

Will Eastern European Migrants Happily Enter the German Pension System?

Some thoughts about the migration potential following the EU eastern enlargement.

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Abstract:

A major concern in Western Europe and especially in Germany is that with the EU eastern enlargement massive inflows of workers “into the social security systems” will occur. In this paper, we take a closer look at the pension systems in the main source and target countries (Poland, Hungary, Czech Republic; Germany) to investigate whether there exist noticeable incentives with regard to the pension systems for Eastern European workers to move westwards. We find that for the mobile groups in society the German system is relatively unattractive compared to the newly reformed pension systems in the accession countries. Hence, we conclude that if migration will take place, it will do so *despite* – not *because* of – the existence of the pension systems.

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1. Introduction

In Western Europe there exists a fear that after the EU eastern enlargement massive inflows of workers from Eastern Europe will occur – the so called “trek westwards” (Straubhaar, 2001). It is expected that migrants will not only go westwards to find jobs and enter the labor markets, but “migrate into the social security systems”. However, entering the social security systems does not necessarily mean that immigrants are net beneficiaries of these systems. It may even be that immigrants are (forced) net contributors – and that net contributions more than offset the income differential between East and West, at least in theory. In this case, east-west migration would lead to income losses and, thus, workers will prefer to stay in their home country.

In our paper, we will investigate a particularly striking case, namely pension systems, in which east-west migration is rather unattractive due to differences in this branch of the social security system. We will show that there is no incentive to move from Eastern Europe to Germany because the newly reformed pension systems, e.g. in Poland or Hungary, are quite similar to the German one and perform even better in some areas if we consider young and skilled migrants as the mobile segment in society. Hence, rationally behaving individuals will take this into consideration and prefer to stay at home under the *ceteris-paribus* assumption. Therefore, by neglecting the effects from the pension system the migration potential may be overestimated.

The main reasons for this result are that the pension reforms in Eastern Europe introduced relatively strong funded pillars in their pension systems which do not involve redistribution. This is an especially attractive feature of a pension system for many young and skilled workers. But also the pay-as-you-go financed pillars have been reformed and a tight link between contributions and benefits has been introduced. Therefore, the level of intragenerational redistribution has been lowered in these countries. Furthermore, the age distribution in the Eastern European countries is more favorable than the German one, thus, even intergenerational redistribution is comparatively low. Under these circumstances, the incentive to migrate into the German pension system remains weak, especially if one takes into account the “entrance fee” which is to be paid to the domestic members of the pension system, according to Sinn (2001).

Our paper proceeds as follows: We first review the literature on the expected migration potential from the Central and Eastern European countries to Germany and the rest of Western Europe. We show that migrants will be relatively young and highly skilled (section 2). In section 3 we will turn to the economics of migration and pension systems. We will describe the aspects of inter- and intragenerational redistribution as well as certain institutional issues. Then we turn in section 4 to a description of the pension system in Poland, Hungary, the Czech Republic and Germany which are considered to be the main source and destination countries of east-west migration. In section 5 we compare the pension systems and try to reassess the migration potential. Finally, section 6 concludes by summarizing our main results.

2. The expected migration potential following the EU eastern enlargement

Existing studies on the migration potential following the EU eastern enlargement primarily concentrate on the expected inflow of migrants to Germany. Up to now Germany has been the main target country for immigration from the 10 central and eastern European countries (CEECs) applying for membership in the EU.¹ Until 1998 more than two thirds of the migrants from these countries to the EU-15 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, due to the geographical vicinity (European Integration Consortium, 2001, 54), historical connections (Bauer/Zimmermann, 1999, 42), the only slowly diminishing substantial income gap (Brücker/Trübswetter/Weise, 2000), and already existing networks of immigrants from the CEECs (e.g. European Integration Consortium, 2001, 95). These factors cause a path-dependency of the direction of migration flows which can be confirmed also empirically (European Integration Consortium, 2001, 105). Therefore Germany is expected to remain the main destination country for immigration.

Three current, very detailed studies undertaking estimations of the migration potential in the aftermath of the eastern enlargement are relevant and will be shortly summarized in this section. Bauer/Zimmermann (1999) assess the migration potential in a study for the Department for Education and Employment of the United Kingdom. In 2001 two more studies were published with quite different results, which led to a controversial debate between the involved scientists: The study from the European Integration Consortium (2001), which includes the DIW, CEPR, FIEF, IAS and IGIER, and the study from the ifo-Institute Munich (Sinn et al., 2001).²

Table 1 gives an overview of the estimation techniques and underlying assumptions of all three studies mentioned. Table 2 presents the estimation results for the EU-15 and Germany, particularly considering the three sending countries we are focussing on in this paper: Poland, Hungary and the Czech Republic. Estimations on 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 (see table 2).

One general problem all studies are facing is that there are no clear criteria how long immigrants are counted as immigrants (Dustmann, 2001). One aspect of this problem is the question whether children born in the target country but not having full citizenship are also defined as immigrants. These children are regarded as immigrants in all studies and also in our paper; it has to be pointed out, however, that estimation results would change significantly if they were not included into the stock of immigrants. A similar problem arises with respect to naturalised immigrants for which the

¹ Czech Republic, Estonia, Hungary, Poland and Slovenia are the first-round candidates; Bulgaria, Latvia, Lithuania, Romania and Slovakia are the candidates for the second round of the eastern enlargement.

² The contributions by Brücker (2001) and Brücker/Trübswetter/Weise (2000) are part of the study of the European Integration Consortium (2001); Flaig (2001) is part of the study by the ifo-Institut (Sinn et al., 2001).

estimations do not account because of statistical registration problems (Sinn et al., 2001, 10). This might lead to considerable underestimations.

All authors emphasise that their results are to interpret carefully as they only represent very rough estimations: Not only due to the definition and statistical problems just mentioned, but also because there are a number of uncertainties and imponderabilities connected with migration decisions (e.g. European Integration Consortium, 2001, 105). Such imponderabilities result for example from the fact that individual factors influencing migration decisions cannot be totally captured in formal models (e.g. Brücker, 2001). 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. It must be doubted, however, whether these historical data provide a good data base for estimating the future migration potential from the CEECs, especially when taking into account the relatively high income differential between sending CEECs and receiving EU-15-countries in comparison to the southern enlargement³. As the income differential is the main explanatory variable in all studies the migration inflow might be underestimated (Sinn et al., 2001, XXVIII). Other possible reasons for an underestimation are the lower distance between Germany and the CEECs in comparison with the countries of the EU southern enlargement, which might cause a higher level of commuters (Brücker/Trübswetter/Weise, 2000).

On the other hand, however, much of the past migration to Germany took place in a time of higher economic growth and of full or at least high employment (Brücker/Trübswetter/Weise, 2000); therefore in a time with a high demand for foreign workforce, even for low-skilled workers, in Germany. As these favourable economic conditions have worsened in the meantime, the future migration potential might be overestimated.

The remarkably differing forecast results are primarily due to the use of different techniques and variables: Especially country-specific fixed effects, individual propensities to migrate and employment opportunities play an important role.⁴ Country-specific effects comprise factors affecting migration like geographical distance, language, culture or long-term differences in factor endowments across countries. Many of them are, however, hard to capture as they cannot be directly observed (European Integration Consortium, 2001, 100). For Brücker (2001) the treatment of country-specific fixed effects is the main explanation for diverging prognoses.

Individual propensities to migrate are negatively influenced by individual monetary costs (e.g. moving costs) and non-monetary costs of migration (e.g. costs incurred by the loss of family and social connections) (Brücker, 2001). It is not possible to quantify these individual costs, but it is

³ In the southern enlargement of the EU, Portugal had the widest income differential towards the EU within the three southern countries when it joined in 1986: Its GDP per capita in ppp amounted to 62% of the EU average. For comparison: The GDP per capita in ppp of the CEEC-10 was 38% of the EU-15 average in 1999. Moreover GDP per capita in ppp varied very strongly within the CEEC-10, from 22% in Bulgaria to 71% of the EU-15 average in Slovenia (European Integration Consortium, 2001, 23f.).

⁴ For an overview over the scientific debate on this topic see Brücker (2001), Flaig (2001), and Dustmann (2001).

plausible to assume that the individual propensities to migrate are unequally distributed across a given population. To account for the unequal distribution of individual propensities to migrate the European Integration Consortium (2001, 96ff.) introduces a negative impact from the migration stock of the former period on the migration flow in its forecast model. Primarily the individuals with the highest (expected) benefit-cost relations of migration migrate. From an increased number of migrants follows that the remaining marginal migrant displays a lower propensity to migrate respectively incurs higher individual migration costs. Hence the migration flow from a particular origin is negatively correlated with the total number of migrants, and the migration flow decreases over time (Brücker 2001). This assumption conflicts with the assumption of network effects used by Sinn et al. (2001, 6ff.). Due to a lack of information about the economic and social conditions (e.g. housing, labour market) in the destination country the first migrants face high costs and risks of migration. With an increased number of migrants these costs and risks are lowered with the support of previously migrated compatriots which have more information due to own experiences. In this sense migrants build a social network which increases with their number. The reduction of costs and risks of migration leads to a subsequent network migration, and there is a positive correlation between the total number of migrants and the migration flow from a particular origin (Bauer/Zimmermann, 1999, 19). The different assumptions regarding the influence of the migration stock from the former period is reflected in the estimated distribution of the migration inflows over the years after EU accession if full labour mobility is given: Sinn et al. (2001, 18ff.) and the European Integration Consortium (2001, 101)⁵ estimate for the first year after accession (depending on the underlying scenario) about 200,000 migrants from the CEECs to Germany. For the following years Sinn et al. (2001) expect increasing migration inflows to Germany (up to 248,000 to 273,000 people p.a.), which only decrease slowly over time (after 10 years still 133,000 to 205,000 migrants). In contrast to these projections, according to the European Integration Consortium the peak of yearly migration inflows to Germany will be observed in the first year (218,000 migrants in the baseline projection⁶); afterwards a continuing decrease of migration inflows is expected (after 9 years only 96,000 migrants).

Forecast results finally depend on how employment opportunities are considered. Sinn et al. (2001) on the one hand totally neglect employment opportunities in sending and receiving countries in his empirical estimation, arguing that the output gap as a proxy for employment opportunities only effects short-term migration decisions, but leaves long-term migration decisions unaffected and can therefore be ignored for estimations covering longer periods (Sinn et al., 2001, 7ff.). Bauer/Zimmermann (1999, 44f.) and the European Integration Consortium (2001, 95ff.) on the other hand also account for long-run employment opportunities and implicitly consider a permanent level of unemployment in origin and target countries.

⁵ Bauer/Zimmermann (1999) do not estimate yearly migration inflows.

⁶ For the other scenarios (see table 1) no results are published.

As mentioned before, the most important explanatory variable for migration in these models is the income differential between source and target country (countries), expressed as the difference in GDP per capita in purchasing power parities (ppp). This variable is used as a proxy for real wage differentials. The use of real wage differentials as explanatory variable would be more adequate as the labour force in the sending countries primarily consists of dependent employees, but the existing data on real wages of different countries are not comparable (Sinn et al., 2001, 7). It can be doubted seriously, however, whether the GDP per capita in ppp is the correct proxy for the existing income gap between current and prospective EU member countries. GDP per capita does not account for tax payments and transfers influencing disposable income (Flaig, 2001). Fiscal activity, however, is not taken into account systematically by the existing studies, a comprehensive perspective considering long-term disposable income is missing. Sinn et al. (2001) only consider potential net contributions to or benefits out of the German social security systems to migrants to show that fiscal activity can distort migration decisions, but the results are not used in the estimation model.

The other two studies ignore international differences in the social security systems – including the pension systems –, arguing that there is no empirical evidence for their relevance in the migration decision (Brücker/Trübswetter/Weise, 2000, 325). The neglect of income gains or losses caused by different pension systems might be also a result of forecasting future migration flows by using historical data. Regarding the EU southern enlargement, in fact there were no remarkable differences in the pension systems between source and target countries. Empirical surveys conducted in some potential migration CEECs, however, find evidence for a significant impact of social security systems on migration decisions (Bauer/Zimmermann, 1999, 97ff.).

Our paper therefore tries to extend the focus from the short-term oriented explanation of migration decisions by using GDP per capita as the most important explanatory variable to a more comprehensive and long-term oriented explanation by taking lifetime income effects from different pension systems into account: Although we are aware, of course, that the benefits of different pension systems are only one element of a more comprehensive measure for differentials in long-term disposable across countries.

For the argumentation underlying this paper it is important to emphasise two aspects of potential migration from the CEECs to the “old” EU-15 member countries which distinguish it from migration in the aftermath of the southern enlargement: The first aspect concerns the age structure of the migration potential, the second one its level of qualification.

Age structures of the population are differing significantly between “old” and “new” member countries. Although birth rates have fallen considerably since the beginning of transition in the CEEC-10, the average age of the workforce will remain rather low for decades in comparison with EU levels (European Integration Consortium, 2001, 25). While only Bulgaria and Hungary show similar demographic developments as the EU-15, all other CEECs have relatively smaller age groups beyond the age 65 and relatively larger cohorts for ages 0 to 14 (Bauer/Zimmermann, 1999,

42f.) For the former CSFR and Poland, for example, a total population growth of 14% respectively 13.8 % is estimated for the period between 1994 and 2025 (Bauer/Zimmermann, 1999, 43). Furthermore a relatively higher mobility of younger people in comparison to the older ones can be empirically 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). The lower age groups are on average more prone to migration than the older ones and they have on average a higher share in the population in the CEECs 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 receiving countries. An indicator for the plausibility of this assumption is the actual 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. "Almost 70 per cent of the workers from the CEECs are aged 25-44 years, while in the EU on average only 55 per cent of all workers belong to this age group." (European Integration Consortium, 2001, 55)

The second aspect refers to the qualification level of potential migrants from the CEEC-10: On average, we expect a higher education level of the migrants from CEEC-10 in comparison to the EU-15 and to past migrants to 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 (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, the qualification level of migrants on average is higher than the overall qualification level in a given source country. 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 (e.g. European Integration Consortium, 2001, 55). That migrants from the CEECs are mostly employed in low skilled sector only seemingly contradicts this fact. It is the result of limited access to labour markets in the EU-15, not of a lack of human capital, as certificates and qualification records are not acknowledged by the EU-15 authorities (Sinn et al., 2001, 48), and leads to dequalifying processes (European Integration Consortium, 2001, 56 f.). It can be expected, however, that the accession process will lead to an approval of these records, i.e. that existing barriers on the labour market for higher educated jobs will be removed.

On the demand side the migrant labour market in the future will be characterised by a further decreasing demand for low-skilled work in the EU and a corresponding rise in the unemployment rate. Immigration into unemployment causes high migration costs as migrants which are unemployed immediately after immigration do not receive any public transfers in the target country. Therefore there are low, and decreasing, incentives for migration for low-skill workers from the CEEC-10 (Sinn et al., 2001, 101).

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 potential average future migrant

from the CEECs is younger, better educated and has a higher level of skills than the average inhabitant of Germany respectively of the EU-15.

3. The economics of migration and pension systems

From the previous section we learned that social security has not (yet) played a major role in the assessment of the east-west migration potential. We will now show, however, the various interdependencies between migration and different types of national pension systems.

3.1. Intergenerational redistribution

Pay-as-you-go (PAYG) financed pension systems work in a rather simple way. The sum of (earnings-related) contributions collected from the working generation is redistributed immediately to those who are retired. Hence, within each period funds are redistributed *intergenerationally*. The return on the retirees' contributions is mainly determined by the population growth rate. Clearly, migration has a direct impact on this *fundamental budget equation* of the pension system (Krieger, 2001). In the destination country, the number of contributors increases, so either the pension benefit can increase or the contribution rate can decrease (Haupt/Peters, 1998). Usually, we find some of both effects at the same time (Wagener, 2001), i.e. increasing benefits and decreasing contribution rates. In an ageing society, benefits decrease *less* and contribution rates increase *less*. The opposite argument holds for the source country because here the number of contributors decreases.

As soon as migration starts to happen, these effects may become self-enforcing. This is because in the destination country with each immigrant the contribution rate can decrease further and therefore c.p. the net income increases, unless some countereffect occurs, e.g. negative changes in the marginal productivity of labor. Empirical investigations show, however, a rather low impact of immigration on the destination country's wages (Friedberg/Hunt, 1995). In the source country just the reverse is going to happen: with each individual leaving the country, the number of contributors falls, so contribution rates will most likely increase and the net income falls. So, the destination country becomes even more and the source country even less attractive for migrants.

Therefore, as soon as migration starts due to some initial incentive, we would expect an improvement in the destination country's pension system and a worsening in the source country's system. However, while on an aggregate level it may seem reasonable to expect migration flows, the picture changes if a single rational individual is considered. The reason for this may be that there is no initial incentive to even start with migrating. With regard to pensions, the individual is interested in the net public pension wealth *NPPW* (Feldstein, 1974) which is the difference of the present value of retirement benefits minus the present value of the contributions to the pension system. If this difference turns negative, the *NPPW* can be interpreted as an implicit tax on income (Wildasin, 1999). In a PAYG financed pension system the *NPPW* turns negative easily if the society is ageing. The fewer contributors there are, the higher the contribution rate will get and the

lower the expected future pension benefit will be. Hence, from an individual perspective migration will be less attractive if reproduction rates are low in the destination country. This can only be overcome if a substantial number of migrants moves to the host country, however, this presupposes an agreement about such a *collective action* because of the otherwise negative incentive for an individual worker.

These issues do not play a role in fully-funded (FF) pension systems which are independent of population growth. Members of this system just collect individual funds for their future pension benefits. Contributions are paid the market interest rate, not a “biological interest rate” in the sense of the population growth rate. Hence, migration decisions do not have an impact on FF pension systems. A young worker who is migrating into a country with an FF system will open an individual account and start contributing funds into this account. The only effect that may occur is a negative interest rate effect due to a higher demand for bonds, however, in an open economy this should be negligible.

Pension systems are usually assumed to consist of three different pillars which are financed differently. The first pillar is defined as the basic (flat) insurance scheme, the second pillar as a public individual or employer-based pension plan, and the third pillar is voluntary individual contributions. Most often the first pillar is PAYG financed while the second and third pillar are mainly funded. Depending on the relative mix of the pillars and the demographic situation, the incentives to enter a certain national pension system are quite different. With low fertility rates, especially young workers are often interested in joining a mostly funded system since this allows them to enjoy the relatively higher interest rate compared to the PAYG system⁷.

With respect to differences in fertility rates, a further argument may play a role. We already know that the return paid to PAYG contributions is c.p. lower in a country with a lower fertility rate. This clearly lowers the migration incentive. If migration would nevertheless take place, redistribution of funds will take place between immigrants and natives. This is because the higher fertility rate of immigrants will increase the average fertility in the host country. This will benefit the native population as well as the immigrants. Hence, the immigrants’ offspring (which is relatively more numerous than the natives’) will partially cover the native population’s pension benefits. Redistribution from the immigrants to the natives takes place in terms of paying an “entrance fee” for entering the country. For Germany, Sinn (2001) estimates this fee or the positive fiscal externality to the German population, respectively, to be about €175,000. But why would an individual leave his country and have his children’s contributions partly redistributed, if he can avoid this by staying in his home country? So, we have two negative effects from fertility differences which may lower the migration incentive substantially. First, the interest rate on contributions is lower the lower the fertility rate; second, entering a country with a lower fertility rate

⁷ This is obviously a myopic behavior as existing pension claims have to be paid for by increased government debt or higher taxes. However, some of the burden may nevertheless be shifted to the old generation (e.g. through a higher VAT), so it may even be rational to behave accordingly.

costs some entrance fee. Furthermore, we found that for young workers it is more attractive to enter a pension system with a strong funded pillar.

3.2. Intragenerational redistribution

While it is rather obvious that pension systems redistribute intergenerationally unless they are fully funded, they may also involve intragenerational redistribution, i.e. redistribution of funds between certain groups within the same generation. These may be skilled and unskilled workers, the rich and the poor, employed and unemployed or those who retire early and those who do not. Furthermore, redistribution between men and women may occur. Again, this holds only for PAYG systems since fully funded systems involve individual accounts, so no kind of redistribution can take place. With regard to migration decisions this makes funded systems especially attractive for those workers who can expect to be net contributors in an intragenerationally redistributive system.

Within the group of PAYG pension systems two polar cases can be distinguished. On the one hand, there are so called Bismarckian systems like in Germany or France. These systems are actuarially fair, i.e. in old age workers will receive pensions that are proportional to their labor income averaged over their work life. Pensions are designed to extend the standard of living that was achieved during work life to the retirement age (Börsch-Supan, 2001). On the other hand, there are Beveridgian systems which can be found e.g. in the United Kingdom or the Netherlands. They provide a flat base pension benefit for all workers, regardless of how much they contributed to the system. While there obviously is intragenerational redistribution involved in the Beveridge system, this does not happen in a Bismarckian system, except for redistribution between men and women due to differences in life length and in case that unisex lifetables are used which is quite common. Realworld pension systems are usually a mixture between the pure Bismarckian and the pure Beveridgian systems. Even the German system involves some degree of intragenerational redistribution as has been shown by Börsch-Supan/Reid-Held (2001).

The net effect of migration between a country with a Bismarck system and a country with a Beveridge system depends mainly on which group is more mobile, the potential net contributors or the potential net benefactors of the system. If e.g. the skilled workers, which are relatively high earning, are especially mobile, than the direction of migration is towards the country with the Bismarckian system. If it is the poor that is mobile, migration will be towards the Beveridge system. For this conclusion to hold, we must assume the residence principle, i.e. the place of residence determines the participation in a pension system.

3.3. Institutional aspects and migration duration

After the EU eastern enlargement the general EU regulations will apply to the new member countries as well. In our context, this is especially EU regulation 1408/71 which states that individuals will keep their pension claims always against the country in which they paid their contributions, regardless of the place of residence. This means that it depends on age how much a

worker may gain (or lose) from migrating into another country's pension system. A worker who is just at the beginning of his work life will stay in the new pension system for about 40 years, while a person who is in his fifties will get benefits from two sources: from his home country he will receive the benefits from the contributions of the last 30 years, in the destination country benefits will be related to the contributions in the next 10 years.

This will again have an impact on the migration behavior of different age groups in society. If the destination country's pension system is very attractive, especially young workers have an incentive to migrate because the present value of expected future gains from the pension system is high. If, however, the *NPPW* in the destination country is negative, for the same reasons as before the migration incentive is very low or at least it is reduced (assuming that there was a sufficiently high wage differential before). Older workers do not care too much about these problems. Most of their income in old age will stem from the home country's pension system. Even if the destination country offers gain from an attractive pension system, this will increase the future pension benefit only slightly. At the same time, a loss from moving into an unattractive pension system is comparably low. Therefore, we would expect that young workers react to differences in the pension system much more than older workers do. To complete the picture, we should mention that with respect to pension benefits retirees do not gain at all from migration because they will receive their entire old age income from their home country.

In this context one has to keep in mind that many individuals do not plan to stay in the host country forever. Some degree of return migration has therefore to be considered. There is, however, a problem because most countries have minimum requirements for eligibility of pension benefits. In Germany, e.g., the requirement is 60 months of contributions. Therefore, a worker has to stay at least for a certain time in the destination country, because otherwise he will not gain from the potentially gainful pension system. Even worse, he may lose future benefits in his home country. Therefore, gains from differences in the pension systems will be realized only in case of long-term migration.

4. Pension systems in Eastern and Western Europe

To investigate whether it may be worthwhile to migrate westwards, we need to take a closer look at the pension systems in the main source and in destination countries, i.e. in Poland, Hungary, the Czech Republic and Germany, respectively. As it is not possible to describe the pension systems in all details, we will put emphasis on the properties which are most relevant to our argument. Hence, our interest will be mainly on the amount of inter- and intragenerational redistribution as well as some other aspects.

Although there were several country-specific reasons, too, why pension reforms became necessary in the CEEC, some general features can be extracted. After the breakdown of the socialist economies, the former pension systems could no longer be sustained in the 1990s. These systems were often considered unfair, 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 come in the Czech Republic. Obviously, the situation is different for the matured German pension system where for political reasons only gradual reforms are possible. Here, the very rapid ageing process is the main challenge.

4.1. Poland

In Poland, a new pension system was introduced in 1999. The public support for the reform was significant. About 90 percent of the respondents believed that the reform was needed and there was heavy support for all important parts of the reforms, e.g. introduction of individual pension accounts, supplementing the PAYG system with funded elements, a high degree of actuarial fairness. The highest support came from the youngest people, the highly educated and the rich (Chlon-Dominczak, 2002, 113-114).

The Polish pension reform 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% and will be the same for all generations, hence, in principle the government abstains from the possibility to change rates⁸. Because of this, pension benefits adjust endogenously to changes in the underlying parameters. This feature of the pension system may especially be interesting for those who have a strong preference for consumption today, i.e. in case the discount rate of future consumption is high⁹, because contribution rates remain at a relatively low level in the face of an ageing society while future pensions will be lowered.

Contributions 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). Thus, the rate of return in the NDC scheme equals the indexed rate of growth of the contribution base (Chlon-Dominczak, 2002, 117). The benefit is adjusted by both the value of contributions paid during the entire work life and life expectancy. Indexation in line with the wage bill helps to give contributions the same weights regardless in which period they were paid. This ensures to remove undesirable or unintended (intragenerational) redistribution, compared to systems which

⁸ 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).

⁹ Persons with a low discount rate which value future consumption very high may prefer a pension system which tries to fix the pension benefit at a certain level. Then, increasing contribution rates are accepted more easily.

emphasize the weight of contributions in the last years before retirement (Chlon/Góra/Rutkowski, 1999, 20-21). Redistribution between men and women is not excluded, however, because unisex life expectancy tables are used to calculate the pension benefit. The minimum retirement age will increase to 60 years for women and 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 pillar¹⁰ 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. Contributions are paid equally by employers and employees. People can freely select just one of the funds that got a license from the pension-fund supervision office. There is a relative rate of return guarantee which is 50% of the average rate of return of all pension funds¹¹ (Chlon/Góra/Rutkowski, 1999, 31). The pension funds are given limits to where they can locate their investments. The limit on investments abroad is very low (only 5%) which is a major limitation to risk diversification. 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.

As usual, the third pillar is savings or voluntary contributions to private pension funds, e.g. by long-term savings plans or occupational-pension programmes. This pillar is very flexible, allowing individuals to reallocate income over the lifecycle according to their preferences and needs. Especially employer-organized group life insurances with a set time for benefit withdrawal are popular among Polish workers (Chlon/Góra/Rutkowski, 1999, 35). Taxation is done by using the pre-paid expenditure tax approach, i.e. contributions are made out of taxed income. Investment returns and benefit withdrawals are tax free. 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.

There exists a minimum pension guarantee additional to the pension system. People are required to have contributed to the pension system for either 20 (women) or 25 (men) years before. If the expected pension benefit from the pension system is below the minimum level, this benefit will top up pensions from the first two pillars to the minimum level (Chlon/Góra/Rutkowski, 1999, 34). However, the minimum pension is separated from the pension system. It is financed from general tax revenues, so despite the minimum pension there exists no Beveridgian component in the Polish pension system.

The transition from a PAYG defined-benefit (DB) system to an NDC system has caused a transitional burden which needs to be financed. Three main sources of financing will be used (Chlon-Dominczak, 2002, 171): privatisation revenues (will cover about 10% of the transition deficit), increased government debt (about 25%), and benefit reductions in public pension system (about 65%). The latter reductions stem from a lower indexation of benefits, increases in retirement

¹⁰ Due to the close resemblance with the new Swedish pension system, some authors speak of pillar 1A and pillar 1B instead of pillars 1 and 2 (see e.g. Gora, 2000).

age and lower replacement rates. Hence, during the transition period most of the burden is carried by the retirees themselves.

In order to analyze the behavior of persons being young at the time of the EU eastern enlargement and retiring in about 35 to 40 years, one can consider the results of long-run projections (e.g. Chlon/Góra/Rutkowski, 1999, 37-41). Due to the NDC system, the 2050 replacement rates for retirement at age 65 are 29.9% from the first pillar and 32.2% from the second pillar, so these cohorts can expect to receive approximately one half of their pension benefits from the second prefunded pillar¹². In total, the replacement ratio is 62.1% which is well below the one from the old system (some 70%). Sensitivity analyses find a substantial improvement of the replacement rates when retiring later than at age 65, while early retirement is quite expensive in terms of foregone benefits. There is a strong incentive to work longer.

In summary, we can conclude that the reformed Polish pension uses mandatory individual accounts to combine two different pillars: an NDC system and individual, privately managed savings accounts. Eventually both parts will contribute about one half of the future pension benefit. The system is relatively transparent and avoids almost all kinds of intragenerational redistribution.

4.2. Hungary

Hungary was the first eastern European country which enacted a pension reform. The reform introduced a new pension system in 1998 which was basically in line with recommendations by the World Bank (1996). The old one-pillar mandatory PAYG system with unindexed retirement benefits was replaced by a three-pillar pension system.

Basis for the first pillar of the new pension system of 1998 was a reformed¹³ and downsized version of the earlier PAYG pension system. The main elements of the reform of the PAYG pillar were the following (Rocha/Vittas, 2001): The retirement age was raised to 62 years for both sexes (from 60 and 55, respectively) 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. Finally, some changes in the tax treatment were conducted.

Unlike in Poland, the reformed first pillar is relevant for all workers. Workers aged 40 and younger are required to enter the new multi-pillar system, while older workers have to enter at least the reformed PAYG pillar. Their participation in the funded pillar is voluntarily. The total contribution

¹¹ Or 4 percentage points, whichever is lower.

¹² The third pillar is not considered here, because so far there are no estimates of the relative size of all three pillars in the matured pension system.

¹³ Some reforms of the PAYG system, like the introduction of a higher retirement age, were enacted already before 1998 because otherwise the system would have been in serious trouble already in the early 1990's (Augusztinovic et al., 2002, 30-32).

rate is supposed to be 30% for all workers, 8% are paid for the 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% of the contributions to the unfunded pillar and 8% to the funded pillar.

The second pillar started operating in 1998. The mandatory contributions are to be placed in pension funds which are legally structured in a similar way as 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 that fulfill this condition). Unisex lifetables have to be employed by the licenced pension funds¹⁴.

Basically two types of guarantees are given by the *Guarantee Funds* which introduce certain redistributive elements into the pension system and thus tend to loosen the link between individual contributions and benefits¹⁵: first, the second-pillar benefit cannot be lower than 25% of the first-pillar benefit, and second, there is some minimum return of the fund's portfolio which is related to the return of long-term government bonds (Rocha/Vittas, 2001). Like in Poland, there is a ceiling to foreign assets which is, however, expected to increase to 30% by 2003 (Rocha/Vittas, 2001).

The third pillar consists of the typical voluntary private pension scheme which is mainly constructed as mutual associations. It was established already in 1994 and has approximately one million members (25% of labor force), most them being middle-to-high income earners above age 35 and employed in larger enterprises. On average, they contribute 5% of the average wage. Total asset have reached 1.5% of GDP in 1999 (Rocha/Vittas, 2001).

Again, the pension reform with a transition from a pure PAYG to a multi-pillar system causes a transitional burden because contribution to the PAYG pillar decrease until all people are covered by the multi-pillar system. Unlike in Poland, privatisation revenues are not explicitly used for financing. Hence, only public debt financing and savings within the first pillar (equivalent to tax financing) are available to cover the projected deficit. For the first years, the government decided to rely relatively more on debt financing to cover the transitional burden, so the expenditures of pension system will decrease only slowly. Later, increases in the retirement age, changes in the tax regime and in the indexation formula will be used to lower the expenditures in order to line them up with the decreasing contributions (Palacios/Rocha, 1998). This will even produce surpluses in the PAYG pillar over the next decades which peak in 2013 (Rocha/Vittas, 2001). It is important to notice that although tax-financing will play a dominant role, the transition will not benefit excessively future generations while current workers would have to carry a double burden. Generational accounting shows that the net burden on future generations falls from \$18.950 to

¹⁴ It might be a problem that annuities can also be bought from outside insurance companies which are not required to use unisex lifetables. Here is clearly a need for regulation (Augusztinovics et al., 2002, 45-46).

\$4.800 but these generations still remain net contributors (Gál/Simonovits/Tarcali, 2001). At the same time the burden on active workers increased slightly as well as the burden of current retirees (due to the introduction of Swiss indexation). However, without the new second pillar current generations would have incurred even greater losses in their generational accounts (Rocha/Vittas, 2001), so intergenerational redistribution becomes less. With regard to intragenerational redistribution we find that it will become less through the reform. The government opted instead to provide most of intragenerational redistribution by a means-tested minimum income guarantee under a new social assistance program (Palacios/Rocha, 1997).

The replacement ratio in the first pillar is expected to drop from currently 60% to 45% in the future. The second pillar will have to make up for the decrease because otherwise old-age poverty will increase substantially. It is estimated that a real interest yield of 4.5% has to be earned to reach at least the previously discussed benefit of 25% of the first-pillar benefit. However, compared to the Polish pension system the projection for the Hungarian replacement ratio are still relatively high which may partly be due to the relatively high contribution rates and the slightly more favorable fertility pattern in Hungary. It should be noted that the difference of approximately 10 percentage points in contribution rates may cause labor market problems after the accession to the EU.

Despite of some criticism and some obvious flaws in the pension reform, it was supported by the majority of Hungarians. The actual switching outcome towards the new three-pillar system was higher than expected and even people aged 40 and older (who were supposed to stay in the reformed first pillar) entered. Polls in 1997 showed a support of the reform of more than 50% (Palacios/Rocha, 1997). At the time of introduction of the reform, about 2 million workers entered the three-pillar system although only 1.5 million were expected (Augusztinovics et al., 2002, 51).

We can summarize as follows: The reformed Hungarian pension system is a three-pillar system in line with World Bank recommendations. The first pillar is a reformed version of the old “traditional style” pension system and not an NDC system as in Poland. There is some discussion to move towards this direction (Simonovits, 2002). Intragenerational redistribution is clearly reduced, but not excluded. The new government made several changes in the last couple of years which were contrary to the initial reform agenda.

4.3. 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 financed public pension system and complemented it with a *voluntary* private pillar¹⁶ (Müller, 2002, 113). So far, it seems that the reforms are not sufficient to guarantee long-run stability. There is some discussion

¹⁵ See Augusztinovics et al., 2002, 46-48, for a discussion of this problem.

¹⁶ There is no mandatory private pillar, so the Czech republic has basically a two-pillar system.

on further reforms ranging from the introduction of an NDC system (Mácha, 2002, 89) to the enlargement of the private pillar and an increase in its efficiency (Jelínek/Schneider, 1999, 269). However, the main actors in the Czech political arena are not in agreement on this topic. It remains to be seen whether the new government will be able to implement more than another gradual reform step.

In the beginning of the 1990s, the government of the (at that time) Czechoslovak Republic began with the first reforms, trying to remove elements such as special preferences for certain groups which added to the unfairness and intransparency of the old system. The key parametric reforms were contained in two legislative acts which were passed in 1994 and 1995, respectively. In 1994, a voluntary supplementary pension insurance scheme was introduced as the second pillar of the pension system; in 1995 the existing public pension pillar was reformed.

This first pillar is PAYG financed and of the defined-benefit (DB) type with a relatively high degree of intragenerational redistribution by mixing flat-rate and earnings-related pensions (Laursen, 2000). The inclusion of this basic flat rate redistributive element (CZK 1,310 per month) into the public pension system is in contrast to the Polish or Hungarian systems where intragenerational redistribution has been abandoned from the pension system and transferred to the state budget.¹⁷ Among other measures, the flat-rate component has significantly contributed to the very high level of equalization within the pension system that can be measured. An income of 50% of the average monthly wage (of CZK 12,658) leads to an old-age pension of CZK 5,098 which is equivalent to a replacement ratio of 80.5%. A double average wage on the other hand is followed by a pension benefit of only CZK 7,182 or a replacement ratio of 28.4% (Mácha, 2002, 82).

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). This, too, adds to the high level of redistribution since contributions are paid from full earnings while benefits are not fully taken into account (Mácha, 1999, 249). 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 person. 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 per year of membership.

In contrast to Poland or Hungary, the reformed Czech PAYG system is not projected to produce surplusses over a long time horizon. In 2020, the already high contribution rate would have to be raised to 35% in order to keep up at the ILO minimum standard level. To keep the contribution rate at 26%, the arising deficit would necessarily cause the replacement ratio to fall

¹⁷ Also, the public pension pillar has not yet been completely separated from the state budget (Müller, 2002, 121-122).

from an average 45-50% to 33% by that time (Mácha, 1999, 252). Estimates show that the deficit will remain manageable at a level of less than 1% of GDP only until 2006, afterwards it will increase rapidly. The total debt of the pension system may reach up to 135% of GDP by 2050 (Laursen, 2000). Nevertheless, the government plans that in the mandatory pillar a net replacement ratio of 55-60% should prevail and that the income from the supplementary scheme should reach 10-15% of net pre-retirement income (Mácha, 2001, 88).

The first pillar of the pension system is supplemented by a voluntary pension fund system introduced in 1994. All funds are of the defined-contribution (DC) type with individual accounts and supervised by the Ministry of Finance. The minimum contribution per month is CZK 100 and there is a certain minimum participation time (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. There is no guaranteed return on contributions but the pension funds are obliged to invest only in instruments that ensure a "safe" return. There are no limits set on different classes of assets and on their geographic origin (Jelínek/Schneider, 1999, 261-262).

Since old-age insurance is a merit good, 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 the contribution exceeds CZK 500 per month, a flat subsidy of CZK 120 will be paid. A special incentive to join a pension fund is a 25% increase of the subsidy during the first two years of membership. Contributions and subsidies are essentially tax deductible, however, interest and dividend income from the pension fund will be taxed eventually after retirement (Jelínek/Schneider, 1999, 262).

Participation in the supplementary pension funds developed rather disappointingly, especially among the younger cohorts. Less than 10% of all participants are aged 30 and younger (Jelínek/Schneider, 1999, 264). Jelínek/Schneider (1999, 265) suspect that young workers view private pension savings simply as a substitute for other forms of savings which should usually be done in a third (however, formally not existing) pillar of the pension system. While young people rely on the PAYG pillar as the main old-age income source, pension funds are only attractive due to the state subsidy as a very long-term investment. Low participation rates among the young are partly offset by rather high rates among those aged 45 and older. Again, the state subsidy is the main reason for this development because it provides a relatively high return on savings compared to the capital market¹⁸. The pension funds are used as a short-term savings system.

Summarizing the features of the Czech pension system, we find that the system is mainly based on a substantially reformed but traditional PAYG pillar which is supplemented by a voluntary private pension pillar. Intragenerational redistribution through a flat-sum pension is part of the system. Most likely, the balance of the PAYG pillar is not sustainable in the future, so further reforms will be necessary. It can not be foreseen yet whether these will be fundamental (e.g. a

¹⁸ The minimum time of participation to become eligible for a pension is just 5 years.

move towards an NDC system) or just gradual. Also, a reform of the private pillar is in the order to make it work more effectively. Moving towards a mandatory system may be such a step.

4.4. 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). This monolithic structure of the pension system can be explained by the defined-benefit character of the first pillar which is combined with a comparatively high replacement ratio: the goal is to extend the standard of living during work life to the retirement age but not to provide a safety net¹⁹, e.g. by providing a minimum pension for all individuals. Hence, in principle there is no need for a second or third pillar of the pension system.

The dominant role of the PAYG pillar, however, makes the pension system especially vulnerable to falling fertility rates. In international comparison, reproduction in Germany is extremely low and causes a significant demographic risk. The ageing process is already relatively advanced. The political risk was small so far because pension reforms were carried out in a very broad consensus among all political actors. This has changed somewhat in the last couple of years when reforms were enacted by different governments which were then rejected by the opposition parties. This is also true for the newly introduced voluntary and supplementary private pension pillar, called “Riester-Rente”. It remains to be seen whether it will survive in its initially form after the next federal elections.

In principle, the German public pension system (“Gesetzliche Rentenversicherung” – GRV) works in a rather simple way. Contributions are mandatory for all dependent workers, except for certain groups which have their own pension system (e.g. civil servants) or those with earnings above a certain income bracket (about €57,300 per year). About 90% of the work force are covered by GRV (Börsch-Supan/Reil-Held/Schnabel, 2001, 165). The contribution rate of 19.1% (2001) 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% if it were levied as a payroll tax²⁰ (Börsch-Supan, 2001, 16). The state grant is usually justified by the existence of non-contributory benefits (for child-rearing etc.), however, there is not necessarily a correspondance between the size of both items. This violates to some degree the contribution-benefit link and allows for intragenerational redistribution.

The German pension formula consists in its very basic version of four factors (Börsch-Supan, 2001, 17; Rürup, 2000):

¹⁹ There is a means-tested social assistance (“Sozialhilfe”) outside the pension system to which all citizens are entitled.

²⁰ This grant stems from the general federal tax revenues as well as from a one-percentage point increase of VAT and an increased green tax.

Pension benefit	=	Individual contribution level	•	Individual years of service	•	Individual adjustment factors	•	Current pension value
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The individual contribution level is the ratio of individual gross earning to average gross earnings in a certain years. This ratio gives the amount of earnings points for a certain year. At retirement, the sum of earnings points (including bonus earnings points for child rearing etc.) is taken to calculate the pension benefit (Schmähl, 1999, 101). Clearly, the number of years of service has a decisive impact on the sum of earnings points. Finally, there are some adjustment factors which determine the individual part of the pension formula: these are the pension type factor and the access factor which takes into account the time of retirement. The latter factor is 1.0 at the age of 65 and starting in 2004 it will be reduced (increased) by 0.003 (0.005) per month of early (late) retirement. In case of early retirement this corresponds to a reduction of the pension benefit by about 3.6% for each year of early pension payment (Rürup, 2000). Börsch-Supan/Reil-Held/Schnabel (2001, 168-170) point out, however, that these factors are not actuarially fair – early retirees receive too high and late retirees too low pensions.

The current pension value represents the value of one earnings point in the year of retirement. It is the “dynamic element” in the German pension formula (Schmähl, 1999, 101-102) and determines the income (re-)distribution between workers and retirees (Börsch-Supan, 2001, 17). The current pension value 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. The benchmark level equals the replacement ratio and is approximately 70% of the net average income of all insured persons. This is DM 2,144 (West) or DM 1,839 (East), such that the actual pension value is DM 48.29 and DM 42.01 (Rürup, 2000).

An important question in all German pension reforms has been how to adjust the pension value to the changing average income of workers. Until 1992, the pension value was indexed to the development of average gross earnings, after 1992 rules were changed to a net average wage indexation in order to cope with the aging of the society. It was feared that pension benefits could rise faster than the contributors’ net incomes, especially due to increasing contributions to the pension system. In the 1999 reform act, it was tried to introduce a “demographic factor” into the pension formula which would explicitly have taken into account the development of life expectancy. This was, however, after the federal election in 1998 immediately revoked by the successor administration. Instead (and in order to gain time), the new government introduced a one-time adjustment in line with the inflation rate in 2000, then turning back to net income indexation in 2001 (Borgmann/Krimmer/Raffelhüschen, 2001).

Finally, in 2002 a “modified gross wage indexation” was introduced. Benefits are now 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 dependency ratio. 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. Furthermore, starting in 2011 only 90% of the gross wage growth will be considered in the pension formula which will shift an additional part of the burden to the retirees. It is questionable whether the rather erratic changes in the pension formula in the last decade increase already low confidence in the long-run stability of the pension system. Polls show that almost two-thirds of all Germans denied the question whether they have confidence in the German pension system (Börsch-Supan, 2001, 26).

The goal of the pension reform is to keep contribution rate below a long-term level of 22% which is supposed to hold even after 2030 when the dependency ratio is expected to be highest. This means in principle that the net replacement rate is free to adjust, however, the government de facto guarantees that the level will not fall below 67%. Bonin (2001) shows that it is unlikely that this twofold goal can be reached: the maximum contribution rate will be attained at a level beyond 23% in 2035 while the net replacement ratio will fall below 67% already in about 5 years. In 2035, it will even be lower than 63%. Given the promises of the government, further reforms or an increasing state grant will be necessary.

To allow the (mandatory) members of pension system to make up the (accepted) decrease in the replacement ratio of about 3%, a supplementary voluntary private pension scheme has been introduced. After phasing in the system between 2002 and 2008, finally up to 4% of gross wage can be saved for retirement in licensed private pension funds or occupational pension plans. The government supports these old-age savings with 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-rearing²¹. 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 live in Germany where will be taxed. 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 that qualify for government support can not pay out collected contribution until the contributor reaches age 60. They have to provide a life-long annuity or a fixed yearly payment of no more than 3.6% of the capital until age 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). This rule is problematic as pension funds may have to introduce (costly) insurance measures to fulfill the “money-back” guarantee which will reduce the return on investment. The same problem arises with occupational pension schemes²² in which membership

²¹ See Sinn (1997) 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.

²² So far, occupational pension were provided only from book reserves. Now, defined-contribution plans may be offered.

also qualifies for government support. Employers have to bear the risk of the minimum pension guarantee.

Bonin (2001) investigates whether the newly introduced private pillar will be able to make up the reductions in the replacement ratio expected after the pension reform. Assuming a modest real rate of return on investment of 1%, he finds that the combined replacement ratio from public and private pensions will start to exceed the 67% level in 2025 and will reach 71% in 2050 which is even higher than today²³. With higher rates of return, the target level of 67% will be exceeded even earlier: in 2020 (2%) or 2018 (3%), respectively. These estimates rest, however, on the assumption that the public pension system will remain sustainable and perform in the expected way which is somewhat doubtful.

Though there exist some intragenerationally redistributive elements in the German pension system which totaled about €50 billion in 1995 (Börsch-Supan/Reil-Held, 2001), these do not go beyond what is international standard (except for the integration of East Germans into the pension system), i.e. child-rearing, early retirement, non-contributory benefits. There exists a small minimum pension element ("*Rente nach Mindesteinkommen*"), but in general means-tested social security (which applies to retirees with too low pension claims as well) is organised outside the pension system. Welfare benefits are covered from the state and local budgets. Starting in 2003, a basic pension provision ("*bedarfsorientierte Grundsicherung im Alter*") will be introduced which tops up too low benefits, but again the funds stem from outside the pension system.

The German pension system after the 2001 pension reform can be summarized as a system with a dominant public PAYG pillar and a rather small supplementary and voluntary private pension pillar which is supposed to cover reductions in old-age income due to a falling replacement ratio. The new pension formula tries at the same time to keep the contribution rate low and the replacement ratio high. There is some doubt whether these goals can be achieved. An attractive feature of the German pension system is its Bismarckian style with a low level of intragenerational redistribution.

5. A comparison of pension systems and a reassessment of the migration potential

As we learned from section 2, the expected average migrant from eastern Europe to Germany is likely to be at least as young and skilled as the average native. Furthermore, we found that migration is clearly beneficial for the German pension system as migrants will pay higher contributions for a longer time. So, migrants should be welcomed from a pure pension policy point of view. Clearly, this is no longer true if the age and skill distribution among migrants turns out to be less favorable than expected.

Especially young and highly skilled workers are very selective with regard to migration and their possible destination country. It may be the case that an existing positive gross wage

differential will be more than offset by an excessive taxation in the destination country, so the migrant may abstain from entering the country. While a negative net wage differential is easily observable, this becomes much more difficult to recognize if lifetime income differentials have to be considered. In the following, we will investigate whether the German pension system creates *ceteris paribus* incentives for young, highly skilled workers to migrate to Germany or whether this group of people prefers to stay in their home country²⁴. We assume realistically that this mobile segment of the population is not excessively risk-averse, so it is not aiming to live in a country with an extremely high level of redistribution.

If the home country's pension system is more attractive, some of the wage differential between Germany and the applicant country is used up and the marginal migrant will no longer move but stay. This, however, means at the same time that the possible benefit with regard to pensions of the EU enlargement (with following migration flows to Germany) may be smaller than expected or even turning negative.

Considering old, unemployed or poor people, we find that they are less likely to migrate. 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 countries²⁵. EU regulation 1408/71 prevents that old people can enter a possibly more generous pension system, they will be paid their home country's pension. The participation of unemployed and poor people in the general social security system is usually prevented by several safety measures. Only a very basic social assistance may be applicable. As these groups are not very flexible in their migration decision, we will put the emphasis of our investigation on skilled workers.

Especially if coming to a foreign country without ethnic or family ties, the willingness of a young and highly skilled worker to participate in redistribution as a net contributor is most likely low. This holds even more if migration is considered to be only temporary because then no reflux of benefits can be expected e.g. in old age. Therefore, it is attractive for the young worker to migrate to a country with little inter- and intragenerational redistribution. A first measure of the level of redistribution is the relative size of the first two pillars²⁶ of the pension system as the second funded pillar does usually not involve redistributive elements.

It is yet too early to estimate the relative sizes of the three pension pillars in the applicant countries, however, there are at least some projections with regard to the expected replacement rate. In Poland, it is expected that the replacement rate from the second pillar will be slightly higher than from the first pillar. In Hungary, there is a guarantee that the second-pillar benefit cannot be

²³ It seems that the general suspiciousness of the German PAYG pillar also affects the new funded pillar (although its expected performance appears to be attractive): until the middle of 2002 only about 2 out of a possible 32 million citizens concluded a contract under the new law.

²⁴ Due to space limitation, we do not consider whether there may be other western European countries which are more attractive than Germany.

²⁵ Some groups of low skilled workers will nevertheless be welcome in western Europe, e.g. nurses, agricultural workers or dustmen.

²⁶ We do not explicitly consider the third pillar as governments usually aim at providing a sufficient old-age income already with the first two pillars.

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 1/4 to 1/3 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 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. For any two countries which are identical expect for the relative size of the PAYG compared to the funded pillar, the country with the smaller PAYG system involves less redistribution.

While it seems that the Eastern European pension systems are more attractive with respect to the level of redistribution measured by the relative size of the funded pillar, we have to take a closer look at different types of redistribution. A PAYG system involves in any case intergenerational, but not necessarily intragenerational redistribution. The amount of intergenerational redistribution depends on the parameters of the system and on the age distribution in society. The more beneficiaries there are and the higher the benefits they receive, the more funds are redistributed between generations.

A rough measure for this indicator is the amount of public pension spending relative to GDP. It shows the overall size of the PAYG pillar and indicates once more its importance in Germany: the share will increase from 11.8% in 2000 to 16.9% in 2050²⁷. 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 hints at 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.

In this context, it should be noticed that the restriction of asset holdings in the pension funds to domestic bonds and stocks (as in Poland and Hungary) is problematic. The high share of government bonds implies simply that implicit government debt from the PAYG pension system is turned into explicit debt. This can be overcome by lifting the restrictions and allowing to invest internationally as it is possible in Germany and the Czech Republic.

Things are somewhat different for the case of intragenerational redistribution as a PAYG system may be of the Bismarckian type where there is a tight link between contributions and benefits. Although Germany is considered the prototype Bismarckian country, there is nevertheless some intragenerational redistribution. Again, the relatively strong FF pillars of the eastern European pension systems should be preferred (if the system were purely Bismarckian, workers should be indifferent). At the same time, strong intragenerational elements in the PAYG pillars

²⁷ This estimate rests on a baseline scenario of 300,000 net immigrants in 2000 falling to 200,00 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.

(compared to Germany) may offset some of the advantage of the strong funded pillar. This is the case, however, only in the Czech Republic where a minimum pension is included in the first pillar. The Polish and Hungarian pension reforms introduced Bismarckian type systems in these countries; means-tested minimum income guarantees became part of the government budget. Hence, with regard to intragenerational redistribution at least Poland and Hungary do not perform worse than Germany.

So far, we have considered only the redistributive aspect of funded and PAYG financed pension pillars, however, it is usually assumed that funded pension systems earn a higher return²⁸. The internal rate of return can be measured by the growth rate of total wages which is roughly the growth rate of wages (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% over the last four decades. At the same time the real return on ten year German government bonds was constantly around 4% (Sinn, 2000). From the point of view of an individual which is possibly myopic²⁹ 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. Schnabel (2000) shows that among young cohorts of self-employed who are not mandatory members of the German public pension system, voluntary participation is close to zero. One can expect that the rates of return in the Eastern European countries will be above the German ones for some time because economic growth will be higher. On the other hand, risk of default or inflation will remain high. Eventually, rates will converge to Western European levels (especially if the Eastern European countries enter the EMU).

The internal rate of return in the PAYG is most likely to even worsen in the future. While German wages grow roughly at the same speed as long-run productivity growth, Eastern European wages will be comparatively higher during the catch-up process and eventually converge to the European standard. Therefore, especially the average annual growth rate of the working-age population will be of interest (see Table 3). Abstracting from the problem of unemployment, this rate is negative for all countries and therefore reduces positive growth of the wage rate – the internal return of PAYG pillar will 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 earlier stabilized at a low level. If wage growth remains higher during the catch-up process though, this may not be a major disadvantage for these two countries.

Next to the reproduction pattern of a society, the development of longevity plays an important role as well. Life expectancy at birth is expected to increase in all countries and for both sexes (see Table 3). This means that the elderly population is increasing at a high rate which is

²⁸ From a theoretical point of view, 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).

²⁹ 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.

between 0.71% per year in Hungary and 1.55% in Poland (Dang/Antolin/Oxley, 2001). It is much more instructive, however, to consider growth rates of both age groups jointly, e.g. by looking at the old-age dependency ratio (share of those aged 65 and older in working-age population (20-64)³⁰). Here, we find that in the three applicant countries the ratio will increase almost linearly between 2000 to 2050: from about 20-23% to about 47-57%. In Germany, the case is somewhat different as the ageing process is further advanced: starting out at 27% in 2000, the ratio will be at 54% already in 2035 and fall slightly afterwards. Pension reforms should therefore be designed differently in Germany: they must take into account the relatively soon and steep increase in the old-age dependency ratio. For a young person of age 20 to 30 who is retiring around 2040 it may be interesting to enter retirement before the old-age dependency ratio peaks. This holds in both systems targeting at a constant replacement ratio (later retirement means still increasing contribution rates) and systems trying to keep the contribution rate constant (enjoying comparatively higher replacement rates than workers retiring later). The demographic risk displayed in the projection for Germany also hints to further reform which will become necessary relatively soon.

All pension reforms carry a certain political risk as it cannot be projected exactly which groups in society may lose from them. Therefore, if the domestic pension system can be considered as relatively stable without prospects of major reforms in the future, migration into a country with an almost certain future reform may not be the most preferred option. In the past, the political risk with regard to the German pension system was rather low. Recently, this has changed somewhat, as there is no longer a broad political consensus about pension issues. On the other hand, the German constitutional court has shown to be very reliable in abandoning problematic regulations in the pension laws. The property-rights character of contributions has been strengthened in several court decisions.

In Poland, the move towards an NDC system will reduce the political risk substantially because the contributions are considered even more to be legal claims to property rights. Expropriations are likely to become more difficult: However, it seems that this is merely a psychological phenomenon. In Hungary and especially the Czech Republic, the political risk is likely to be higher as the government still has an important impact on the pension systems.

A special problem may arise between the Czech Republic and Germany, both countries having a voluntary funded pillar. While in Germany, participation is subsidized by a state grant for low-income earners and a tax exemption for high-income earners, in the Czech Republic only a state grant is offered. For a potential high-skilled migrant it is more attractive to receive a tax exemption as it will result in a relatively higher subsidization compared to the flat benefit, hence, he will c.p. choose Germany as place of residence. Clearly, this is no problem if countries have a mandatory second pillar like Poland and Hungary.

³⁰ This ratio turns even worse if the actual average retirement age is considered which is about 59 years in Germany.

Pension reforms that include the introduction of funded pillars necessarily involve a transitional burden as existing pension claims have to be financed somehow. It is a quite difficult task to estimate the exact burden of a certain person without the simulation of generational accounts, the estimation of the *NPPW* or other means. It depends on the cohort into which the person was born and on his position in the income distribution. There is definitely a need for further research as there do not exist estimates of generational accounts for all CEEC countries. Gál/Simonovits/Tarcali (2001), for example, estimate the generational account of a person aged 20 to be \$6,400, while Borgmann/Krimmer/Raffelhüschen (2001) find a value of almost €250,000 for the same person in Germany. Related to GDP per capita in ppp, we get a ratio of 0.60 for Hungary and 9.65 for Germany. If these numbers can be compared (which is very doubtful), net lifetime contributions to the German pension system are enormous compared to the situation in Hungary. Hence, there should be a strong disincentive to migrate to Germany. But instead of relying on these problematic numbers, we only conclude that in all four countries the burden of transition is shared by all generations, however, to a different extent.

6. Conclusions

After the EU eastern enlargement inflows of migrants from the Eastern European countries mainly to Germany are expected. The estimates of the migration potential, however, do not take into consideration the lifetime income aspect of migration. We argued that neglecting this comprehensive income measure may lead to false expectations about the migration potential.

In our *ceteribus-paribus* analysis we therefore investigated the impact of pension systems on the potential migration decision of Eastern Europeans, especially those who are young and skilled as they are likely to be mobile and most interesting to the target countries. This is because they improve the age and revenue structure of the domestic pension system. However, this group of persons is highly selective with regard to their future country of residence. An unfavorable pension system may scare them off.

Our findings are mixed. We cannot conclude that either the Eastern European or the German pension systems perform worse than the other(s). Each system has certain advantages and disadvantages, however, it seems that the Polish pension reform is especially well done. On the other hand, Germany and the Czech Republic are in need of further reforms to solve the ageing problem.

Comparing Poland and Germany, we find that the Polish move towards an NDC system has eliminated much of the redistributive nature inherent in most pension systems. While both systems are quite similar and have a tight link between contributions and benefits (and so almost no intragenerational redistribution), the strong funded pillar and the small PAYG system in Poland reduce also intergenerational redistribution which may be of special interest for a young migrant who has no connections to Germany and possibly considers a return after some time. Furthermore, the age structure in Poland is more favorable than in Germany.

Considering the fact that according to Sinn (2001) each immigrant has to pay an “entrance fee” when coming to Germany, there is no strong case for young and skilled Polish workers to migrate to Germany if only differences in the pension systems are considered. This holds in a similar way for Hungary, too, where the age structure is even more favorable than in Poland. However, the expected size of the funded pillar is smaller. Also, the system is not of the NDC but of the defined-benefit type as in Germany. Several discretionary gradual reform steps have been undertaken already in the few years after the implementation of the new pension systems. This indicates an increased political risk as some reform steps are opposite to the original reform. It seems therefore that Poland has already gone one step further than Hungary. Nevertheless, there is no urgent need for young and skilled Hungarians to leave their home country towards Germany because of an unfavorable domestic pension system.

The results are slightly different for the Czech Republic where no fundamental reforms have been conducted yet. Compared to the other three countries’ pension systems, the Czech system includes an intragenerationally redistributive component. Furthermore, the participation (of the young) in the voluntary funded pillar is disappointing. The state grant is not sufficient, especially if other countries offer tax incentives to potential migrants (however, in Germany only for permanent migrants). Workers rely heavily on the PAYG pillar which makes them vulnerable to demographic risks and leaves the level of intergenerational redistribution high (though not as high as in Germany).

The Czech Republic is certainly the country in which migration incentives from the pension system are most likely to arise, although this is not certain. For Polish or Hungarian skilled workers, no major incentives to move westwards exist – they may even suffer lifetime income losses from changing the pension system. Notice, however, this is only a partial effect which will most likely be more than offset by the income differential.

Nevertheless did our exercise show that the assumptions that Eastern Europeans will happily move “into the German social security system” and expect to be net beneficiaries is misleading in the case of pension systems. Here, it is much more likely that potential migrants are indifferent or even “unhappy” about the prospect of entering the German pension system. If a similar reasoning holds for other branches of the social security systems, the assumption that social security can be neglected in the estimation of the migration potential is problematic.

Further research needs to be carried out to analyze the migration incentives in more detail. It would be useful to conduct a generational accounting study for the expected destination and target countries to estimate which cohorts gain or lose from the existing pension systems. This should give deeper insights into the incentives to migrate.

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Models and assumptions		Sinn (2001)	European Integration Consortium (2001)	Bauer/Zimmermann (1999)
estimation model		econometric dynamic partial adjustment model to an equilibrium migration stock OLS estimator	econometric cross-section time-series, error-correction model fixed-effects estimator	econometric cross section time-series model fixed-effects estimator
variables	income gap	rel. GDP per capita in ppp ¹	rel. GDP per capita in ppp	rel. GDP per capita in ppp
	employment opportunities	[output gap in the destination country integrated in the model, but not used for the estimation] ²	employment rates of destination and source country	relative unemployment rate ³
	network effects	migrant stock of the former period in the destination country	[no significant influence on the migration level] ⁴	not used in estimation, only theoretical argument
	expectations under uncertainty	based on past values of income gap	based on past values of income gap and employment rate	-
	EU-membership	dummy variable	-	-
	free labour mobility	dummy variable	2 dummy variables (free movement and guest-worker agreements)	different time samples
	country-specific fixed effects	-	human development index and language dummy	dummy variables
	individual propensities to migrate	-	based on migration stock of the former period in the destination country ⁴	-
	migration incentives through social security	not used in estimation, calculates only potential net contributions of immigrants	-	not used in estimation, only theoretical argument
dvdata for parameter estimation		migration experience from EU southern enlargement (Greece, Portugal, Spain) and migration experience from Italy and Turkey to Germany (1974-1997)	migration experience from EU-15, Norway, Switzerland, Turkey and former Yugoslavia to Germany (1967-1998)	migration experience from EU southern enlargement (Greece, Portugal, Spain) (1985-1997)
assumptions and conditions for the estimation	sending countries	5 CEECs with the largest population (Poland, Romania, Czech Republic, Hungary, Slovakia) (extrapolation of projections from these 5 CEECs to CEEC-10)	CEEC-10	CEEC-10
	receiving country/-ies	Germany	Germany (extrapolation of projections from Germany to EU-15)	EU-15
	institutional assumptions/scenarios	immediate unlimited free mobility of labour	immediate unlimited free mobility of labour	(I) corresponding to southern EU enlargement (transition period) (II) restricted mobility (III) free mobility
	economic scenarios	income convergence rate p.a.: (I) 0% (II) 2%	(I) baseline projection: income convergence rate p.a. (i.c.r.) 2%; unemployment rates (u.r.) of 1998 (II) low projection: i.c.r. 3%; u.r. Germany 10%; u.r. source countries 5% (III) high projection: i.c.r. 1%; u.r. Germany 5%; u.r. source countries 15%	given scenario from the 1990ies

Table 1: Models and assumptions

¹ ppp: purchasing power parities (usually in US\$)

² This follows the assumption that changes in the output gap in the destination country are induced by the business cycle only and therefore result in short-term migration inflow fluctuations only (Sinn, 2001, 15).

³ The relative unemployment rate is defined as the unemployment rate in the sending country divided by the unemployment rate in the receiving country.

⁴ The results of the European Integration Consortium show that migrant network effects have an influence on the distribution of migrants across the receiving countries but not on the overall level of migration (European Integration Consortium, 2001, X). According to Brücker (2001) the negative effect of an increased total number of migrants in the former period, due to the decreasing propensity to migrate of the marginal migrant overcompensates the falling costs of migration due to network effects.

Estimation results		Sinn (2001)	European Integration Consortium (2001)	Bauer/Zimmermann (1999)
long-run migration potential⁵	to EU-15	-	migration potential rate: 4% ≈ 4.2 million people	(gross) ⁶ emigration rate: 2-3% (scenario (I)) ≈ 2.1 – 3.2 million people
	to Germany	migration potential rate: 8,6% ⁷ ≈ 9.1 million people	migration potential rate: 2-3% ⁸ ≈ 2.1 – 3.2 million people	-
migration stock after 5/10/15 respectively 4/9/14/29⁹ years of EU-membership (in million people)	to Germany under the different economic scenarios	from the 5 projection countries after 5/10/15 years of EU-membership: (I) 1.7/2.7/3.2 (II) 1,8/3,1/4,1	-	-
		extrapolated migration stock from CEEC-10 after 5/10/15 years of EU-membership: (I) 2.1/3.3/4.0 (II) 2.2/3.8/5.0	from CEEC-10 after 4/9/14/29 years of EU-membership: (I) 1.3/1.9/2.2/2.5 (II) 1.1/1.6/1.8/1.9 (III) 1.4/2.1/2.5/3.0	-
	to EU-15	-	extrapolated migration stock from CEEC-10 after 4/9/14/29 years of EU-membership: (I) ¹⁰ 2.0/2.9/3.4/3.9	-
migration from Poland (economic or institutional scenarios)	to Germany	migration stock after 5/10/15 years of EU-membership (in million people) (I) 0.9/1.3/1.6 (II) 0.9/1.5/2.0	migration stock after 4/9/14/29 years of EU-membership (in million people) (I) ¹⁰ 0.5/0.7/0.8/0.9	-
	to EU-15	-	migration stock after 4/9/14/29 years of EU-membership (in million people) (I) ¹⁰ 0.5/0.7/0.8/0.9	long run (gross) emigration: (I) 1.83% ≈ 0.7 million people (II) 1.29% ≈ 0.5 million people (III) 6.11% ≈ 2.4 million people
migration from Hungary (economic or institutional scenarios)	to Germany	migration stock after 5/10/15 years of EU-membership (in million people) (I) 0.1/0.2/0.2 (II) 0.1/0.2/0.3	migration stock after 4/9/14/29 years of EU-membership (in million people) (I) ¹⁰ 0.1/0.2/0.2/0.2	-
	to EU-15	-	-	long run (gross) emigration: (I) 1.05% ≈ 0.1 million people (II) 0.94% ≈ 0.1 million people (III) 2.20% ≈ 0.2 million people
migration from Czech Republic (economic or institutional scenarios)	to Germany	migration stock after 5/10/15 years of EU-membership (in million people) (I) 0.1/0.1/0.2 (II) 0.1/0.2/0.2	migration stock after 4/9/14/29 years of EU-membership (in million people) (I) ¹⁰ 0.05/0.1/0.1/0.1	-
	to EU-15	-	-	long run (gross) emigration: (I) 0.46% ≈ 0.5 million people (II) 0.74% ≈ 0.8 million people (III) 0.33% ≈ 0.3 million people ¹¹

Table 2: Estimation results

⁵ Percentages refer to the total current population of the CEEC-10 of 106 million people.

⁶ Bauer/Zimmermann (1999) do not account for remigration, while the other studies implicitly account for remigration by using the migration stock, therefore they estimate gross migration only.

⁷ This estimation is made by Brücker (2001) who uses the ifo-model and assumes a constant GDP per capita in ppp differential between Germany and CEEC-10.

⁸ See Brücker (2001), 45.

⁹ The time horizons of the studies are differing: Sinn (2001) examines the first 15 years after the enlargement; the European Integration Consortium (2001) analyses the period up to the year 2030 which is identified as the year in which the peak of immigration definitely is reached (European Integration Consortium, 2001, 100ff.).

¹⁰ Results are published only for the baseline projection (scenario I).

¹¹ The somewhat surprising results for scenario II and III for the Czech Republic are due to statistical problems (Bauer/Zimmermann, 1999, 45).

Table 3: A comparison of some features of the pension system in Poland, Hungary, the Czech Republic and Germany

	Poland	Hungary	Czech Republic	Germany
Expected relative size of second pillar to first pillar	>50% (estimate)	>25% (guaranteed minimum)	17-27% (planned by govt.)	$\sim 3/67 * 100 = 4.5\%$ (target level)
Public pension spending (% of GDP), 2000 / 2050	10.8 / 8.3	6.0 / 7.2	7.8 / 14.6	11.8 / 16.9
Minimum pension or income included in the pension system?	no	no	yes	no
Old-age dependency ratio (in %) 2000 / 2035 / 2050*	20.4 / 38.4 / 55.2	23.7 / 34.9 / 47.2	21.9 / 42.3 / 57.5	26.6 / 54.1 / 53.2
Average annual growth rate of working-age population 2000-2050*	-0.45	-0.67	-0.77	-0.46
Average annual growth rate of elderly population 2000-2050*	1.55	0.71	1.17	0.93
Life expectancy at birth*				
Males (2000 / 2050)	69.9 / 78.5	66.8 / 74.6	71.5 / 75.2	74.7 / 80.0
Females (2000 / 2050)	78.2 / 84.7	75.2 / 81.1	78.4 / 81.5	80.8 / 85.0

* Source: Dang/Antolin/Oxley (2001)