



CEBR/CESIFO CONFERENCE ON PENSION REFORM

Copenhagen, 11 – 12 June 2005

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

Alexander Kemnitz

CESifo
Poschingerstr. 5, 81679 Munich, Germany
Phone: +49 (89) 9224-1410 - Fax: +49 (89) 9224-1409
E-mail: office@CESifo.de
Internet: <http://www.cesifo.de>

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

Alexander Kemnitz*

University of Mannheim
Department of Economics
D-68131 Mannheim

May 2005

Abstract

This paper investigates the effect of labor immigration on public pensions when wage setting by a centralized trade union leads to unemployment. It is shown that immigration improves the financial soundness of pay-as-you-go pensions if and only if it diminishes total employment. This occurs if the absolute value of the elasticity of labor demand exceeds the unemployment rate.

JEL classifications: F22, H55, J51

Keywords: Immigration, Public Pensions, Trade Union

*Tel: +49-621-1811798. Fax: +49-621-1811794. e-mail: kemnitz@econ.uni-mannheim.de. Thanks to Eckhard Janeba for helpful comments. The usual disclaimer applies.

1 Introduction

Opening up the borders for international migration is one heavily disputed response to the old age security crisis facing most industrialized countries. Proponents of such measures emphasize that migrants are typically younger than natives, so immigrant contribute more to pay-as-you-go financed social security than they receive, at least in the period of arrival.¹ Formalized by Razin and Sadka (1999,2000) in a full employment framework, this approach is fundamental to the net positive fiscal effect of immigration identified by much quantitative work (Storesletten, 2000).

Obviously, the validity of this argument hinges crucially on the effect on aggregate employment. While immigrant job creation is unproblematic when labor markets are competitive, a voluminous literature has stressed that the employment consequences of immigration are ambiguous when labor markets are distorted (Schmidt et al., 1994, Razin and Sadka, 1995, Fuest and Thum, 2000). Indeed, in the binding minimum wage economy of Razin and Sadka (1995), immigration does not affect total employment and no positive effect on total pension contributions can materialize. Although that literature typically does not address pension issues, it suggests a stabilizing role of immigration for public pensions also in the presence of unemployment, provided that wage flexibility allows for employment to increase with aggregate labor supply. This presumption is corroborated by the findings in Kemnitz (2003), who explicitly links immigration and public pensions in the presence of unemployment due to trade union wage setting at the firm level.

However, as emphasized by a number studies originating with Calmfors and Driffill (1988), there is significant international variation in the degree of union centralization. Therefore, firm level bargaining may be a poor description of the wage setting process in many countries, with unexplored consequences of the labor market effects of immigration.

This paper scrutinizes the existence of beneficial effects of immigration on public pensions in an economy where the labor market is dominated by a trade union taking macroeconomic ramifications of its actions into account. We show that the consideration of union centralization reverts the above argumentation. In any unemployment equilibrium, immigration is found to harm public pensions whenever it increases the

¹ Whether this is also true when first-generation immigrants have retired, depends on the numerical presence and the economic integration of the immigrant offspring. See Razin and Sadka (1999), Casarico and Devillanova (2003) and Krieger (2004) for a discussion.

total number of jobs. An alleviation of the demographic burden of social security occurs only if total employment decreases. Whether this is the case or not, depends on the existing level of unemployment in the host economy.

The economic explanation of this result rests on the fact that a large union chooses a wage in the inelastic part of labor demand. Otherwise, members' expected utility could be increased by a wage cut: such a measure would not only mitigate income uncertainty by lowering the unemployment rate, but also increase the wage bill, the total amount of resources available to the workforce. But with inelastic labor demand, any job creation due to immigration necessarily erodes the base of public pension financing.

The paper is organized as follows. The next section introduces the model and derives the labor market equilibrium. Section 3 deals with the effects of immigration. Some concluding remarks are offered in Section 4.

2 The Model

Consider an economy of two overlapping generations where people work in the first period of life and retire in the second. The size of each native generation is normalized to unity: $N_t = 1$. However, the workforce increases unexpectedly in period t due to the immigration of M_t workers from other countries.

The economy produces a single output good by a large number of firms using a standard neoclassical production function combining capital and labor:

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

Being small compared to the market, firms take factor prices as given. Profit maximization implies that each firm hires both factors to the extent that marginal productivities equal factor prices:

$$r_t = f'(k_t) \tag{1}$$

$$w_t = f(k_t) - k_t f'(k_t). \tag{2}$$

The capital market is competitive and the adjustment of the interest rate ensures full utilization of capital. However, this need not be true for labor, because the wage is determined by a trade union, see below.

Every individual born in period t receives utility out of consumption in both periods of life according to the utility function:

$$U_t = U(c_t^i, z_{t+1}^i). \quad (3)$$

To simplify matters, (3) is the same for all individuals and obeys the usual properties: $u_1 > 0, u_2 > 0, u_{11} < 0, u_{22} < 0, u_{12} \geq 0$.

The employment status of a member of generation t in period t is denoted by $i \in \{E, U\}$. Employed individuals earn a net wage $(1 - \tau - c)w_t$, where τ and c are the contribution rates to unemployment insurance and old age security. Unemployed individuals receive an unemployment benefit b_t .

In $t + 1$, generation t retires and all individuals receive a pension p_{t+1}^i . Following Cassamatta et al. (2000), pension payments comprises a flat benefit \bar{p}_{t+1} and an earnings related component where Ω_{t+1} denotes the equivalence factor. Hence, the consumption constraints in both periods amount to:

$$c_t^i = d(1 - \tau - c)w_t + (1 - d)b_t - s_t^i \quad (4)$$

$$z_{t+1}^i = p_{t+1}^i + R s_t^i \quad (5)$$

with

$$p_{t+1}^i = \bar{p}_{t+1} + \Omega_{t+1}(d w_t + (1 - d)b_t),$$

where $d = 1 \iff i = E$ and $d = 0 \iff i = U$. Positing without loss of generality that all individuals have the same utility function (3), optimal private savings are characterized by

$$u_1^i + R u_2^i = 0,$$

where we have used the type superscript as a shortcut: $u_1^i = u_1(c_t^i, z_{t+1}^i)$. Let the resulting indirect utility function be denoted by $v(I_t^i, r_{t+1})$, where $I_t^i = c_t^i + z_{t+1}^i/(1 + r_{t+1})$. The expected utility of a generation t individual reads:

$$V_t = (1 - \pi_t^U)v(I_t^E, r_{t+1}) + \pi_t^U v(I_t^U, r_{t+1}) \quad (6)$$

where π_t^U is the probability to be unemployed. We assume that individuals are risk

averse:²

$$\frac{\partial v}{\partial I_t^i} > 0, \frac{\partial^2 v}{\partial I_t^{i^2}} < 0.$$

Like the native young, immigrants do not possess any physical capital. Hence, the capital stock of the economy is determined by the savings of generation- $t-1$ natives.

The government runs two redistributive programs, an unemployment insurance scheme and a pay-as-you go pension system. When both contribution rates are constant over time, budget constraints are:

$$\tau w_t L_t = b_t(N_t + M_t - L_t) \quad (7)$$

$$c w_t L_t = (N_{t-1} + M_{t-1})\bar{p}_t + \Omega_t(w_{t-1}L_{t-1} + b_t(N_{t-1} + M_{t-1} - L_{t-1})). \quad (8)$$

The constancy of c is usual in the literature, see Razin and Sadka (1999) and Casarico and Devillanova (2003). As shown by Kemnitz (2004), a constant τ is more conducive to employment creation due to immigration than other social policies when trade unions are small.

All workers of a generation are organized in a trade union. In contrast to most of the literature (Corneo and Marquardt, 2000, Irmen and Wigger, 2002), this union is considered large in the sense that it takes the effect of its wage decision on aggregate employment and the unemployment benefit into account.

In any standard overlapping-generation framework like the present one, the conflict between labor and capital is necessarily also a conflict between the young and the old, since present union members become capitalists later in life. In order not to blur the identification of a trade union as the agent representing labor, we posit that the union maximizes in the current utility of workers, and pays no attention to the effect of current wage setting on aggregate savings and future capital incomes.³ In other words, the dependency of r_{t+1} on w_t is disregarded. Otherwise, the union would serve the interest of the income of future capitalists at the expense of future workers.⁴

As a consequence, the problem of a trade union in period t is:

2 This property results from a variety of assumptions on the direct utility function (3), the most obvious one being additive separability of its arguments.

3 This assumption is germane to the large union assumption, because small unions take the interest rate as fixed by definition (Devereux and Lockwood, 1991).

4 Alternatively, one could think of the union exploiting the effect on capital accumulation in favor of the workers in the next generation. However, this would induce respective opposition from all present members.

$$\max_{w_t} V_t$$

subject to $\frac{\partial r_{t+1}}{\partial w_t} = 0$ and, assuming equal employment chances of immigrants and natives, $\pi_t^U = \frac{N_t + M_t - L_t}{N_t + M_t}$ with $L_t \leq N_t + M_t$. This gives the first order condition:

$$\frac{\partial L_t}{\partial w_t} v_t^E + L_t \frac{\partial v_t^E}{\partial I_t^E} \frac{\partial I_t^E}{\partial w_t} - \frac{\partial L_t}{\partial w_t} v_t^U + (N_t + M_t - L_t) \frac{\partial v_t^U}{\partial I_t^U} \frac{\partial I_t^U}{\partial w_t} \leq 0 \quad (9)$$

with $= 0$ if $L_t < N_t + M_t$ and $v_t^i = v_t^i(I_t^i, r_{t+1})$.

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

Proof. Unemployment results if the second-order condition $\frac{\partial^2 v_t}{\partial w^2} < 0$ is fulfilled and (9) holds with equality. Rearranging that expression gives:

$$\begin{aligned} \varepsilon_t \left[v(I_t^E) - \frac{\partial v_t^E}{\partial I_t^E} (I_t^E - \bar{p}_{t+1}) - v_t^U - \frac{\partial v_t^U}{\partial I_t^U} (I_t^U - \bar{p}_{t+1}) \right] \\ + (1 + \varepsilon_t) \left[\frac{\partial v_t^U}{\partial I_t^U} \tau w_t \left(1 + \frac{\Omega_{t+1}}{(1 + r_{t+1})} \right) + \frac{\partial v_t^E}{\partial I_t^E} (I_t^E - \bar{p}_{t+1}) \right] = 0, \end{aligned} \quad (10)$$

where $\varepsilon_t = \frac{f(k_t) - k_t f'(k_t)}{f''(k_t) k_t^2} < 0$ is the elasticity of labor demand. The first row of (10) is negative because the term in square brackets is positive: $V(I) - \frac{\partial V}{\partial I} (I - p)$ increases in I :

$$\frac{\partial [V(I) - \frac{\partial V}{\partial I} (I - p)]}{\partial I} = -\frac{\partial^2 V}{\partial I^2} (I - p) > 0.$$

The term in square brackets in the second row is unambiguously positive. Therefore, (10) can hold only if $\varepsilon > -1$, such that the second row is positive. \square

Increasing the wage has two effects. On the one hand, the higher unemployment reduces the expected utility of risk averse workers. On the other hand, it affects the wage bill, the total income available to the workforce. In any part of the labor demand curve which is not inelastic, diminishing the wage would improve equality without sacrificing total income, so the expected utility of workers would increase. Therefore, any optimal wage policy leading to unemployment must trade off the higher income risk with the higher total income due to a wage increase, which requires labor demand to be inelastic in equilibrium.

From a modelling perspective, the existence of an unemployment equilibrium in the presence of union centralization is a delicate issue. Layard et al. (1991) set forth a

number of arguments why union centralization is likely to lead to full employment, including the fact that unemployment can never result when the technology implies a generally elastic labor demand. However, the empirical evidence supports neither such a technology (Hamermesh, 1993, Table 3.2) nor an absence of unemployment in economies with centralized wage setting (Cahuc and Zylberberg, 2004, Table 12.13). Therefore, the analysis proceeds under the assumption that the economy is in an unemployment equilibrium.

3 The Effects of Immigration

We now consider the impact of immigration on employment and the welfare state. To simplify the exposition, we assume that the economy features unemployment before and after immigration. We discuss the implications of abandoning this assumption at the end of this section.

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

Proof. From (10):

$$\frac{\partial L_t}{\partial M_t} = -\frac{\frac{\partial^2 V_t}{\partial w \partial M_t}}{\frac{\partial^2 V_t}{\partial w \partial L_t}},$$

where the denominator is positive due to the second order condition of the union's maximization problem. For the numerator, we have:

$$\frac{\partial^2 \Omega}{\partial w \partial M} = \frac{\partial^2 v_t^U}{\partial I_t^U} \left(1 + \frac{\Omega_{t+1}}{1 + r_{t+1}}\right)^2 (\tau(1 + \varepsilon)w_t + \varepsilon b_t) \frac{\partial b_t}{\partial M_t},$$

where $\frac{\partial b_t}{\partial M_t} = -\tau w_t L_t / (N_t + M_t - L_t)^2 < 0$. Using the definition of b_t yields:

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

and hence $\frac{\partial L_t}{\partial M_t} \gtrless 0 \iff L_t \lesseqgtr (1 + \varepsilon)(N_t + M_t)$. Since $\varepsilon < -1$, the direction of the employment effect is ambiguous. Using the definition of the unemployment rate shows that:

$$\frac{\partial L_t}{\partial M_t} \gtrless 0 \iff \pi_t^U \gtrless \varepsilon.$$

The unemployment benefit reacts according to:

$$\frac{db_t}{dM_t} = w_t \left[\left(1 + \frac{1}{\varepsilon}\right)(N_t + M_t) - \frac{L_t}{\varepsilon} \right] \frac{\partial L_t}{\partial M_t},$$

which is positive because the term in square brackets has the same sign as $\frac{\partial L_t}{\partial M_t}$. \square

If the wage (and hence employment) remained at the pre-migration level, immigration would simply deteriorate the situation of the unemployed. Due to the concavity of individual utilities, the union adjusts the wage in order to care for these individuals. However, due to the inelasticity of labor demand, the direction of this adjustment is ambiguous. On the one hand, an employment increase is beneficial by reducing the dependency ratio, on the other hand, it is harmful by deteriorating total contributions. When the unemployment rate is very high, the decline of the dependency ratio is more important and the union lowers the wage. For low unemployment, the revenue effect dominates and the wage rises.

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

Proof. Let $P_t = cw_t L_t$ denote the total amount paid to the retirees in period t . Immigration affects these revenues according to:

$$\frac{\partial P_t}{\partial M_t} = \frac{cw_t}{N_{t-1} + M_{t-1}} \underbrace{\left(1 + \frac{1}{\varepsilon}\right)}_{<0} \frac{\partial L_t}{\partial M_t}. \square$$

With the number of pensioners and the contribution rate being fixed, pension payments to the old are a given fraction of the total wage bill. This wage bill increases only when total employment decreases. This turns the usual argument that immigration helps the welfare state through higher employment upside down.

Up to now, we have presumed that the economy remains in an unemployment equilibrium after immigration. However, one can not exclude the possibility that the corner solution $L_t = N_t + M_t$ arises. But even in that case, the total wage bill can, but need not increase due to immigration. Moreover, such a shift would mean that immigration is not only a cure to public pensions, but also eliminates the whole problem of unemployment.

4 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 result originates in the fact that the union operates in the inelastic part of labor demand. As a consequence, employment increases reduce the wage bill, to which public pensions are intimately linked. Therefore, similar effects could arise also in other labor market setting. However, this paper argues that inelasticity is a structural feature of centralized union wage setting. Moreover, the existing models of immigration and public pensions (Razin and Sadka, 2000, Casarico and Devillanova, 2003, Kemnitz, 2003) have relied exclusively on technologies with elastic labor demands where the above effect can not materialize.

This analysis has been concerned with the short-run effects of immigration on public pensions only. However, the income of the retirees emanates both capital holdings and transfers, and immigration exerts countervailing effects on both sources: when employment declines, pension contributions increase but the interest rate falls, whereas the opposite is true for an employment increase. Therefore, the welfare state consequences should clearly be distinguished from utility consequences. This is also true for the young native generation. While the unemployed enjoy higher benefits, the employed receive higher or lower incomes depending on the direction of the wage adjustment. In addition, the probability to get a job changes.

The overall welfare of generation t depends on the interest rate prevailing in next period. However, any respective findings are necessarily subject to strong assumptions, in particular on the income dependency of the savings ratio and the relation between the capital stock and the elasticity of labor demand, which affects future wage setting. Because the public discussion on the contribution of immigration to the welfare state focusses on the short run and the long run effects distract attention from the key mechanism behind our results, we leave them for future research.

References

- Cahuc, P. and A. Zylberberg (2004): *Labor Economics*, MIT Press.
- 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.
- Cassamatta, G., H. Cremer and P. Pestieau (2000): The Political Economy of Social Security, *Scandinavian Journal of Economics* 102, 503-522.
- 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.
- 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.
- Krieger, T. (2004): Fertility Rates and Skill Distribution in Razin and Sadka's Migration-Pension Model: A Note, *Journal of Population Economics* 17, 177-182.
- Layard, R., Nickell, S. and R. Jackman (1991): *Unemployment. Macroeconomic Performance and the Labour Market*, Oxford University Press.
- 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.
- Razin, A. and E. Sadka (2000): Unskilled Migration: A Burden or a Boon for the Welfare State? *Scandinavian Journal of Economics* 102, 463-479.

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

Storesletten, K. (2000): Sustaining Fiscal Policy Through Immigration, *Journal of Political Economy* 108, 300-323.