Political Risk versus Market Risk in Social Security

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Introduction

Pay-as-you-go Social Security is typically characterized as a universal defined benefit (DB) pension. With this characterization, the debate surrounding the creation of personal accounts then becomes a choice between a safe DB plan and a risky defined contribution (DC) one. While no one can argue against the fact that stock and bond returns are risky, the long-run rate of return from traditional Social Security depends on the future course of fertility rates, immigration rates, mortality rates and the growth rate of real wages. There is considerable uncertainty about all four of these variables and hence traditional Social Security cannot be considered a safe asset. The three demographic variables, for instance, produced a number of surprises in the last half of the twentieth century (the baby boom, the baby bust, the uneven pace of mortality improvement, etc.). Shifts in demographics and macroeconomic variables render traditional Social Security vulnerable to political risk because legislated changes in taxes and benefits are required to restore actuarial balance. Such adjustments undermine the "safe" benefits promised by traditional Social Security.

We will argue that the characterization of traditional Social Security as a defined benefit retirement program is inappropriate. An essential element of defined benefit pension programs is that the participants do not bear the funding risk. That is, if the fund becomes underfunded (due to poor returns or a deviation between what actually happens and the actuarial assumptions), the funding inadequacy is not borne by the participants, but by the employer or an insurance entity. The risks are transferred from the participants to others, leaving the workers with a safe benefit. Of course, this is a characterization of DB plans; reality is somewhat different. DB benefits remain risky because they are not indexed for inflation and because the risk transfer is incomplete. The point here is that the funding risk (or at least most of the funding risk) is not borne by participants.

Social Security doesn't even approximate a DB plan. The funding risk is borne by participants. It isn't transferred to anyone else. In fact, since it is a nearly universal plan, it is impossible to think of who could insure the benefits for the participants. What we are calling political risk in this paper could be thought of as funding risk. The fundamental risks of Social Security are not being generated by politicians; they are

being generated by the demographic and economic factors affecting funding. The politicians are simply an intermediary in the transmission of underlying risks.

There exist several studies that have attempted to study and quantify various aspects of political risk. Harris, Meyerson, and Smith (2001) and CBO (2001) study the impact of demographic and wage-growth risk on the trust fund balances. Harris, Myerson, and Smith also do a comparative analysis of the risks of traditional Social Security and systems in which part or all of the trust fund assets are invested in private securities. How the variability in the system's finances translates into risk for *individual* participants is a more difficult question. In our earlier work on this topic (Nataraj and Shoven 2003), we assumed that the Social Security system is run on a purely PAYGO basis, in which the payroll tax rate is fixed and all its proceeds are distributed in a lump-sum fashion to the current elderly. Within this framework, we ask whether individuals are better off with a pure PAYGO Social Security system (which is subject to political or funding risk because benefits are adjusted to reflect revenue), a pure defined contribution funded plan (which is subject to financial risk), or some combination of the two. Elementary portfolio theory suggests that "some of each" is the right answer. Indeed, this is what we conclude: even very risk-averse participants desire a system with an individual accounts component.

In reality, however, the Social Security system is not a pure PAYGO system. Both benefits and taxes are legislated for the indefinite future, with any excess revenue going into a trust fund. We have argued (Nataraj and Shoven 2003) that the presence of a trust fund cannot serve as an effective smoothing device for individual returns – that is, the full impact of demographic and wage-growth risk must ultimately be borne by the system's participants. A persistent trust fund deficit will force policymakers to raise taxes or cut benefits. The U.S. has already effectively cut promised benefits several times (e.g., by raising the normal retirement age and making part of benefits taxable) and similar adjustments have been necessary in many countries (e.g., Germany has increased the retirement age). However, in order to understand the nature of political risk, it is important to investigate how governments respond to a divergence between assets and liabilities, and how this response passes demographic risk on to the system's participants.

Existing studies that attempt to quantify individual-level political risk include McHale (2001), Blake and Turner (2003), and Schnabel (1998). These papers examine the impact of particular law changes on measures of participants' lifetime benefits. McHale shows that recent reforms undertaken by the U.S. and various European countries significantly reduced the social security wealth (defined as the present value of promised social security benefits) for a representative 45-year-old worker. On the other hand, since reforms were phased in, workers who were at retirement age at the time of the reform were not affected much. Blake and Turner examine the impact of recent law changes in the U.K. and the U.S. on the internal rates of return promised to 25-year-old workers. The Schnabel paper is most like this one. Schnabel calculates internal rates of return for different cohorts of participants in the German Social Security system. He finds that returns decline for younger cohorts. Real rates of return for those born in 1980 range from zero to one percent, depending on assumptions. He finds that roughly 80 percent of contributions are implicit tax rates for this cohort. He asserts that this is leading to compliance problems that threaten the stability of the German system.

In this paper, we carry out a detailed analysis of political risk in the U.S., and an overview of recent law changes across several European countries. For the U.S., we compute internal rates of return (IRRs) for various age groups under existing law in each year since 1939. We find a considerable amount of variation in IRRs through time for a given birth cohort, a finding that is inconsistent with the characterization of Social Security as safe. Participants experienced significant declines in their IRRs as a result of adjustments made to restore the system's solvency in 1983 and 1994. We also find that, if the system was brought into actuarial balance in 2005 (by raising the payroll tax), younger cohorts would experience a decline in their lifetime IRR of approximately 80 basis points (0.8 percent). We also confirm McHale's finding that, historically, those at or near retirement age bear less political risk than younger workers. It is not true, however, that retirees and those near retirement have always been exempt from benefit cuts. In particular, increasing the income taxation of benefits is equivalent to reducing benefits. Those steps, taken in the 1980s and 1990s in the U.S., applied to current and future beneficiaries alike. Our study of recent law changes in European countries reveals that workers there also bear considerable demographic risk. Germany, France, Sweden,

and Italy have all made fairly large benefit cuts in recent years and are faced with the prospect of making more. Given the evidence of what has happened in the U.S. and in Europe, it is impossible to continue the notion that traditional Social Security is a defined benefit program with safe benefits.

Our analysis suggests that political risk is inevitable in traditional Social Security. When a private employer runs a DB pension plan, both demographic and financial risk are borne by the firm's shareholders. Since shareholders must make up any funding shortfall in the system, workers can reasonably expect their benefits to be safe. In a universal retirement system like Social Security, however, there is nobody outside the system to bear the funding risk. Any funding shortfall must be paid by raising payroll taxes or cutting benefits. Alternatively, the costs can be passed on to taxpayers; however, taxpayers and Social Security participants are essentially the same group. Thus, demographic and economic risk makes it impossible to design a universal DB system. This fact is gradually being recognized in the design of pension systems. The best example of this is Germany's most recent reform, which explicitly links benefits to the dependency ratio through the use of a "sustainability factor." This means that participants not only bear the funding risk in the long run, but also that this risk is automatically transferred to them via the sustainability factor.

This paper is organized as follows. Section II presents our detailed analysis of law changes and their impact on returns for U.S. Social Security. Section III describes recent law changes in Germany, France, Sweden, and Italy. Section IV concludes.

Political Risk in the United States

It is well known that internal rates of return (IRRs) in the U.S. Social Security system vary considerably by cohort; in particular, the earliest cohorts to retire under the system received significantly larger returns than more recent ones. A less emphasized fact is that each individual cohort experiences variation over its lifetime in the IRR promised by the law. Law changes often occur in response to accumulated demographic changes and therefore can be viewed as a reflection of demographic risk in the system. We define political risk as variation in IRR promised to Social Security participants under the law. Another possible measure of political risk is variation in replacement rates

(e.g., McHale 2001). However, we feel that IRR is a more appropriate measure because it also considers tax changes, which may be quite significant for young workers.

We consider all law changes to the Social Security retirement program from 1939 to the present. Towards the beginning of this period, most of the law changes worked to expand the system: a series of tax and benefit increases occurred between 1939 and 1972. There was a number of ad hoc benefit increases intended to compensate participants for inflation. The form of these benefit increases was often a reduction in the number of years used in the computation of average monthly earnings. In 1973, benefits were explicitly indexed to inflation, albeit in a flawed manner. In 1978, wage indexation was introduced in the computation of average monthly earnings. In response to demographic changes that shifted Social Security's actuarial balance, tax increases were necessary in 1977 and benefit cuts (in the form of subjecting benefits to income taxation) and further tax increases were introduced in 1983 (the Greenspan Commission reforms). A greater proportion of benefits became taxable in 1994. All of these recent reforms clearly reflect demographic risk being passed on to workers. The 2005 Social Security Trustees Report estimates that an immediate 3.5 percentage point increase[1] in the payroll tax is required to bring the system into balance over the infinite horizon. Again, this represents demographic risk that must be borne by the system's participants.

We study how these legislative changes have altered real IRRs for participants. For our base case, we consider single males from various birth-year cohorts from 1900 through 1985. We assume each individual is born on January 1 of the relevant year, starts working at age 20, retires at the normal retirement age, and lives until age 80. The fixed lifespan is a simplification. The rate of return variation due to individual mortality experience is not our central concern. We are more concerned about the impact of tax and benefit law changes and changes in the expected rate of growth of real wages. A more complete analysis would factor in the impact of changing mortality.

We consider three types of wage earners – average, high (90^{th} percentile), and low (10^{th} percentile). In order to simulate wage histories, we use Outgoing Rotation Groups from the 2001 and 2002 Current Population Survey to compute the wage for each of the three income levels for each age group. We then divide this by the wage for the

[1] This 3.5 percent number is for the intermediate set of economic and demographic assumptions.

corresponding income level across workers of all ages. These ratios are shown in Figure 1 for male, female, and all workers with average earnings; we use the male ratios in our simulations. We take the wage for the relevant income level in each year of the worker's life and use the age-wage ratio to arrive at a wage for the worker. For example, consider an average male 30-year-old in 1950. The national average annual wage in 1950 was $2,763. According to our computations, a 30-year-old male earns 1.13 times the national average. Therefore, our imputed wage for him in 1950 is ($2,763)(1.13) = $3,122.

In computing the IRR for workers under a particular piece of legislation, we make several assumptions. In our base case ("rational expectations"), workers assume that future inflation (measured by the CPI) and aggregate wage growth will be equal to the geometric average of the past 5 years. After 1978, wage growth expectations are especially important because they are used to calculate expectations regarding the earnings cap, bend points, and indexing of past wages. After 2005, inflation and wage growth are assumed to be 2.8 and 3.9 percent respectively, as per the Social Security Administration's intermediate scenario in the 2005 Trustees Report. There is, however, no uncertainty about the path of the individual's wages; this allows us to isolate the impact of aggregate demographic risk, as opposed to individual-level earning risk. Prior to 1972, benefits were not explicitly indexed to inflation. It is reasonable that workers might expect adjustments to occur in the event of inflation. However, this was not written into the law. In the base case, our computation of IRRs in this pre-1972 period embodies the naïve expectation that no further changes will be made to the law to compensate for inflation or otherwise.

The 1983 and 1993 law changes reduced benefits by subjecting them to income taxation. In 1983, up to 50 percent of an individual's benefit was subject to taxation; this proportion was raised to 85 percent in 1993 (taking effect in 1994). However, benefits are only taxable for retirees with income above a certain level. We assume that our average and 90th percentile earners have sufficient retirement income to trigger income taxation, while our 10th percentile earner does not. The income tax rates are assumed to be 20 and 30 percent for average and 90th percentile earners respectively.

Since current Social Security is unsustainable, participants will certainly face benefit cuts or tax increases in the future (although the specifics have yet to be

determined). Of course, from the perspective of a young worker, it makes little difference whether the payroll tax is raised or benefits are cut – both changes should have a similar impact on the IRR. We feel that it is important to include some measure of this risk in our analysis. This is risk that the politicians have yet to transfer to Social Security participants. We assume that in 2005, the payroll tax is increased by 3.5 percentage points, enough to bring the system into actuarial balance over the infinite horizon.

Our base case results are shown in Figures 2, 3, and 4 (for average, 90th percentile, and 10th percentile earnings respectively). As is well known, earlier cohorts received significantly higher IRRs than more recent ones. Moreover, higher income individuals receive lower IRRs. The variation in the promised IRR over a cohort's lifetime is significant, and this degree of variation does not appear to be related to income; that is, while the system is progressive, low-income individuals do not appear to be particularly insulated from political demographic risk. Fluctuation in IRRs occurs for two reasons: law changes and changing expectations of future inflation and wage growth. The magnitude of the fluctuations is considerable. For instance the IRR for the 1975 cohort average earning single male (from Figure 3) was -0.95 percent in 1993; it rose to +2.04 percent by 2000 and fell to -0.39 percent by 2004. Workers' expectations were updated to reflect strong real wage growth in the late 1990s, resulting in higher IRRs through wage indexation. On the other hand, the impacts of the law changes are clearly seen in 1983 and 1994. The IRRs for the average and high earners fall significantly as their benefits become subject to taxation. Even the 10th percentile earner is hurt by the 1983 reform due to increases in the retirement age.

The link between IRRs and wage growth raise an important point. The main source of income to most Social Security participants is their human capital, or labor income, which is highly susceptible to aggregate wage growth risk. Traditional Social Security forces its participants to take on even more of this risk by tying their return on their Social Security wealth to wage growth. This is undesirable from a portfolio choice perspective. In our previous work (Nataraj and Shoven 2003), we have argued that portfolio diversification makes a two-tier system, which combines demographic and financial risk, preferable to traditional Social Security. Even if Social Security wealth is modeled as the present value of future benefits, it is not tied to the returns on capital.

An alternative to our rational expectations assumption is that workers perfectly foresee all future inflation and wage growth. In this "perfect foresight" scenario, the only source of risk is law changes; macroeconomic variables are predicted with perfect accuracy. We feel that this assumption is less realistic, as Social Security does expose participants to risk from changing inflation and wage growth. However, the perfect foresight computation is useful as a sensitivity analysis and to isolate demographic risk that is passed on through law changes. The perfect foresight results are shown in Figures 5, 6, and 7 for average, high, and low earners respectively.

Note that the changes in IRRs are more discrete than in the base case. With perfect foresight, expectations do not get updated on an annual basis; therefore, the promised IRR changes only when the law does. Again, it is clear that earlier cohorts were promised higher returns at any stage in their lives, and that low earners receive higher returns. Moreover, the results also make it clear that low earners were relatively insulated from the most recent cuts in benefits (1983 and 1993). This makes sense as the cuts took the form of (progressive) income taxation of benefits for high earners only.

Our broad conclusions from the base case still stand. Social Security participants face a significant amount of variation in the returns they get as a result of law changes. Law changes – necessitated by actuarial imbalances – pass demographic risk on to participants. This risk can be considerable, which casts doubt on the characterization of traditional Social Security as safe. One might wonder how political risk compares with the financial risk that participants would face with a system of individual accounts. In our previous work (Nataraj and Shoven 2003), we showed that a 60-40 stock-bond portfolio provides a mean lifetime IRR of 6.2 percent with a standard deviation of 2.03 percent. In contrast, a pure pay-as-you-go system (in which benefits are updated every year to reflect demographic changes) generates a mean lifetime IRR of 1.02 with a standard deviation of 0.55 percent. The risk and returns calculated in this paper are similar. Between 1977 and 2004, the average IRR for an average earning single male in the 1960 birth cohort was 0.525 percent, while the standard deviation of the time series of IRRs was 0.8 percent. There can be no doubt that the deal offered by Social Security has changed over the years. The debate over personal accounts, therefore, is not one of "safe" versus "risky" benefits, but one of portfolio choice.

Political Risk in Europe

In Europe as well, many law changes have taken place – and more are still required – in order to deal with changing demographics. In this section, we describe recent reforms in Germany, Italy, France, and Sweden. A detailed list of the legislative changes can be found in Tables 1-4.

Germany

Germany's demographic problem is significantly more severe than that of the U.S. As discussed by Börsch-Supan and Wilke (2004), Germany has experienced a faster increase in life expectancy and a more dramatic "baby bust." As a result, more than 25 percent of the German population in 2030 will be over the age of 65; the dependency ratio is projected to be 43.3 percent. At the end of the 1980s, policy makers realized that the existing replacement rate of 70 percent could only be maintained by raising the payroll tax from 19.5 to 40 percent by 2035.

These demographic shifts have resulted in a number of reforms to the public pension system (see Table 1). The first set of reforms was passed in 1989 and took effect in 1992. The main change was to index benefits to net, rather than gross, wages. The legislation also increased the normal retirement age and introduced benefit reductions for early retirement and benefit increases for late retirement, although these adjustments were less than actuarially fair. A second set of reforms was enacted in 1997 and scheduled to take effect in 1999. These reforms were supposed to introduce a "demographic factor" into the computation of benefits in order to index them to life expectancy. However, this reform was revoked in 1998 before it took effect. Only one part of the 1997 legislation – a gradual increase in retirement ages – was actually implemented as scheduled. A third major reform was passed in 2001 and took effect in 2002. This legislation curtailed increases in the payroll tax, constraining it to stay below 20 percent until 2020 and 22 percent until 2030. The replacement rate was lowered from 70 to 67 percent (of net wages). In addition, a second funded tier was established; workers were given the option of investing 4 percent of their gross earnings into this system. The definition of net earnings was adjusted to reflect this 4 percent contribution, making the effective fall in the replacement rate more than the stated 3 percentage points. Using the old definition of net earnings, the new replacement rate is 63.5 percent. The most recent set of reforms

was passed in 2004. The main change was to index pensions to the dependency ratio by including a "sustainability factor" in benefit computations to reflect shortfalls in funding.

These reforms have made it clear how vulnerable the German system is to demographic and funding risk. Indeed, the "sustainability factor" introduced last year is an explicit recognition of this vulnerability. German workers have begun to appreciate this risk as well: in recent years, there has been an increasing awareness that traditional pension benefits are not, in fact, safe. As Börsch-Supan and Wilke (2004) explain:

> In the past, stability of [the benefit] formula has created a sense of actuarial fairness, so that workers perceived the contributions largely as insurance premia. However, this has changed when the formula was altered several times since 1992 … Surveys show that by 2001, contributions were largely perceived as taxes (p. 15).

Fehr and Habermann (2004) compute the impact of the "sustainability factor" reform on future replacement and contribution rates. They find that the reform increases the variability of the replacement rate (by tying it explicitly to the dependency ratio) and reduces the variability of the contribution rate (as it will no longer have to vary as much to meet the replacement rate target).

France

In France, a study in the early 1990s showed that the contribution rate for the PAYGO system (then 17 percent for the private sector) would need to rise by 50 to 100 percent by 2040 to sustain the average replacement rate of 80 percent of net wages (Blanchet and Legros 2002). The first major reform occurred in 1993 (see Table 2). The main provisions of this reform were to index pensions to prices rather than wages; to increase in the number of years used in the computation of average wages; and to increase the career length required to receive full benefit. Each of these measures constitutes benefit reductions. According to Blanchet and Legros (2002), the first two provisions substantially lowered the cost of the program, while the impact of the third was minimal. They further state that after the reform, the contribution rate would still need to rise by 70 percent by 2040.

Additional reforms took place in 2003 and included increases in the required career length for full benefits; bonuses for working beyond the age of 60 or the required minimum career length; and an increase in the minimum pension for low-wage workers.

The main effect of the reform was to increase retirement ages (Benallah et. al. 2005). As the system continues to face a substantial long-run actuarial deficit, further tax and benefit adjustments appear inevitable.

Sweden

Sweden's traditional PAYGO system faced severe demographic pressures, particularly from low birth rates and rapidly improving life expectancies. The roughly 18.5 percent payroll tax rate was projected to rise to as high as 36 percent by 2025 in order to maintain the old benefit structure (Normann and Mitchell 2000). The Swedish parliament agreed to sweeping reforms in 1994 and passed the implementation legislation in 1998. The new system completely replaces the traditional system of formula-based benefits with a two-pillar system consisting of a PAYGO notional defined contribution component (with a 16 percent contribution rate), and a fully funded individual account system (with a 2.5 percent contribution rate). The notional DC individual accounts still operate on a PAYGO basis, with the "account balance" being credited with "earnings" tied to the growth in per capita wages. Participants can choose from a variety of pension funds for their 2.5 percent funded individual account.

The effect of switching to a combination of defined contribution accounts (notional and funded) means that the system is automatically adjusted to changes in life expectancy (through the annuitization of the accounts at retirement), that longer careers and later retirement are rewarded, and that fluctuations in the rate of growth of real wages are borne by participants through the crediting of their notional accounts. The notional accounts, thus, reflect risk in the growth of real wages while the funded accounts are subject of capital market returns. Rather than face the prospect of 36 percent tax rates, the total contribution rates are now scheduled to remain fixed at 18.5 percent. Interestingly, Sweden's system of employer provided pensions has largely converted from DB to DC plans in tandem with the reform.

Italy

Italy's pension faces financial problems because of its low fertility rate (1.2 births per woman of childbearing age) and the resulting increase in the dependency ratio, which is expected to reach 48 percent by 2030 (Franco 2002). Reforms were undertaken in 1992 (see table 3) and included an increase in the retirement age; an increase in the

number of years of earnings used in the benefit computation; a shift from wage to price indexation of benefits; and an increase in the required career length for receiving a pension. These reforms collectively reduced the liabilities of the system (and therefore the retirement wealth of its participants) by 25 percent. Reforms passed in 1996 included the introduction of a defined contribution component, the indexation of benefits to life expectancy, and the abolition of a guaranteed minimum pension level.

The reforms undertaken thus far are still inadequate to restore balance to the system. Two current proposals are to allow policymakers to revise the benefit formula more frequently, and to add additional demographic factors to the benefit formula. Both of these proposals reflect recognition of demographic risk, which is inevitable in a traditional Social Security system. While not as explicit as Germany's "sustainability factor", Italy's proposed reforms make an implicit commitment to revise benefit formulas in the case of funding shortfalls.

Conclusion

The main point of the paper is that traditional PAYGO Social Security such as the systems in U.S. and Europe are not comparable to private sector defined benefit retirement plans. There is no third party insuring the benefits of the participants in these plans. Workers are never vested in their benefits. The benefit formulas and the contribution rates can, have been, and will be changed as necessary for financial sustainability. The result is that traditional Social Security programs offer risky returns to their participants, with most of that risk stemming from demographic and productivity (real wage) factors. Once the riskiness of traditional Social Security is recognized, then the discussion of funded individual accounts should become one of asset diversification.

We have shown the fluctuations in the rate of return offered by U.S. Social Security have been considerable due to periodic law changes and changes in the growth of real wages. We have also reviewed the relatively fast pace of change in European systems. The two most dramatic examples of change (and risk borne by participants) are in Germany, where a sustainability factor has been added to the benefit formula (and where payroll tax rates have been capped), and in Sweden, where the entire defined benefit system has been replaced with a two-tier defined contribution plan.

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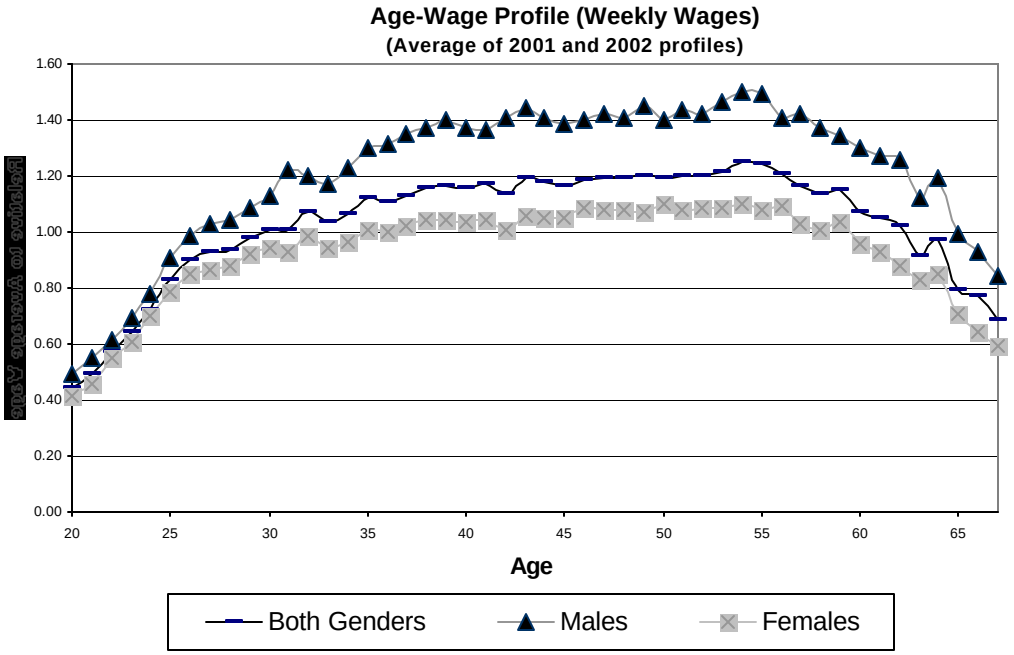


Figure 1

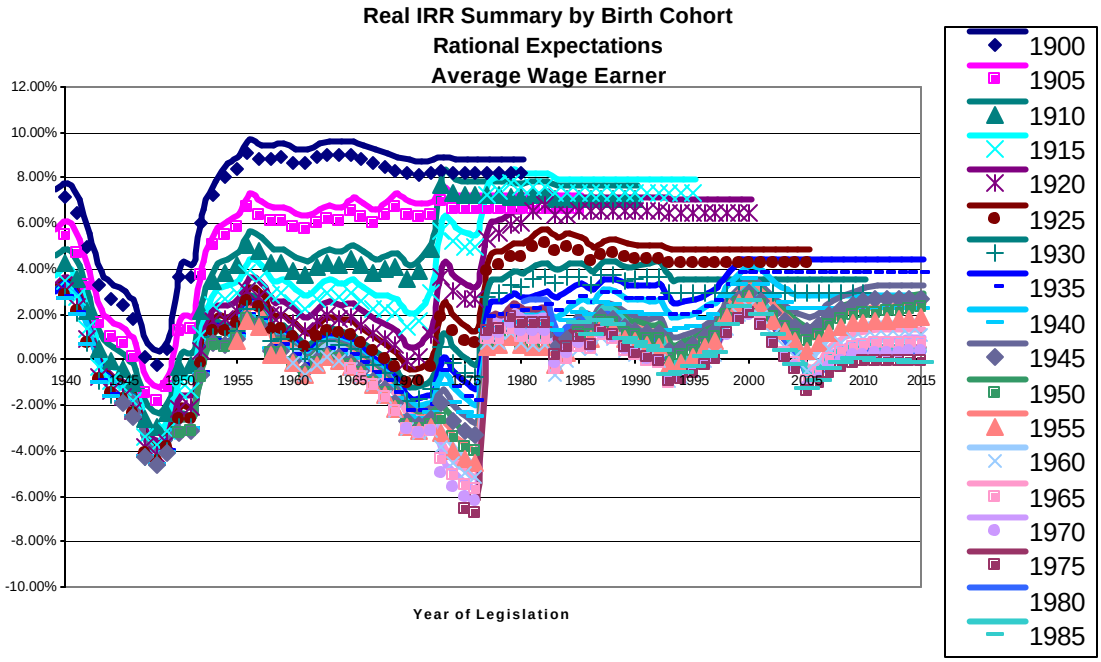
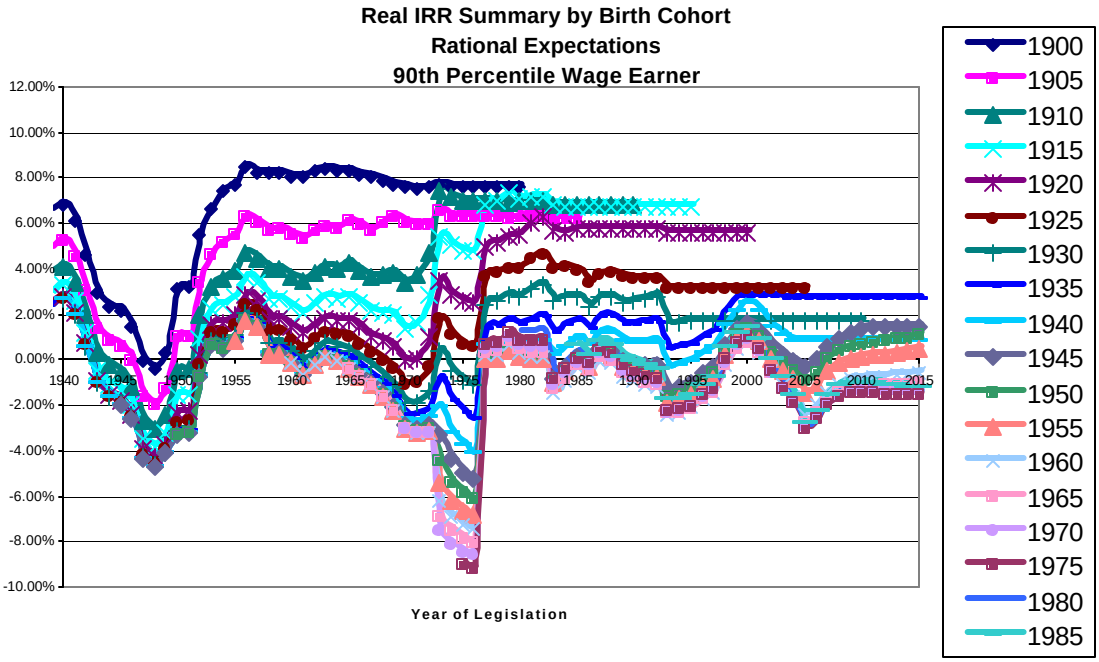


Figure 2



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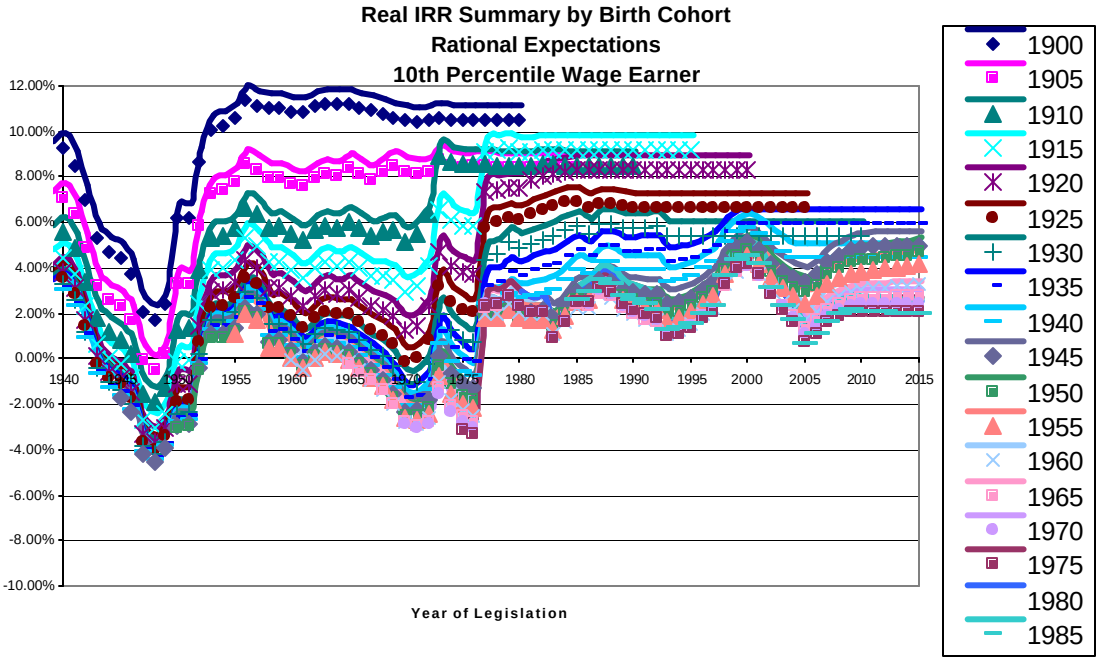

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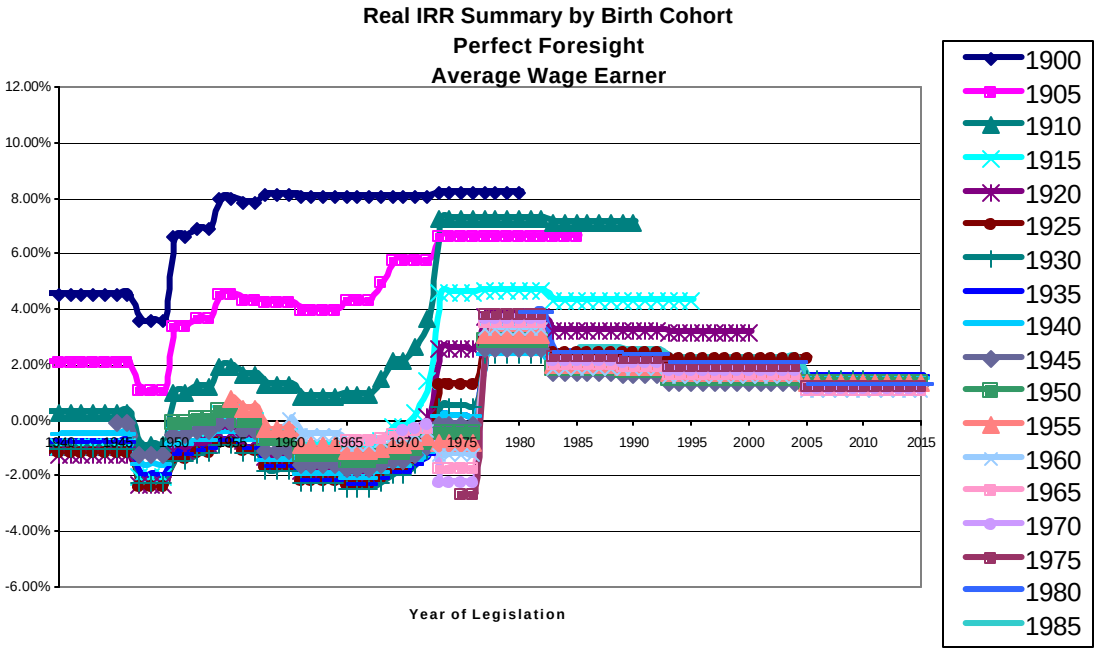


Figure 5

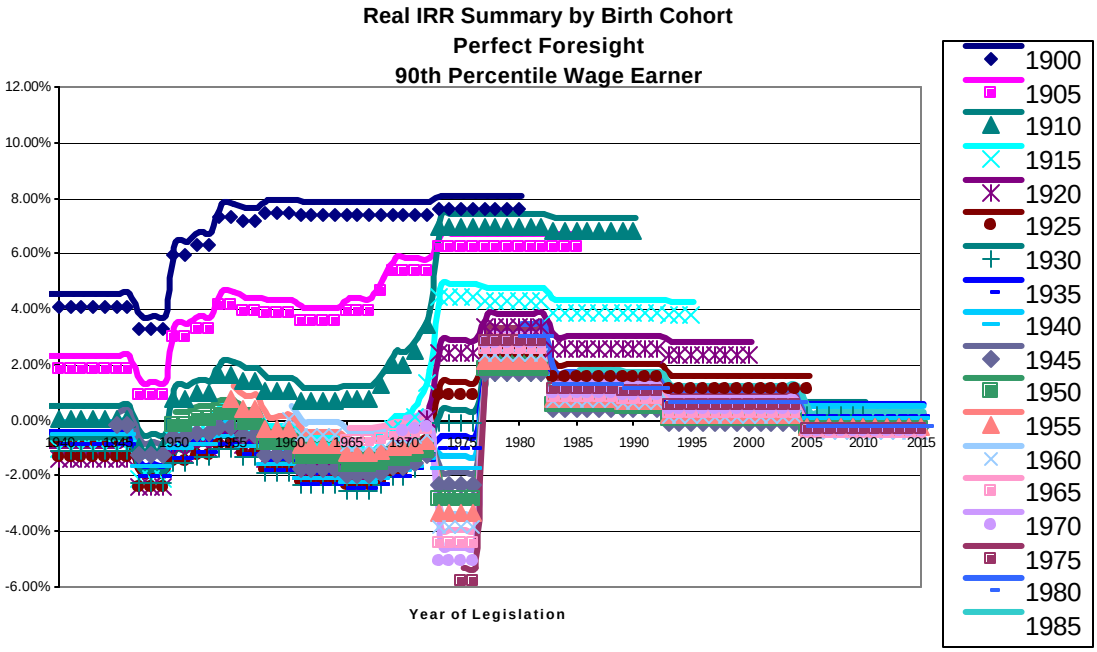
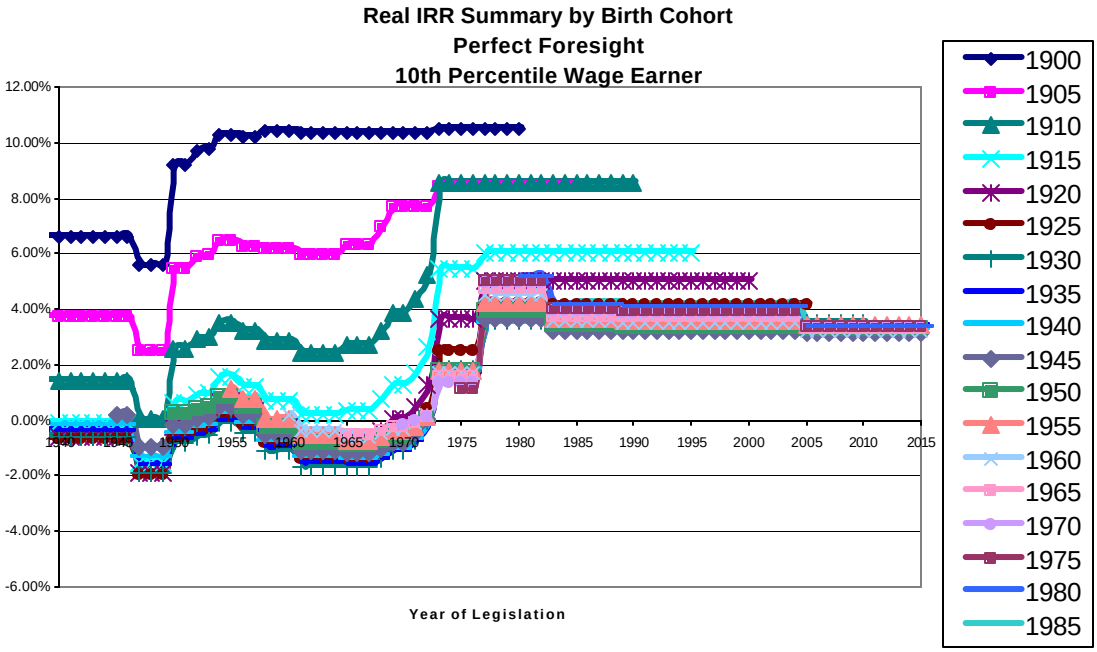


Figure 6


Real IRR Summary by Birth Cohort
Perfect Foresight
10th Percentile Wage Earner
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
-2.00%
-4.00%
-6.00%
1940
1945
1950
1955
1960
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Year of Legislation
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Figure 7

Table 1: Law Changes In Germany

Enacted	Effective	Law change	Impact
1989	1992	? Pensions indexed to net, rather than gross, wages and salaries ? Increases in retirement ages (63 to 65 for men beginning in year 2000 and ending in 2001; 60 to 65 for women beginning in year 2000 and ending in year 2006) ? Partial actuarial adjustments for early/late retirement (reduction of pension by 0.3 % for each month of early retirement and increase of pension by 0.5 % for each month of late retirement) ? Shortening of contribution-free periods (e.g. military service & education) ? Higher transfer from the Federal Employment Office for the unemployed	? Pensions grow at a slower rate ? Provided disincentive for early retirement and incentive for late retirement ? Special pension benefits reduced
1997	1999	? Gradual change of eligibility age for the unemployed and women from 60 to 65 ? No distinction between men and women after 2015 ? Unemployment retirement will be abolished after 2007 ? Part-time retirement made impossible after 2007	? Effective retirement ages increased by 2 years
2001	2002	? Contribution rates stabilized (must stay below 20% until 2020 and below 22% until 2030) while net replacement rate must stay above 67% ? Pension levels(including supplementary pensions) gradually reduced from 70% to 67~68% replacement levels ? 4% of gross earnings invested into the new funded supplementary pension (voluntary) ? Supplementary pensions subsidized by tax deferral, tax deduction, and direct subsidies	? Aimed at limiting non-wage labor costs and achieving a fairer balance of intergenerational burden ? Actual pension levels fall by 10% to 63.5% due to the supplementary pension ? Demand for voluntary supplementary pensions moderate (35% of all eligible workers in 2003) ? Supplementary pensions expected to compensate for the reductions in PAYGO scheme for younger cohorts but not necessarily for older cohorts ? Replacement rates expected to fall below the minimum set at 67% and contribution rates rise above the maximum set at 20% ? Transition generation will bear a larger burden (need 8% savings rate to cover the loss)
2004	?	? Include a “sustainability factor” in the benefit formula to reflect the system dependency ratio that considers not only the development of life expectancy but also other demographic changes (e.g. migration and birth rates) ? Administrative changes to encourage subscriptions to supplementary pensions ? Gradual increase in normal retirement age from 65 to 67 along with corresponding increase in early retirement ages starting in 2011 until 2035 (not yet legislated)	? “Sustainability factor” gives the pension benefit formula a self-stabilizing effect ? Supplementary pensions made more popular and transparent ? Contribution rates maintained below the maximum level

Sources: 1989/1992 reform from Rürup (2002); 2001/2002, and 2004 reforms from Börsh-Supan and Wilke (2004)

Table 2: Law Changes in France

Enacted	Effective	Law Change	Impact
1993	1993	? Pensions indexed to prices, instead of wages ? Gradual increase of number of contribution years required for full pension benefits from 37.5 to 40 years over 10 years for private-sector employees ? Number of years used to compute pension increased from 10 to 25 years over 15 years	? Contained pension expenditures through benefit cuts at the expense of substantially reduced replacement rates and lower standard of living for the retirees ? Increase in the required contribution years had minimal impact, while the new indexation and increased number of years used to compute pension enabled the reduction in expenditure
2003		? Number of contribution years required for full pension increased to 40 for public-sector employees by 2008 ? Above number will increase up to 41 for both public- and private-sector employees by 2012. This number will be kept modified in line with changing life expectancy ? Introduction of bonus of 3% per year for workers working beyond 60 and beyond the required years up to maximum 5 years ? Minimum pension for low-wage workers who have completed the contribution years required for full pension increased	? Aimed to increase effective retirement age ? Replacement rates further reduced

Sources: 1993 reform from Blanchet and Legros (2002); 2003 reform from Bernallah et. al. (2005).

Table 3: Law Changes in Sweden

Enacted	Effective	Law Change	Impact
1994/1998	2001	? Two-pillar model of NDC (Notional Defined Contribution) PAYGO and a mandatory FDC (Fully Funded Individual Accounts) system established ? Pre-reform overall contribution rate of 18.5% maintained (16% to PAYGO + 2.5% to the advanced funded scheme) ? Both accounts converted into annuities at retirement ? Annuities based on lifetime account values at retirement, life expectancy of the cohort, a real rate of return on accounts. ? Individually chosen funds (500 choices in 2000) with no restriction on fund's portfolio composition ? Occupational pension schemes transformed into FDC scheme ? No fixed retirement age, but earliest age to receive pension set at 61 ? Old Universal Benefits and Supplementary Benefits replaced by Universal Guarantee Pension ? The size of this pension graduated in accordance with the two contributory public retirement benefits (NDC and FDC)	? Creation of a more financially stable system, emulating a pure insurance model ? Funded component fit into the overall system without creating a new tax for future generations ? Replacement rates are similar as before at around 70%. ? Risks of increasing longevity shifted to individuals and intergenerational imbalance reduced ? Established actuarially fair system that erases impediments to continued work ? Indexation to wage-growth improved financial sustainability ? Funded component increased national savings ? More individual autonomy ? Future benefits more uncertain ? The pensions of people born in 1954 and later will be fully calculated in accordance with the new benefit formula. Pensions of people born between 1938 and 1953 will be determined by a combination of old and new rules. ? Basic security ensured through a universal guarantee pension

Sources: Palmar (2002), Palme (2005)

Table 4: Law Changes in Italy

Enacted	Effective	Law Change	Impact
1992	1993	? Increase in the normal retirement age for private-sector employees (55 to 60 for women; 60 to 65 for men) ? Reference period for calculating pension-able earnings lengthened from 5 to 10 years; for young workers it was expended to the whole working life ? Increase in the minimum number of years of contributions to receive old age pension from 15 to 20 years ? Pensions indexed to prices, instead of wages ? Minimum number of years of contribution required for public-sector employees to be entitled to a seniority pension raised to 35, same as private-sector employees ? Restrictions in the special eligibility conditions applying to public-sector employees ? Adjustment of pensions to price temporarily limited ? Disbursement of new seniority pension curtailed	? Partially succeeded at limiting the ratio of public pension expenditure to GDP (about one-fourth of net pension liabilities canceled) ? Reduced imbalances that create unfair advantages/disadvantages for certain groups (i.e. pension levels for younger workers linked to lifetime contribution) ? More equalized treatment of public-sector and private sector employees ? Cuts unevenly distributed: reduction of 8% for pensioners, 37% for long contributory records, 42% for short or discontinuous records ? Long transition period and uneven distribution of reform burden due to exclusion of individuals with at least 15 years of contributions from changes ? Failed to tackle seniority pension
1995	1996	? Shift from Defined Benefit to Defined Contribution system ? Old age pension proportional to the value of accrued social security benefits, instead of recent final earnings ? Pensions linked to the average life expectancy at the age of retirement ? Workers allowed to choose a retirement age between 57 and 65 ? Guaranteed minimum pension level abolished ? Seniority pension gradually abolished ? Minimum number of years of contribution required for old age pension reduced	? Aimed at reducing distortion effects of labor income tax through actuarial adjustments ? Removed favorable treatment of workers with short or dynamic careers ? Introduction of new pension benefit formula avoided the need to explicitly modify parameters, making cuts benefit cuts more acceptable ? Liabilities of the private-sector pension scheme increased (4~9% of GDP) ? Implementation of the reform extremely slow, just as the reform of 1992 (only individuals starting to work after 1995 will receive pensions computed only on the basis of new rules)
Current Proposals		? Faster implementation of the reforms enacted in 1992 and 1995 ? Accelerate the development of supplementary pension funds through tax deductions ? Shift in the old age retirement bracket (from 57 ~ 65 to 62 ~70) ? Provide an incentive to postpone retirement ? More frequent revisions of the parameters in the benefit formula ? Increase the number of factors in the benefit formula reflecting demographic and economic changes	

Source: Franco (2002).