

**GERMANY:  
A SOCIAL SECURITY SYSTEM ON THE VERGE OF COLLAPSE**

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**Axel Börsch-Supan**

Department of Economics, University of Mannheim, Germany  
Center for Economic Policy Research, London, UK  
National Bureau of Economic Research, Cambridge, Massachusetts

**ABSTRACT**

Germany has one of the most generous retirement systems in the world. At the very same time, Germany also faces one of the most incisive population aging processes. The ratio of workers to pensioners will decrease to about one to one within the next generation. This will put the German pay-as-you-go social security system under sever pressure.

This paper has three aims. First, it shows that the design of the current system has incentive effects which make coping with the future demographic challenges particularly difficult. Second, it shows that the German pay-as-you-go mechanism cannot be fixed by any single policy measure alone. Moreover, while a combination of several feasible measures may be able to stabilize the contribution rate, the internal rate of return of the pay-as-you-go system will fall to a level that is likely to create strong incentives to „opt out“ wherever possible. Third, the paper shows that a transition to a funded system is feasible without creating a „double“ burden on the transition generation.

**ADDRESS:**

Prof. Axel Börsch-Supan, Ph.D.  
Department of Economics  
University of Mannheim  
D-68131 Mannheim, Germany  
Fax: +49-621-292-5426  
E-Mail: axel@econ.uni-mannheim.de

# **GERMANY: A SOCIAL SECURITY SYSTEM ON THE VERGE OF COLLAPSE**

**Axel H. Börsch-Supan**

## **Introduction**

Germany relies heavily on pay-as-you-go (PAYG) financing for old age social security. PAYG pensions constitute more than 80 percent of the income of households headed by persons aged 65 and older, while funded retirement income, such as asset income or firm pensions, plays a much smaller role than in the Netherlands or the Anglo-Saxon countries. At the same time, Germany, together with Austria and Switzerland, is the OECD country with the most pronounced population aging process.

This paper argues that the PAYG system of social security in Germany cannot provide the flexibility that is necessary to master the demographic changes to come. The German PAYG pension system is locked between the Scylla of a low pension level and the Charybdis of a high contribution rate. Even after several reforms and modification has the German PAYG system strong incentive effects towards early retirement and escape into disability insurance that are detrimental to the finances of the system.

Additional flexibility can be achieved by funding the pension systems at least partially. This works mainly through two mechanisms. First, intertemporal substitution – possible only in a funded system – permits a smoothing of the demographic burden across a much longer period than the contemporary budget constraint of a PAYG system. Second, international diversification on global capital markets enables to escape the likely decline of domestic rates of return in an aging economy.

The paper synthesizes simulations of the German PAYG system with projections of a gradual transition to a (partially) funded system. The paper has three parts. The first part briefly describes the German public pension system and its main incentive effects. In the second part, I present the demographics of population aging and its implications for the PAYG pension system. I then collect projections of the PAYG contribution rate under alternative labor force scenarios, most notably a change in the retirement age and in female labor force participation, and show that the PAYG system has insufficient flexibility under realistic assumptions. In particular, the German PAYG system yields implicit rates of return that are much lower than in a funded pension scheme. The third part of the paper is therefore

concerned with the transition to a (partially) funded system. It shows that the transition problem is much less severe than frequently argued, and that financial risks can be minimized by international diversification. Indeed, a funded system that invests globally can provide a rate of return that generates a macroeconomic per capita consumption path through the entire 2000-2050 period that strongly dominates per capita consumption under PAYG.

## I. The German Public Pension System and its Incentive Effects

The German public pay-as-you-go pension system (the „Gesetzliche Rentenversicherung“ and its equivalents<sup>1</sup>) is by far the largest pillar of retirement income, much more so than in many other countries (Exhibit 1).<sup>2</sup> It is mandatory for every worker except for the self-employed and those with very small incomes. In addition, the German social security system is very generous. The system has a very high replacement rate, generating net retirement incomes that are currently about 72 percent of pre-retirement net earnings for a worker with a 45-year earnings history and average life-time earnings (Exhibit 2).<sup>3</sup> This is substantially higher than, e.g., the corresponding U.S. net replacement rate of about 53 percent.<sup>4</sup> In addition, it provides relatively generous survivor benefits that constitute a substantial proportion of total unfunded pension wealth.

A detailed description of the German public pension system and how it compares to other public pension systems can be found in Börsch-Supan and Schnabel (1997). In this section, we focus on the incentive effects which make coping with the future demographic challenges particularly difficult.

The German public pension system (or, as it is referred to in Germany, „retirement insurance“ system) provides *old-age pensions* for workers aged 60 and older, *disability benefits* for workers below age 60, that are converted to old-age pensions latest at age 65, and *survivor benefits* for spouses and children. In addition, pre-retirement (i.e., retirement before age 60) is possible through several mechanisms using the public transfer system, mainly unemployment compensation.

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1 E.g., the retirement system of civil servants. The system was founded in 1889 by Bismarck as a funded system. After WW II, the 1957 pension reform introduced PAYG financing, which was fully phased in by 1967.

2 See the international comparisons in Gruber and Wise (1998)

3 This replacement rate is defined as the current pension of a retiree with a 45-year average earnings history divided by the current average earnings of all dependently employed workers. This is different from the „replacement rate“ in the appendix table. It is also different from the replacement rate relative to the most recent earnings of a retiring worker that are usually higher than the life-time average.

4 Using the same replacement rate concept as in footnote 3.

A main feature of the German old-age pensions is “flexible retirement” after age 63 for workers with a long service history. In addition, retirement at age 60 is possible for women, unemployed, and workers who cannot be appropriately employed for health or labor market reasons. Benefits are computed on a life-time contribution basis and adjusted according to the type of pension and retirement age. They are the product of four elements: (1) the employee’s relative wage position, averaged over the entire earnings history, (2) the number of years of service life, (3) adjustment factors for pension type and (since the 1992 reform) retirement age, and (4) the average pension level that is indexed during the entire retirement period to the average net wage of the working population. The first three factors make up the “personal pension base” while the fourth factor determines the income distribution between workers and pensioners in general. Because of wage indexation, productivity gains are automatically transferred also to pensioners.

Before 1992, there was no adjustment of benefits to retirement age.<sup>5</sup> However, because benefits are proportional to the years of service, a worker with fewer years of service would get lower benefits. With a constant income profile and 40 years of service, each year of earlier retirement decreased pension benefits by 2.5 percent, and vice versa.

The 1992 social security reform is gradually changing this by introducing retirement age-specific adjustment factors. Exhibit 3 displays these adjustment factors for a worker who has earnings that remain constant after age 60. It relates the retirement income for retirement at age 65 (normalized to 100 percent) to the retirement income for retirement at earlier or later ages. As references, the table also displays the corresponding adjustments in the United States and actuarially fair adjustments at a 3 % discount rate.<sup>6</sup> As can be seen, the German public pension system is not actuarially fair. The system before the 1992 reform was particularly distortive in rewarding early retirement. While there is little economic incentive for Americans to retire before age 65 and only a small disincentive to retire later than at age 65, the German social security system tilts the retirement decision heavily towards the earliest retirement age applicable. The 1992 pension reform in Germany has diminished but by no means abolished this incentive effect.

The failure to adjust benefits in an actuarially fair manner create a loss in unfunded social security wealth when a worker postpones retirement. This loss is large relative to the

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<sup>5</sup> Curiously, the German system before 1992 provided a large increase in retirement benefits for work at ages 66 and 67. However, it was ineffective because the inducements to early retirement by far offset this incentive.

<sup>6</sup> See Börsch-Supan (1992). The actuarially fair adjustments equalize the expected social security wealth defined in Appendix 2 for a worker with an earnings history starting at age  $S=20$ . A higher discount rate yields steeper adjustments.

labor income that could be earned when working longer. Exhibit 4 shows these losses in percent of potential earnings. They can be interpreted as implicit taxes on the wages earned when postponing retirement. The implicit taxes exceeded 50 percent before the 1992 pension reform but are still in excess of 20 percent when the 1992 reform will have been fully phased in.

The incentive effects are even stronger if one manages to claim disability status. In this case, also after the 1992 reform no adjustments apply. Thus, implicit tax rates are similar to the pre-1992 regime in excess of 60 percent for workers retiring before age 60. Disability is an important pathway to retirement, as Exhibit 5 shows. Even after tightening disability eligibility from the early 1980s on, still more workers enter retirement through the disability insurance than through old-age pensions. In addition, „pre-retirement“ schemes in combination with early retirement due to unemployment account for another 20 percent of retirement entires.

The incentive effects are reflected in a mean retirement age below age 60, with a dramatic plunge after the „flexible retirement“ option was introduced in 1972 (Exhibit 6), and a retirement age distribution marked by distinct „spikes“ at ages 60, 63 and 65 (Exhibit 7). Age 65 mostly applies to women with a very short earnings history, while the most popular retirement age among men is age 60.

More formal econometric analyses were carried out by Börsch-Supan (1992), Schmidt (1995), and Börsch-Supan and Schmidt (1996). These studies used microeconomic option value analyses to compute the incentive effects of the non-actuarial adjustment of benefits in the German social security system on early retirement. They show, that the 1992 reform will increase the average retirement age only by about half a year, and reduce retirement before age 60 from 32.2 percent to 28.2 percent, while a switch to a system with actuarially fair adjustment factors would shift the retirement age by more than two years. The effects of a non-distorting system are most powerful in the reduction of early retirement, i.e., retirement before the official window period. Retirement at ages 59 and below would drop from currently 32.2 percent to 17.8 percent.

## **II. Structural Limitations of the German PAYG System**

The incentives towards early retirement aggravate an anyway strained situation of the German public pension system. After the PAYG system has been introduced in 1957, the system is now matured. High unemployment together with low old-age labor force

participation generates a high dependency burden and a contribution rate that is currently in excess of 20 percent of gross income. To all of this, the change in the age composition of the German population is slowly but steadily accelerating.

### *The Demographics of Aging*

All industrialized countries are aging but particularly so Germany. Exhibit 8 shows projections of the share of the elderly population, here defined as age 60 and older. The proportion of German elderly will increase from 21 percent in 1995 to 36 percent in the year 2035, when the aging process will peak. With Switzerland and Austria, this will be the highest proportion in the world. However, not only Europe is aging. The Asian countries, notably Japan, is projected to face a very steep aging process in the middle of the next century, and even in Africa will the share of the elderly significantly increase.<sup>7</sup>

The aging process in the OECD countries is partly a transitional process because a large baby boom cohort is followed by a thin baby bust generation. This transitional process is superimposed by the world-wide secular process of a steadily increasing life expectancy. The increase in life expectancy – about 1.5 years every 10 years in Germany – is not likely to end soon. To the contrary and to the surprise of many demographers, it even has accelerated between the most recent computations of German mortality tables. The combination of both processes will dramatically change the structure of the German age pyramid. As Exhibit 9 shows, there will be more elderly and less working age persons in absolute terms.

Consequently, the ratio of elderly to working age persons – the old age dependency ratio – will increase steeply in the industrialized countries and particularly so in Germany. The OECD projects an increase from 20.6 percent in 1990 to 39.2 percent in 2030 for its European member countries.<sup>8</sup> In Germany, the old age dependency ratio will far more than double from 21.7 percent in 1990 to 49.2 percent in 2030.<sup>9</sup>

One might be suspicious about projections that reach as far as the year 2030. However, the major components of these demographic projections are fairly certain. The two generations of retirees and their children in the year 2030 are already in place. Thus, changes in fertility do not affect the dependency ratio in the year 2030 anymore. Changes in the mortality rate are subtle; if at all, current mortality projections underestimate the increase in life

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<sup>7</sup> World Bank (1994).

<sup>8</sup> Number of persons aged 65 and older divided by number of persons aged 15 through 64.

<sup>9</sup> OECD, based on World Bank projection by Bos et al. (1994). The OECD dependency ratio relates persons age 65 and older to persons between ages 15 and 64.

expectancy. The main wild card in these demographic projections is immigration. In the case of Germany, projected immigration is low relative to current and recent immigration, characterized by the opening of the iron curtain and its aftermath. I will show further below that immigration has to be huge over more than two decades in order to revert the demographic trends depicted in Exhibits 8 and 9.

### *The Social Insurance Burden*

The increase in the dependency ratio has immediate consequences for the pay-as-you-go social insurance system because fewer workers have to finance the benefits of more recipients. This affects not only the PAYG pension system, but also health and long-term care insurance and other social programs financed by general taxes that are geared to the elderly.<sup>10</sup>

Again, Germany faces the strongest challenge. The German social security contribution rate, now at about 20 percent of gross income,<sup>11</sup> will exceed 30 percent of gross income at the peak of population aging if the current replacement rate and the current labor force participation remains as they are now (Exhibit 10). Official estimates range between 26 and 29 percent, assuming some adaptation of the retirement age, the replacement rate, and female labor force participation.<sup>12</sup> Because the main share of health care services are consumed by the elderly, also health insurance contributions will increase. Currently at 12.5 percent on average, the contribution rate is projected to increase by almost 50 percent to 17.5 percent of gross income. The most dramatic increase is in the new long-term care (LTC) insurance because the share of the very old is particularly quickly rising. If current benefit levels will be maintained, the contribution rate will double from 1.7 percent now to almost 3.5 percent in 2035. Unlike to the pension and health insurance systems, the contribution rate to the LTC insurance will continue to increase after the peak of population aging in the year 2035 because of the projected increase in life expectancy

### *Reforming the PAYG Pension System*

Is the current German pay-as-you-go pension system sufficiently flexible to bear the large and increasing retirement burden? What are the policy instruments that can realistically be employed? What are the built-in labor market mechanisms, developing endogenously within the current system, that accommodate population aging? Or should we substitute, at least

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<sup>10</sup> In addition, about 20 percent of the German old age social security budget is financed by general taxes.

<sup>11</sup> Currently, the total contribution rate is 20.3 percent. 10.15 percent are deducted from employees' gross pay, another 10.15 percent are paid by the employer.

<sup>12</sup> Prognos (1995).

partially, the current pay-as-you-go systems by pension systems which are at least partially funded?

It is helpful to depart from the well-known budget equation of a pay-as-you-go pension system that finances current pension benefits by current social security tax contributions. If  $P$  denotes the number of beneficiaries,  $W$  the number of workers paying social security contributions, and  $r$  the replacement rate, here defined as the ratio between the current average pension benefit and the current average wage, then the social security tax rate  $c$  has to be

$$c = r \times P/W$$

in order to balance the budget of the PAYG pension system.

To a first degree of approximation,  $P/W$  is the dependency ratio. This ratio will more than double for Germany. Thus, if one wants to keep the current level of benefits constant, the current system requires a doubling of the tax rate. This is the Scylla mentioned in the introduction: already the current social security contribution rate of 20.3 percent in Germany is considered an obstacle to international competitiveness and an incentive to escape taxation, so that the government has pledged to keep the rate at „around 20 percent.“

If this were the case, benefits will have to decrease to half of their current levels to keep the PAYG budget balanced. This is Charybdis: it would drive a considerable percentage of retirees below the poverty line.<sup>13</sup> Even a less dramatic benefit reduction has severe consequences. For instance, current government proposals recommend that the replacement rate for a worker with a 40 year service history should drop from 64 to 57 percent. This replacement rate implies that a worker with 79 percent of average earnings has a pension just at the poverty line. The PAYG pension system is in a serious dilemma, if not at the verge of collapse.

The only way to escape this dilemma is to change the ratio of beneficiaries to contributors,  $P/W$ . The most powerful route to achieve this is to change the retirement age as this increases the number of contributors and at the same time decreases the number of beneficiaries. As pointed out in the first part of this paper, retirement age is rather low in Germany, slightly below age 60 in 1996, mainly because of a generous early retirement policy once designed to reduce the unemployment rate. Thus, increasing retirement age appears to be

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<sup>13</sup> The poverty line for a retired couple was a monthly income of DM 1298 in 1989 (Bäcker, Bispinck, et al., 1989, p.135). 38.4% of blue collar and 20.1% of white collar retirees received an old-age pension below DM 1300 per month in 1989 (Bundesminister für Arbeit und Sozialordnung, 1990, p.200-207). Most of these households have some supplemental income, increasing their income by 15-20% (Börsch-Supan and Schnabel, 1997).

a rather natural option. As a first step, removing the actuarial unfairness will increase retirement by about two years.<sup>14</sup> However, this will not suffice. Exhibit 11 depicts simulations with a detailed demographic and employment projection model developed elsewhere.<sup>15</sup> It shows that in order to fully compensate for the effects of population aging, the average retirement age has to increase by 9.5 years, to about age 69.<sup>16</sup> It is unlikely that the labor market is sufficiently flexible to permit this to happen.

A similar argument applies to another instrument of labor market flexibility that has recently gained popularity, namely part-time retirement. Part-time retirees receive only part of their pension benefits, and they pay social security contributions from their part-time labor income. The above simulation shows that this will not be an effective mechanism to alleviate the pension crisis. Even if all pensioners would begin as part-time retirees, 18 years of half-time work are required to offset the aging effect in Germany – too long in face of a life-expectancy at age 60 that is about 17 years for German males.

Increasing the number of workers without a corresponding decrease of retirees is less effective but still helpful. In this sense, an increase in female labor force participation is another mechanism which also helps reducing the retirement burden. However, the effect is small for Germany. Even if female labor force participation would reach the level of male labor force participation within the next decade, the increase of the social security contribution rate would be dampened by only about 6 percentage points.<sup>17</sup> This effect is depicted in Exhibit 12. The effect is small because social security benefits will eventually also rise because more female workers are enrolled in the pension system. Thus, higher female labor force participation eliminates some of the current transfer payments in form of survivor benefits, and it has a small transitional effect when female labor force participation is still increasing but the benefits are not yet due. It is also important to note that the additional labor force participation must substitute leisure by labor to be a genuine enlargement of the labor force. If instead non-market (household) labor is substituted by market labor, without a corresponding reduction of leisure, the only effect is a widening of the tax base, tantamount to simply a tax increase for households that now have two earners. In addition, the same qualification holds as in the case of a shift to later retirement ages: the labor market has to be sufficiently flexible to absorb the additional labor supply.

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<sup>14</sup> See part 1 of paper.

<sup>15</sup> Börsch-Supan (1995): Demographic scenario „MOSTLIK“; constant age and gender-specific labor force participation rates.

<sup>16</sup> Börsch-Supan (1996).

<sup>17</sup> Ibid.

Migration is another potentially powerful mechanism to alleviate the effects of population aging. Quite clearly, the influx of young immigrants can in theory fully compensate for population aging. In practice, one faces two problems. First and again, the domestic labor market has to be sufficiently flexible to absorb immigrant workers and provide the necessary training. Given high European unemployment rates, there is certainly at least a serious short-run limitation. Second, the numbers have to work out. To fully compensate for population aging in Germany at the given typical age structure of immigrants – immigrants into Germany are on average about ten years younger than the resident population – about 800,000 persons (workers and family) have to immigrate annually into Germany from now on through the year 2035, see the simulation results depicted in Exhibit 13. These are very large numbers.<sup>18</sup> They are not without a historical precedent but only during a few exceptional years, e.g., after the opening of the iron curtain, and they are unlikely to persist. Felderer (1992) correctly argues that a full compensation of the aging process through migration is impossible. Nevertheless, the simulation results depicted in Exhibit 13 also show that a steady immigration of 300,000 immigrants will reduce the increase of the social security contribution rate by about a third, provided that labor force participation of these immigrants is equal to current German labor force participation.<sup>19</sup>

Finally, tightening the eligibility for disability benefits – a part of the German retirement system that is particularly expensive because benefits occur early in life – is another frequently cited step. As far as disability claims are made essentially for labor market reasons and without a „real“ disability this amounts to an increase in retirement age discussed above. About 27 percent of male workers and 20 percent of female workers use the pathway of claiming disability in order to retire before age 60, most of them between ages 54 and 59.<sup>20</sup> However, the effect of tightening the eligibility for disability benefits is smaller than often claimed. Even if all early retirement before age 60 were eliminated, average retirement age would increase by only 2.3 years for male and 1.9 years for female workers.

It should be clear, that no single one of these steps can solve the dilemma of the German PAYG pension system.<sup>21</sup> Of course, this does not imply that a combination of several steps will inevitably fail to solve the pension crisis within the PAYG system. Such a piecemeal

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<sup>18</sup> The projections in Section 1 assume an annual immigration of some 80,000 persons annually. Note that all numbers refer to net immigration.

<sup>19</sup> Börsch-Supan (1994)

<sup>20</sup> Verband Deutscher Rentenversicherungsträger, Rentenzugangstatistik, Nettozugänge (ohne Umwandlungen), 1995. In addition to this *general* disability pension for workers aged less than 60 years, an almost equal share of workers claim the *old-age* disability pension between ages 60 and 65.

<sup>21</sup> See Blanchet (1988) who provides similar projections for France.

approach could consist of an increase in retirement age (by three steps: two years by making the benefit calculation actuarially fair, another year or two by shifting the pivotal age of the benefit calculation („normal retirement age“), and another year by tightening disability rules)<sup>22</sup> and by hoping for higher female labor force participation and a steady influx of immigrants below a level that causes concern among residents.

The main problem with this piecemeal approach is that it is far from clear that the labor market is sufficiently flexible and will absorb this additional labor supply during the next two decades. One can only hope that population aging, after all a decrease of the working age population as a share of the total, population, will resolve the unemployment problem automatically. To the extent that this will not happen smoothly, the PAYG system must increase contributions and/or decrease benefits rather dramatically in order to remain in balance, as was shown above. Current government proposals tend to be in this direction and include the above-mentioned reduction in replacement rates. In the sequel of this paper, I will argue that this policy is unwise because it forfeits the long-run opportunities provided by a gradual transition to a funded pension system.

#### *Implicit Rates of Return of the German PAYG System*

The problem can be cast in terms of a lack of a reasonable rate of return implicit in the PAYG system. In macroeconomic terms, the rate of return of a PAYG system is the sum of the growth rates of the work force and of labor productivity. In microeconomic terms, one relates the flow of life-time contributions of a specific worker to the flow of expected pension and computes the rate of return that equalizes the present values of both flows.<sup>23</sup> Exhibit 14 shows the average PAYG rate of return under two extreme policy assumptions: maintaining the current replacement rate (and thus increasing the contribution rate as described above) and maintaining the current contribution rate (and thus lowering the pension level). Freezing the contribution rate generates negative rates of return for all cohorts from after 1950 because they will receive a low pension after having fully contributed during already half of their working lives. Freezing the replacement rate is more advantageous for them, but does not help for later cohorts. Cohorts born after 1967 will also in this case have negative rates of return because they have to bear the steeply contributions that were shown in Exhibit 10.

Due to the survivor benefits, the rates of return are higher for couples than for males (Exhibit 15), while they are virtually identical for the average retiree (retiring at age 60 after 35

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<sup>22</sup> These changes are interdependent and are not necessarily additive.

<sup>23</sup> See Schnabel (1997).

years of service) and the reference retiree of German government publications („Eckrentner“, retiring at age 65 after 45 years of service).

### III. Transition to Funding

These very low rates of return contrast with the rate of return in a funded system. The long-run real rate of return of investments funneled into the German business sector was 7.4 percent during the 20 years from 1975 through 1994. This rate is based on a portfolio that includes all equity and debt that was invested from 1975 through 1994 in all corporations in Germany (including foreign owned corporations), counting interest, dividends and capital gains from 1975 until 1994 after business and before personal taxes.<sup>24-25</sup> Households would not receive this full rate of return because of financial transaction costs and profits of the pension funds, so a reasonably realistic rate of return of a funded pension would be around 5.9 percent.<sup>26</sup> Even the long run interest rate on government bonds, about 4 percent, beats the rate of return implicit in the German PAYG system.

Another metric to show the difference between the PAYG and a funded system is the annual payment into the respective system. Assume a worker with average earnings who starts a work life of 40 years at age 20, retires at age 60, and dies at age 80. This worker has 40 years to save for 20 years of retirement. To fully fund the retirement income at the current replacement rate, which is about DM 22,400 annually,<sup>27</sup> annual savings of about DM 1,100 are required if a household would earn the full 7.4 percent average rate of return of the German corporate sector. This is only 10 percent of the current average annual contribution to the German PAYG pension system, DM 11,500 in 1995.<sup>28</sup> The huge difference is due to the force of compounding a large rate of return differential over a long time period. If, more realistically, the household would not receive the full rate of return of the corporate sector but 1.5 percent less for financial transaction costs and profits of the pension fund,<sup>29</sup> the required annual savings would be about DM 1,800. Even at the interest rate on government bonds, the

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<sup>24</sup> Initial stock in 1970 is counted as inflow, final stock in 1994 as outflow. For a fair comparison to the tax-free pay-as-you-go pension, income from a funded system is assumed to be also free from personal taxation. In any case, note that the interest income of an average earner's pension fund is below the current exemption limit for capital income taxation.

<sup>25</sup> McKinsey Global Institute (1996) also computed US and Japanese real rates of return (9.1 and 7.1 percent, resp.). The US rate closely corresponds to the rate computed by and used in Feldstein and Samwick (1996).

<sup>26</sup> Administration costs of Dutch pension funds are about 0.5 percent; they are considerably higher in Chile.

<sup>27</sup> Bundesministerium für Arbeit und Sozialordnung (1997), p. 108.

<sup>28</sup> The average household paid 1995 DM 11976 for social insurances (Statistisches Jahrbuch, 1996, p.547). Of these, 48 percent went to the pension system. The same amount was paid by the employer on the employees' behalf.

<sup>29</sup> Administration costs of Dutch pension funds are about 0.5 percent; they are considerably higher in Chile.

required annual savings of DM 3,300 are less than a third of the current contributions. These large differences are due to the force of compounding a large rate of return differential over a long time period. If this worker had a choice *de novo* between the PAYG and the funded system, it quite clearly would be to „opt out“ into a funded system.

And indeed, that is what one can observe in the small part of the German pension system in which workers can actually opt out, namely among the self-employed. As Exhibit 16 shows, the percentage of self-employed who contributed more than the minimum amount dropped dramatically between 1985 and now from about 60 percent to about 20 percent.

It is important to realize that this rate of return difference has changed since the 1957 pension reform. In the early years of the German Federal Republic, the rate of return of the PAYG system was reasonably high – some 3 to 4 percent in real terms from 1950 through 1980 – because Germany had a rather steep labor productivity increase in addition to a mild labor force growth.<sup>30</sup> At the same time, rates of return in the capital market were much lower than today. For workers retiring now, the PAYG system was clearly more advantageous than a fully funded system in which the savings had been invested in the German business sector during the time between 1950 and 1980.

However, this has changed. While the rate of return of savings funneled into the German business sector has increased to between 7 to 8 percent in real terms, labor force growth is now slightly negative and will decline even more. In addition, labor productivity is increasing only at the long run historical average of about 1.5 percent rather than at the speed during the German economic miracle.<sup>31</sup> This has shifted the balance towards a funded system.

### *Two Transition Models*

However, today's workers simply do not have the choice to leave the PAYG system because they have to finance the pensions of the current retirees. This transition problem requires one generation to pay twice – once for their parents and once for themselves. In a sense, this transition generation has to pay off the debt resulting from the very first generation when the PAYG system was started because the initial generation received pensions without contributions. Obviously, the severity of the transition problem depends on the size of this additional burden for the transition generation. As it will turn out, it is not at all a „double“ burden.

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<sup>30</sup> This is in line with a recent estimate by Eitenmüller (1996) who reports 6.5 percent in nominal terms (the rate of inflation during the 1950-80 period was 3.1 percent, and 3.0 for the 1980-93 period).

<sup>31</sup> Buchheim (1994), p.15.

There is a wide array of literature in how to solve the transition problem. The theoretical literature has focused on the question whether an intergenerational redistribution scheme exists that permits compensation of the transition generation by those future generations that will profit from the funded system. These schemes require taking up debt during the transition period. However, this demands resources and creates distortions because the debt has to be paid back through taxes. Economic theory shows that if the transition burden is sufficiently smoothed to avoid labor disincentive problems, a transition to a funded system is advantageous for all generations, including the transition generation. A crucial parameter is therefore the elasticity of labor supply with respect to increases in the contribution and general tax rates. Unfortunately, there is little reliable empirical evidence on this parameter. One can only tentatively conclude from the current electorates' pressure on governments to reduce taxes, and from the fast increase of labor escaping taxation,<sup>32</sup> that this elasticity must be fairly large. Raffelhüschen (1993) and Buslei and Kraus (1996) provide simulations for Germany. Feldstein and Warwick (1996) and Kotlikoff (1996) have computed simulations for the U.S. These simulations show that under realistic parameter choices one can indeed design feasible transition schemes that are advantageous for all generations. In turn, Fenge (1995) assumes that the actuarially fair part of the German PAYG system does not create any kind of labor supply disincentive. He concludes that a pareto-improving transition from the PAYG to a funded system is not possible. A problem with Fenge's analysis is that it fixes wages and the rate of return such that potential efficiency gains through the funding mechanism over and above removing the small tax distortion of the actuarially unfair part of social security contributions will have no impact on national income. In fact, all of the contributions may be regarded as distortionary taxes if the expected rate of return is negative, and funding may have beneficial effects on capital market efficiency.<sup>33</sup>

Yet another problem of the literature on pareto-improving transitions is that it may ask for too much. A welfare gain that includes at least some weight to our children's utility may suffice to convince the electorate to vote for a transition. Because the payment difference between PAYG and fully funded is so large, as shown above, very small „altruism“ weights will already offset the disutility of the transition burden. There are also more philosophical arguments which put considerable doubt on whether the concepts of intergenerational pareto-efficiency, intergenerational equity or even justice across generations are meaningful.<sup>34</sup> In

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<sup>32</sup> Increases in self-employment and black-market transactions.

<sup>33</sup> Börsch-Supan (1997).

<sup>34</sup> See the interdisciplinary discussion in Johnson and Thomson (1989).

addition to the discounting problem, so many other elements of the historical environment change across generations that it may be rather academic to be „just“ in this one aspect of history.

To put the additional burden in its proper perspective, it is helpful to look at the orders of magnitude involved if one generation must indeed carry the full transition burden. In order to do this, we consider two transition scenarios. Both are based on a demographic and labor force projection model described in Börsch-Supan (1995).<sup>35</sup> Both transition schemes are compared to a continuation of the PAYG system under current benefit levels. Note that in all three scenarios retirement income and retirement age are the same, namely at the current level. Thus, we compare situations with the same utility during the retirement years.

In the first scenario, I assume that the contribution rate to the PAYG system will be frozen from the year 2000 on at the projected rate of then 21.1 percent of gross income. In this case, the annual social security benefits of an average retiree in 2035 will be about DM 8,500 lower than if the current net replacement rate of 72 percent were maintained by increasing the contribution rate as depicted in Exhibit 10. Exhibit 17 shows how much an average worker has to save to make up for this „pension gap.“ This computation assumes the worst case: a worker born in 1960, who started working in 1980, starts saving in the year 2000, retires in the year 2020, and lives until the year 2040. This worker will have very little time to save and faces the peak of population aging just during the retirement years. This worker faces a pension gap of about DM 7,600 on average between the years 2020 and 2040, reaching a peak of DM 8,500 in the year 2035, and totaling to a present discounted value of almost DM 90,000. In order to accumulate this level of pension wealth from the year 2000 until retirement in 2020, the worker needs to save DM 2,300 annually at a 5.9 percent interest rate. At an average net household income of about DM 51,000,<sup>36</sup> this appears to be quite feasible. The increase of the household saving rate from currently 11.6 percent<sup>37</sup> to 15.1 percent implied by this calculation is large, although not unprecedented.<sup>38</sup>

The DM 2,300 annual savings should be compared with the increase in the PAYG contributions that are required to keep the same level of benefits. Current retirement age maintained, PAYG contribution rates will gradually rise to almost 28 percent in the year 2020, when our worker will retire (see Exhibit 10). The annual contribution increase is on average

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<sup>35</sup> Demographic scenario „MostLik“; constant age and gender-specific labor force participation rates.

<sup>36</sup> Statistisches Jahrbuch für die Bundesrepublik Deutschland, 1996, p. 67, inflated to 1996.

<sup>37</sup> Household saving rate in 1996, Deutsche Bundesbank, quoted from FAZ.

<sup>38</sup> The household saving rate in 1975 was about this level.

DM 2,900.<sup>39</sup> Thus, the transition requires on average less resources than maintaining the PAYG system. However, because the contribution increase is back-loaded while savings occur every year at a fixed amount, it depends on the time preference of the household whether the household prefers the transition to a partially funded system or maintaining the PAYG system. Exhibit 17 shows that even under the high time preference rate, the difference is small.

Exhibit 18 presents the results of a different transition model that honors all claims to the pay-as-you-go system that are acquired before the transition but will result in a fully funded system after the transition: In 1997, it is announced that the transition to a fully funded system will begin in the year 2005. For all persons who have retired until 2005 (i.e., for retirement age 60 all cohorts that are born before 1945), pensions remain as they are. Persons retiring in the transition period will get a pay-as-you-go contribution in proportion to the share of their work life before the transition year. Thus, a worker retiring in 2006 after 40 years of work will receive 39/40 percent of a pay-as-you-go pension. The remainder, 1/40 of the retirement income, has to be financed by private savings during the time before retirement (between 1997 and 2006). A worker retiring in 2007 will have 38/40 of a pay-as-you-go and 2/40 of a funded pension, etc. From the year 2045 on, assuming a 40-year work life, no worker will acquire new pay-as-you-go pension rights.<sup>40</sup>

Exhibit 18 shows the simulated time path of contributions plus savings by cohort, assuming a 40 year work life and a retirement age of 60. The dotted line corresponds to the monthly PAYG contributions if current replacement rates are maintained. The solid line denotes monthly PAYG contributions plus monthly savings according to the above transition model. Although the transition does not give any relief to the generation that has to finance the transition burden, this burden turns out to be anything but „double“ – in fact, it just smoothens the increase in contributions that are unavoidable under the current German pay-as-you-go system. The maximum transition burden occurs about 2012 to the cohort born in 1952 which has relatively little time to save but already has to finance a substantial part of retirement income by saving. However, the added burden is relatively small and anything but a „double burden.“ It is less than DM 190 per month for the average earner of this cohort, about the same order of magnitude as in the first scenario. This added burden should be compared to the DM 975 that the average earner currently pays as monthly contributions to the PAYG system. Note that the transition will be advantageous for all cohorts born after 1963.

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<sup>39</sup> Total increase between years 2000 and 2020 divided by 20 years.

<sup>40</sup> The transition lasts even longer until all persons with some pay-as-you-go pension share have died.

## *Risks of Funded Pension Systems and How to Cope With Them*

While the PAYG system is not without its own risks – most notably the demographic risk that was in the center of the discussion in the second part, but also the political instability of a public transfer system that has been modified almost continuously during the last 10 years – the public discussion tends to focus on the risks associated with funded pension systems. A funded system that requires putting the accumulated savings into government creates an enormous temptation for government to use these funds to finance current consumption.<sup>41</sup> This generates low returns and submits the funds to a substantial political risk. Similar considerations hold for private firm pensions that are as book reserves invested as equity in the own firm.<sup>42</sup> Both of these risks can be avoided by keeping savings private and under the control of the investors in a competitive capital market. This is why the term „privatization“ is frequently used for proposals that recommend transitions from PAYG to partially or fully funded pension systems.

While funding reduces the demographic risk that plagues the PAYG system, it does not fully eliminate it. An aging society, featuring fewer workers and a stable if not shrinking population, also needs less capital for production. This lowers the rate of return. However, simulations show that this effect is small but not negligible.<sup>43</sup>

This points to the most serious risks of funded pensions, namely the financial risks. They include inflation and the possibility of low or negative returns. Although countries such as Germany and Austria that went through a hyperinflation and two wars during this century are particularly sensitive to these risks, they can be substantially reduced by diversification.

Financial risks can be diversified within a country. However, funding opens another dimension of flexibility that is unavailable in the current pay-as-you-go pension systems. The capital market not only extends the contemporary budget constraint of the PAYG system and yields intertemporal flexibility through the savings mechanism. The quickly increasing globalization of the capital market also permits diversifying country-specific risks. While a global PAYG pension system that would diversify the demographic risk is unthinkable, a global funded system is emerging simply because the capital markets are growing together.

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<sup>41</sup> The Social Security Trust Fund in the U.S. is used to reduce the large U.S. government debt.

<sup>42</sup> This is frequently the case in Germany and in the Netherlands.

<sup>43</sup> Börsch-Supan (1995) estimates a range between 30 and 120 basis points. See also Cutler et al. (1990).

International diversification reduces the inflation risk as well as the financial risks. It also minimizes the residual demographic risk of a domestically funded system. Simulations show that international diversification raises the potential level of consumption quite considerably above the level achievable in a PAYG system but that the main step is funding in the first place.<sup>44</sup>

Exhibit 19 is an example of such a simulation exercise. It depicts the path of aggregate consumption for Germany in four scenarios.<sup>45</sup> Scenario 1 represents maintaining the current PAYG system, while the other scenarios represent funded systems based on private savings. In Scenario 2, these savings are invested domestically. Scenario 3 depicts a two-region world consisting of Germany and the newly industrialized countries in South-East Asia.<sup>46</sup> These countries are growing quickly, they still require large sums of capital, and they have a much younger population. We assume perfect capital mobility between the two regions. Scenario 4 includes all OECD countries and models the potential crowding-out effects by competition on the capital market – not only Germany but all other aging countries will try to invest in growing economies. The exhibit shows that while a declining consumption appears unavoidable, the decline is small under funding but substantial when the current pay-as-you-go system is maintained. The increase in consumption is due to the fact that capital is now employed where it is scarce and where labor is abundant. This creates higher rates of return than domestically possible. It is important to note that this mechanism improves per capita GDP and aggregate consumption not only in the capital-exporting country but also in the capital-receiving country.

A final point for a country that went through a hyperinflation and two wars during this century: while a transition from a pay-as-you-go system to a fully funded system requires time and hurts the transition generation unless an intertemporal redistribution scheme is put in place, the reverse transition can always be made at an instant and without any further losses. If the capital stock is destroyed in a catastrophe, one can restart a pay-as-you-go system from current income, such as it was done after World War II in Germany.

## Conclusions

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<sup>44</sup> Cutler et al. (1990), Börsch-Supan (1995), Meier (1996).

<sup>45</sup> Exhibit 10 refers to consumption in each year, aggregated across cohorts. It therefore does not permit a welfare comparison across cohorts.

<sup>46</sup> Hong Kong, Indonesia, South Korea, Malaysia, the Philippines, Singapore, and Taiwan.

The current debate about the implications of population aging on our pay-as-you-go pension systems focuses on patching up the current system. These fixes include downsizing the system by decreasing benefits, increasing the retirement age, and hoping for an increase in female labor force participation and some help from immigrants. These fixes require considerable additional flexibility of the labor market but stay within the realm of the inflexible pay-as-you-go budget constraint. They do not change the very low implicit rate of return of the PAYG system which becomes negative for cohorts born after 1967.

A gradual transition to funding opens two important dimensions of additional flexibility. First, it permits more intertemporal flexibility through the savings mechanism. Rather than experiencing a 10-20 year squeeze around the year 2030, funding can smoothen the aging burden from now on through the peak of population aging. The additional burden that is levied on the transition generation is relatively small because the rate of return differences are so large in the case of Germany.

Second, funding permits international flexibility. An aging country can profit from the lack of capital in developing countries, just as well as these countries can increase their rate of growth with the added capital. The globalization of capital markets decreases the country-specific risks – inflation, financial and residual demographic risks – through the possibility of a broad diversification. While a declining consumption during the peak of the population aging process appears unavoidable, the decline can be very small when the savings are internationally diversified, but substantial when the current pay-as-you-go system is maintained.

Of course, it is imperative that the funding mechanisms work decentralized through the capital market. This is different from book reserves (like many German firm pensions) and different from a state-managed fund (such as the U.S. Social Security Trust Fund or as recently proposed for German civil servants). In addition to the financial risk reduction via diversification, decentralization minimizes the political risks of fund appropriation.

Finally, one should keep in mind that changing the retirement system later will become more complicated. First, saving needs time, and it is already fairly late to start saving for the generation that will retire around the peak of population aging. Second, the politics of the social security system will change soon. The political power is quickly shifting from the working population to the retired population – to an electorate which is unlikely to substantially change the balance between per capita benefits and contributions.

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