Migration Challenge for PAYG

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Abstract

Immigration has been popularised in the economics literature as a tool to balance the troubled PAYG pension systems. A pivotal research by Razin and Sadka showed that unskilled immigration can surmount the pension problem and, further, boost the general welfare in the host economy. However a large strand of current economics literature is engaged in identifying mechanisms through which unskilled immigration, while solving the pension problem, causes undesired shifts in general welfare. This work shows that actually recurring unskilled immigration may challenge the very pension system and decrease the pension benefits themselves. Moreover, it is shown that at any time given the opportunity the population will vote for the unskilled immigration that is welfare depriving in the long-term.

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1 Introduction

Decreased fertility, in tandem with increased longevity, challenges the sustainability of the unfunded pay-as-you-go (PAYG) pension systems in most developed economies: Decreased fertility shrinks the contribution base while the increased longevity burdens the system with more pension claims. Thus, sustainability of the system requires urgent reforms: parametric, demographic, or a combination of the two. Parametric reforms include increased pension contributions (tax rates, or late retirement), decreased benefits, or a combination of the two. Alas, those reforms are welfare impairing: increased contributions harm the working-age population, while the old-age suffer from decreased benefits.

Demographic reforms are the theoretical alternative to (the above-described) parametric reforms. Two main lines of literature exist on the demographic alternatives. The first strand discusses the the problems of native-born population, *i.e.* fertility enhancing policies (*e.g.* Cigno, 2010) and human capital accumulation (*e.g.* Cremer *et al.*, 2011), while the second strand discusses the possibility of substituting the native-borns with immigrants (e.g. Storesletten, 2000; Schou, 2006). Much of the literature is employed in studying the welfare effects of those immigration reforms. The current paper, however, shows that immigration reforms are mostly 'equivalent' to parametric reforms in sense that it decreases the pension benefits (and thus is not a meaningful alternative): The focus will be on unskilled immigration to an economy with unfunded defined-contribution PAYG pension system, both demogrant (redistributive, Beveridgean) and earnings-related (actuarially fair, Bismarckian) pensions.

Already Razin and Sadka (1999) showed that the unskilled immigration can surmount the PAYG challenge: The unskilled immigrants do not merely pay the required contribution but, potentially, increase the welfare to everyone. Thus, the

immigrants come in and pay the missing part of contributions that the system needs for sustainability. When they age, they increase the claims on benefits; however, their children support the pension system then (while bringing the old equilibrium back).

Since Razin and Sadka (1999) much has been written to show that there are numerous ways the general welfare is impaired by the increased unskilled immigration (hence showing that demographic reforms are not preferred to parametric reforms). Thus, Razin and Sadka (2000) claim that the pension benefits are increased with increased unskilled immigration but, in case of closed economy, the wages will decline and thus hurt those who mostly rely on labour for income.

Casarico and Devillanova (2003) noted that the wage decline caused by influx of unskilled immigrants will change the skill distribution among the natives in the host economy. They showed the changes that come with the possibility of endogenous skill upgrade cause many inter- and intra-generational welfare re-distribution conflicts. Jinno (2011) develops the idea further incorporating a possibility of endogenous skill upgrade for the immigrants as well while noting that there are some assimilation costs. The results suggest further re-distributional conflicts. Krieger (2004) claimed that, in case high fertility of the immigrants and low skill level of the immigrant children are accounted for, welfare impairment and re-distribution occurs.

Kemnitz (2003, 2008) introduces the problem of unemployment into the analysis. He claims that unskilled immigration increases unemployment and harms the native unskilled even though there is a boon to general welfare. Muysken, Cörves and Ziesemer (2011) in a similar manner showed that unskilled immigration increases unemployment and unless there is an upgrade for their skill level they may impair the general welfare.

Meanwhile, there is a strand of literature claiming that only an excessively large inflow of immigrants can help the pension system sustainability: For instance, Übelmesser (2004) claims that the EU cannot accommodate as many migrants as is needed for the pension system sustainability, and claims that parametric reforms are also necessary. Blake and Mayhew (2006) study combination of parametric reforms with immigration, claiming that the need for immigrants into the UK will be constantly growing if the pension system is not reformed. Serrano, Eguía and Ferreiro (2011) claim that even the recent vast immigration is not enough for sustainability of the Spanish pension system and the reforms are inevitable.

Many large-scale computational studies have been conducted in order to identify whether the immigration can make the PAYG pension systems sustainable. Thus Lee and Miller (2000) and Storesletten (2000) model the US economy, and concluded that some immigration can help alleviate the aging problem of baby-boom generation. Schou (2006) presents similar detailed study for Denmark and concludes that immigrants are net beneficiaries of public pension system and their contribution to the economic growth is marginal. More recently, Chojnicki *et al.* (2012) presented a retrospective study on the US economy and concluded that larger immigration would have been beneficial to the general welfare of the population. However, their study was concentrated on the short- to medium-term effects of the immigration, and did not study possible long-term effects.

The current paper, claiming that under certain conditions unskilled immigration may result in lower pension benefits (with pension contributions being fixed), shows that increased immigration is not desirable. The paper utilises the idea of multi-period immigration policy, *i.e.* the immigrants enter the economy each period, as opposed to one-time-migrant-inflow framework of Razin and Sadka (2000). While in Razin and Sadka model the old equilibrium is restored after number of periods,

the multi-period immigration results in a new equilibrium, distinct from the initial one: That allows studying the reaction of the economy in full, *i.e.* both the new equilibrium and the transition path. An important channel that links the unskilled immigration to pensions is studied: The paper employs the framework of several recent publications by Fanti and Gori (2010, 2012) that follow the dynamics of per-capita capital in a Diamond-type overlapping-generations model. Thus the paper connects unskilled immigration to distortions in the savings, that result in lower capital per capita and thus in generally lower wages. Hence, even though the pension benefits grow compared to wages (as in Razin and Sadka (1999)), the wages may decrease so that the benefits are less than they would be without the immigrants.

The current paper also studies the general welfare changes for the entire transition period: The general welfare study in the heterogeneous agent framework allows to discuss political feasibility of immigration policy reform. Similar to Razin et al. (2011) and Lacomba and Lagos (2010) the current paper identify those policies that the current population might favour. Furthermore, as opposed to Lacomba and Lagos this paper allows the population to chose immigrant skill level and follows the long-term welfare effects of the adopted policies.

Thus the current paper is somewhat in line with the literature that shows how the PAYG system reversely affects demography which later challenges the system itself (*e.g.* Cigno, 2006; Cipriani, 2013) as it shows how the designed immigration policy that intends to support the system actually further burdens the system.

The rest of the paper is organised as follows: Section 2 introduces the economic environment. Section 3 defines the equilibrium and provides the pension system analysis under migration. Section 4 analyses political equilibrium and transitional dynamics. And the concluding remarks are in the final section.

2 The Economic Environment

A two overlapping generations exist in a closed economy environment. During the first period of their life the agents work (for a remuneration), save and consume. For the second period the agents consume their pension benefits and savings. The firm organises the production by hiring labour and capital from the households. The government collects the pension contributions from the young and distributes among elders. All markets clear.

2.1 Population

Each period young migrants are allowed into the country equal to μ share of the native young. Thus the total working-age population in the economy is:

$$T_t = N_t (1 + \mu) \tag{1}$$

where N_t is the size of the native born population with the following dynamics:

$$N_t = N_{t-1} (1 + \mu) n \tag{2}$$

where it is assumed that immigrants and their descendants have the same fertility rate $(n - 1)$. However, the immigrants have only ε of the skill level of the native population. Thus the efficient labour in the country at any time is:

$$L_t = N_t (1 + \mu\varepsilon) \tag{3}$$

and is different from the total size of the population.

2.2 Household

Each household is represented by a single agent that solves a lifetime utility maximisation problem:

$$\mathbb{U}_t = \max\left(\ln c_t + \beta \ln c_{t+1}\right) \tag{4}$$

subject to the budget constraints:

$$\begin{aligned} c_{i,t} + s_{i,t} &= w_t e_i \left(1 - \tau^d - \tau^{er}\right) && (5) \\ c_{i,t+1} &= p^d_{t+1} + p^{er}_{i,t+1} + s_{i,t}\left(1 + r_{t+1}\right) && (6) \end{aligned}$$

where i shows the status in the country (native born or migrant), $c_{i,t}$ and $s_{i,t}$ are, respectively, the consumption and savings of type i agent at time t, e_i shows the efficiency of the worker (is unity for native born and ε for immigrants), τ^d and τ^{er} are, respectively, the pension contribution rates to the demogrant and earnings-related pension systems, p^d_t is the demogrant benefit received by all old equally each period, while $p^{er}_{i,t}$ is the earning-related pension benefits that each old receives according to own contribution:

$$p^{er}_{i,t} = \varphi_t \cdot w_t e_i \tag{7}$$

where φ_t is the pension replacement rate.

The optimal household savings take the value

$$s_{i,t} = \frac{\beta}{1+\beta} w_t \varepsilon_i \left(1 - \tau^d - \tau^{er}\right) - \frac{p^{d,e}_{t+1} + \varphi^e_{t+1} w^e_{t+1} e_i}{(1+\beta)\left(1 + r^e_{t+1}\right)} \tag{8}$$

where $p^{d,e}_{t+1}, \varphi^e_{t+1}, w^e_{t+1}$ and r^e_{t+1} are the expected values of the pension benefits, replacement rate, wage, and interest rate respectively.

2.3 Firms

There is one firm that uses Cobb-Douglas production function[1] with an α share of capital. Hence the usual optimality conditions hold:

$$w_t = (1-\alpha) A k_t^{\alpha} \tag{9}$$

$$r_t = \alpha A k_t^{\alpha-1} - 1 \tag{10}$$

where k_t is the capital per effective labour.

2.4 Pension system

Two parallel pension systems will be accounted for: a demogrant (Beveridgean tradition) system that evenly distributes the income over old population, and earnings-related pension system (Bismarckian tradition) that is actuarially fair. Pension systems run periodically balanced budgets, *i.e.* the contributions collected are given out as benefits. Thus, the earnings-related pension system can be presented as

$$p_t^{er} L_{t-1} = \tau^{er} w_t L_t \tag{11}$$

Using (2) and (3) the earnings-related benefit size can be calculated

$$p_{t,i}^{er} = \tau^{er} w_t e_i (1+\mu) n \tag{12}$$

where $p_{t,i}^{er} = p_t^{er} e_i$ is the (efficiency-weighted) pension that type i agent gets at period t. Similarly, the demogrant system can be represented as

$$p_t^{d} T_{t-1} = \tau^{d} w_t L_t \tag{13}$$

[1] Certainly, the assumed perfect substitutability of skilled and unskilled workers brings obvious limitations to the model. However, there are two main reasons for this assumption: First, the current assumption makes the comparison of the results with the main body of the literature straightforward (as the assumption is the most common); and second, the empirical literature on the topic has not identified the exact relationship yet (*e.g.* Okkerse, 2008).

Using (1) and (3) the pensions benefits can be calculated:

$$p_t^d = \tau^d w_t \left(1 + \mu\varepsilon\right) n \tag{14}$$

i.e., as in Razin & Sadka (1999) the first order effect of the immigrants on the pensions is strictly positive.

3 Equilibrium

Given the parameter values, $\alpha, \beta, \varepsilon, \mu, \tau$, and the initial values K_o, N_o the Equilibrium is an allocation $\{c_{i,t}, s_{i,t}, p_t\}$ and a price vector (w_t, r_t), such that the population follows the dynamics given by (1) and (3), the households optimise their problem (4)-(7), the firm optimises so that (9) and (10) hold, the pension budgets (11) and (13) are balanced, and the capital market clears, *i.e.*

$$K_{t+1} = N_t s_{n,t} + N_t \mu s_{m,t} \tag{15}$$

Substituting for (2) and (8), (15) can be rewritten as:

$$K_{t+1} = \frac{N_t}{1+\beta}\left(\left(1+\mu\varepsilon\right)\left(w_t\left(1-\tau^d-\tau^{er}\right)\beta - \left(1+\mu\varepsilon\right)\frac{\varphi_{t+1}^e w_{t+1}^e}{1+r_{t+1}^e}\right) - \left(1+\mu\right)\frac{p_{t+1}^{d,e}}{1+r_{t+1}^e}\right) \tag{16}$$

Using (9), (10), and (14) and assuming that agents have rational expectations, the dynamics of the capital per effective labour can be obtained:

$$k_{t+1} = \frac{\alpha A\left(1-\alpha\right)\left(1-\tau^d-\tau^{er}\right)\beta}{n\left(1+\mu\right)\left(\alpha\left(1+\beta\right)+\left(1-\alpha\right)\left(\tau^d+\tau^{er}\right)\right)} k_t^{\alpha} \tag{17}$$

that solves for the steady state equilibrium value for the capital per effective labour:

$$\bar{k} = \left[\frac{\alpha A\left(1-\alpha\right)\left(1-\tau^d-\tau^{er}\right)\beta}{n\left(1+\mu\right)\left(\alpha\left(1+\beta\right)+\left(1-\alpha\right)\left(\tau^d+\tau^{er}\right)\right)}\right]^{\frac{1}{1-\alpha}} \tag{18}$$

As it can be immediately observed the capital per effective labour decreases with the size of (and is immune to the skill level of) the immigration.

3.1 Pension Benefits in the Equilibrium

As in the previous section the two pension systems will be discussed separately: The equilibrium value of the demogrant pension benefits can be obtained by substituting the equilibrium wage rate into (14):

$$\bar{p}^d(\mu) = \tau^{er} B \cdot \frac{1+\mu\varepsilon}{(1+\mu)^{\frac{\alpha}{1-\alpha}}} \tag{19}$$

where

$$B = (1-\alpha)\left(An^{1-2\alpha}\right)^{\frac{1}{1-\alpha}} \left(\frac{\alpha\beta(1-\alpha)\left(1-\left(\tau^d+\tau^{er}\right)\right)}{\alpha(1+\beta)+(1-\alpha)\left(\tau^d+\tau^{er}\right)} \right)^{\frac{\alpha}{1-\alpha}}$$

does not change with the size or skill level of immigration. Thus, to understand the effect of immigration on the pension benefits suffices to find the sign of the derivative of (19):

$$\frac{d}{d\mu}p^*(\mu) = \frac{\tau^{er}B}{(1-\alpha)(1+\mu)^{\frac{1-2\alpha}{1-\alpha}}} \left(\varepsilon(1+\mu)(1-\alpha) - \alpha(1+\mu\varepsilon)\right) \tag{20}$$

Proposition 1 *Demogrant pension benefits decrease with the size of immigration if the skill level of immigrants (compared to natives) is*

$$\varepsilon < \frac{\alpha}{1-\alpha+\mu(1-2\alpha)} \tag{21}$$

while $\alpha < \frac{1+\mu}{1+2\mu}$.

Proof. The pension benefits decrease if the derivate (20) is negative. As first part (the ratio) of the product on the right-hand side of (20) is a positive constant, the sign of the derivative depends on the sign of the second part and is negative given the conditions above are satisfied. ■

The proposition effectively claims that even though after-immigration pensions are higher compared to the wages, the immigration-caused capital dilution may be stronger and result in wages that generate lower pension benefits compared to their pre-immigration levels. In more details, the logic is as follows: In after-immigration equilibrium the efficient population dynamics is stabilised on the level of immigration size $(1+\mu)$, that results in a capital dilution with the size of $(1+\mu)^{\frac{1}{1-\alpha}}$, wich in turn results in a wage (*i.e.*, the 'quality' of tax base) decrease with a magnitude of $(1+\mu)^{\frac{\alpha}{1-\alpha}}$. Meanwhile, with population dynamics stabilised the size (the 'quantity') of the tax base is increased by the efficient size of the immigrants $(1+\varepsilon\mu)$.Hence, when the increased 'quantity' of tax base does not cover the decreased 'quality' of the base the pensions decrease (that is, if more skilled natives need to share their demogrant pensions with many lower-skilled natives, the pensions decrease). For example, if $\alpha = 0.4$ and the immigration is under five per cent $\mu < 0.05$, then immigrants with even sixty-five per cent of local efficiency already will force the pension benefits to decrease.

In the case of earnings-related pensions, the behaviour of equilibrium value of the benefits:

$$\bar{p}^{er}(\mu) = \tau^{er} B \cdot (1+\mu)^{\frac{1-2\alpha}{1-\alpha}} \tag{22}$$

are obtained by substituting the equilibrium wage rate into (12), and can be studied similarly:

Proposition 2 *Earnings-related pension benefits increase with the size of immigration when $\alpha < 1/2$, and decrease otehrwise.*

Proof. Directly follows from (22). ■

Hence, in the case of earnings-related pension system, as opposed to the case of demogrant pension system, the pension benefits always grow (in economically meaningful case of $\alpha < 1/2$). This result is due to the fact that actuarially fair

distribution of earnings-related pension system guarantees that relative benefits increase more (multiply of $(1+\mu)$) than the capital-dilution caused wage decrease (multiply of $(1+\mu)^{\frac{\alpha}{1-\alpha}}$).

Thus, the corollary of the two prepositions is that the effect of the immigration on the equilibrium level of overall pension benfits ($\bar{p}^d + \bar{p}^{er}$) depends on the size and efficiency level of the immigrants as well as the *Bismarckian factor* (BF)[2]. Thus if the BF is small and the immigration control is poor then the first proposition results will prevail and the pension benefits will decline. The situation is probable to happen in many European countries such as Denmark, Switzerland, Israel or the UK with low BF — 0, 0.03, 0.05, 0.07, and 0.09 respectively (Krieger & Traub, 2013) — and having liberal immigration policies (the EU and EEA free labour movement or simplified ancestry-based citizenship policies); the reverse can be expected from countries with low BF and tight immigration control (such as Australia with BF 0.03) or combination of liberal immigration with high Bismarckian factor (such as Germany and France with BF 0.55 and 0.72, respectively); while in countries with moderate immigration control and moderate BF (such as the USA with BF 0.46) will be ambiguous.

3.2 Political Economy and Transition Dynamics

Aside from the effects of the immigration on pension benefits, the immigration also affects the other components of the general welfare - the wages and interest rates. The lifetime utility of the agents (4) can be rewritten as

$$\mathbb{U}_t = D + (1+\beta)\ln\left(w_t\left(1+r_{t+1}\right)\left(1-\tau^d-\tau^{er}\right)+p^d_{t+1}+p^{er}_{t+1}\right)-\ln\left(1+r_{t+1}\right) \tag{23}$$

[2]Bismarckian factor (Cremer & Pestieau, 1998) is a measure of actuarial fairness of pension systems. It takes values between 0 and 1, with 0 being for purely redistributive (demogrant, Beveridgean) pension systems and 1 for strictly actuarially fair (earnings related, Bismarckian) pension systems. In the present stylised model the Bismarckian factor can be presented as $\tau^{er}/\left(\tau^{er}+\tau^d\right)$.

where $D = \ln \frac{\beta^\beta}{(1+\beta)^{(1+\beta)}}$. In order to single out the effect of the immigration on the non-pension-related welfare, $\tau^d = \tau^d = 0$ can be assumed. In equilibrium the utility function will have as a variable part only $(\alpha - (1-2\alpha)\beta)\ln k$ which, in any economically meaningful situation, changes in the same direction as k. Thus the non-pension-related welfare decreases with the immigration as a result of capital dilution (from (18)). So the general welfare in the equilibrium will depend on the aggregate of pension- and non-pension related welfare effects, and most often can be expected to be negative as is observed in Figure 1.

[Insert figure 1 here]

The above claim might lead to a conclusion that the immigration policy should not be politically feasible. However, as in the presented model altruitism towards future generations is not assumed, it will suffice to show that the agents present in the economy at the first period benefit from the policy. Thus using (17) the capital dilution caused by the immigration in the initial two periods can be presented as

$$k_1 = \frac{\bar{k}}{1+\mu\varepsilon} \tag{24}$$

$$k_2 = \frac{\bar{k}}{(1+\mu\varepsilon)^\alpha (1+\mu)} \tag{25}$$

the wages and interest rates will accordingly be

$$w_1 = \frac{\bar{w}}{(1+\mu\varepsilon)^\alpha} \tag{26}$$

$$w_2 = \frac{\bar{w}}{\left((1+\mu\varepsilon)^\alpha (1+\mu)\right)^\alpha} \tag{27}$$

$$1+r_1 = \frac{\bar{r}}{(1+\mu\varepsilon)^{1-\alpha}} \tag{28}$$

$$1+r_2 = \frac{\bar{r}}{\left((1+\mu\varepsilon)^\alpha (1+\mu)\right)^{1-\alpha}} \tag{29}$$

The initial old face their savings from the previous period, higher interest rates, and lower wages as pension benefit base. However, as can be seen from (12) and (14) the pension benefits compared to wages grow faster than the decrease in the wage rate. Thus the initial old only gain from immigration, and they prefer more skilled. Figure 1 illustrates this phenomenon.

The initial young face lower wages, higher interest rates, and lower wage rate. In order to understand their preferences the lifetime utility (23) without pensions can be considered again. Thus,

$$\begin{aligned} U_1 &= \text{constant} + \ln w_1^{1+\beta} \cdot r_2^{\beta} \\ &= \text{constant} + \ln \left(\frac{1}{1+\mu\varepsilon} \bar{w} \right)^{1+\beta} \left(\left(\frac{1}{1+\mu\varepsilon} \right)^{\alpha} \frac{1}{1+\mu} \bar{r} \right)^{(1-\alpha)\beta} \\ &= \text{constant} + \ln \bar{w}^{1+\beta} \bar{r}^{(1-\alpha)\beta} + \ln (1+\mu)^{(1-\alpha)\beta} \left(\frac{1}{1+\mu\varepsilon} \right)^{\alpha-(1-2\alpha)\beta} \end{aligned} \tag{30}$$

The last term on the right-hand side of (30) increases with the size of immigration and decreases with the efficiency level, making the initial young favour low skilled immigration (Figure 1). The result is due to the fact that the efficiency of immigrant decreases the wages in the labour market where the initial young earn, however, they face the interest rate of the next period where only the size of the immigration matters.

Hence in political equilibrium the initial population (both young and old) will vote for positive migration of low efficiency immigrants though in the long-term that is welfare impairing for their future generations. It is assumed that once voted upon the policy will stay in place forever, though in similar fashion a repetitive voting could be studied as in Razin *et al.* (2011).

Figure 1 illustrates the above described dynamics for welfare (left-hand side) and pensions (right-hand side) in 2 European states - the United Kingdom (above)

and Germany (bellow) - chosen as two extreme cases of immigration and pension system combinations.[3] The horizontal axes show the immigrant efficiency level (compared to the natives) and the agents born during the respective period (with initial old being the first cohort). In each graph the pre-immigration equilibrium levels are presented for comparison.

For both countries there is a working assumption that $\alpha = .4$ and immigration $\mu = 5$ per cent. The tax rates are chosen so that they match the Bismarckian factors provided in Krieger & Traub (2013) and pension replacement rates from (Table 7 of) Eichhorst *et al.* (2011), *i.e.* $\tau^{er} = 11.2$ and $\tau^{d} = 9$ per cent for Germany and $\tau^{er} = 1$ and $\tau^{d} = 18$ for the UK. Both countries reach their new steady states before the 13th cohort is born.

As the figure shows, the first two cohorts of agents (*i.e.*, the voters on policy) improve their welfare positive immigration in both countries. As in the discussion above the initial young only favour the less-efficient immigrants, furthermore, in case of the UK the initial young will agree to immigrants that have the maximum efficiency of 59 per cent of the locals while in the case of Germany the 'allowed' efficiency level is as high as 68 per cent. At the same time, the post-immigration equilibrium level of the UK pensions decrease once the efficiency level is less than 65 percent, while the threshold is as low as 23 per cent. Thus the political equilibrium will result in immigration that will cause a decrease in PAYG pensions in the UK, an increase in PAYG pensions in Germany (though the overall welfare will decrease).

The figure also highlights the achievements of the UK selective migration policy. As Razin et al. (2011) might predict the UK immigration policy restricts the immigrants with the lowest efficiency that would be attracted to the highly redis-

[3]While the United Kingdom has implemented tight immigration policy (despite EU directives) and exercised fully distributive pension system, Germany has been more liberal in immigration policy (supporting EU free labour movement and Aussiedler return policies) and excercised more actuarially fair pension system.

tributive policies. Thus, Algan *et al.* (2010) table 1 claims that the native hourly wage in the UK is 11.12 while the immigrants earn on average 11.48, which combined with the data of 73.1 per cent of immigrant labour force participation rate as opposed to the native 79 per cent, gives $\varepsilon = .955$. Meanwhile, the same table shows that the lowest skilled immigrant group has an hourly wage of 6.26 and only 55.7 per cent of them are employed, that produces $\varepsilon = .399$. Though these results, as illustrated in *Figure 1,* are against the prediction of the current model (that at a given moment the population will vote for rather less efficient immigrants) it may prove useful in the upcoming liberalisation of the UK labour market for the immigrants from the new (and poorest) EU member countries. Alternatively, the data can be interpreted as a social planner solution of the model (*i.e.*, the case when all the future generation welfare and pensions are also accounted for, and the immigration policy has not been voted for by non-altruistic agents).

The German and French data (Algan *et al.*, 2010) come closer to the public choice (political equilibrium) solution, however again better fits in the social planner environment. Thus, the actual German immigrants (based on similar calculations as above) have efficiency level of 85 per cent of the native born, while the lowest group has just 40 per cent. The respective French numbers are 90 and 80 percent. Given that the data is from 2005-2006, it is possible to interpret the opening of German and French labour markets to the immigrants from the new EU member states as a political equilibrium prediction of this model. And finally, the data also fits the model once we assume gerontocracy in the UK, Germany, and France.

4 Conclusion

The ageing challenge for unfunded public pensions (increasing pension benefit claims and decreasing pension contribution base) has long been studied in economics. The possibiles measures are lesser pension benefits, larger contributions (including late retirement), fertility enhancement programmes, and replacement immigration (i.e. young immigrants compensate for missing native-born). A vast literature now exist dealing with the last.

At the height of the discussion Razin and Sadka (1999) introduced the idea of unskilled immigration surmounting the ageing challenge in an infinitely living economy (even with purely redistributive, demogrant, Beveridgean pension policy). The idea is simple: The unskilled immigrant workers enter the economy and together with the native-born working-age population contribute for the old-age pensions. When those immigrants age, the natives have to share their pensions with them, however, the larger cohorts of the native-born (including the children of immigrants) contribute for the pensions of the old-age immigrants. Effectively, the economy borrows from the very last generation (absurd in an infinitely-living economy) and elevates the welfare of all the involved parties.

Many (including the mentioned authors themselves) rebelled at the idea of pure benefit of unskilled immigration and proposed various mechanisms that challenge the general welfare of the involved parties. Prices, unemployment, child-costs and the like have been proposed as possible challengers. However, the current work challenges the very idea of unskilled immigrants serving for the sustainability of the pension system.

It is shown that, though the unskilled immigration increases the pension benefits compared to wages, it affects the savings in the economy. Low savings in their turn result in low capital per capita, and thus lower wages. As a result the

demogrant pension benefits decrease. However, the earnings-related (actuarially fair, Bismarckian) pensions, that are widely employed in many countries combined with demogrant pensions, is shown to generate higher pension benefits compared to pre-immigration levels. Thus the efect of low skilled immigration on overall pension levels depend on the share of the earnings-related pension benefits and the level of immigrant labour efficiency.

Further it is shown that the overall welfare of all the agents (with the exception of initial population) is decreased with the unskilled immigrants. Meanwhile, the inital old benefit from any immigration (still preferring better skilled migrants) due to direct pension benefit increase and the initial young prefer migrants with low skill only in order to boost the interest on their savings while facing insubstantial loss in wage rates. As a result, should a policy be set based on the preferences of the current population (i.e. if public choice prevails), an unskilled immigration policy will be installed resulting in decreased pension benefits (and welfare) for the future population. The real data interpretation of the model suggests that either political gerontocracy prevails in the discussed European states or the immigration policy is set by the social planer who values the welfare of the future population as well.

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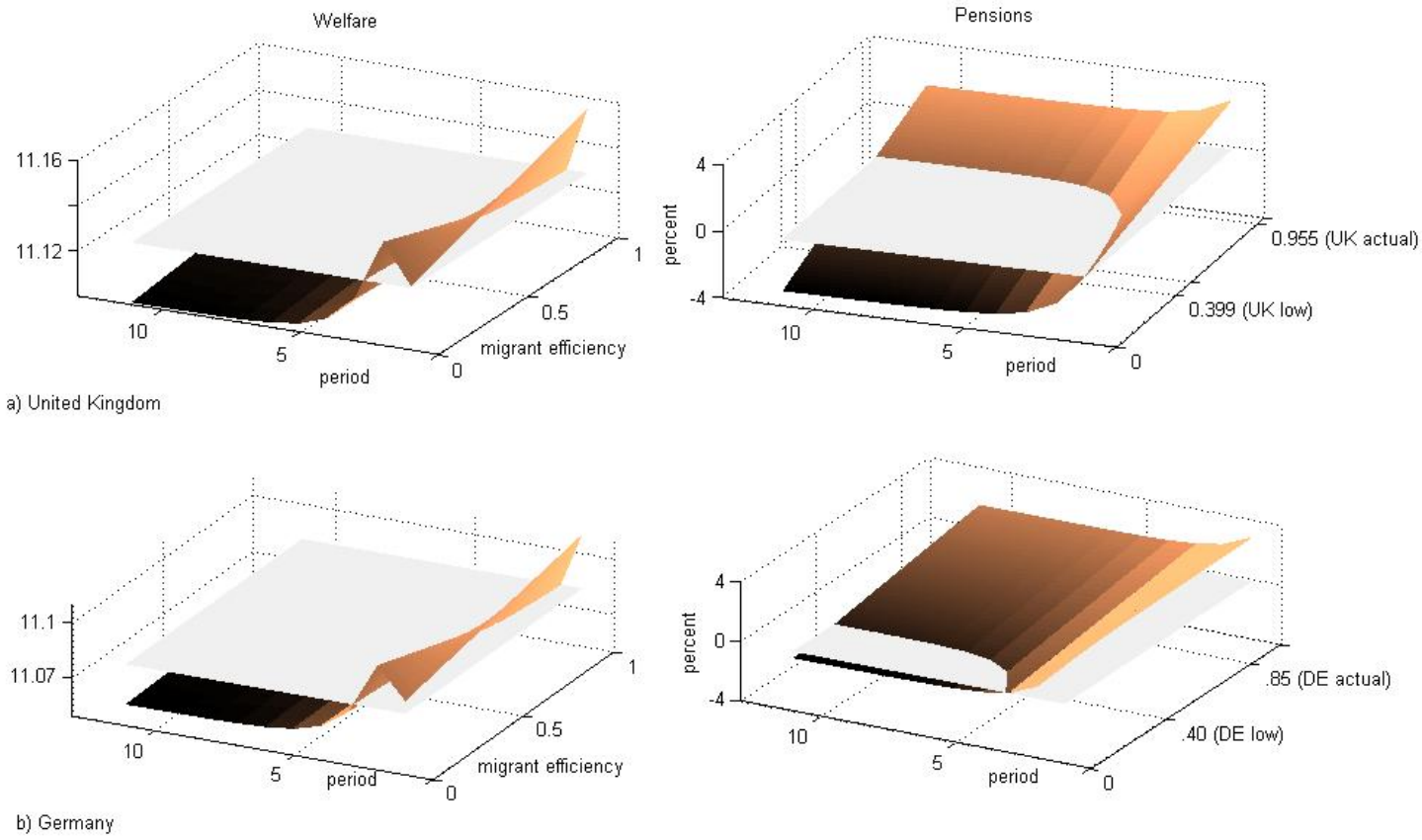

Figure 1: Transition dynamics for pension benefits (right hand side) and the genral welfare (left-hand side) for the UK (top row) and Germany (bottom row)