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Will Eastern European Migrants Happily Enter the German Pension System after the EU Eastern Enlargement?

By Tim Krieger and Christoph Sauer*

Abstract

A major concern in Western Europe and especially in Germany is that inflows of workers will occur with the EU eastern enlargement, and that they will be net beneficiaries of the domestic social security systems. We introduce a model and present evidence by comparing pension systems in the main source and target countries (Poland, Hungary, Czech Republic; Germany) that shows that immigrants most likely have to face a burden from entering the German pension system. Only if the total number of immigrants is sufficiently large the burden may change into a gain. We conclude that if migration takes place it will do so *despite* – not *because* of – the existence of the pension systems.

Zusammenfassung

In den bisherigen EU-Mitgliedsstaaten, insbesondere aber in Deutschland, wird befürchtet, dass es in der Folge der EU-Osterweiterung zu einem starken Zuzug von Osteuropäern kommen wird, die Nettoempfänger von Leistungen der heimischen Sozialsysteme sein werden. Diese Sichtweise soll in dieser Arbeit hinterfragt werden. Ein Modell und ein Vergleich der Rentensysteme in den wichtigsten Herkunfts- und Zieländern (Polen, Ungarn, die Tschechische Republik sowie Deutschland) zeigen, dass die Zuwanderer vielmehr eine Last durch den Eintritt in das deutsche Rentensystem zu tragen haben. Nur bei einer hinreichend großen Zahl von Zuwanderern können diese möglicherweise mit einem positiven Effekt rechnen. Daraus folgt, dass die erwartete Zuwanderung nach Deutschland nicht *wegen*, sondern *trotz* des deutschen Rentenversicherungssystems stattfinden wird.

JEL-Classification: H55, H73, F15, F22

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1. Introduction

In 2004, eight central and eastern European countries will join the European Union. Due to large differences in national per-capita incomes, inflows of workers from these countries can be expected – a *trek westwards* (Straubhaar, 2001). Projections assume that about two to five million people will migrate to the EU in the next 15 years.

Immigration is therefore an important topic in the political debate of some western European countries, in particular in Germany which is assumed to become the main target country for migrants. Germany therefore advocated a seven year transition period of restricted freedom of movement for citizens of the accession countries (as during the southern enlargement). Otherwise, it is sometimes feared that migrants will not only move westwards to find jobs and enter the labor markets, but *migrate into the social security systems*, causing a burden on the domestic population.

It is, however, often neglected that entering the social security systems does not necessarily imply that immigrants will become net beneficiaries of these systems. It may even be that immigrants are (forced) net contributors, thus having to bear a burden instead. Sometimes immigrants may simply help to stabilize a certain branch of the domestic social security system. In this regard pension systems may be a particularly striking case because immigration increases the number of contributors to pay-as-you-go (PAYG) pension systems such as the German one.

In our paper, we will show in a simple model that immigration into an ageing country with a PAYG pension system will impose a burden on immigrants, if the source country is less aging and/or has a fully funded pension system, because the implicit rate of return on contributions decreases when the target country's pension system is entered. In this case, migrants should not be too *happy* about migrating into a different pension system as the expected gain from the income differential between the target and the source country will be lowered. Only if the total number of immigrants is sufficiently large (which can, however, not be foreseen by a single potential migrant), may a gain from migration accrue to the migrant. We will further show that changing the burden into a gain will become increasingly difficult if, for example, the accession country has a more favorable age structure than the target country or if its pension system involves less redistribution both within and between generations.

Based on this model we will investigate differences in the pension systems of the main source and target countries of east-west migration after the EU enlargement, i.e. Poland, Hungary, the Czech Republic and Germany, respectively. We find that the expected immigration is clearly beneficial to the German pension system, not only because of an increase in the number of contri-

butors but also, for example, because of an improvement of the age structure of contributors. On the other hand, total immigration is likely to be too small to induce a gain for immigrants from entering the German pension system. They will consider this fact as a burden because in their home countries dependency ratios are more favorable and the newly reformed pension systems involve at least less intergenerational redistribution.

Our paper proceeds as follows: first, we briefly investigate the relationship between immigration and pension systems (section 2). Then, we introduce our model and explain its main results (section 3). In section 4, we review the literature on the expected migration potential from the central and eastern European countries to Germany and the rest of the EU. Furthermore, we investigate the age structure and skill distribution in Germany, the accession countries and among migrants in this chapter. Section 5 presents the pension systems in the four countries under consideration and compares some of their aspects with regard to the findings of our model. Section 6 concludes by summarizing our main results.

2. The economics of migration and pension systems

Pension systems of the PAYG type are closely linked to the composition of the domestic population. This type of pension system is characterized by intergenerational redistribution from the young to the old, so contributions and benefits depend on the number of contributors and on the number of retired individuals. Migration may change the composition of the population and therefore have an impact on the PAYG system. This is not the case with a funded pension system where contributions are equivalent to private savings. In the following, we will briefly investigate the effects of migration on pension systems.

In PAYG pension systems, total contributions collected from the working generation L_t (i.e. $\tau_t \cdot L_t$, τ_t being the contribution per worker) are immediately redistributed to those who are retired, L_{t-1} . Let p_t be the pension benefit in period t and let $n_t = L_t/L_{t-1} - 1$ be the population growth rate, then the pension system is balanced if

$$(1) \quad \tau_t \cdot L_t = p_t \cdot L_{t-1} \Rightarrow p_t = \tau_t(1 + n_t)$$

This makes the impact of migration rather obvious as it changes the size of the labor force L_t . In the destination country, the number of potential contributors to the pension system increases, provided that the immigrants get into work (otherwise, they will not become members of the pension system). The more immigrants enter the country, the more the domestic population gains¹ unless some counter effect occurs, e.g. negative changes in the margin-

al productivity of labor. Empirical investigations show, however, a rather low impact of immigration on the destination country's wages even if one expects substitutability between domestic workers and immigrants (Friedberg/Hunt, 1995; Bauer, 1998). Hence, due to migration effects on the pension systems, the destination country becomes even more attractive and the source country (where exactly the opposite happens) even less attractive for mobile workers.

In addition to this quantitative effect, a qualitative effect is likely to occur. This happens if the composition of the domestic population changes not only quantitatively but also with regard to its age or skill distribution. In fact, even if net migration is zero the qualitative effect occurs if, for example, out-migrants are old and immigrants are young on average. There is a positive effect on the domestic pension system if, for example, immigrants

- are younger on average than the domestic population as they will pay contributions relatively longer than natives; this will benefit the average-age domestic worker in the first years of his retirement,
- have relatively more children than natives which means that the immigrants' offspring will not only support their own parents after retirement, but also domestic parents with fewer offspring,
- have a higher average skill level compared to the domestic workers which means that they will contribute relatively more to the pension system than natives,²
- have a lower unemployment rate than natives,
- offer labor that is a complement to domestic labor which helps to lower overall unemployment.

Obviously, the opposite holds as well: if immigrants are unskilled, have very few children and are very likely to become unemployed, there might be a negative effect. Usually, however, immigrants are expected to induce a *positive* externality on the native population. Sinn (2001) estimates the positive fiscal externality to the German population via the pension system to be about € 175,000 per immigrant. One reason for this result is that the average immigrant woman had about 35% more children than the average German woman in the last 15 years (Sinn, 2001).

Comparing these outcomes with a fully funded (FF) pension system, we find that the FF system is, in general, not influenced by immigration. This is

¹ Notice that our analysis neglects special groups of immigrants, like *Aussiedler* (resettlers of German origin, e.g. from the former Soviet Union), which have privileged access to social security systems in the target country in comparison to other immigrants.

² Only if there is a strict equivalence between contributions and benefits, this problem will not arise. However, all real-world pension systems redistribute between the rich and the poor.

because contributions are collected in individual accounts and are turned into an annuity after retirement from which pension benefits are paid. Unlike the PAYG system where the (implicit) rate of return is the population growth rate plus the growth rate of wages (here, the latter has been neglected for simplicity), in the FF system it is simply the market interest rate r :

$$(2) \quad p_{t+1} = \tau_t \cdot (1 + r_{t+1}) .$$

While on an aggregate level migration has a positive effect on a PAYG pension system, this may be different from an individual migrant's perspective. An individual benefits from the pension system if the net public pension wealth (NPPW; see Feldstein, 1974) is positive, i.e. the difference of the present value of retirement benefits minus the present value of the contributions to the pension system:

$$(3) \quad NPPW = \sum_{t=R}^D \frac{p_t}{(1+r)^t} - \sum_{t=0}^R \frac{\tau_t}{(1+r)^t} \Rightarrow NPPW = \frac{p_{t+1}}{1+r_{(t+1)}} - \tau_t$$

where R is the age of retirement and D the end of life.³ If this difference turns negative, which is typical for ageing societies with a PAYG pension system, the NPPW can be interpreted as an implicit tax on income (Wildasin, 1999). The fewer contributors there are, the higher the contribution rate and/or the lower the expected future pension benefit will be. Therefore, there is clearly a disincentive to migrate into an ageing society with a PAYG pension system. It makes a slight difference though, whether you enter a defined-benefit system or a (notional) defined-contribution system. In the first case, there are few ways to escape increasing contribution rates (pension benefits are kept constant despite of fewer contributors), unless the number of immigrants is so large that increases of the contribution rate are actually being stopped (see section 3). From an individual's perspective, the latter can hardly be foreseen. In a system which concentrates on keeping contribution rates unchanged, future benefits will shrink. The level of *intergenerational* redistribution remains constant while it is increasing in the previous case. Ageing causes the same problems as before, but now one has the choice whether to accept the lower future benefits, whether to invest in child rearing⁴ or whether to engage in capital-market investments.

There is another issue which concerns a potential migrant: the amount of *intragenerational* redistribution within the pension system. Beveridgian pension systems induce strong redistribution between the rich and the poor by

³ The second part of (3) is the NPPW for the two-periods scenario employed in section 3 of this paper.

⁴ Clearly, there is the possibility of free-rider behavior (see Apolte, 2002, and Sinn, 2001).

introducing basic pensions, Bismarckian systems keep a tight link between contributions and benefits so that there is only little redistribution.⁵ Depending on whether a member of a pension system is rich or poor, he prefers one system to the other. If a high-earning individual moves from a Bismarckian to a Beveridgian system, he will be worse off c.p. as his future pension benefit will fall back to the basic pension level.

In a sense, FF systems are pure Bismarckian pension systems as they operate with a tight link between contributions and benefits. All contributions plus the interest paid on them will be paid back. The NPPW is therefore zero and no redistribution has taken place.

3. A simple model

In the following, we will introduce a simple model which can explain some of the effects discussed above. We consider the case of a country on the verge of joining an economic union. Both the joining country and the economic union have a PAYG pension system. The economic union is ageing at a relatively faster rate, i.e. its population growth rate is lower. Furthermore, we presume that at the time of joining the economic union workers of the joining country are attracted by a substantial wage differential which is sufficiently large to override negative incentives imposed by the pension system. Migrants will enter the country despite the fact that they have to enter the pension system. If the wage differential were small, it would not be attractive to migrate from the individual migrant's perspective. However, we will show that a sufficiently large number of migrants will cause falling contribution rates which are attractive for both natives and immigrants.

Let there be two countries where country A is the core area (economic union) and country B is the joining country. In a framework which is similar to Homburg/Richter (1993), individuals maximize lifetime utility and face the following intertemporal budget constraint:

$$(4) \quad c_t + \frac{z_{t+1}}{1+r_{t+1}} = w_t^i + \bar{p} \frac{n_t^i - r_{t+1}}{(1+r_{t+1})(1+n_t^i)} \text{ for } i = A, B^6$$

which makes use of the fact that – in contrast to Homburg/Richter (1993) and different from equation (1) – countries define the pension benefit as exogenously given, while the contribution rate adjusts endogenously, i.e.

⁵ But even the very Bismarckian German system involves some degree of intra-generational redistribution as has been shown by Börsch-Supan/Reid-Held (2001).

⁶ Here, c_t is consumption during the working life, z_{t+1} is consumption during retirement, and w_{t+1}^i is the country-specific wage rate.

$$(5) \quad p_t^i L_{t-1}^i = \tau_t^i L_t^i \Rightarrow \tau_t^i = \bar{p} \frac{L_t^i}{L_{t-1}^i}.$$

This is typical for many European countries which have pension systems of the defined-benefit (DB) type.⁷ The pension benefits are assumed to differ by a fixed fraction α between both countries; for simplicity we set $\alpha = 1$. The ratio L_t^i/L_{t-1}^i is the inverse of the dependency ratio which measures the ratio of retirees (aged 65 and older) to population in working age (aged 15 to 64).

Migration of workers from the joining country may start as soon as they are allowed to cross borders. Retirees are assumed to be immobile in the sense that they receive pension benefits from the country they contributed to. In order to induce migration flows, it is necessary that the location-dependent income, which is the right-hand side of (4), is larger in the core area than in the joining country:

$$(6) \quad w_t^A + \bar{p} \frac{n_t^A - r_{t+1}}{(1 + r_{t+1})(1 + n_t^A)} > w_t^B + \bar{p} \frac{n_t^B - r_{t+1}}{(1 + r_{t+1})(1 + n_t^B)}.$$

Substituting for n^i and τ_t^i , we find that migration takes place until

$$(7) \quad w_t^A - \bar{p} \left[\frac{L_{t-1}^A}{L_t^A} - \frac{L_{t-1}^B}{L_t^B} \right] = w_t^B$$

which is the condition for a migration equilibrium. We simply assume here, instead of explicitly adding a term which measures migration cost, that the core area's wage is net of migration cost (from the perspective of a potential migrant). The bracketed term measures the difference in the national pension systems by comparing national dependency ratios and is determined by the difference in the fertility of the domestic population. If the fertility rate is lower in the core area, as we will assume in the following, the incentive to leave the joining country is lowered. The bracketed term simply corresponds to the difference of both countries' NPPW, i.e. ΔNPPW .

The wage differential decreases with a larger number of migrants because in both countries marginal productivities of labor change. Eventually, marginal productivities of labor should equalize, taking into account the pension differential. At the outset, wage differentials – e.g. between Germany and the EU accession countries – are probably much larger than the differences in the pension systems, so the negative impact will not matter too much. Nevertheless, the effect of the pension system is negative for each single individual as it reduces the expected income gain from migration.

⁷ See Werding (2003) for a classification of European pension systems.

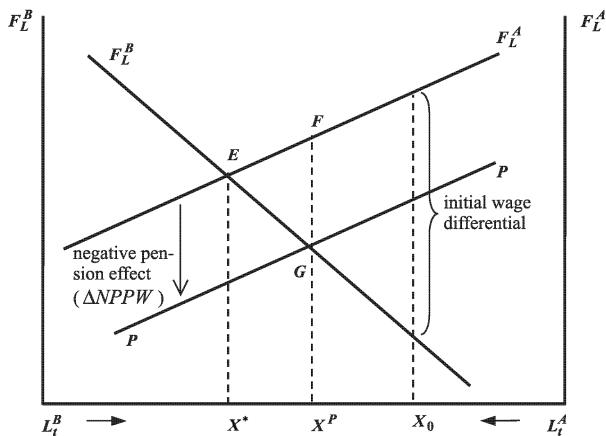


Figure 1: Interregional allocation of workers when a PAYG pension system exists

This can be seen from Figure 1 where marginal productivities for two regions are shown. The marginal productivity curve of the core area (F_L^A) is shifted downwards by the negative pension effect. The resulting curve is PP . This is because at the outset where the number of young migrants X is zero ($X_0 = 0$) the prevailing wage differential is smaller than in a scenario without a pension system. An artificial migration disincentive is created which leads to a suboptimally low number of migrants (X^P instead of X^*). The welfare loss is represented by triangle EFG .

So far, the analysis has not yet explicitly taken into account the fact that migration has both a positive effect on the core area's pension system because the number of contributors increases and a negative effect on the joining country's pension system which suffers from the outflow of contributors. Under the given pension system, contribution rates can fall according to (5). However, we assumed that contribution rates at the outset are more favorable in the joining country (recall that fertility rates in the core area are lower), therefore a single migrant will not change the performance of the pension systems substantially and still considers the pension system in the target country as a burden. However, if there is a sufficiently large number of migrants, the performance of the pension system noticeably improves in the core area and worsens in the joining country. At some point, the core area's pension system will do even better than the joining country's, i.e. contribution rates will be lower. The pension systems have identical contribution rates if the bracketed term in (7) vanishes. We can therefore derive a *break-even migration level* \bar{X} , which equalizes contribution rates, from the following equation:

$$(8) \quad \frac{L_{t-1}^A}{L_t^A + \bar{X}} \stackrel{!}{=} \frac{L_{t-1}^B}{L_t^B - \bar{X}} \Rightarrow \bar{X} = \frac{L_{t-1}^A L_t^B - L_{t-1}^B L_t^A}{L_{t-1}^A + L_{t-1}^B} = \frac{L_{t-1}^A L_{t-1}^B (n_t^B - n_t^A)}{L_{t-1}^A + L_{t-1}^B}.$$

Any migration level beyond \bar{X} will positively add to the wage differential and creates an additional positive migration incentive. This can be seen from Figure 2 where the QQ line intersects the marginal productivity curve of country A at the break-even migration level \bar{X} .⁸ If – due to a large wage differential – migration is larger than \bar{X} , the new optimal migration level will be X which is beyond the welfare maximizing level in a world without pension systems (X^*).

Notice that the break-even level may lie to the left of X^* . In this case, shown by the RR curve, the impact of the pension system is negative for all migrants as $\bar{X}' > X^*$. The optimal migration level X^{**} is below X^* . The reason is that net wages equalize when the NPPW difference is still negative. This scenario is analogous to the case discussed in Figure 1.

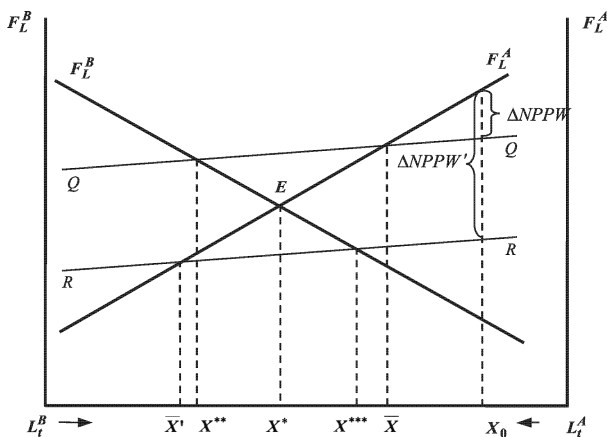


Figure 2: Interregional allocation of workers in case of endogenous determination of the contribution rate

In Figure 3, the derivation of the break-even migration level is presented again, here in terms of contribution rates to the pension system. The curves are derived from the equation for the contribution rate, given by (5), taking

⁸ At the outset, there is a positive difference between the NPPWs of both countries which lowers the marginal product of labor in country A, i.e. $F_L^A - \Delta NPPW$. Clearly, F_L^A falls if immigration X takes place. $\Delta NPPW$, however, is reduced since $d(\Delta NPPW)/dX = -\bar{p}[L_{t-1}^A/(L_t^A + X)^2 + L_{t-1}^B/(L_t^B - X)^2] < 0$. Therefore, the QQ curve approaches the F_L^A -curve as X increases and eventually goes beyond it.

into account migration X .⁹ Again, both pension systems are equal at migration level \bar{X} where both contribution rates are identical. If all citizens of country B move to the core area, the minimum contribution rate $\tau_t^{A,\min}$ can be reached in A. To the left of \bar{X} , the contribution rate in the core area is higher than in the joining country, so entering the pension system is not (yet) attractive; in this case only the wage differential induces migration.

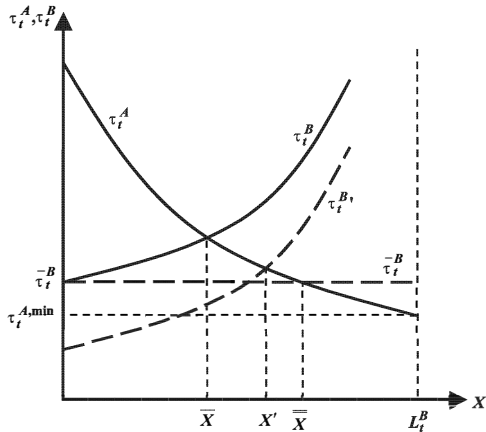


Figure 3: The change in national contribution rates caused by migration

Here, a problem of coordination failure may arise because a single potential migrant does not consider the positive externality he induces on other potential migrants. A single migrant will not noticeably change the core area’s pension system. A sufficiently large number of migrants, however, will induce contribution rates to fall below the joining country’s level. Both the citizens of the core area and the migrants will gain from this reduction in contribution rates. Whether this actually happens depends on whether the wage differential is large enough to induce at least \bar{X} potential migrants to move.

It should be noted that this result follows from the fixed-pension benefit assumption because this allows both natives and immigrants to gain from immigration. Furthermore, we assumed the migration equilibrium to be stable at least in the short run.¹⁰ Long-run stability is much more difficult to guarantee

⁹ Considering migration X , we have $\tau_t^A = \bar{p} L_{t-1}^A / (L_t^A + X)$ and $\tau_t^B = \bar{p} L_{t-1}^B / (L_t^B - X)$ with the derivatives $d\tau_t^A/dX = -\bar{p} L_{t-1}^A / (L_t^A + X)^2 < 0$ and $d\tau_t^B/dX = \bar{p} L_{t-1}^B / (L_t^B - X)^2 > 0$, which leads to the curves shown in the graph. At the maximum possible migration level L_t^B , $\tau_t^A = \bar{p} L_{t-1}^A / (L_t^A + L_t^B) \equiv \tau_t^{A,\min}$ and τ_t^B approaching infinity as the denominator is zero.

¹⁰ For this to hold, the increase in the number of contributors in country A must decrease wages more than contributions to the pension system. Otherwise, all workers

(see Hange, 2001, 74–79, for a discussion of this issue). The problem that arises is with the next generation which has to pay for an increased number of retirees. If the fertility of immigrants is still relatively higher after entering the core area, it is the immigrants' children that will face too high contribution rates compared to a scenario without migration in the preceding period. Some children may therefore consider to migrate to country B in $t + 1$ where the number of retirees is smaller due to migration in t . The process of migration and re-migration may extend to all future periods. However, this is probably not a major concern of today's migrants.

Let us briefly assume that the joining country's pension system is not fixing the pension benefit, but the contribution rate, as it is the case in a notional defined-contribution system. The contribution rate is now assumed to remain at $\bar{\tau}_t^B$, regardless of the number of migrants, i.e. changes in the size of the labor force now have an effect on pension benefits only. Under this scenario, more migrants, i.e. \bar{X} , are needed to break even, as can be seen from Figure 3. This is because no negative contribution rate effect occurs in the joining country.

Finally, we assume that the joining country's pension system consists not only of a PAYG pillar, but also of a funded pillar, leaving the replacement income \bar{p} unchanged. The funded pillar will cover a share β of the pension benefit. If dynamic efficiency holds, i.e. $r > n$, contributions τ_t^B can fall by more than β because contributions to the funded pillar yield a higher return. Therefore, contributions in the joining country are relatively lower than in the core area. This leads to a downward shift of the τ_t^B curve in Figure 3 to a new $\tau_t^{B'}$ curve. Hence, the new break-even level of migration is X' which shows that the difference between the two pension systems is larger under this scenario.

Summarizing our findings, we conclude that if there is a relatively low number of migrants, migrants will face a burden by entering the core area's pension system, assuming a higher reproduction rate in the joining country. If, however, the number is sufficiently large, both immigrants and natives will gain from migration. Moving from a system with defined contribution rates or with a larger funded pillar to a system without tends to increase the burden which lowers the income gain that is possible if there were no pension systems at all. The pension system causes an artificial migration disincentive which leads to a too low (but nevertheless quite substantial) migration from the joining country to the core area.

of the joining country will immediately move to country A (leaving country B deserted) as all of them will unambiguously gain from migration.

4. The expected migration potential following the EU eastern enlargement

After the theoretical considerations of the previous sections, we will now briefly summarize three major studies on east-west migration which estimate the number of expected immigrants. Furthermore, we add data on important differences between the major source and destination countries of migrants, i.e. Poland, Hungary, the Czech Republic and Germany, respectively. This information regards the list of impact factors on a target country's pension system which was presented in section 2.

The aforementioned studies were conducted by Bauer/Zimmermann (1999), the European Integration Consortium (2001), and Sinn et al. (2001). While the first study is concerned with immigration into the entire EU, the latter two studies primarily concentrate on the expected inflow of migrants to Germany, as until 1998 more than two thirds of the migrants to the EU-15 from the 10 central and eastern European countries¹¹ (CEECs) applying for membership in the EU went to Germany (European Integration Consortium, 2001, 104). Forecasts of the future migration potential assume that the 1998 distribution of migrants across the EU countries will remain constant over time. Therefore, Germany is expected to be the main destination country for immigration.

The estimates of the immigration potential to Germany range from two million up to five million people in the first 15 years after accession, depending on the underlying forecast model and the chosen scenario. The results represent only rough estimates due to definition and statistical problems as well as problems to capture the individual factors influencing migration decisions (Brücker, 2001a). Furthermore, all estimations are based on econometric models using historical data, taking into account the experience from past migration to Germany, especially in the context of the EU southern enlargement, which may not give a sufficiently exact base for estimating the future migration potential from the CEECs.

The most important explanatory variable for migration in the estimation models is the income differential between source and target country (countries), expressed as the relative difference in GDP per capita in purchasing power parities. This is just the previous section's wage differential. In 1998, this measure was 33, 40 and 47 percent of the EU-15's for Poland, Hungary and the Czech Republic, respectively (Brücker, 2001b, 7). It does not account for tax payments and transfers influencing disposable income (Flaig, 2001), so a comprehensive perspective considering long-term disposable income is missing. Sinn et al. (2001) consider potential net contributions to or benefits

¹¹ Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republik, and Slovenia.

from the German social security systems to migrants in order to show that fiscal activity can distort migration decisions. Surveys conducted in some CEECs find evidence for a significant impact of differences in social security systems on migration decisions (Bauer/Zimmermann, 1999, 97–100). Other studies argue that there is no empirical evidence for any relevance of social security systems for the migration decision (Brücker/Trübswetter/Weise, 2000, 325).

Despite this ambiguity, the findings of the surveys are in line with our basic argument. In the first place, it is the wage differential which drives migration decisions. Whether or not the pension system has, among other things, a positive or negative impact on expected incomes depends on the total number of migrants. These effects are difficult to predict (or even to recognize), and potential migrants may therefore neglect or misjudge them, leading to ambiguous empirical evidence. This may turn out as a costly mistake: Wildasin (1999, 267–270) shows that the loss in NPPW by migration between six European countries may amount to up to almost 40% of lifetime wealth.

In the following, we will turn to the factors from section 2 which have an impact on pension systems. In particular, we consider the age distributions and fertility rates in Germany, the accession countries and among potential migrants. Furthermore, we will look at skill distributions and unemployment probabilities.

Age structures of the population in the EU member countries and in the CEECs differ significantly. Although birth rates have fallen since the beginning of transition in the CEEC-10 (but are expected to recover in the future), the average age of the workforce will remain rather low for the next one or two decades in comparison with EU levels (European Integration Consortium, 2001, 25) due to relatively high birth rates before 1990. Almost every CEEC has relatively smaller age groups beyond age 65 and relatively larger cohorts aged 0 to 14 (Bauer/Zimmermann, 1999, 42–43). Table 1 lists selected demographic projections for Poland, Hungary, the Czech Republic and Germany.¹²

For pension systems, the average annual growth rate of the working-age population is important. Abstracting from the problem of unemployment, this rate is negative for all countries and therefore reduces the effect of the positive growth of the wage rate – the internal return of the PAYG pillar is going to be lowered. On a 2000–2050 time horizon, this growth rate is less negative in Germany than in Hungary and the Czech Republic because fertility has stabilized earlier at a low level. However, one should recall that the growth rate of wages has to be added to the population growth rate in order to calculate the

¹² Note that these projections include already some net migration (see Dang/Antolin/Oxley, 2001)

Table 1

Selected demographic projections (Source: Dang / Antolin / Oxley, 2001)

	Life expectancy at birth				Annual growth rate of working-age population	Annual growth rate of elderly population	Old-age dependency ratio in %		
	males		females						
	2000	2050	2000	2050					
	2000	2050	2000	2050	2000 – 2050	2000 – 2050	2000	2000 – 2035	2035 – 2050
POL	69.9	78.5	78.2	84.7	-0.45	1.55	20.4	38.4	55.2
HUN	66.8	74.6	75.2	81.1	-0.67	0.71	23.7	34.9	47.2
CZ	71.5	75.2	78.4	81.5	-0.77	1.17	21.9	42.3	57.5
GER	74.7	80.0	80.8	85.0	-0.46	0.93	26.6	54.1	53.2

implicit return in a realistic way. During the economic catch-up process in the CEECs, growth rates will be higher than in Germany, so the disadvantage for these two countries will (at least partly) be offset.

Next to the reproduction pattern of a society, the development of longevity plays an important role as well. According to Table 1, life expectancy at birth is expected to increase in all countries and for both sexes. It is much more instructive, however, to consider growth rates of both the working population and the retirees jointly, e.g. by looking at the old-age dependency ratio which was used in equation (7) to measure the differences in pension systems. Figure 4 shows that the ageing process in Germany is far more advanced than in the accession countries. The 20% level of the dependency ratio¹³ was passed already in 2000 in Germany, but in the other countries it will only be reached in 2011, 2012 and 2016, respectively. When the dependency ratio peaks in Germany at about 43% in 2035, even the most advanced eastern European country, the Czech Republic, reaches only about 35% (U.S. Bureau of Census, 2003).¹⁴ Only at the very end of the projection’s time horizon will the accession countries catch up to or pass the German ratio. In terms of the implicit return on pension contributions, the change from an accession country’s PAYG pension system to the German one does not appear to be an attractive choice, at least in the next one or two decades, which is the relevant time

¹³ Here, those aged 65 and older are related to those aged 0 to 64.
¹⁴ Dang / Antolin / Oxley (2001) use a slightly different measure and compare the number of retirees to those in working age (age 20–64). They project dependency ratios of 55% for Germany and 42% for the Czech Republic.

period for the discussion of the EU enlargement. This finding was the underlying assumption in equation (7).

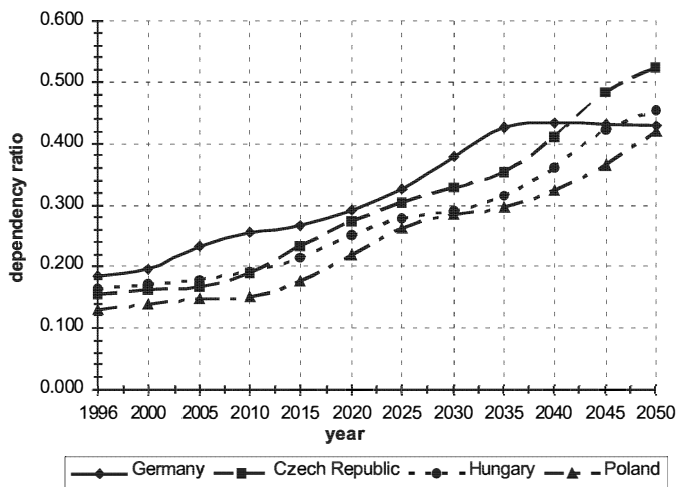


Figure 4: Projected old-age dependency ratio (65+ / 10–64) in Germany, Poland, Hungary and the Czech Republic (Source: U.S. Bureau of Census, 2003)

While the dependency ratio gives an idea of a country's age structure, it is mainly the age structure of immigrants that matters for the target country's pension system. Empirically, a relatively higher mobility of younger people in comparison to the older ones can be observed, which can be explained on the basis of human capital theory as expected lifetime gains from migrating are smaller for older people (Bauer/Zimmermann, 1999, 15). The younger age groups are on average more prone to migration and in the majority of the CEECs they have a higher share in the population compared to the EU-15. Hence, it can be expected that the potential migrants from the CEEC-10 are on average considerably younger than the population in the target countries. This assumption is confirmed by empirical results based on micro-analytical surveys which show that 57.7% of the potential emigrants from the Czech Republic, 54.3% from Hungary and 51.1% from Poland are younger than 30 (Fassmann/Münz, 2002, 77). A further indicator for the plausibility of this assumption is the current age structure of already immigrated employees from the CEECs to EU-15: on average, these workers are significantly younger than nationals and foreign workers in the EU. In EU-15, on average only 55% of all workers are aged 25–44, while among workers from the CEECs it is almost 70% (European Integration Consortium, 2001, 55).

The migration probability of old, unemployed or poor people is below average. This is partly because they are less mobile and partly because they have less opportunities to enter the labor market or the social security systems of the western European countries than other population groups. EU directive 1408/71 prevents old people from entering a possibly more generous pension system. The mobility of unemployed and poor people is limited by their reduced ability to pay movement costs as a result of their relatively low income. These costs even rise if immigration into unemployment is taken into account. The participation of unemployed and poor new-immigrants in the general social security system of the destination country is usually prevented by several *safety measures*.¹⁵ In Germany, for example, immigration into unemployment implies that the immigrant has no legal claims on means-tested social benefits (*Sozialhilfe*). Drawing such benefits by an unemployed immigrant without German citizenship can justify his or her expulsion from Germany, regardless how long he or she has lived there and even if he or she is an EU-citizen (Sinn et al., 2001, 155–158).¹⁶

Regarding the skill distribution one should consider the qualification level of potential migrants from the CEEC-10: on average, one can expect a rather high education level of the migrants from the CEEC-10, even in comparison to the population of the EU-15. This can be explained firstly by the generally high education levels in the CEECs compared to other countries with similar per capita incomes (see, e.g., European Integration Consortium, 2001, 26). Sinn et al. (2001, 71) emphasize that the general education level in the CEEC will even increase in the future. Secondly, as human capital theory points out, it can be expected that the average qualification level of migrants is higher than the overall qualification level in a given source country. The individual migration probability is positively correlated with higher education which enhances individuals' ability of information collection and processing, thereby reducing the risks and costs of migration (Bauer/Zimmermann, 1999, 15). Empirically, it can be observed that migrants already emigrated from the CEEC-10 have a higher endowment with human capital in comparison to past migration from other countries to EU-15, possibly even in comparison to the EU-15 (see, e.g., European Integration Consortium, 2001, 55).¹⁷ Surveys

¹⁵ For an overview of such safety measures in the German social security system, see Sinn et al. (2001, 121–158).

¹⁶ EU-citizens, in contrast to other immigrants, are entitled to means-tested social benefits for up to six months in case of becoming unemployed. If they do not find a new job during this period, they can be expelled like other unemployed immigrants because of receiving such benefits (Sinn et al., 2001, 158).

¹⁷ That migrants from the CEECs are mostly employed in the low skilled sector (European Integration Consortium, 2001, 56–57) only seemingly contradicts this fact: it is the result of limited access to labor markets in the EU-15, as certificates and qualification records are not acknowledged by the EU-15 authorities (e.g. Sinn et al., 2001, 48). It can be expected, however, that the accession process will lead to an approval of

show that 55.1% of the potential emigrants from the Czech Republic, 57.2% from Hungary and 50.5% from Poland have an intermediate, high or academic education level (Fassmann/Münz, 2002, 77–78).

Much of past migration to Germany took place at a time of higher economic growth and employment levels in Germany (Brücker/Trübswetter/Weise, 2000), i.e. at a time with a high demand for foreign workforce, especially for low-skilled workers. As general economic conditions have worsened in the meantime and due to technological and structural changes of the economy, the low-skilled migrant labor market is characterized by an ongoing decrease in demand and a corresponding rise in the unemployment rate and/or decrease of wages (Sinn et al., 2001, 65–70). Immigration into unemployment causes high migration costs as migrants who are unemployed immediately after immigration receive hardly any public transfers in the target country. Decreasing wages in the low-skill labor market segment lower the income-gap for low-skilled workers between sending and receiving countries. Therefore, there are low, and decreasing, migration incentives for low-skill workers from the CEEC-10 (Sinn et al., 2001, 101).¹⁸

In sum, empirical evidence indicates that within the CEECs the highest potential mobility prevails within the younger population groups, especially when they have a comparatively high education level (Sinn et al., 2001, 104). Therefore, we can conclude that the German pension system will gain from eastern European immigrants, not only because of the previously described quantitative effect, but also because of the qualitative effect.

On the other hand, it was shown that the German pension system suffers from a particularly rapid ageing process. Hence, it most likely imposes a burden on individual migrants from the accession countries, at least for low levels of total migration (according to our model). If this is the case, migrants will prefer not to enter the German pension system if they had a choice of options. Schnabel (2000) shows that among young cohorts of self-employed Germans who are not *mandatory* members of the German public pension system, voluntary participation is close to zero. With regard to migrants the same attitude can be expected. Only if immigration is sufficiently large, may the German pension system be viewed as having a positive impact on immigrants, but projections show that very large numbers of immigrants are needed to stabilize the age structure of the German population and thus to possibly drive down contribution rates.

According to the estimations presented in this section an average yearly inflow of 130,000 to 330,000 persons from the accession countries is expected

these records, i.e. that existing labor market barriers for higher educated jobs will be removed.

¹⁸ Some groups of low-skilled workers will nevertheless be welcome in western Europe, e.g. nurses, agricultural workers or dustmen.

over the next 15 years. The United Nations (2000, 37), however, estimate that an average yearly immigration of 324,000 persons is needed just to keep the total population in Germany constant until 2050. The dependency ratio nevertheless increases under this scenario because the average age is rising. A net immigration of 3.4 million persons per year is needed to keep this ratio constant as well. This enormous number neglects, however, that productivity growth and thus the growth of the wage rates adds to the implicit return of the PAYG system and that there will possibly be an effect due to a decrease of the dependency ratio in the home countries if migration takes place. In order to achieve a balanced pension system, the necessary immigration can therefore be lower. Nevertheless, in Germany quite substantial net migration is needed to stabilize the pension system and even more is needed to end up beyond the break-even level of our model. As this immigration level is unlikely to occur, the pension system will most likely impose a burden on immigrants

5. A comparison of pension systems in Eastern Europe and Germany

In this section, we investigate in more detail the institutional aspects of the pension systems of the four countries under consideration. This will allow us to derive further evidence on whether it is favorable for eastern European migrants to enter the German pension system. We will not only briefly describe the pension systems and reforms in these countries, but also take a closer look at the relative sizes of the pillars of the pension systems and at the methods of financing the PAYG pillar. Both have a potential impact on the typical migrant as we learned from sections 2 and 3: a relatively lower level of funding makes the target country's pension system less attractive. Furthermore, migrating from a country with a defined-contribution system to a country with a defined-benefit system or with more intragenerational redistribution (e.g. by changing from a Beveridgian to a Bismarckian pension system) is likely to impose a burden on the individual migrant.

5.1 The pension systems of Poland, Hungary, the Czech Republic and Germany

Although there were also country-specific reasons why pension reforms became necessary in CEECs in the 1990s, some general features can be identified. After the breakdown of the socialist economies, the existing pension systems could no longer be sustained. They were often considered as unfair and ineffective and faced major financing problems due to sharply increasing unemployment, bankruptcies and problems of collecting contributions. Public

confidence in the pension systems was very low. Since fundamental reforms take time and need to be backed by strong public support, in the beginning only gradual reforms were introduced to overcome the most pressing problems. However, this was not sufficient to keep up the sustainability in the long run when the ageing of societies will become the main challenge. Hence, in the second half of the 1990s fundamental reforms were introduced in Poland and Hungary, a step which is yet to be taken in the Czech Republic. Obviously, the situation is different for the mature German pension system where for political reasons only gradual reforms are possible. Here, the very rapid ageing process is the main challenge.

5.1.1 Poland

In Poland, a new pension system was introduced in 1999. It replaced the existing PAYG system with a three-pillar system. The new first pillar is a notional defined contribution (NDC) system which bases benefits on individual contributions during the working years. The contribution rate is fixed at 12.22% by law and will be identical for all future cohorts, hence, in principle the government abstains from the possibility of changing contribution rates.¹⁹ Pension benefits will therefore adjust endogenously to changes in the underlying parameters. They are indexed at a rate of 75% of the growth of the covered wage bill which is affected by both average wage growth and growth of the labor force. The sum of uprated contributions forms the basis for the individual's pension (Chlon/Góra/Rutkowski, 1999, 20). Benefits are adjusted by both the value of contributions paid during the entire work life and life expectancy. The minimum retirement age will be raised to 60 years for women and to 65 years for men. Furthermore pension rights for certain non-contributory periods are recognized, e.g. for maternity, child-leave, mandatory military service etc.

Like the first pillar, the second pillar is mandatory. It consists of individual, privately managed savings accounts. The contribution rate is fixed at a level of 7.3%, so the total contribution rate from both mandatory parts is 19.52% of gross earnings. All contributions to licensed pension funds are paid equally by employers and employees. There is a guarantee for a relative rate of return which is 50% of the average rate of return of all pension funds (Chlon/Góra/Rutkowski, 1999, 31). At the age of retirement, the collected contributions of the insured person and the returns from the capital market have to be converted into an annuity.

¹⁹ At least, increases in the contribution rates can be excluded. The rates may eventually be reduced when the pension system has matured (Chlon/Góra/Rutkowski, 1999, 21).

As usual, the third pillar is constituted by savings or voluntary contributions to private pension funds, e.g. by long-term savings plans or occupational-pension programs. This pillar is very flexible, allowing individuals to reallocate income over the lifecycle according to their preferences and needs. Taxation follows the pre-paid expenditure tax approach, i.e. contributions are made out of taxed income. Investment returns and benefit withdrawals are tax exempt. This is different from the first two pillars where contributions are tax deductible. After retirement, personal income tax has to be paid on the benefits.

5.1.2 Hungary

The Hungarian pension reform introduced a new pension system in 1998 which is basically in line with recommendations by the World Bank (1995). The old one-pillar mandatory PAYG system with non-indexed retirement benefits was replaced by a three-pillar pension system.

The basis for the first pillar of the new pension system of 1998 was a reformed²⁰ and downsized version of the earlier defined-benefit PAYG pension system. The main elements of this reform were the following (Rocha/Vittas, 2001): the retirement age was raised to 62 years for both sexes as well as the number of years of service to 40 to be eligible for early retirement without penalty. At the same time, penalties for early retirement and rewards for late retirement were increased. Backward net wage indexation was substituted by the *Swiss* indexation formula which gives the same weight to net wage and consumer price changes. Furthermore, some redistributive elements of the benefit formula were removed as it was one of the main goals of the reform to tighten the link between contributions and benefits.

The total contribution rate in the reformed pension system is supposed to be 30% for all workers, 8% are paid by employees and 22% by the employers. Starting in 2002, young workers are supposed (though this step has been postponed for some time recently) to pay 22 percentage points of the total contribution rate to the unfunded pillar and 8 percentage points to the funded pillar.

In the second pillar, mandatory contributions are to be placed in pension funds whose legal structure is similar to the previously existing third-pillar mutual benefit funds (Palacios/Rocha, 1998). The main difference is, however, that at retirement the accumulated capital becomes part of a real insurance pool that shares mortality risk (Augusztinovics et al., 2002, 40). The capital is turned into an annuity which is expected to follow the same indexation rule as the public pillar (though there are no products on the market yet

²⁰ Some reforms of the PAYG system, like the increase of the retirement age, were enacted already before 1998 because otherwise the system would have been in serious trouble already in the early 1990s (Augusztinovics et al., 2002, 30–32).

that fulfill this condition). The third pillar consists of the typical voluntary private pension scheme which is mainly constructed as mutual associations.

5.1.3 The Czech Republic

In contrast to Poland and Hungary, the Czech Republic has not (yet) conducted a fundamental systemic reform of its pension system. Instead, a number of gradual reforms was enacted in the course of the 1990s which aimed at improving the existing PAYG public pension system and complementing it with a *voluntary* private pillar (Müller, 2002, 113).²¹ So far, it seems that the reforms are not sufficient to guarantee long-run stability.

The first pillar is of the PAYG defined-benefit type. It mixes flat-rate and earnings-related pension benefits (Laursen, 2000). The inclusion of a basic flat rate redistributive element (CZK 1,310 per month) into the public pension system stands in contrast to the Polish or Hungarian systems where intragenerational redistribution has been shifted from the pension system to the state budget.²²

The earnings-related part of the pension benefit is calculated on the basis of average earnings from a certain number of working years which will be raised to 30 by 2016. There are, however, nominal thresholds incorporated into the calculation of the personal assessment base. At present, earnings up to CZK 6,600 are fully considered, beyond this sum only fractions are added (Mácha, 2002, 81). The pension benefits are indexed to consumer price inflation. The total contribution rate is 26% of gross wages, 19.5% being paid by the employers and 6.5% by the insured persons. The statutory retirement age is being raised gradually to 62 for men and 57–61 for women, depending on the number of children reared. The accrual factor for old-age pensions is 1.5 for each year of membership.

The first pillar of the pension system is supplemented by a voluntary defined-contribution type pension fund system introduced in 1994. The minimum contribution per month is CZK 100 and there are certain minimum participation times (Jelínek / Schneider, 1999, 260–261). At the end of the savings period or at the time of retirement, the member of the pension fund receives either a lump-sum payment or a regular pension from an annuity.

The government subsidizes participation in the private pension funds. A person contributing the minimum amount of CZK 100 receives a subsidy of CZK 40. With increasing contributions, the subsidy falls in relative terms. If

²¹ There is no mandatory private pillar, so the Czech Republic has basically a two-pillar system.

²² Also, the public pension pillar has not yet been completely separated from the state budget (Müller, 2002, 121–122).

the contribution exceeds CZK 500 per month, a flat subsidy of CZK 120 is paid. Participation in the supplementary pension funds has developed rather disappointingly, especially among the younger cohorts. Less than 10% of all participants are aged 30 and younger (Jelínek / Schneider, 1999, 264). Low participation rates among the young are partly offset by rather high rates among those aged 45 and older. The state subsidy is the main reason for this development because it provides a relatively high return on savings compared to the capital market.²³ The pension funds are used as a short-term savings system.

5.1.4 Germany

Until very recently, the German pension system has basically been a one-pillar, defined-benefit PAYG system of the Bismarckian type. On average, 85% of old-age income stems from the public pension pillar. Less than 5% are covered by (voluntary) occupational pensions and about 10% by savings, earnings and family transfers (Börsch-Supan, 2001, 15).

In the German public pension system contributions are mandatory for almost all dependent workers (except for certain groups), about 90% of the work force are covered by it (Börsch-Supan / Reil-Held / Schnabel, 2001, 165). The contribution rate of 19.5% is levied equally on employees and employers. There is, however, a federal grant of about 30% of overall revenues that would increase the contribution rate by another 8 percentage points if it were levied as a payroll tax (Börsch-Supan, 2001, 16).

The German pension formula in its very basic version consists of four factors (Börsch-Supan, 2001, 17; Rürup, 2000): the individual contribution level, the years of service, adjustment factors, and the so called *current pension value* (CPV). The individual contribution level is the ratio of individual gross earning to average gross earnings in a certain year. This ratio gives the amount of earnings points for a certain year. At retirement, the sum of earnings points of all years of service (including bonus earnings points for child rearing etc.) is taken to calculate the pension benefit (Schmähl, 1999, 101). This number is adjusted by the pension type factor and by the accession factor which takes into account the time of retirement. These factors are 1.0 for old-age pensions at the age of 65 and will be reduced (increased) by 0.003 (0.005) per month of early (late) retirement, corresponding to a reduction of the pension benefit by about 3.6% for each year of early pension payment (Rürup, 2000).

The CPV represents the value of one earnings point in the year of retirement. It is the *dynamic element* in the German pension formula (Schmähl,

²³ The minimum time of participation to become eligible for a pension is just 5 years.

1999, 101–102) and determines the intergenerational income redistribution between workers and retirees. It is derived from a benchmark pension (which is supposed to guarantee living standard security) that an insured person can achieve after 45 years of insurance at the average wage level. Despite several recent, sometimes rather erratic adjustments of the CPV, adjustments in principle follow the *modified gross wage indexation rule*, introduced in 2002. Benefits are related to the development of the gross wage minus the contributions to the pension system, thus, both retirees and workers are affected by the increasing old-age dependency ratio.²⁴ Furthermore, starting in 2011 only 90% of the gross wage growth will be considered in the pension formula.

The goal of the recent pension reform is to keep the contribution rate below a long-term level of 22%. In principle, this implies that the net replacement rate is free to adjust, but the government de facto guarantees that the level will not fall below 67% – a twofold goal which can hardly be achieved (Bonin, 2001). To allow members of the pension system to make up the (accepted) decrease in the replacement ratio of about 3 percentage points, a supplementary voluntary private pension scheme has been introduced. After phasing in the system between 2002 and 2008, finally up to 4% of the gross wage can be saved for retirement in licensed private pension funds or occupational pension plans. The government supports these old-age savings by direct payments or tax deductions. The state subsidy will be € 154 per person and € 185 per child in 2008; thus, there is a bonus for child-rearing.²⁵ The new private pillar is complemented by a move towards a system of deferred taxation in which contributions to the individual savings accounts, but not pensions are tax exempt (Bonin, 2001). This has important consequences: regardless of citizenship, every worker can participate in the new pillar and will receive the state subsidy if he is unlimitedly liable to income taxation. After retirement, the beneficiaries are obliged to remain tax-liable in Germany. Hence, they actually have to reside in Germany, otherwise they have to pay back the subsidy. Hence, migrants who are planning to return to their home country in old age will not benefit from the state grant in the new pension pillar.

Pension funds cannot pay out collected contributions until the age of 60. They have to provide a life-long annuity or a fixed yearly payment of no more than 3.6% of the capital until the age of 85 (the rest is annuitized then). There is a guarantee that the nominal value of the fund at retirement is at least equivalent to the accumulated contributions (Bonin, 2001).

²⁴ If total pension benefits increase strongly in one period, contribution rates necessarily go up which in turn decreases the increase of the benefits in the next period.

²⁵ See Sinn (2001) who suggests that only parents should be allowed to stay in the PAYG system while those without children should be compelled to enter an additional and mandatory funded system.

5.2 Comparing different aspects of the pension systems

Table 2 briefly summarizes our previous findings and gives further interesting characteristics of the pension systems. Except for Poland, all countries have defined-benefit systems, so only Polish migrants face the problem of migrating into a *different* type of pension system which tends to increase the break-even level of migration. With regard to intragenerational redistribution, little changes when migrating from Poland or Hungary to Germany since all three pension systems are Bismarckian. This criterion only matters for potential Czech migrants. If the migrant expects to be rather high earning (at least in the future), he may find the German pension system attractive in this respect.

Table 2

Selected characteristics of the pension systems (Source: Chlon / Gora / Rutkowski, 1999, 40; Palacios / Rocha, 1997, 22 – 24; Mácha, 2002, 88; Dang / Antolin / Oxley, 2001, 49; own calculations)

		POL	HUN	CZ	GER
First pillar	financing method	PAYG-NDC	PAYG-DB	PAYG-DB	PAYG-DB
	intragenerational redistribution	Bismarckian	Bismarckian	some Beveridgian elements	Bismarckian
Second pillar		mandatory	mandatory	voluntary	voluntary
Expected replacement income in %	total	62	~57	65 – 75	70
	from first pillar	30	45	55 – 60	67
	from second pillar	32	min. 11.25	10 – 15	3
	second pillar total	> 50	min. 25	17 – 27	~ 5
Expected public pension spending in % of GDP	2000	10.8	6.0	7.8	11.8
	2050	8.3	7.2	14.6	16.9

Note: Based on a full career average worker.

Furthermore, the relative size of unfunded and funded pension pillars can be considered. The model in section 3 predicts that a relatively larger funded pillar in the joining country increases the break-even level, so it is more likely that the pension system is considered to be a burden. Although the estimates in Table 2 are only very rough, it is clear that the funded pillar in all three

accession countries exceeds the German one by far. The projections show that in Poland a slightly higher replacement income from the second pillar than from the first pillar is expected. In Hungary, there is a guarantee that the second-pillar benefit cannot be lower than 25% of the first-pillar benefit while in the Czech Republic the government targets at a level of 17–27%. Müller (1997, 227) expects about one fourth to one third of old-age income in eastern European countries to stem from funded sources. Compared to this, the new German funded pillar remains small. It is supposed to make up the reduction in the replacement rate of the PAYG system from 70% to 67%. Even if the funds perform very well, only 5% to 10% of the replacement income will be covered by them.

The relative size of the first two pillars may also be used as a first measure of the level of redistribution within the pension system because the second funded pillar does usually not involve redistributive elements, while the first pillar does. Especially if coming to a foreign country without ethnic or family ties – which could be considered as social and information networks –, the willingness of migrants to participate in inter- and intragenerational redistribution as net contributors is most likely to be low. This holds even more if migration is considered to be only temporary because then only a partial or even no reflux of benefits can be expected in old age.

A further measure for the level of intergenerational redistribution is the amount of public pension spending relative to GDP. It shows the overall size of the PAYG pillar and once again indicates its importance in Germany: the share will increase from 11.8% in 2000 to 16.9% in 2050.²⁶ A similar development (though at a lower level) will occur in the Czech Republic where the increase will be from 7.8% to 14.6%. It is striking that this happens in countries which introduced only gradual reforms and points out the necessity of further reforms in the future. In marked contrast are Hungary and Poland where the share remains almost constant or is even decreasing: in Hungary from 6.0% to 7.2% and in Poland from 10.8% to 8.3% (Dang / Antolin / Oxley, 2001). This is due to the fact that the replacement income will increasingly come from the funded pillar and less from the PAYG pillar.

The demographic risk displayed in this projection for Germany (and the Czech Republic) is followed by a political risk. It is difficult to project which groups in society may lose from the reforms eventually. It is certainly preferable to be member of a pension system which can be considered as relatively stable without prospects of major reforms in the future. However, Bismarck-

²⁶ This estimation rests on a baseline scenario of 300,000 net immigrants in 2000 falling to 20,000 net immigrants in 2050. A sensitivity analysis shows that an increase of net immigration by 50% relative to the baseline will lower the share by 1 percentage point (Dang / Antolin / Oxley, 2001). This shows that even massive migration from Eastern Europe to Germany will have only slight effects on the pension system.

ian systems substantially reduce the political risk because contributions are considered to be legal claims to property rights. The German constitutional court, for example, has strengthened the property-rights character of claims from contributions in several court decisions.

So far, we have mainly pointed at the redistributive aspects of funded and PAYG financed pension pillars, but having pillars of different size should have an impact on the average return on contributions to the entire three-pillar pension system since it is usually assumed that in the funded pillar a higher return can be earned.²⁷ One should recall that the internal rate of return in the PAYG system can be measured by the growth rate of total wages which is roughly the growth rate of the average wage rate (productivity of labor) plus the population growth rate (number of contributors). In Germany, this rate of return has been falling from 2.8% to 1.5% p.a. over the last four decades. At the same time the real return on 10-years German government bonds was constantly around 4% p.a. (Sinn, 2000). From the perspective of an individual who is possibly myopic²⁸ and not overly interested in intergenerational redistribution, it has therefore been more attractive to participate in the funded pillar or to just put the money into a savings account. Our model therefore predicts that the break-even level of migration is higher if the joining country has a relatively larger funded pillar.

One can expect that the rates of return on government bonds in the eastern European countries will be above the German ones for some time because economic growth will be higher as a result of an economic convergence process (e.g. Fassmann / Münz, 2002, 90–95). On the other hand, risk of default or inflation will remain high. Eventually, rates will converge to western European levels (in particular when the CEECs enter the EMU).

Most likely, the internal rate of return in the German PAYG system will even worsen in the future if immigration does not take place. While German wages grow roughly at the same speed as long-run productivity growth, eastern European wages are increasing comparatively faster during the catch-up process, which already started at the end of the last decade (Sinn et al., 1999, 34–38), and are eventually going to converge to the European standard, although this is going to take a long time (Fassmann / Münz, 2002, 90–95).

Therefore, we can expect that the average return on contributions to the domestic pension system is higher in the accession countries than in Germany.

²⁷ From a theoretical perspective, the difference in the rates of returns may also be explained by intergenerational redistribution: the lower rate of return in the PAYG system then is just the mirror image of the introductory gains of older generations (see Sinn, 2000).

²⁸ We will not enter the debate whether in the long run the market interest rate will fall if “too many” members of pension funds will sell their assets at the same time in order to retire while there may be “too few” young persons willing to buy the assets.

Although we did not model this scenario explicitly in section 3, it should be obvious that this makes the German pension system less attractive compared to the other ones. Only a sufficiently large immigration may offset this effect by driving down contribution rates.

6. Conclusions

While immigration may be a burden for the domestic population in one or the other respect, this is certainly not true for the domestic pension system. The quantitative effect of having more contributors will be beneficial and help to keep contribution rates low or pension benefits high. This holds even more if there is an additional qualitative effect of immigration, e.g. if immigration improves the age structure or the skill distribution in a country. At least with regard to the age structure this is certainly true in the case of east-west migration. Migration into this branch of the social security system is certainly not a problem.

Quite on the contrary, the pension system of a target country may induce a negative migration incentive if it imposes a burden on immigrants. This conclusion can be derived from the model introduced in this paper. If the dependency ratio is lower in the source country, the potential gain from a wage differential between target and source country is reduced. In the case of east-west migration from Poland, Hungary or the Czech Republic to Germany, the number of migrants will be somewhat reduced (but still substantial according to most projections), unless pension issues are completely ignored by the immigrants. However, our model also shows that a sufficiently large number of immigrants will turn the burden imposed by the pension system into a gain which should generate an artificial migration incentive. This gain stems from the fact that contributions to the pension system may fall below the source country's level because we consider a defined-benefit pension system in the target country as common in western Europe. The problem is, however, that potential migrants cannot be sure whether the total number of migrants is sufficiently large and will therefore abstain from migrating – a coordination failure occurs. We also find that the projected numbers of immigrants can hardly stabilize the German pension system, let alone drive down contribution rates.

Further analyses showed that the real-world pension systems may even aggravate the model's predictions. Not only is the ageing process (measured by the dependency ratio) far more advanced in Germany than in the accession countries, but also the latest reforms in these countries will substantially improve the performance of their pension systems. The introduction of significant funded pillars reduces the amount of redistribution in the pension systems compared to Germany. Poland, in particular, moved to a pension system with

a very strong funded pillar with no inter- or intragenerational redistribution and a Bismarckian PAYG-NDC pillar with very little intragenerational redistribution. As implied by our model this will increase the migration disincentive induced by the pension system even further. Next to redistribution, the average return on contributions matters as well. The relatively larger funded pillars and the fact that the growth rate of wages is higher during the catch-up process in the CEECs should lead to a higher average return on contributions to both pillars. A counter effect occurs only beyond the break-even level of migration with falling contribution rates in the target country.

Because projected immigration is probably not sufficient to drive down contribution rates in Germany, we conclude that the German pension system imposes a burden on potential immigrants from the eastern European accession countries. While Germans should be happy about each immigrant who becomes a new contributor to the German pension system, the immigrants are probably not all too happy about the prospects of being in charge of stabilizing a foreign country's pension system. In this sense, migration takes place despite – not because of – the German pension system.

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