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Can Immigrant Employment Alleviate the Demographic Burden? The Role of Union Centralization

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Abstract:

We examine how labor immigration affects public pensions under centralized wage setting. We show that immigration improves the sustainability of pay-as-you-go pensions if and only if total employment declines. This occurs if the labor demand elasticity exceeds the unemployment rate.

JEL-Classification: F22, H55, J51

Keywords: Immigration, Public Pensions, Trade Union

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1 Introduction

Allowing for international immigration is often argued to mitigate the old-age security crisis faced by most industrialized countries. Basically, this argument builds on the fact that immigrants rejuvenate the host country's age structure as they are on average younger than natives. Razin & Sadka (1999) formalize this point in a full employment context.

Obviously, the implications of immigration for pay-as-you-go pensions are intimately linked to the labor market effects. However, these effects are far from unambiguous, once the unrealistic assumption of competitive labor markets is abandoned (Schmidt et al., 1994; Razin and Sadka, 1995; Fuest and Thum, 2000).

The literature on immigration to economies with distorted labor markets has virtually not considered pay-as-you-go pensions explicitly. Nevertheless, the conjecture is that immigration still stabilizes public pensions provided that sufficient wage flexibility creates jobs. This presumption is corroborated by Kemnitz (2003), the only study hitherto linking immigration and public pensions in the presence of unemployment.

Identifying union wage setting as the source of unemployment, Kemnitz (2003) utilizes the standard model of bargaining at the firm level. However, there is significant international variation in the degree of union centralization. According to a number of studies originating with Calmfors and Driffill (1988), firm level bargaining is a proper description for the Anglo-Saxon world, but not for many European countries, in particular the Nordic ones, where wage setting is heavily centralized.[1] The consequences of immigration in such a setting are by and large unexplored.

This paper scrutinizes the effects of immigration on public pensions when a large trade union dominates the labor market. It shows that the above popular argument reverts in this setup: In any unemployment equilibrium, immigration harms public pensions whenever the total number of jobs increases. As a consequence, an alleviation of the demographic burden of social security occurs only if total employment declines. Whether this is the case depends on the existing level of unemployment in the host economy.

The paper is organized as follows. The next section introduces the model, derives the labor market equilibrium and examines the effects of immigration. Section 3 concludes.

[1] Golden et al. (2002) provide a recent update of the Calmfors and Driffill (1988) classification.

2 The Model

Consider an economy of two overlapping generations where people are fit for work in the first period of life and retire in the second. We normalize the size of each native generation to unity: $N_t = 1$. In period t, the workforce increases unexpectedly by the immigration of M_t young individuals. Except for immigration, the economy is closed.

In every period, atomistic firms produce the single output good by a standard neoclassical production function combining physical capital K_t and labor L_t:

$$Y_t = F(K_t, L_t) = L_t f(k_t),$$

where $k_t = K_t/L_t$ is the capital intensity. Profit maximization gives the usual marginal productivity conditions:

$$r_t = f'(k_t), \quad w_t = f(k_t) - k_t f'(k_t). \tag{1}$$

The capital market is competitive, so the interest rate r_t adjusts such that the physical capital is fully utilized. However, aggregate employment is endogenous because firms hire only so much labor that the marginal productivity equals the wage w_t determined by the trade union. The wage setting process will be addressed below.

Every individual receives utility from consumption in both periods of life (c respectively z) according to a standard identical utility function:

$$U_t^i = U(c_t^i, z_{t+1}^i). \tag{2}$$

Each employed earns a net wage $(1 - \tau_U - \tau_P)w_t$, where τ_U and τ_P are the contribution rates to unemployment insurance and public pensions. Unemployed young receive the benefit b_t, and the old get the pension p_t^i. Letting $i \in \{E, U\}$ denote the employment status of a young individual, consumption is given by:

$$c_t^i = d(1 - \tau_U - \tau_P)w_t + (1 - d)b_t - s_t^i, \tag{3}$$

$$z_{t+1}^i = p_{t+1}^i + (1 + r_{t+1})s_t^i, \tag{4}$$

where s_t^i are private savings and $d = 1 \iff i = E$ and $d = 0 \iff i = U$. Like in e.g. Razin & Sadka (1999) and Casarico & Devillanova (2003), the pension benefit is a demogrant: $p_{t+1}^i = \bar{p}_{t+1}$.

After the employment status is revealed, individuals save according to the first-order condition:

$$u_c^i + R_{t+1} u_z^i = 0, \tag{5}$$

where $u_x^i = u_x(c_t^i, z_{t+1}^i)$ and $R_{t+1} = 1 + r_{t+1}$. Individual indirect utility in state i can be written as $v(I_t^i, R_{t+1})$, where $I_t^i = c_t^i + z_{t+1}^i / R_{t+1}$ is discounted lifetime income in that state. Hence, the expected indirect utility of a generation t individual is:

$$V_t = (1 - \eta_t) v(I_t^E, R_{t+1}) + \eta_t v(I_t^U, R_{t+1}), \tag{6}$$

where η_t is the unemployment probability of a member of generation t. Immigrants and natives are economically identical, so we assume equal employment probabilities: $\eta_t = \frac{N_t + M_t - L_t}{N_t + M_t}$. Hence, η_t corresponds to the unemployment rate. Moreover, we posit risk aversion, that is indirect utility is concave in income:[2] $\frac{\partial v}{\partial I_t^i} > 0$, $\frac{\partial^2 v}{\partial {I_t^i}^2} < 0$.

Physical capital depreciates fully after one period. Hence, the current capital stock equals last period savings:

$$K_{t+1} = \eta_t (N_t + M_t) s_t^U + (1 - \eta_t)(N_t + M_t) s_t^E. \tag{7}$$

The welfare state cares for the young unemployed and the elderly. Both contribution rates being constant over time, budget balance requires:[3]

$$\tau_U w_t L_t = b_t (N_t + M_t - L_t), \tag{8}$$

$$\tau_P w_t L_t = (N_{t-1} + M_{t-1}) \bar{p}_t. \tag{9}$$

The trade union is formed by all individuals of the working generation. In contrast to the existing literature (Corneo and Marquardt, 2000; Irmen and Wigger, 2002), this union is large in the sense that it controls the economy-wide wage.

In any standard OLG framework like the present one, the conflict between labor and capital is necessarily also a conflict between the young and the old. Moreover, individuals are affiliated with different classes over the life cycle, present union members becoming capitalists later in life.

[2] This property results from a number of assumptions on (2), the most obvious one being additive separability: $U_{12} = 0$.

[3] The constant τ_P is usual in the literature (Razin & Sadka, 1999; Casarico & Devillanova, 2003). In the context of small unions, Kemnitz (2004) has shown that a constant unemployment contribution rate is very conducive to wage flexibility.

We follow the common view that the trade union represents the interests of labor. Therefore, we assume that the union sets the wage in order to maximize the utility effects of the wage-related components of lifetime income and neglects effects via capital incomes. Otherwise, the union would take the consequences of current wage setting on future interest rates via aggregate savings into account. However, this would mean that the union cares for (future) capitalists at the expense of (future) workers, and the union could not be identified as labor's agent.[4] Therefore we restrict the union's interest to current utility, internalizing the effects on unemployment and welfare state budgets, but disregarding dynamic factor price repercussions.

Formally, the trade union in period t maximizes (6) with respect to w_t, taking K_t and r_{t+1} as given, but considering the marginal productivity conditions (1), individual utility maximization (5) and welfare state budgets (8) and (9). Utilizing the shortcut $v_t^i = v_t^i(I_t^i, r_{t+1})$, the first order condition reads:

$$\frac{\partial L_t}{\partial w_t} v_t^E + L_t \frac{\partial v_t^E}{\partial I_t^E} \frac{\partial I_t^E}{\partial w_t} - \frac{\partial L_t}{\partial w_t} v_t^U + (N_t + M_t - L_t) \frac{\partial v_t^U}{\partial I_t^u} \frac{\partial I_t^U}{\partial w_t} \leq 0, \tag{10}$$

with strict equality if $L_t < N_t + M_t$.

Proposition 1. *In any labor market equilibrium with unemployment, the union sets a wage in the inelastic region of labor demand.*

Proof. An unemployment equilibrium requires that (10) holds with equality and $\frac{\partial^2 V_t}{\partial w^2} < 0$. Multiplying (10) by w_t/L_t and inserting:

$$\frac{\partial I_t^E}{\partial w_t} = \frac{I_t^E - \frac{\bar{p}_{t+1}}{1+r_{t+1}}}{w_t}, \quad \frac{\partial I_t^U}{\partial w_t} = (1+\varepsilon_t) \frac{I_t^U - \frac{\bar{p}_{t+1}}{1+r_{t+1}}}{w_t} + \frac{\tau \varepsilon_t L_t^2}{(N_t + M_t - L_t)^2},$$

where $\varepsilon_t = \frac{\partial L_t}{\partial w_t} \frac{w_t}{L_t}$ is the elasticity of labor demand and expanding by $\varepsilon_t \frac{\partial v_t^E}{\partial I_t^E} (I_t^E - \frac{\bar{p}_{t+1}}{1+r_{t+1}})$ leads to:

$$\begin{aligned} &\varepsilon_t \left[v(I_t^E) - \frac{\partial v_t^E}{\partial I_t^E}(I_t^E - \bar{p}_{t+1}) - v_t^U + \frac{\partial v_t^U}{\partial I_t^U}(I_t^U - \frac{\bar{p}_{t+1}}{1+r_{t+1}}) \right] \\ + \quad &(1+\varepsilon_t) \left[\frac{\partial v_t^U}{\partial I_t^U} \tau_U w_t + \frac{\partial v_t^E}{\partial I_t^E}(I_t^E - \frac{\bar{p}_{t+1}}{1+r_{t+1}}) \right] = 0. \end{aligned} \tag{11}$$

The first row in (11) is negative as $v(I) - \frac{\partial v}{\partial I}(I-x)$ increases in I for arbitrary $x \in [0, I)$: $\frac{\partial [v(I) - \frac{\partial v}{\partial I}(I-x)]}{\partial I} = -\frac{\partial^2 v}{\partial I^2}(I-x) > 0$. Moreover, the term in square brackets in the second row is unambiguously positive. Therefore, (11) can hold only if $\varepsilon_t > -1$.□

[4] This complication is original to the large union setup. As emphasized by Devereux and Lockwood (1991), the small union has a negligible impact on aggregate savings and hence the interest rate.

To clarify the economics behind this result, consider a wage cut starting from a point in the non-inelastic part of labor demand ($\varepsilon_t \leq -1$). First, the risk averse union members profit as the rise in employment reduces the probability of the bad state of unemployment. Second, the sum of resources available to the young in both states, the wage bill, either remains constant ($\varepsilon_t = -1$) or even increases ($\varepsilon_t < -1$). Consequently, a lower wage would diminish income uncertainty without sacrificing total resources and make union members better off than before. Hence, $\varepsilon_t \leq 1$ cannot be an equilibrium. Put differently, any equilibrium wage leading to unemployment must trade off the lower income risk with a reduction of the wage bill, which requires a (locally) inelastic labor demand.

Now, what are the effects of immigration?

Proposition 2. *Immigration has an ambiguous impact on both the unemployment benefit and total employment. Employment rises (falls) if the unemployment rate is lower (higher) than the absolute value of the elasticity of labor demand.*

Proof. From (11):

$$\frac{dL_t}{dM_t} = -\frac{\partial^2 V_t}{\partial w_t \partial M_t} \Big/ \frac{\partial^2 V_t}{\partial w_t \partial L_t},$$

where the denominator is positive due to the second order condition of the union's maximization problem ($\frac{\partial^2 V_t}{\partial w_t^2} < 0$). The sign of the numerator:

$$\frac{\partial^2 V_t}{\partial w \partial M} = -\frac{\partial^2 v_t^U}{\partial {I_t^U}^2} \frac{\tau_U w_t L_t}{(N_t + M_t - L_t)^2} \left[\tau_U (1+\varepsilon) w_t + \varepsilon b_t\right]$$

equals the sign of the last term in square brackets. Employing (8) yields:

$$\frac{\partial^2 V_t}{\partial w \partial M} \gtreqless 0 \iff L_t \gtreqless (1+\varepsilon)(N_t + M_t),$$

and hence $\frac{dL_t}{dM_t} \gtreqless 0 \iff L_t \lesseqgtr (1+\varepsilon)(N_t + M_t)$ and since $L_t = (1-\eta_t)(N_t + M_t)$:

$$\frac{dL_t}{dM_t} \gtreqless 0 \iff \eta_t \gtreqless -\varepsilon_t. \tag{12}$$

The unemployment benefit reacts according to:

$$\frac{db_t}{dM_t} = \frac{\tau_U w_t (N_t + M_t)}{(N_t + M_t - L_t)^2} \left[\frac{\eta_t + \varepsilon_t}{\varepsilon_t} \frac{dL_t}{dM_t} - (1 - \eta_t)\right], \tag{13}$$

where the first term in square brackets is positive because of (12) whereas the second term is negative.□

The economic intuition is as follows. If the wage (and hence total employment) remained at the pre-migration level, immigration would make unemployment more likely and decrease the benefit. The union works against this by adjusting the wage.

However, the inelasticity of labor demand renders the direction of the wage adjustment ambiguous: a wage cut brings more individuals into employment, but also diminishes unemployment insurance revenues. The first effect increases in the unemployment rate, and the second one in the inelasticity of labor demand.

Regarding public pensions, we have:

Proposition 3. *Immigration alleviates the demographic burden only if it decreases total employment.*

Proof. Immigration affects the pension a period t-retiree $\bar{p}_t = \frac{\tau_P w_t L_t}{N_{t-1}+M_{t-1}}$ according to:

$$\frac{\partial P_t}{\partial M_t} = \frac{\tau_P w_t}{N_{t-1} + M_{t-1}} \Big(\underbrace{1 + \frac{1}{\varepsilon}}_{<0} \Big) \frac{dL_t}{dM_t}. \square$$

Pension payments are a constant fraction of the total wage bill. This wage bill increases only when total employment decreases. This turns the conventional argument that immigration helps the welfare state through higher employment upside down.

3 Conclusion

This paper puts some caution on the conventional wisdom that immigrant labor improves the financial sustainability of pay-as-you-go financed pensions. In a model with centralized wage setting, it was shown that immigration benefits the retirees only if total employment declines. The creation of additional jobs, in contrast, harms old-age security. This finding originates in the fact that labor demand is inelastic in equilibrium. Consequently, any employment increase reduces the wage bill, the source of public pension financing.

The combination of Proposition 2 and 3 allows to conclude that immigration helps the soundness of public pensions only if the absolute value of the elasticity of labor demand exceeds the unemployment rate. In the light of the empirical estimates on ε_t lying around unity (Hamermesh, 1993, Table 3.2), this is likely to be the case.

References

Calmfors, L. and J. Driffill (1988): Bargaining Structure, Corporatism, and Macroeconomic Performance, Economic Policy 6, 16-61.

Casarico, A. and Devillanova, C. (2003): Social Security and Migration with Endogenous Skill Upgrading, Journal of Public Economics 87, 773-797.

Corneo, G. and M. Marquardt (2000): Public Pensions, Unemployment Insurance, and Growth, Journal of Public Economics 75, S.293-311.

Devereux, M.B. and B. Lockwood (1991): Trade Unions, Non-Binding Wage Agreements, and Capital Accumulation, European Economic Review 35, 1411-1426.

Fuest, C. and Thum, M. (2000): Welfare Effects of Immigration in a Dual Labor Market, Regional Science and Urban Economics 30, 551-563.

Golden, M., Lange, P. and M. Wallerstein (2002): Union Centralization among Advanced Industrial Societies: An Empirical Study, Dataset available at http://www.shelley.polisci.ucla.edu/data. Version dated July 28, 2004.

Hamermesh, D. (1993): Labor Demand, Princeton University Press.

Irmen, A. and B. U. Wigger (2002): Trade Union Objectives and Economic Growth, Finanzarchiv 59, 49-67.

Kemnitz, A. (2003): Immigration, Unemployment and Pensions, Scandinavian Journal of Economics 105, 31-47.

Kemnitz, A. (2004): Unemployment Insurance, Immigrants' Skills, and Native Earnings, Finanzarchiv 60, 111-139.

Razin, A. and E. Sadka (1995): Resisting Migration: Wage Rigidity and Income Distribution, American Economic Review 85, 312-316.

Razin, A. and E. Sadka (1999): Migration and Pension with International Capital Mobility, Journal of Public Economics 74, 141-150.

Schmidt, C. M., Stilz, A. and Zimmermann, K.F. (1994): Mass Migration, Unions, and Government Intervention, Journal of Public Economics 55, 185-201.

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