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ABSTRACT

This paper discusses a possible solution to the double problem that faces European governments in dealing with the future of Social Security pensions. Like other governments around the world, they must deal with the rising cost of pensions that will result from the increasing life expectancy of the population. But the European governments have the extra problem that any solution must be compatible with a European Union labor market in which individuals from any member country are free to work anywhere within the European Union. The solution to this double problem that is developed in this paper combines an investment-based system of individual accounts with a “notional defined contribution” system financed by pay-as-you-go taxes.

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The Future of Social Security Pensions in Europe

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This paper discusses a possible solution to the problem that faces European governments in dealing with the future of Social Security pensions. The governments of the European Union face a double problem. Like other governments around the world, they must deal with the rising cost of pensions that will result from the increasing life expectancy of the population. But the European governments have the extra problem that any solution must be compatible with a European Union labor market in which individuals from any member country are free to work anywhere within the European Union. The solution to this double problem that is developed in this paper combines an investment-based system of individual accounts with a “notional defined contribution” system financed by pay-as-you-go taxes.

Before discussing that option, I begin by providing a brief description of the current pension situation in European countries and the prospects for the future if the current system is left unchanged. I then discuss an obvious way of dealing with the double problem by shifting to a pure investment based system of individual accounts. Although this has attractive features, it is likely to involve a politically unacceptable degree of risk for future retirees. This leads to a discussion of using a mixed system that combines investment-based and pay-as-you-go elements. Although using a defined-benefit form of the pay-as-you-go system for this purpose would create problems in the context of the integrated European labor market, a notional defined contribution

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system of the type described below would avoid these problems and therefore would provide a potential solution to the two problems facing European governments in dealing with their pension systems.

Current and Future Social Security Pensions

Although the current European Social Security pension systems differ from one another, there are certain common features in most of the systems of the European Union countries.¹ They are financed by taxes (usually payroll taxes) on a pay-as-you-go basis, i.e., with the taxes paid in each year used to finance concurrent benefits. The benefits are generally based on the number of years that the individual has worked and on the individual's average lifetime level of earnings.

Because of the pay-as-you-go feature, the taxes needed to finance future benefits will rise sharply as the number of retirees rises relative to the number of workers. This is not a temporary or transition problem but a permanent problem caused by the aging of the population. With no change in benefit rules or in the pay-as-you-go financing system, the tax rate required to finance the benefits would have to rise by about 50 percent in most countries² with even greater increases in some countries. This high pension cost would be in addition to the cost of public sector health services and to the other existing high income and value added tax rates.

¹For a description of the major Social Security pension systems of Europe and the history of recent reforms, see Martin Feldstein and Horst Siebert, Social Security Pension Reform in Europe (Chicago: University of Chicago Press, 2002)

² The Netherlands and Britain, with their funded systems, are largely immune to this problem but not to the changes that will be needed. to operate in this labor market environment.

Even if the European governments were not facing this cost-increasing demographic change, the current defined-benefit pay-as-you-go systems would not be a satisfactory long-term structure for the EU countries as the EU labor market becomes more integrated. To see why, consider a Portuguese citizen who works part of his life in Germany, part in France, and part in Italy, and eventually retires in Spain. He (or his employers in the three countries where he works) pays taxes to the three different governments as part of their pay-as-you-go pension systems. When he retires in Spain, who will pay his benefits? And under which country's defined benefit rules will his benefits be calculated?

One possibility is that, as a Portuguese citizen, he will receive benefits from Portugal even though he never worked there and never paid any taxes to Portugal. That would obviously place an unfair and unacceptable burden on Portugal. The same would be true of the possibility that the benefits would be paid by Spain, the country where he retires. A more plausible idea would be to share the burden of retirement benefits among France, Germany, and Italy.

But on what basis would the cost be divided? What rules would determine his benefits? And what would make the separate contributions from the three governments add up to the appropriate defined benefit total? It would certainly not be appropriate to simply treat the three employment experiences separately and allow the individual to collect the sum of the three, an amount that might bear little or no resemblance to what he would receive with the same lifetime earnings record if he had stayed in a single country.

Investment Based Individual Accounts

A simple solution would be to replace the existing pay-as-you-go defined-benefit plan

with a system of individual investment-based accounts to which individuals and/or their employers are required to contribute. At retirement age, the accumulated balance in these accounts could be used to finance an annuity.

Such an investment based account would be completely portable, going with the individual as he goes from country to country. The benefits could be paid wherever he retires. Governments or the EU might be involved in specifying the minimum amount (or percent of earnings) that must be contributed and in regulating the form of investment and the rules governing the payouts after normal retirement age. But governments would not collect taxes or pay benefits.

The higher rate of return available in such an investment-based system of individual accounts would dramatically reduce the long-run cost of providing retirement benefits.³ Under the typical pay-as-you-go system, the individual earns a real rate of return on the contributions that he and his employer make of about 2 percent per year.⁴ In contrast, an investment based system

³There would of course be a transition cost in the form of a higher saving rate in order to make possible the lower long-term costs. But calculations based on U.S. data suggest that such a transition can be financed with a relatively small increase in total payments in the near term and medium term, an increase that is substantially less than the permanent increase in the cost that would be required if the current system were unchanged. See, e.g., Martin Feldstein and Andrew Samwick, "The Economics of Prefunding Social Security and Medicare," in NBER Macroeconomics Annual, 1997 (Cambridge: MIT Press, 1997) available also as NBER Working Paper W6055 at www.nber.org/papers/w6055.

⁴The return in a pay-as-you-go system results from the increasing tax base used to finance benefits. Because the number of employees and the average real earnings of each employee rises through time, a pay-as-you-go system can give retirees more in benefits than the taxes they paid while they were working.

would provide an expected real return of about 6 percent.⁵ To see the impact of this difference in rates of return on the cost of providing pension benefits, consider an individual who works from age 25 to 65 and then retires from age 65 until his death at age 85. The individual contributes to the pension during his working years and receives benefits each year during retirement.

The calculations can be simplified and made transparent if we assume that all of the pension saving is done at the midpoint of the working years (i.e., at age 45) and that all of the retirement benefits are paid at the midpoint of the retirement years (age 75).⁶ With a 2 percent pay-as-you-go saving rate, \$1000 contributed at age 45 grows to \$1811 at age 75. With a 6 percent rate of return, the same \$1811 can be achieved at age 75 by saving only \$315 at age 45. Thus the investment based system can produce the same retirement benefit with less than one-third of the contribution of the pay-as-you-go system. This in turn implies that benefits that would require a 30 percent payroll tax rate could be financed with an investment based saving rate of 9.45 percent. Such a reduction in the mandatory contribution rate during working years would substantially raise the spendable income of the typical employee and would also substantially reduce the distortions to incentives caused by the low-return pay-as-you-go tax.

⁵The six percent figure is based on U.S. data but is not likely to be very different for investments in European securities. More specifically, a portfolio of 60 percent stocks (the Standard and Poors Index) and 40 percent corporate bonds had a mean real annual return of 6.7 percent for the period from 1945 to 1995. If we subtract 0.4 percent for administrative costs, we have a usable return of 6.3 percent. (These values reflect the historic experience of a mean *logarithmic* rate of return of 5.9 percent with a standard deviation of 12.5 percent; these logarithmic rates of return imply a mean *level* rate of return of 6.7 percent.)

⁶Detailed calculations with annual saving and benefit payouts show that this is a quite good approximation.

Market Risks in Investment-Based Systems

These rate of return calculations are based on the average return that has been achieved historically and that might be expected to prevail on average in the future. There is, however, significant uncertainty about the future rates of return and substantial variability from year to year in the return on a portfolio of stocks and bonds. To assess the extent of the risks that an individual would face in such an investment-based system, Elena Rangelova and I⁷ calculated the probability distribution of the pension annuities that an individual would receive if he (or his employer) saved 6 percent of his earnings in each year, invested those savings in a portfolio of 60 percent stocks and 40 percent bonds, and then used the accumulated proceeds at age 66 to purchase a variable annuity invested in the same stock-bond mix.⁸ We compared the resulting annuity payments to the benefits that would be payable under current U.S. benefit rules, which we refer to as the “benchmark” level of benefits.⁹

The simulation results for retirees at age 67, 77, and 87 are shown in Table 1. The median investment-based annuity at age 67 would be equal to more than twice the benchmark benefit (i.e., 2.12 times the benchmark) even though the six percent saving rate is only about one-third of the

⁷Martin Feldstein and Elena Rangelova, “Individual Risk in an Investment Based Social Security System,” *American Economic Review*, September 2001, available also as NBER Working Paper number 8074 (see www.nber.org/papers/w8074.)

⁸The simulations reflect the uncertainty about the mean return in the future as well as the year to year fluctuations around that mean.

⁹The benefit rules specified in current law relate benefits to past earnings. Benefits replace approximately 40 percent of immediate preretirement wages for a retiree with average lifetime earnings and without dependents and about 60 percent of earnings for such a retiree with a dependent spouse. The benefits are adjusted each year after retirement to maintain a constant real value. Maintaining the current benefit rules would require raising the payroll tax rate from the current 12.4 percent to about 19 percent as the ratio of retirees to workers increases.

long-run tax rate that would be required with a pure pay-as-you-go system. There is only one chance in about 5 that the 67 year old retiree would receive less in the investment-based system than in the pay-as-you-go system and an equal probability of receiving at least 4.3 times the benchmark benefit.

There is, however, a small chance that the retiree would receive substantially less in the investment based system than the benchmark level of benefits. Table 1 shows that a 67 year old has one chance in 50 of receiving only 47 percent of the benchmark benefit and one chance in 100 of receiving less than 40 percent of the benchmark benefit.

The risk of a relatively low benefit increases as the individual ages, reflecting the increasing variance as more years of uncertain returns are accumulated. At age 77, there is one chance in 10 that the investment based retirement benefit would be less than 56 percent of the benchmark benefit and one chance in 100 that it would be less than 21 percent of the benchmark. At age 87, there is one chance in 10 that it would be less than 40 percent of the benchmark and one chance in 100 that it would be less than 12 percent of the benchmark.

Some individuals might be willing to accept the risk implied by these figures in order to have the higher expected level of benefits than in the pay-as-you-go system as well as the possibility of the substantially higher benefits associated with the cumulative probabilities of 70, 80 and 90 percent. This would be particularly true among those who have private pensions and other sources of retirement income. Others who do not have additional sources of retirement income might still favor the investment-based system but would invest in a more conservative portfolio that provided less opportunity for both low and high annuity values. But for many individuals, this pure investment based system might entail too much risk for it to be a politically

viable alternative to the pay-as-you-go system.

Guarantees to Reduce Risk

Several Latin American governments, including Chile, Argentina, and Mexico, have introduced pure investment based systems but have combined that with a government guarantee that the each retiree will receive at least as much as he would have under the rules of the previous pay-as-you-go system. This does of course put future taxpayers at risk of having to pay retirees to fill the shortfall between their investment-based annuities and the guarantee level. However , the figures in Table 1 imply that the probability that taxpayers will be called upon in this way is quite low, e.g., less than a 20 percent probability that retirees aged 67 would need a supplementary payout and about a 33 percent probability for those aged 87. Calculations indicate that there is about a 60 percent probability that taxpayers will not have to make any payment in a year.¹⁰ The sum of the expected guarantee payments and the 6 percent saving rate is almost always less than the tax that would be required to support the same level of retirement benefits in a pure pay-as-you-go system.

It is not necessary to have government guarantees to reduce the risk of the pure investment-based system. Private financial markets could in principle provide a guarantee for those individuals who want one and are willing to pay for it by accepting a lower expected rate of return. One possibility is to give up some of the potential for the very high annuity levels shown in Table 1 in order to eliminate the risk of very low annuities. Financial markets could deliver this

¹⁰See Martin Feldstein and Elena Rangelova, "Individual Risk and Intergenerational Risk Sharing in an Investment-Based Social Security System," National Bureau of Economic Research Working Paper 6839, 1998, available at www.nber.org/papers/w6839.

by selling a “collar,” i.e., a “put option” that reduces the risk of low annuities financed by foregoing some or all of the annuity payments above some level. The individual in effect sells a “call option” on his annuity in order to finance the purchase of a put option.

An alternative way to reduce the risk of the pension system to both retirees and taxpayers is to use a mixed system that combines an investment based component with some pay-as-you-go benefit.¹¹ This raises the expected cost of providing the benefits but reduces the risk of very low benefits or of a very large tax financed guarantee payment. For example, cutting the full future pay-as-you-go tax in half (i.e., from 19 percent to 9.5 percent in the US context) would finance half of the benchmark benefit, guaranteeing that no matter how poorly financial markets perform the retiree would have at least 50 percent of the benchmark benefit level. Combining this with a three percent rate of saving and portfolio investment (instead of the six percent assumed in Table 1) would cut the probability that a 67 year old would receive less than 80 percent of the benchmark from 10 percent to less than 5 percent.¹² The probability of receiving less than 50 percent of the benchmark would be cut from about 2 percent to zero.

Such a mixed system thus eliminates the risk of very low levels of retirement income but

¹¹For an example of such a mixed system, see Martin Feldstein and Andrew Samwick, “Potential Effects of Two Percent Personal Retirement Accounts,” *Tax Notes*, vol.79, No. 5, May 4, 1998, available in an updated version in National Bureau of Economic Research Working Paper 6540 (see www.nber.org/papers/w6540).

¹²To see this, note that if the pay-as-you-go benefits are half of the benchmark, the individual receives 80 percent of the benchmark if the investment-based component is equal to 30 percent of the benchmark. For a 77 year old, Table 1 shows that with a 6 percent saving rate the investment-based component has only a 5 percent chance of being less than 62 percent of the benchmark. With half of that saving rate, the investment-based component has a 5 percent chance of being less than 31 percent of the benchmark. Combining the two implies that there would be only a five percent chance of being less than 81 percent of the benchmark.

does so only by accepting a higher combined cost of the two components. Alternatively, one can think of a mixed system as reducing the cost of a pure pay-as-you-go system by accepting some investment risk.

A Notional Defined Contribution System

But even if European governments were willing to accept the combination of cost and risk involved in the mixed system, it would not be possible to use a defined benefit form of the pay-as-you-go system because of the problems that I discussed earlier in this paper, i.e., setting the benefit level and allocating the cost for individuals who work in more than one country. There is however an attractive alternative for the pay-as-you-go component: a “notional” defined contribution system of the type that has recently been introduced on a purely national basis in Sweden and Italy.¹³ In a notional defined contribution system, each individual has a personal account to which he (or his employer) pays a prescribed annual amount or share of earnings. These funds are not invested in stocks and bonds but go to the government and are used to finance concurrent pay-as-you-go benefits. But unlike the defined benefit system, each individual’s account is directly credited with the amount that the individual (or his employer) pays into the pay-as-you-go system. In addition, the account receives a rate of return on the accumulated balance at a notional rate of “interest” equal to the rate of growth of the aggregate payroll tax base. This notional rate of return is the rate that the government can afford to pay in a pure pay-as-you-go system and makes the expected benefits equal on average to the benefits that would be paid in

¹³For a description of these systems, see the papers on Sweden and Italy in Martin Feldstein and Horst Siebert, Social Security Pension Reform in Europe. (Chicago: University of Chicago Press, forthcoming 2002), available at www.nber.org under Books-in-Progress.

a defined benefit pay-as-you-go system.

The advantage of the notional defined contribution system is that it makes it easy to operate a pay-as-you-go system in which the individual works in a variety of countries during his lifetime and may retire in yet a different one. With a notional defined contribution system, there is no difficulty in defining the available benefits. At retirement age, the individual has an accumulated amount in his personal account that he can take in cash, convert to a private investment-based annuity, or shift to a pay-as-you-go annuity with a rate of return equal to the rate of growth of the tax base in the country to which he transfers those funds.

The amount of the accumulated funds at retirement age (or indeed at any age before that) in the individual's account is the sum of what he and his employer paid in taxes during his working years augmented by the notional rate of return. If the individual starts by working in Germany, he or his German employer pays a payroll tax to the German government which credits the account with a rate of return equal to the estimated long-term rate of growth of the payroll tax base in Germany (i.e., the sum of the growth rates of average wages and the number of people in the labor force). If at the end of (say) 15 years the individual moves his employment to France, the German government transfers the individual's accumulated funds to the French government. Additional tax payments and notional interest then accumulate in the individual's account, using the French tax rate and the French notional rate of return.

When the individual retires, all of the funds in his account is owed to him by the government where he was working when he retired. There is no unfair burden on any country since each country transfers to a successor government or to the individual only the amount that that individual has paid into the local system (including the amount carried over from a previous

government) plus a rate of return that can be attributed on the basis of the growing tax revenue without having to raise the tax rate.

There would of course be both administrative and economic problems in shifting from the existing national pay-as-you-go systems to a mixed system that combines individual investment based defined contribution accounts with individual pay-as-you-go notional defined contribution accounts. But the examples of Sweden and Italy show how the shift from traditional defined benefits to notional defined contributions can be introduced and several countries have shown how to shift from a pure pay-as-you-go system to one that combines that system with individual investment based accounts.¹⁴ Unless the countries of the European Union move in this direction, they will face substantially higher payroll tax rates and a Social Security pension system that is not compatible with the notion of the free mobility of labor among the countries of the European Union.

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¹⁴See descriptions of several European systems that have made such a transition in Martin Feldstein and Horst Siebert, Social Security Pension Reform in Europe (Chicago: University of Chicago Press, 2002) and of the Australian experience in Malcolm Edey and John Simon, "Australia's Retirement Income System," in Martin Feldstein, Privatizing Social Security (Chicago: University of Chicago Press, 1998).

Table 1

Probability Distribution of Investment-Based Retiree Benefits
as Multiple of the Pay-as-You-Go Benchmark Benefits

Cumulative Probability	Age 67	Age 77	Age 87
0.01	0.40	0.21	0.12
0.02	0.47	0.26	0.17
0.05	0.61	0.39	0.26
0.10	0.79	0.56	0.40
0.20	1.08	0.84	0.65
0.30	1.38	1.16	0.95
0.40	1.71	1.52	1.34
0.50	2.12	1.95	1.83
0.60	2.57	2.54	2.49
0.70	3.26	3.34	3.45
0.80	4.29	4.72	5.04
0.90	6.30	7.49	8.84

The investment-based benefits are based on a saving rate of 6 percent and a real mean return of 6.3 percent. The benchmark benefits are the benefits that would be paid to an average employee under the current pay-as-you-go U.S. Social Security law; in the long-term this would require taxes equal to 19 percent of earnings.

Source: Martin Feldstein and Elena Rangelova, "Individual Risk in an Investment-Based Social Security System," American Economic Review, 2001 and NBER Working Paper 8074.