Public pensions and immigration policy when voters are differently skilled

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October 2004

Abstract:
Although immigration of workers generates a positive externality on members of domestic pension systems, many countries are very reluctant to allow foreigners into their labor markets. In a political economic framework, we explain this voting outcome by considering a young unskilled median voter who faces – in addition to a reduction of contribution rates – negative effects from immigration as well.

Keywords:
pensions, immigration, median voter, skill differences

JEL classification:
H55, J61

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1. Introduction

In most countries very controversial political debates start when it comes to immigration issues. There are as many hopes as there are fears related to this topic. One hope is that immigration may help to soften the problems of ageing societies. Members of a country's pension system gain from each immigrant by a positive externality which is similar to the introductory gift to retirees when a pay-as-you-go (*PAYG*) pension system is introduced (see Sinn, 2000, 2001). A recent example of this debate has been the political struggle about an immigration law in Germany, which is one of the most rapidly ageing countries in the world.

Although the foreigners' share of the total population amount to approximately 9 percent, it was not until this year that Germany managed to introduce an immigration law at last. Previously, Germany did not actively select immigrants because it was official government policy to argue that Germany is simply *not* an immigration country. When politics became somewhat more realistic by the end of the 1990s, the final political debate began and lasted for almost 5 years before the two chambers of the German parliament (with opposing majorities) agreed on a joint draft. However, the law contains only few of the features of a modern immigration law despite recognizing that Germany is in fact an immigration country. The law's main goal is a general restriction of immigration except for some groups of highly-skilled persons (outstanding scientists and top managers). Given the fact that members of the German pension system gain on average €175,000 from each immigrant (Sinn, 2001), this is a surprising fact. By choosing a restrictive immigration policy, Germany voluntarily foregoes this advantage for its pension system.

According to Razin and Sadka (1999, 2000) even *unskilled* immigrants who are net beneficiaries of the welfare system should be welcomed because of the positive effect of the externality. However, they also point out that the gain from immigration may be distributed unevenly between different groups in society. This argument plays a crucial role in Scholten and Thum (1996) and Haupt and Peters (1998) as well. In their models, the age of the native median voter determines a society's preference for immigration. If, e.g., the gain from immigration accrues mainly to the old, they will favor immigration while younger generations may be more reluctant, in particular if immigration has also negative effects, such as falling wages.[1] A median voter in his fifties will most likely only choose an immigration policy with restrictions. The outcome depends, however, on the underlying pension system.

The first (public) pillar of most countries' pension systems is a pay-as-you-go system of the defined-benefit type (Werding, 2003), in which either the pension benefit or the replacement rate is fixed by law. In case of parameter changes this implies that – assuming a balanced budget of the pension system – contribution rates have to change endogenously. If the number of contributors increases and there is a given number of retirees, contribution rates may fall. In the following, we will investigate a pension system of the previously described type and consider a voting decision. Our model combines the basic ideas of two previous models. On the one hand, we take the more realistic defined-benefit system[2] from Scholten and Thum (1996) instead of the defined-contribution system in Razin and Sadka (1999). On the other hand, we distinguish voters by their skills as in Razin and Sadka (1999) and not only by their age as in Scholten and Thum (1996). Our result is no longer an unambiguous

[1] Other explanations include, e.g., an increasing social distance (Hillman, 2002) or poor labor market performance of immigrants' offspring (Krieger, 2004).

[2] In this system, pension benefits are the endogenous variable. Only few countries, such as Sweden or Poland, have adopted this system.

support for unskilled immigration. Instead some positive but restricted level of immigration is chosen which depends on immigration elasticities and other parameter values. The number of immigrants is too low compared to the social optimum.

2. Basic assumptions

Consider an OLG framework and let $N_t \equiv H_t + L_t + M_t$ be the total labor force consisting of H_t skilled workers, L_t unskilled workers and M_t unskilled immigrants[3] (if they are allowed into the country after a pro-immigration voting decision). The number of retirees in period *t* is N_{t-1}. All natives, i.e. workers and retirees, vote on immigration. Immigration policy can be described by the immigration ratio which is the ratio of total labor force and native labor force:

$$\gamma_t = \frac{H_t + L_t + M_t}{H_t + L_t}. \tag{1}$$

Choosing any $\gamma_t > 1$ implies that immigrants are allowed into the country. The population growth rate is given by the ratio of the labor force today and in the previous period, i.e. $n_t = (H_t + L_t)/(H_{t-1} + L_{t-1}) - 1$. Furthermore, we can define the dependency rate as the ratio of retirees to total labor force and we assume that after one period immigrants can no longer be distinguished from natives, i.e.[4]

$$D_t(\gamma_t) = \frac{N_{t-1}}{N_t} = \frac{H_{t-1} + L_{t-1}}{H_t + L_t + M_t} = \frac{1}{(1+n_t)\gamma_t}. \tag{2}$$

Let us further assume that $Y = F(H, L)$ is a linear-homogeneous production function with the usual properties. In flexible labor markets, wages depend on immigration as the total number of unskilled workers increases with each immigrant. The output after immigration may be written as $Y = F(H, L+M)$, so that we have $w_t^H(\gamma_t)$ with $\partial w_t^H / \partial \gamma_t > 0$ and $w_t^L(\gamma_t)$ with $\partial w_t^L / \partial \gamma_t < 0$.

The *PAYG* pension system's budget equation including immigrants' contributions is given by

$$\tau_t (w_t^H H_t + w_t^L (L_t + M_t)) = q_t \omega_t (H_{t-1} + L_{t-1}) \tag{3}$$

where τ_t is the contribution rate, q_t is the replacement rate and ω_t is the average wage given by $\omega_t = \theta w_t^H + (1-\theta) w_t^L$ with $\theta = H_t/(H_t + L_t + M_t)$. Here, each retiree receives the same pension benefit which is related to the average wage. Notice that the average wage depends on immigration as well, i.e. $\omega_t(\gamma_t)$ with $\partial \omega_t(\gamma_t)/\partial \gamma_t < 0$ for $w_t^L < w_t^H$.

[3] We only consider unskilled immigrants here because this group is always available and willing to enter a country like Germany. The number of skilled workers is relatively small and countries compete for them. They may therefore not be available in sufficient numbers.

[4] We assume that the dependency ratio is usually smaller than 1 when immigration takes place. So, even if the population is ageing, this can still be compensated by a sufficiently high immigration ratio.

Following Scholten and Thum (1996), we assume a fixed-replacement rate regime with $q_t = q$. Therefore contribution rates have to change endogenously to changes of the underlying parameters, such as fertility rates, life expectancy or the number of immigrants. From (2), (3) and the definition of ω_t follows

$$\tau_t = \frac{q}{(1+n_t)\gamma_t} = qD_t(\gamma_t). \tag{4}$$

3. Voting outcome

Each group in society has distinct preferences regarding the number of immigrants allowed into the country. Retirees will receive a pension of $q\omega_t(\gamma_t)$. Since q is constant and $\partial\omega_t(\gamma_t)/\partial\gamma_t < 0$, they will unambiguously lose from immigration and vote for zero immigration ($\gamma_t = 1$). When only the contribution rate adjusts to immigration, retirees do not participate in the gain from the positive externality. Instead, immigration will lower the calculation basis to which pension benefits are related.

Let us assume that immigrants have the same number of children as natives and that immigrants' offspring have the same skill distribution as the natives' offspring.[5] If no further immigration takes place in the future, the ratio of skilled and unskilled workers and thus the average wage remains unchanged in period $t+1$ ($\omega_t = \omega_{t+1}$). From this follows that immigration today has a negative effect on the future pension benefit, $q\omega_{t+1}$, as well because $\partial\omega_{t+1}(\gamma_t)/\partial\gamma_t < 0$ and $q = constant$.

Since immigration will always cause some gain to the domestic population, which stems from the positive externality generated by the increasing number of contributors, it is likely that further immigration will happen in the succeeding periods. If immigrants are also unskilled, ω_{t+1} will decrease further due to $\gamma_{t+1} > 1$. The negative pension effect anticipated by today's workers will become even more pronounced. Qualitatively, however, there is no difference. Consequently in order to simplify the analysis, we will follow Scholten and Thum (1996) by assuming that voters are myopic. Hence, γ_{t+1} is taken as given and not considered in the optimization problem of the young generation, i.e. we assume $\partial\omega_{t+1}/\partial\gamma_{t+1} = 0$.

Keeping this in mind, skilled and unskilled workers favor the immigration policy γ_t which maximizes today's net income plus the future pension benefit:

$$V^i(\gamma_t) = w_t^i(\gamma_t)\left[1 - qD_t(\gamma_t)\right] + q\omega_{t+1}(\gamma_t), \quad i = H, L.$$

The first-order condition (FOC) of the workers turns out to be

$$V_{\gamma_t}^i(\gamma_t) = \frac{\partial w_t^i}{\partial\gamma_t}\left[1 - qD_t(\gamma_t)\right] + \frac{w_t^i qD_t(\gamma_t)}{\gamma_t} + q\frac{\partial\omega_{t+1}(\gamma_t)}{\partial\gamma_t} = 0, \quad i = H, L \tag{5}$$

[5] This is a common assumption in models on immigration and public pensions. See Krieger (2004) for a critical assessment of this assumption.

where we used $\partial D_t(\gamma_t)/\partial\gamma_t = -D_t(\gamma_t)/\gamma_t$. The first term of (5) describes the direct wage effect of unskilled immigration on domestic workers. It is positive for skilled workers and negative for unskilled workers since $\partial w_t^H/\partial\gamma_t > 0$ and $\partial w_t^L/\partial\gamma_t < 0$. The second term is positive (and larger for skilled workers) because the dependency rate (2) falls with an increasing number of incoming workers. This implies that the contribution rate can be lowered, increasing net income. The third term is negative and identical for both groups, *H* and *L*. Therefore immigration has more positive effects for skilled workers than for unskilled workers who have to face an additional negative wage effect in addition to the negative pension effect. Only the decrease in contribution rates benefits the unskilled. Applying the median-voter theorem, we can thus conclude that skilled workers favor a larger immigration ratio than unskilled workers, which makes the unskilled workers the median voter group since retirees prefer zero immigration (we exclude the possibility that one of the three groups in society has a majority of votes).

We can now determine the optimal immigration ratio chosen by the median voter. For an explicit solution, we define the elasticities of wages with respect to unskilled immigration in period *t* as

$$\eta^i \equiv \frac{\partial w^i_{t(+1)}}{\partial \gamma_t} \cdot \frac{\gamma_t}{w^i_{t(+1)}}$$

where η^L is the elasticity of the unskilled worker's wage and η of the average wage ω (both in period *t* and *t+1*). We will assume the immigration elasticities to be constant over time. Let λ be the ratio of average wage and unskilled workers' wage: $\lambda \equiv \omega_t / w_t^L = 1 - \theta(w_t^L - w_t^H)/w_t^L > 1$.

Recalling that $D_t(\gamma_t) = 1/[(1+n_t)\gamma_t]$ and $\omega_{t+1} = \theta w_t^H + (1-\theta) w_t^L$ with $\theta = H_t/(H_t + L_t + M_t)$ and using constant immigration elasticities, we can rewrite $V^L_{\gamma_t}$ from (5) as

$$\eta^L \left[1 - \frac{q}{(1+n_t)\gamma_t} \right] + \frac{q}{(1+n_t)\gamma_t} + q\eta\lambda = 0 \tag{6}$$

Solving for γ_t gives

$$\gamma_t^{Med} = \frac{q(\eta^L - 1)}{(1+n_t)(\eta^L + q\eta\lambda)} > 0 \tag{7}$$

which is positive because the elasticities, η^L and η, are strictly negative. Usually these immigration elasticities are small negative numbers (see Friedberg and Hunt, 1995), so we expect the numerator to be slightly larger than *q* in absolute terms, while the denominator is smaller than *q* if we assume the fertility rate to be close to zero and λ not excessively high. Hence, the entire term is greater than 1 which implies that the median voter favors a positive immigration level.

In order to make the results somewhat more explicit, we will consider some real-world estimates for Germany. Bauer (1998, p. 214) estimates the wage elasticity of German blue collar workers (here used as a proxy for unskilled labor) with respect to immigration of blue collar workers to be -0.07. DeNew and Zimmermann (1994) find the (average) wage elasticity with respect to total immigration to be -0.02 which we can use as a proxy for η. By comparing average wages and blue collar workers' wages in the German manufacturing sector (taken from Statistisches Bundesamt, 1999, p. 581) we calculate λ to be approximately 1.14. Finally, let the reproduction rate be 0.02 and the replacement rate 0.7, which is close to the German situation, then we obtain

$$\gamma_t^{Med} = \frac{0.7(-0.07-1)}{(1+0.02)(-0.07+0.7\cdot(-0.02)\cdot 1.14)} = 8.54 > 0$$

In 1999 there were about 8.5 million blue and white collar workers employed in the German manufacturing sector. Given this information, we can calculate the desired number of immigrants by extracting M_t from (1). We obtain $M_t = 64.09$ (million workers) which is 7.5 times the number of workers in this sector. This result indicates that a voting decision on unskilled immigration does not lead to a too strong restriction of immigration. In fact, the absolute number appears to be quite high and may even exceed the number of potential immigrants considering entering the country.[6] Compared to the negative wage reaction, the positive externality benefitting the pension system is very substantial.

However, our result is sensitive to parameter changes. An increase in λ which measures the income dispersion leads to a decrease in the preferred number of immigrants. Unskilled natives are afraid that unskilled immigration will worsen their income position even further. This is a widespread fear in many countries although immigration elasticities are actually low. Therefore, it seems that people may overestimate this effect.

The signs of the derivatives of the immigration ratio with respect to both immigration elasticities, η^L and η, are positive. Since the elasticities themselves are negative, this implies that a smaller negative wage reaction to unskilled immigration allows for a higher equilibrium level of immigration preferred by the median voter. Furthermore, the derivatives of γ_t^{Med} with respect to reproduction rate and replacement rate are showing the expected signs. The more native offspring there is, the fewer immigrants are needed. Higher pension benefits per retiree require additional contributors which may be immigrants.

5. The welfare optimum

Instead of a majority rule, let us suppose a government which cares about the welfare of all living and yet unborn future generations. Then we can simply consider a representative generation to describe the normative benchmark case of a utilitarian optimum, which we denote by γ^*. This means that we maximize steady-state utility of an arbitrary generation by considering lifetime income of both skilled and unskilled workers:

[6] Krieger and Sauer (2004) investigate the question whether an ageing country is attractive at all to immigrants. They find that the number of potential immigrants to a country like Germany is probably too low to achieve the desired effect on the pension system.

$$\max_{\gamma} W^{GOV}(\gamma) = \left[L \cdot wL(\gamma) + H \cdot wH(\gamma)\right] \cdot \left[1 - qD(\gamma)\right] + (L+H) qw(\gamma)$$

The first-order condition, which determines the socially optimal immigration policy γ^*, can now be compared to the median voter outcome. The condition is given by

$$\begin{aligned} L \cdot \left(\frac{\partial w_t^L}{\partial \gamma_t} \left[1 - qD_t(\gamma_t)\right] + \frac{w_t^L q D_t(\gamma_t)}{\gamma_t} + q \frac{\partial \omega_{t+1}(\gamma_t)}{\partial \gamma_t} \right) \\ + H \cdot \left(\frac{\partial w_t^H}{\partial \gamma_t} \left[1 - qD_t(\gamma_t)\right] + \frac{w_t^H q D_t(\gamma_t)}{\gamma_t} + q \frac{\partial \omega_{t+1}(\gamma_t)}{\partial \gamma_t} \right) = 0. \end{aligned} \tag{8}$$

Since we are interested in the difference between the social optimum and the median voter's optimal choice, it suffices to investigate the condition at the point where γ is optimally chosen by the median voter. This is the case when the first bracketed term in (8) becomes zero and thus fulfilling optimality condition (5) for *L*. The terms that remain thereafter describe the deviation of the planner's solution from the median voter's choice and correspond to the optimality condition of the skilled workers. Immigration is expanded beyond the median voter outcome as long as the benefits from higher wages and from lower contribution rates exceed the cost of a lower pension income received by skilled workers. We already know that skilled workers prefer a higher immigration ratio than unskilled workers. Hence, the democratically adopted immigration policy given by the median voter's choice, γ_t^{Med}, is too small compared to the social optimum: $\gamma_t^{Med} < \gamma^*$.

This result can be explained by the fact that the welfare of a representative generation is the average welfare of all its members. Hence optimal immigration policy should also be averaged over these members' preferred levels. This approach is justified because it cannot be foreseen whether a yet unborn person will become a skilled or an unskilled worker in the future.

6. Conclusion

Immigration issues are very controversial topics in political debate although even unskilled immigration generates a substantial positive externality on the domestic population. There are various reasons for the reluctant support of immigration by many people. In our model, a negative wage reaction makes the entire population less favorable towards immigration. As the negative effects are often spread unevenly among different groups in society, preferred immigration levels differ by age and skill level of voters. Here, in particular retirees but also unskilled workers suffer from immigration.

Under these circumstances the voting outcome may diverge from the social optimum. The model predicts that the utilitarian benchmark cannot be realized because the unskilled young median voter is affected more negatively than the representative (average) young worker. The voting process leads to an outcome which is too low compared to the social optimum because the positive externality of immigration is not fully internalized. In a political economic framework, Razin and Sadka's (1999) positive view on immigration can therefore no longer be sustained. At the same time, Scholten and Thum's (1996) result becomes even more pronounced. Not only age but also skill differences may lead to sub-optimal outcomes.

Nevertheless, a rough estimate based on our result shows that the positive externality of immigration is quite high while the wage reaction is rather small. In terms of stabilizing the pension system, immigration may contribute substantially to achieving this goal. On the other hand, the negative wage effect is only one (exemplary) impact factor of many which may make natives more reluctant to accept immigration. Only the sum of several factors can explain outcomes such as the German immigration law.

Finally, it should be noted that our model is somewhat restrictive, in the sense that there is no possibility to choose between skilled and unskilled immigrants who may or may not be allowed into the country. If the share of skilled workers in society is not too large and if a choice between both types of immigration is possible, the outcome of the immigration debate in Germany can even be better understood. If at all, only skilled workers will be affected by skilled immigration, whereas the other groups will gain. Hence, it is not difficult to agree on an outcome such as in Germany. However, due to the demographic situation in the long run the need for large numbers of immigrants, including unskilled workers, will become so pressing that a revision of today's immigration policy will be inevitable. Organizing the necessary majority will then be an even more difficult challenge.

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