanation suggests that a more unequal democracy would prefer more fiscal redistribution, which may be best achieved via a state pension system funded by progressive taxation.[11] We test this by controlling for measures of income inequality around the time of the historical pension funding decision.

Another hypothesis is that if the proportion of the population close to retirement age was large at the time of the decision, there would be more support for a PAYG system, which tend to benefit older generations above past contributions (Conesa and Krueger (1999), Cooley and Soares (1999), and Tabellini (2000).

Another possibility is that negative experiences with large financial crises, including financial losses due to sharp price shocks. affected the population's attitude towards security markets, creating demand for more state insurance. We accordingly control for large negative financial shocks that had no comparable redistributive effect for pivotal voters, such as the size of the 1929 stock market correction in each country.

Finally, we consider a list of possible determinants on pension funding coming from macroeconomic, cultural or political structure features. We test whether there is an effect of average inflation, rather than its extreme values. We test for cultural determinants as proxied by the predominant religion, although most arguments for a role

[9] In recent times, many Eastern European countries, where the role of the state had been discredited by their communist past, chose to couple state guarantee for older cohorts with pre-funding for younger workers.

[10] Pension funds provide long-term demand for securities and may increase total demand if they induce forced savings or if they have a coordinating role, e.g. by avoiding panics among dispersed investors or provide better diversification.

[11] State funding is not per se more redistributive. The most redistributive pension systems appear to be those where their state funded component is small and targeted to lowest income groups (such as the UK).

of religion concerns coinsurance rather than pension funding.[12] We also consider the effect of democracy and of electoral voting rules (whether majoritarian or proportional).[13]

3. Empirical analysis

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

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. 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. We include all countries where current pension assets reflect a historical choice taken under a democratic government, so we exclude former Communist countries. The variable PENSION represents the percentage of funded pension assets over GDP in 2004, while PENSION+LIFE also includes accumulated life insurance assets.[14] We also investigate the ratio of pension assets to our estimates 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 3.

Information on price series was collected mainly from the Global Financial Database (from Global Financial Data Corporation). For some countries, we completed the time series from other sources (Maddison, 1991, Mitchell, 1992, as well as national

---

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.

[12] Religion has been shown to affect financial development (Stulz and Williamson, 2003) and social security structure (Cutler and Johnson, 2004).

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

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 was at least 30%. (No results are affected if we increase the threshold to 70%). As a final measure, we use the actual highest annual increase in CPI in the given period (denoted MAX_CPI). 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).

We take from La Porta *et al.* (1997) the legal origin dummy variable, defined as one for English legal origin (common law countries) and labeled COMMON_LAW.[15] We further collect from OECD (2004) stock market capitalization in 2002 for all countries, denoted by MARKET_CAP. The percentage of Catholics in each country and information on the electoral rules are taken from Tabellini et al (2003).[16]

We collect data on alternative factors that may have affected preferences or beliefs during the period under consideration. To explore the impact of other crises,[17] we construct a variable CRASH1929 which captures the size of the crash in the domestic stock market from the market high until the through (Taylor, 2002). We also collect data on demographics, specifically the proportion of older people, at different points in time. Its current value controls for the stock of pension liabilities, while its value at the time of the pension decision measures the size of a political block favorable to a fiscalization of pensions. The variable POP_ 65+ measures the proportion of the population over 65 years old, using US Census information (cf. www.census.gov/ipc/www/idbsprd.html). The historical values are taken for 1950, in some cases for either 1951 or 1960-1961 if

[14] We performed the same analysis on pension assets data of 2002, with very similar results.
[15] 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).
[16] We use current information on these variables, as they should not have changed much in the meantime.
[17] 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.

data is not available for earlier years. Finally, to test the impact of income inequality, we use the historical data around the historical pension choice from Forbes (2000).

We have complete information on 16 countries and partial information on 8 more countries. For all 24 countries, we do have information on inflation and pension assets.

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). 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 argument 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 quite similar magnitudes.

There is very little variation among countries in the proportion of older people in the population (POP1950_65+), with an average of 8.7%. While this suggests that the hypothesis can only have a modest explanation power, it may make 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. It clearly indicates a negative link between inflationary shocks and accumulated pension assets, and suggests that outliers do not

drive these results. This is confirmed by similar graphs using the other inflation variables (not shown here). Figure 2 shows the relationship between legal origin and funded pension assets. There, the link appears less clear, although the figure seems to indicate a slightly positive relationship.

Empirical results

Table 3 gives our basic results. The effect of an inflationary shock on funded assets is very strong, whatever the specifications of the shock. Countries that experienced a sharp inflationary shock subsequently favored an unfunded pension system. The effect is economically significant, since (in the univariate setting; cf. Regression 1 in Panel A) such countries have 58.5% less funded pension and life insurance assets in 2004 than countries that did not have hyperinflation. Moreover, this variable already explains 31% of the variation alone. The variable SHOCK remains significant when estimated together with HIGH_INFLATION (Regression 2), indicating that extreme inflation has much explanatory power, but that pension asset are also quite affected by a high inflation experience. Reassuringly, our results hold if we use a continuous variable MAX_CPI (Regression 3). [18]

Regression 4 (Table 3, Panel A) shows that common law countries do not have a greater propensity to a more privately funded pension system. Legal origin explains little of the variation compared to our measure of wealth distribution shocks. In Regressions 5 – 6, when we examine both hypotheses jointly, its sign is negative, while the inflationary shock remains significant and at the same level of magnitude as in the univariate analysis.

In our sample, we do not have any legal origin countries which experienced a major inflationary acceleration (i.e. SHOCK takes the value one). Ideally, we would have wanted to include an interactive term SHOCK*COMMON_LAW. Instead, we consider the effect of legal origin in the sub-sample of countries that did not experience an inflationary shock (Regressions 7 – 9, Table 3). Surprisingly, even in this selected sample legal origin does not contribute in explaining pension funding. [19]

[18] It is not possible to estimate SHOCK and MAX_CPI jointly, given their very high correlation (95%).
[19] This leaves the question why common law countries did not experience high inflation. We will show later that none of them has been subject to military invasion or major war devastation.

We next test is whether non-democracies exhibit a different pattern. A dummy variable takes value one if the countries were not democratic at the time the major pension plan was put in place, which is the case of Mexico, Portugal, South Korea and Spain. The non-democracy dummy is highly significant and negative (Regression 10). The inflationary shock variables remain highly significant and of the same magnitude, even in the sub-sample of countries that were democracies (Regressions 11–12).

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. Next we control for the level of unfunded pension liabilities. Since no OECD data is available for our sample, we estimate pension liabilities by capitalizing recent annual old age benefit expenditures in each country, although the measure is likely to be imprecise.[20] 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.

Robustness and Alternative Specifications

Table 5 investigates some alternative hypotheses and controls: the importance of older people in the population (POP1950_65+) in 1950, the impact of the stock markets crash of 1929-early 1930s (CRASH1929), stock market returns (STOCK_RETURNS), stock market capitalization (current MARKET_CAP and market capitalization in 1913), average annual inflation over several time periods (1901-1945 and 1920-1945),[21] and the percentage of Catholics in total population.

In regressions 1 – 3, Panel A we find no support for a direct role of demography as predicted by Conesa and Krueger (1999), nor for the crash of 1929 (Regression 4 – 6, Panel A), even in a univariate setting. Long-run stock market returns are significant

[20] We capitalize liabilities by discounting at 5% a perpetual annuity based on current pension payments.
[21] For the calculation of average annual inflation in each country, we excluded years of particularly high inflation, in particular of hyper-inflation and possible run-ups. For some countries, we did not have a

determinants of accumulated pension assets(Regressions 7 – 9, Panel A), as it may be expected, but they do not affect the significance of the price shocks.

Current stock market capitalization is significant, and the political shocks remains significant even after its inclusion. Our conjecture predicts that capitalization is determined jointly with pension funding by historical political preferences. On the other hand there is no evidence that historically more financially developed countries chose for more private funding, as its 1913 value is never significant (Panel B).

In Regressions 5 – 8, Panel B, we control for average yearly inflation. Results indicate that only large shocks to inflation matter, not inflation per se. . Finally, we control for the percentage of Catholics in the population. The variable is not significant, nor does it affect the impact of inflationary shocks.

In Table 6, we test the alternative political economy hypothesis that income inequality (as opposed to wealth inequality) was critical to pension funding, under the presumption that state pensions are more redistributive, or offer more social insurance. We use income inequality data from Forbes (2000) on the Gini coefficient in income distribution in the 1960s. Interestingly, more unequal society do rely more on state funding, but this effect is less significant than the wealth inequality shocks caused by the price shocks. Possibly, this other political factor contributed particularly to shape the redistributive or social insurance features of the pension system. In Table 6, we further investigate whether the electoral voting rule matters for the choice of pension system (Regressions 4 – 6). While it helps explaining this choice when looking at a univariate setting, it becomes insignificant when including inflationary shock as additional explanatory variable.

Testing for the exogeneity of shocks

A critical question is whether the variation in inflationary shocks is indeed exogenous. While the main cause of such shocks were devastating world and civil wars which can be reasonably treated as exogenous, high inflation is ultimately the result of a

---

sufficiently long time period to include them. In this case, we only included them if not more than three years of data was missing.

money supply choice, often with an ultimate fiscal cause (Sargent and Wallace, 1981). Of course, money printing may be the sole resort in the aftermath of a major war. Countries which experienced heavy destruction face urgent demands for large public expenditures, just when the ability to rapidly raise fiscal revenues is at its lowest point. If spending needs are massive and no alternative funding exists, there is little choice but to print money.[22] Moreover, inflation often started during the war in invaded countries, as the occupiers captured money printing for their own needs (e.g. in France and Belgium). Yet it is possible that, for a given amount of war destruction, some governments chose to print money, while others to resist 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 measure war destruction in two ways. The most direct is a continuous variable, the change in population during the war prior to the inflationary shock (data are drawn from Maddison, 1991), which occurs in most countries after WW1.[23] The other measure is a self-constructed index of war destruction, the sum of three different dummy 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 inflationary shock or highest inflation level (year of MAX_CPI). This data set has been widely used in other studies on the impact of democracy such as Mulligan, Gil and Sala-i-Martin (2002).

Table 7 seeks to explain price shocks in terms of war shocks, the contemporaneous measure of political institutions, and an interaction term. Under our

[22] 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.
[23] For the countries (Iceland and Switzerland) never involved in a war, we use values of the WW1.

conjecture, only the war shock should be significant, which is clearly 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 being an avoidable choice undertaken by countries with poor political accountability. The results are less sharp once we seek to explain the much broader inflationary range represented by HIGH INFLATION. While war damage is always very significant on its own, we cannot find any systematic effect in the general regression. We conclude that it is hard to explain inflationary episodes outside extreme shocks.

4. Conclusions

This paper provides evidence that current pension funding reflects historical choices between market pre-funding and state guarantee were driven mainly by political preferences prevailing at the time concerning investor protection and more generally the structure of corporate governance, Such choices presumably persisted because they had a direct reinforcing effect, since a lack of exposure to financial markets among the population maintained low support for investor protection (Pagano and Volpin, 2006), even when conditions changed..

We presented evidence of a causal role for political shocks on pension funding choices which parallels the history of the Great Reversals after the Second World War. The approach suggests that structural choices on corporate governance regimes and the extent of labor rents in the interwar period were also affected by political choices (Pagano and Volpin, 2005; Perotti and von Thadden, 2006. Roe 2006).

Our instrument to establish causality is variation in inflationary shocks which led to large wealth shocks for the politically pivotal middle class. We have offered evidence that high inflation shocks in our sample appear to have followed devastating world or civil wars, and were thus natural causes for urgent fiscal spending, such \as to feed orphans, demobilize troops and rebuild the infrastructure. Such spending could not be easily funded otherwise in the aftermath of destructive conflicts when the ability to raise

fiscal revenues is at its lowest point. In the sample of luckier countries, the highest inflation rate is modest and is mostly associated with the oil shock of the 1970s.

Our ability to test for causation depends on both exogeneity of the price shocks and considerable variation in national experiences with pension funding and price shocks. We show that price shocks appear to have resulted from exceptionally circumstance of extreme spending needs coupled with weak fiscal capacity. Our sample shows that while some countries suffered great war damage, they did not succumb to high inflation if they could fiscalize war costs so as to distribute over time the spending shock. With no exception, these countries did not experience military invasions, such as the UK in both world wars. The sample also contains countries that did not suffer any military destruction, such as Germany in WW1, where hyperinflation arose from an extremely high burden of reparation payments coupled with loss of territory and control over national resources. The political consequences of such shocks cannot be underestimated, as Keynes stated eloquently in his Political Consequences of the World War (1920).

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 a massive privatization program, which diffused financial participation and created political support for capital markets (Biais and Perotti, 2002).

In conclusion, our results confirm the diffused impression that pension funding is a highly political issue. In the end, understanding the political determinants of pension structure is essential to help identifying the range of feasible solutions, and to predict to what extent structural features of existing systems, such as solidarity and coinsurance features, will persist. An important research theme in the future should be to identify the determinants also of claim coinsurance and redistribution across pension systems.

REFERENCES

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

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

Caucutt, Elizabeth, Thomas F. Cooley and Nezih Guner (2006), *The Farm, the City, and the Emergence of Social Security*, unpublished manuscript.

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

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

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

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

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

Flora, Peter (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.

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

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny (1997), *Legal Determinants of External Finance*, Journal of Finance 52 (3), 1131-1150.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny (1998), *Law and Finance*, Journal of Political Economy 106, 1113-55.

Lindert, Peter H. (1994), *The Rise of Social Spending, 1880-1930*, Explorations in Economic History 31, pp. 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, Stockton Press.

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

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

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

Pagano, Marco and Paolo Volpin (2006), "Shareholder Protection, Stock Market Development and Politics", Journal of the European Economic Association

Perotti, Enrico, and Ernst Ludwig von Thadden (2006), *The Political Economy of Corporate Control and Labor Rents*, Journal of Political Economy.

Piketty, Thomas, Postel-Vinay G., Jean Laurent Rosenthal (2006), *Wealth Concentration in a Developing Economy: Paris and France, 1807-1994*, American Economic Review, vol. 96, no 1, 2006, p. 236-256

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

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

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

Tabellini, Guido, Torsten Persson and Fabrizio Trebbi (2003), *Electoral Rules and Corruption*, Journal of the European Economic Association.

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

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 >.

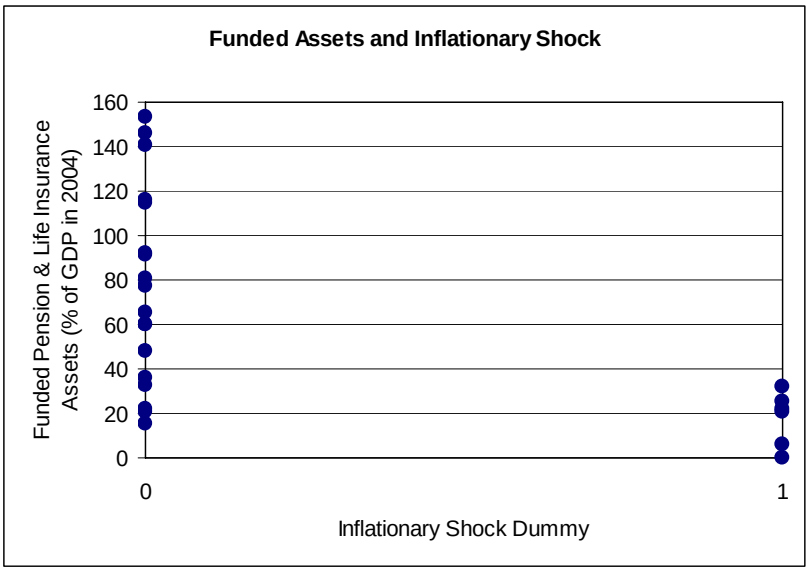

Figure 1 shows total funded pension and life insurance assets as percentage of GDP in 2004 (the variable PENSION+LIFE) on the x-axis and SHOCK dummy (as defined in Section 3) on the y-axis.

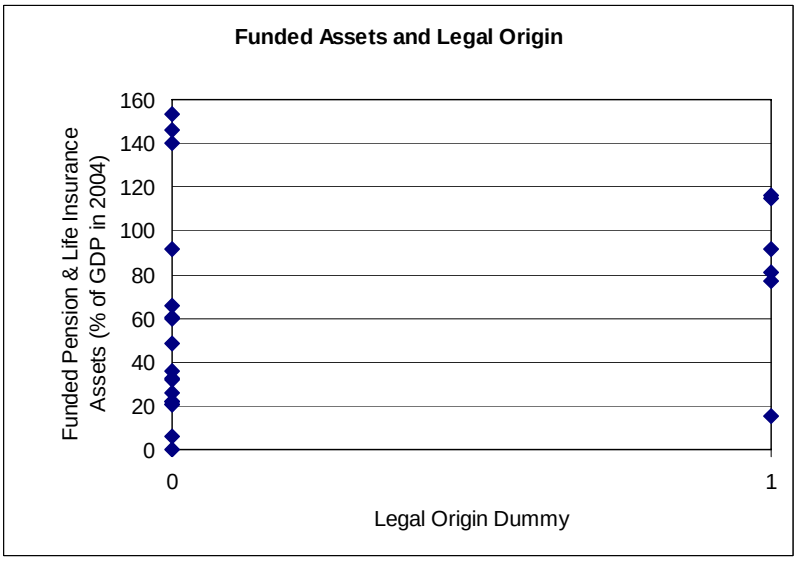

Figure 2 shows total funded pension and life insurance assets as percentage of GDP in 2004 (the variable PENSION+LIFE) on the x-axis and COMMON_LAW dummy on the y-axis.

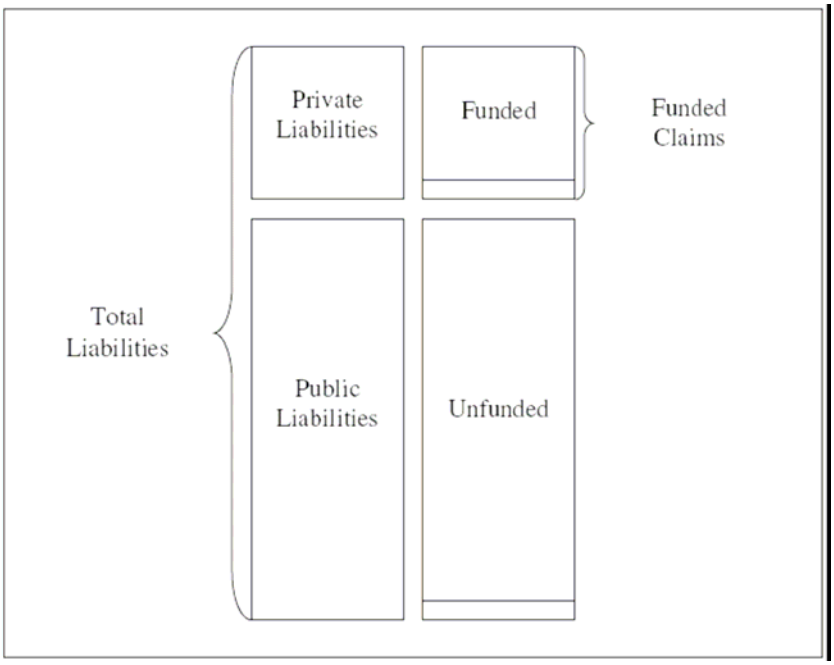

Figure 3 shows the calculation of funded pension assets (or “funded claims”) as percentage of total pension liabilities.

Table 1: Development of Pension Systems in Various Countries

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

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.

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
CRASH1929	64.8	65.0	39.4	86.2	14.3	16
MARKET_CAP	0.723	0.436	0.146	2.044	0.572	22
NON-DEMOCRACY Dummy	0.167	0.000	0.000	1.000	0.381	24
POP1950_65+	0.087	0.089	0.035	0.122	0.023	24
POP2004_65+	0.147	0.155	0.055	0.191	0.034	24
STOCK_RETURNS	3.129	3.020	-0.120	5.880	1.773	23

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: Political shocks and pension funding choices

Panel A

Variables	(1)	(2)	(3)	(4)	(5)	(6)
SHOCK	-58.52 ***	-36.83 ***			-36.83 **	-38.81 **
	(11.58)	(13.70)			(14.04)	(17.56)
HIGH_INFLATION		-43.38 **			-73.87 ***	-72.30 ***
		(18.68)			(21.29)	(23.37)
MAX_CPI			-0.15 ***			
			(0.028)			
COMMON_LAW				28.10	-45.73 *	-47.64 *
				(18.36)	(22.52)	(23.50)
POP2004_65+						-100.31
						(243.41)
No. of Obs.	24	24	22	24	24	24
R-squared	31%	48%	45%	7%	57%	57%
Adj. R-squared	28%	43%	42%	3%	50%	48%

Panel B

Variables	(7)	(8)	(9)	(10)	(11)	(12)
	Countries without the Largest Shocks (SHOCK = 0 Sub sample)				Excluding Non-Democracies (NON-DEMOCRACY = 0 Sub sample)	
SHOCK				-49.08 ***	-63.21 ***	-63.46 ***
				(14.41)	(12.44)	(16.54)
HIGH_INFLATION	-43.38 **		-73.87 ***			
	(18.53)		(21.29)			
COMMON_LAW		9.67	-45.73 *	3.45		-0.66
		(20.38)	(22.52)	(20.82)		(21.28)
NON-DEMOCRACY Dummy				-37.31 **	NA	NA
				(14.91)		
No. of Obs.	18	18	18	24	20	20
R-squared	26%	1%	38%	40%	32%	32%
Adj. R-squared	21%	X	30%	32%	28%	24%

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. The variable POP2004_65+ measures for the proportion of the total population over 65 years old in 2004. 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 sub sample SHOCK = 0. Regressions (11) and (12) are for the sub sample NON-DEMOCRACY = 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 *	-40.24 ***	-0.23 ***	-0.17 ***	-0.12 *	-0.15 **
	(9.58)	(13.16)	(12.14)	(14.88)	(0.06)	(0.06)	(0.07)	(0.06)
HIGH_INFLATION			-58.38 **				-0.19 **	-0.16 **
			(26.49)				(0.07)	(0.07)
COMMON_LAW		17.65	-26.13	8.72		0.16 **	0.02	0.00
		(17.37)	(26.29)	(19.62)		(0.08)	(0.09)	(0.08)
POP2004_65+				-290.30				-1.44
				(193.62)				(1.20)
No. of Obs.	24	24	24	24	24	24	24	24
R-squared	22%	27%	48%	31%	29%	43%	53%	59%
Adj. R-squared	19%	19%	40%	21%	26%	38%	46%	50%

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. 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 POP2004_65+ measures for the proportion of the total population over 65 years old in 2004. Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 5: National experiences with financial returns, demographics and religion

Panel A

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SHOCK	-57.47 ***	-54.14 ***	-35.04 **	-54.63 ***	-45.86 **	-18.29 **	-61.66 ***	-55.28 ***	-32.14 ***
	(13.51)	(17.25)	(16.73)	(12.99)	(17.91)	(8.10)	(13.23)	(16.34)	(9.47)
HIGH_INFLATION			-74.00 ***			-87.54 ***			-87.57 ***
			(21.95)			(15.57)			(16.39)
COMMON_LAW		9.72	-45.75 *		27.68	-31.77 *		19.73	-43.58 **
		(21.10)	(23.05)		(19.82)	(17.60)		(17.41)	(19.27)
POP1950_65+	48.28	52.33	79.07						
	(252.57)	(239.20)	(177.93)						
CRASH1929				0.16	0.08	0.46			
				(0.624)	(0.575)	(0.354)			
STOCK_RETURNS							6.85	7.40 *	8.23 ***
							(4.30)	(3.98)	(2.97)
Nbr. of Obs.	24	24	24	16	16	16	23	23	23
R-square	31%	32%	57%	25%	33%	86%	39%	42%	82%
Adj. R-square	25%	22%	48%	14%	16%	80%	32%	33%	78%

Panel B

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SHOCK	-57.98 ***	-20.05 **	-29.38 **	-19.21		-59.44 ***		-57.13 ***	-56.01 ***
	(13.26)	(7.79)	(12.88)	(15.18)		(13.16)		(11.02)	(12.59)
HIGH_INFLATION		-81.20 **		-59.50 ***					
		(18.78)		(17.71)					
COMMON_LAW		-30.76		-37.11 **					
		(20.00)		(14.12)					
MARKET_CAP_1913	8.5	14.94							
	(38.89)	(16.47)							
Current MARKET_CAP			42.64 **	30.98 **					
			(17.57)	(13.06)					
Average Inflation 1901-1945					-7.91 *	-5.58 **			
					(4.10)	(2.54)			
Average Inflation 1920-1945							-7.28 *	-3.77 *	
							(3.53)	(2.16)	
% Catholics									-0.20
									(0.19)
Nbr. of Obs.	15	15	22	22	15	15	21	21	24
R-squared	33%	85%	48%	64%	12%	39%	18%	42%	34%
Adj. R-squared	x	79%	42%	56%	5%	28%	13%	35%	28%

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. The variable MARKET_CAP_1913 gives the market capitalization of the country's stock markets in 1913. The variable Current MARKET_CAP gives the market capitalization of the country's stock markets in 2002. 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 6: Alternative Political Explanations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
SHOCK		-40.03 ***	-23.96 ***		-52.48 ***	-36.35 **
		(9.82)	(8.41)		(14.84)	(14.60)
HIGH_INFLATION			-42.72 ***			-41.94 *
			(13.69)			(22.42)
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)
Nbr. of Obs.	21	21	21	24	24	24
R-squared	25%	43%	63%	12%	35%	49%
Adj. R-squared	21%	36%	57%	8%	28%	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. "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 (Tabellini et al, 2003). Robust standard errors are in parentheses. Significance levels: *** for 1%, ** for 5%, and * for 10%.

Table 7: Effect of War Damage and Political System on Inflationary Shock

Variables	Dependent Variable = SHOCK				Dependent Variable = HIGH_INFLATION			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
War Destruction	0.254 ***	0.568 **			0.304 ***	0.090		
	(0.073)	(0.273)			(0.072)	(0.254)		
Change in Population, in Percent			-0.840 **	0.927			-0.662 ***	-1.010
			(0.326)	(1.864)			0.247	(1.191)
Polity2 Variable		0.011		-0.036		-0.010		-0.014
		(0.029)		(0.029)		(0.036)		(0.027)
Polity2 Variable * War Destruction (Interactive Term)		-0.023				0.017		
		(0.017)				(0.014)		
Change in Population * Polity2 (Interactive Term)				-0.107				0.025
				(0.102)				(0.067)
No. of Obs.	24	23	23	22	24	23	23	22
R-squared	32%	39%	17%	36%	37%	46%	9%	14%
Adj. R-squared	29%	29%	14%	25%	34%	38%	5%	- -

NOTE: For Regressions (1) – (4), 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 (5) – (8), the dependent variable is the dummy variable HIGH_INFLATION, which is equal to one if the country experienced an increase in CPI of 30% or more in a single year, and zero otherwise. 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%.

Appendix

Political choice over investor protection

We sketch here a simple model drawn from Perotti and von Thadden (2006), which endogenizes political support for minority investor protection.

Suppose voters choose whether control rights over firms will be assigned either to market investors or to banks. Assume financial risk is fully diversifiable, but labor income risk cannot be hedged. Voters are risk averse with mean-variance preferences, and have different shares θ_i of the market portfolio F containing all securities (shares and bank loans). They work for ex ante identical firms which earn iid random profits π. Each firm has bank debt equal to B.

The wage W is optimally set to be senior to financial claims. Actual labor income w equals Max [W, π]. Thus each agent has expected income equal to E(w) plus his or her share of financial wealth, $\theta_i F$, and their utility is given by

$$E(W) - \tfrac{1}{2} A \, Var(W) = E \, Max[W, \pi] + \theta_i E(F) - \tfrac{1}{2} Var(W)$$

where A is the coefficient of absolute risk aversion, $E(F) = \Sigma \min(\pi_i - W, 0)$ for all firms, and $Var(W) = prob(W<\pi) \, Var(\pi|W<\pi)$ since financial risk is diversifiable.

The investor to which a political majority assigns control rights choose whether firms should adopt a profitable but risky strategy R with return π_H and variance σ_H or a safer but less profitable strategy S with lower return π_L and lower variance σ_L. Dispersed investors prefer the high risk strategy, which creates more labor income risk, while large investor or banks would choose a safer strategy, provided the wage W is not too high.

In this setting, the median voter theorem applies, and the pivotal voter M chooses minority investor protection by trading off more financial wealth (in proportion to θ_M) versus more labor income risk. Clearly, if the median voter is not holding enough financial wealth, the political choice will favor weak investor protection so as to block control by dispersed market investors which create more labor market risk. Thus in a democratic society with diffused financial holdings, a majority will grant strong minority

equity protection and thus control to equity control, while in a society where wealth is concentrated among the very rich, the median class prefers weak investor protection (which leads to concentrated equity or bank control).[24] Formally, support for investor protection emerges when the financial stake held by the median voter θ_M satisfy [25]

$$\theta_M E(\pi_R - \pi_L - W) < E\,\text{Max}\,[W, \pi_L] - E\,\text{Max}\,[W, \pi_R] + \tfrac{1}{2} A \{\text{Var}\,(W|\pi_R) - \text{Var}\,(W|\pi_L)\}$$

namely, when the capital gain accruing to the median voter from the riskier strategy does not compensate for the utility loss caused by higher labor income risk.

If financial participation by the middle class is too low, investor protection will not be supported. In such a case, it is natural for voters to hand over pension contributions to the state than to invest them in securities.

In Perotti and von Thadden (2006), labor rents are also a political choice. In societies where the middle class has less financial wealth, voters support higher labor rents, which are therefore more exposed to financial risk. This reinforces the voter preference for a control structure which produces less risk.

[24] Concentrated owners prefer safer strategies since they are undiversified and control benefits are lost in case of insolvency.

[25] This threshold always exists under reasonable conditions on the distributions of π_R and π_L; in particular, π_R should not stochastically dominate π_L (Perotti and von Thadden, 2006).