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High Skilled Immigration Policy and Union Wage Setting

Moritz Bonn*

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Abstract

This paper studies the effects of high skilled immigration on employment and net income in the host economy where the market for low skilled labor is distorted by union wage setting and a redistributive unemployment benefit scheme. I show that high skilled immigration can increase as well as decrease low skilled employment depending on how the public budget adjusts to immigration and that the effects on workers' net income levels may vary substantially. I conclude that a Pareto improvement can be achieved if the unemployment benefit level remains unaffected by high skilled immigration.

JEL Classification: F22 · H53 · J51 · J61

Keywords: Immigration, Imperfect Labour Markets, Fiscal Redistribution

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1 Introduction

The debate about an optimal immigration policy has been going on for years in almost every developed country. Due to the rising importance of high skilled workers in an increasingly integrated world economy, many researchers suggest that immigration guidelines should be restructured in order to attract internationally mobile and highly qualified workers. The economic benefits that are attributed to high skilled are mainly built up on two pillars. First, they are on average more innovative than low skilled and can therefore increase the total factor productivity of the economy. Second, since high skilled workers on average have higher wage incomes and are rarely unemployed they are expected to be net contributors to the welfare state.[1]

However, in contrast to the intuitive arguments, only in some developed countries, a special focus on highly qualified workers can be found in the respective immigration guidelines. Hence, especially Anglo-Saxon countries which pursued an active skill-selective immigration policy, display substantially higher shares of skilled immigrants than all other OECD destinations (Bertoli et al., 2009). For instance, in 2006, the share of immigrants with tertiary education of non-OECD origin varied enormously between the destination countries ranging from 10.4 % in Italy, 12.4 % in Austria and 18.6 % in the Netherlands to 32.1 % in USA, 51.7 % in Australia and 63.6 % in Canada (OECD 2009).

But why is high skilled immigration valuated so differently between countries? Shouldn't one assume that high skilled immigration is beneficial in all countries? By answering these questions one muss take into account that even if high skilled immigration enhances welfare on an aggregate level, it simultaneously has an important effect on the distribution of income, creating "winners" and "losers".[2] Furthermore, it is reasonable that the more individuals are disadvantaged, the larger is the opposition against high skilled immigration.

This paper argues that destinations are differently affected by high skilled immigration since these countries exhibit differences according to the scope and organization of their welfare states. More precisely, individualistic societies as they are generally found in Anglo-Saxon countries rather pursue a low tax policy by guaranteeing a minimum welfare state whereas rather collectivistic societies like in Central and Southern European countries constituted a broad welfare state with higher taxes and contributions.

Therefore, it is probable that high skilled immigration, as a positive exogenous shock

[1] The positive effects of high skilled immigration are well summarized by Chiswick (2007). The gain on innovation due to high skilled immigration in the United States is measured by Hunt and Gauthier-Loiselle (2010).

[2] In fact, Borjas (1995) calculated that the overall efficiency surplus by immigration (Berry and Soligo 1969) is very small compared to the income redistribution effect that is generated by immigration.

to the fiscal budget, leads to different adjustment channels on the welfare state and thus influences the labor market outcome of the native population differently. The model presented in this paper concludes that high skilled immigration is more efficient in the Anglo-Saxon welfare state so that it faces lower opposition in these countries.

In this context, I examine the employment as well as the respective net income effects that are caused by an inflow of high skilled workers. I consider a CES production technology with high and low skilled labor as the only relevant factors of production. Both factors are assumed to be close but imperfect substitutes as is common in empirical research on labor economics. I further assume that the market for low skilled labor is distorted by wage setting of a monopoly trade union as well as by an unemployment pension scheme. According to the latter, I assume that it is funded by an egalitarian income tax rate and distinguish between different scenarios of how the fiscal authority adjusts to an inflow of foreign workers. I distinguish between an *exogenous unemployment benefit case* and an *exogenous tax rate case.* The first case depicts a simplistic version of the Anglo-Saxon welfare state where the government fixes unemployment pensions at a constant minimum level. The second case can be understood as an extreme interpretation of the European welfare state where the government is interested in increasing social security and is therefore raising the contribution rate up to a maximum value. It is shown that the impact of high skilled immigration on employment as well as net income may change substantially if one switches from one case to the other. More precisely, I provide proof that in case of a constant unemployment benefit level, high skilled immigration is a Pareto improvement since both high and low skilled individuals achieve a net income gain. High skilled immigration will generate a positive low skilled employment effect which leads to an overall tax reduction making all considered income groups better off. Results change as one considers the exogenous tax rate case. I show that, if the tax rate by which unemployment benefits are funded is exogenously fixed, low skilled unemployment rises. With regard to net income, low skilled individuals on average will be better off whereas high skilled workers will definitely lose. However, the overall effect of high skilled immigration on domestic income remains slightly positive.

The innovation of this paper is the opportunity to allow for different adjustment channels of an unemployment pension scheme in a model framework with an imperfect low skilled labor market. Thus, two strings of the recent economic literature on immigration theory are combined. Following Fuest and Thum (2000, 2001), I conclude that immigration has a substantial impact on unionized wage setting and thus besides wages can also influence low skilled employment. However, the authors do not distinguish labor according to different

skill levels.[3]

Furthermore, since I point at the relevance of fiscal redistribution in the context of immigration, this paper is in the tradition of Facchini and Mayda (2009). Similarly, they model different scenarios how the fiscal authority adjusts its redistribution parameters in response to immigration. However, unlike Facchini and Mayda (2009), who consider a redistributive welfare state and perfect labor markets, I point at redistribution in the context of the funding of unemployment pensions in a distorted low skilled labor market.

The paper most closely related is Kemnitz (2009) who analyses the potential of domestic welfare losses affected by high skilled immigration. In a one sector, two factor economy with imperfect labor markets, he proves that high skilled immigration affects low skilled employment negatively and thus has a negative gross income effect on the domestic population if the funding of the unemployment benefit system is not too unfair. However, these results are driven by the critical assumption that the funding rate of unemployment benefits is exogenous. In this context, the model presented in this paper is more general and allows for different adjustment channels.

The forthcoming part of the paper is structured as follows: in Section 2, the basic model framework will be introduced. Section 3 illustrates the effects of high skilled immigration on domestic low skilled employment. In Section 4, I deduce the net income effects for high as well as low skilled individuals. Section 5 concludes.

2 Model Framework

2.1 Production Technology

The basic model framework is similar to the one presented in Kemnitz (2009). Consider a one good economy where the only relevant factors of production are high skilled labor H and low skilled labor N. An aggregate good Y is produced with standard CES-technology:

$$Y = \left(\beta N^{\rho} + (1-\beta) H^{\rho}\right)^{\frac{1}{\rho}}. \tag{1}$$

ρ describes the degree of substitutability between high and low skilled workers. Let σ be the elasticity of substitution between high and low skilled labor, than $\rho = \frac{\sigma-1}{\sigma}$. I follow the empirical economic literature by assuming that σ between high and low skilled labor

[3] In Fuest and Thum (2001), individuals can become high skilled. The high skilled leave the wok force and become employers who earn the firms' profits.

is larger than 1 so that $0 < \rho < 1$.[4] Low and high skilled labor is supplied by domestic workers and immigrants. The market for high skilled labor is by assumption fully competitive and high skilled labor supply is completely inelastic. By contrast, the low skilled labor market is distorted by wage setting of a representative trade union. Firms choose low skilled employment according to their profit maximization condition for a given low skilled wage. If the wage is set above the market clearing level, the number of employed low skilled workers N falls below the number of potential workers causing unemployment. Assume that all low skilled individuals face the same probability of becoming unemployed, no matter whether an individual is an immigrant or not.

To simplify, assume that the scope of immigrants can be determined by the choice of the country's immigration policy. Thus, there is a constant and sufficiently large stock of potential high and low skilled immigrants.

Let H_0 account for the domestic high skilled and L_0 for the domestic low skilled labor force, m_H and m_L be the respective immigration levels, then (1) can be transformed to:

$$Y = (1 + m_L)\, L_0 \left(\beta n^\rho + (1-\beta)\,(h\delta)^\rho\right)^{\frac{1}{\rho}}. \tag{2}$$

where $n = \frac{N}{L_0(1+m_L)}$ describes the low skilled employment rate, $h = \frac{H_0}{L_0}$ is the domestic ratio of high to low skilled individuals and $\delta = \frac{1+m_H}{1+m_L}$ reflects whether the immigration policy rather attracts low or high skilled migrants. It is thus straightforward that $\delta > 1$ can be described as an immigration policy which prefers high to low skilled immigrants.

Firms are assumed to face perfect competition on the product market. Factor demand is determined as the inverse of the profit maximization conditions with respect to low and high skilled labor:

$$w_l = \beta^{\frac{1}{\rho}} \alpha^{\frac{\rho-1}{\rho}} \tag{3}$$

$$w_h = (1-\beta)^{\frac{1}{\rho}} (1-\alpha)^{\frac{\rho-1}{\rho}} \tag{4}$$

where w_l indicates the low skilled and w_h the high skilled wage rate. In this context, α is the low skilled wage share ($\alpha = \frac{w_l N}{Y} = \frac{\beta n^\rho}{\beta n^\rho + (1-\beta)(h\delta)^\rho}$). The use of α is advantageous since it also indicates the wage elasticity of low skilled labor demand. The higher α, the more elastically low skilled labor demand reacts to changes of the low skilled wage rate.[5]

[4] For instance see Katz and Murphy 1992, Johnson 1995, Card and Lemieux 2001, Doquier et al. 2010.

[5] Let η_{n,w_l} be the wage elasticity of low skilled labor demand, the labor share is: $\alpha = 1 - \frac{1}{(1-\rho)\left|\eta_{n,w_l}\right|}$.

2.2 Union Wage Setting

Suppose the low skilled wage rate to be determined by wage setting of a monopoly trade union which is utilitarian with respect to its members. To keep it simple, I assume that the total low skilled labor force is unionized so that the trade union takes into account the income of employed as well as unemployed.[6] The trade union is assumed to have a utility function of the following kind:

$$U = (1-t)\left(w_l N + b\left(L_0\left(1+m_L\right) - N\right)\right). \tag{5}$$

b describes an unemployment transfer which is the unique alternative income of unskilled workers if they become unemployed. t depicts an egalitarian tax rate by which unemployment benefits are funded. Since income of employed and unemployed is taxed by the same rate and there are no savings, t can also be interpreted as a consumption tax.[7]

The trade union maximizes (5) by taking into account the firms' labor demand at a given wage rate which is the inverse of (3). The optimal low skilled wage can be computed as a surplus λ on unemployment benefits b.

$$w_l^* = (1+\lambda)\, b = \frac{1}{\rho + \alpha\,(1-\rho)} b. \tag{6}$$

Hence, the wage surplus on unemployment benefits is

$$\lambda = \frac{w_l^*}{b} - 1 = \frac{(1-\alpha)\,(1-\rho)}{\rho + \alpha\,(1-\rho)}. \tag{7}$$

(7) indicates that the wage surplus gained by wage setting λ is negatively affected by an increase of the low skilled wage share α. This is reasonable as one keeps in mind that the low skilled wage share and the wage elasticity of low skilled labor demand in absolute terms are positively related. The higher the wage elasticity of labor demand, the larger are the employment losses if the wage is set above the benefit level. Since ceteris paribus an increase of the high skilled work force (e.g. by high skilled immigrants) decreases the low skilled wage elasticity of labor demand it raises the wage for low skilled workers.[8]

[6] Similarly, one could assume that a group of potential non-union workers and union members receive the same wage and equally likely become unemployment. If we abstract from risk aversion, it also does not matter whether the trade union is going to maximize the expected Income of its median member or the total income of workers (Layard et al. 2005).

[7] At first sight, it may seem unusual that unemployment benefits are taxed. However, one can also suggest that the unemployment benefit level $b\,(1-t)$ is slightly adjusted in case of a tax change.

[8] Let η_{n,w_l} be wage elasticity of labor demand. Then, the wage set by the trade union can be calculated

However, since there is a constant low skilled labor force which is limited to one, the optimal low skilled wage rate set by the union has a lower end at the full employment wage for low skilled $\widetilde{w}_l = \beta\left(\beta + (1-\beta)\left(h\delta\right)^{\rho}\right)^{\frac{1-\rho}{\rho}}$. This is feasible since any further reduction in low skilled wage would not yield any employment gains. Thus, the low skilled wage rate can be formulized as follows:

$$w_l = \max\left\{(1+\lambda)\, b; \widetilde{w}_l\right\}. \tag{8}$$

(8) indicates that wage setting above the market clearing wage rate $\widetilde{w}_l$ only exists if the transfer level b is sufficiently large ($b \geq \frac{\widetilde{w}_l}{1+\lambda}$). Since equilibrium low skilled unemployment is a fundamental feature in all industrialized countries, I abstract from the case that unemployment transfers are too low so that the full employment wage level never exceeds the wage set by the trade union. Otherwise labor market imperfections would not have any effect on the labor market equilibrium.

2.3 The Public Expenditure Constraint

Firms and trade unions regard unemployment transfers as well as the tax rate as exogenous parameters. On an aggregate level, however, both variables are linked by a balanced public constraint. Assume that the government funds aggregate unemployment benefits by raising taxes on the entire income of the economy. This of course leads to income redistribution since, contrary to the overall funding of the welfare system, only low skilled workers benefit from it in case they become unemployed.

$$b\,(1-t)\,(L-N) = t\,(w_l N + w_h H) \tag{9}$$

Since there is perfect competition on the product market and firms thus receive zero profits, the gross total output is distributed among low and high skilled workers according to their respective income shares of α and $1-\alpha$. Hence, (9) can be manipulated to:

$$b = \frac{t}{1-t}\frac{n}{1-n}\frac{w_l}{\alpha}. \tag{10}$$

The government has two variables under control, the egalitarian tax rate and the unemployment benefit level. As has been mentioned before, it is essential to know how the government adopts these variables to changes of the employment level. I distinguish the following two cases.

---

as $w = \frac{|\eta_{n,w_l}|}{|\eta_{n,w_l}|-1} b$.

- *an exogenous unemployment benefit* case ($b = \bar{b}$),
- *an exogenous income tax rate case* ($t = \bar{t}$),

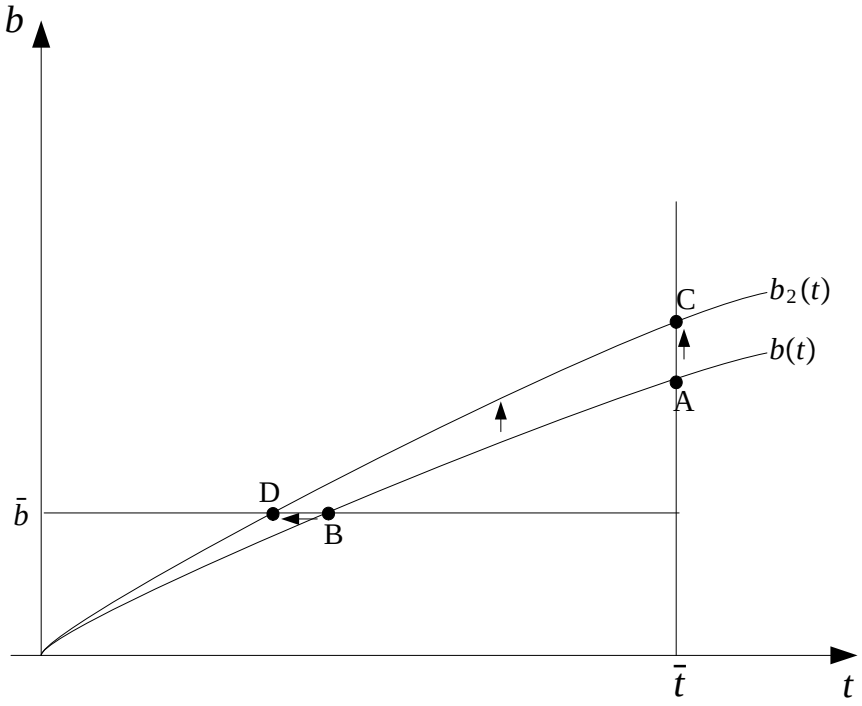

Figure 1: The effect of a positive shock to the public budget

Figure 1 provides a simple illustration of these cases. It is reasonable to suppose that the exogenous tax rate case is predominantly evident in countries with comparably large welfare states where the funding rate due to high expenditures converges to an upper limit $\bar{t}$. The exogenous unemployment benefit case rather fits to a small welfare state where unemployment benefits only comprise a basic support mainly to guarantee the survival of the unemployed but not to grant much further support.

It is interesting to compare how the two welfare states scenarios adjust to a positive shock on the public budget. Figure 1 demonstrates that in the exogenous tax case, unemployment benefits rise from A to C whereas in the exogenous unemployment benefit case, the funding rate will decrease from B to D.

Of course, these are the extreme scenarios of a general adoption process and one could also assume intermediate cases where the government adjusts both variables in response to high skilled immigration. However, this would simply imply a mixture of the effects that are obtained in the above cases and therefore would not provide any further insights.

3 The Effect of High Skilled Immigration on Low Skilled Employment

This section analyzes how an immigration policy which favors high skilled workers (indicated by $\delta > 1$) affects the low skilled employment rate. In the low skilled labor market equilibrium, supply represented by the wage setting equation (8) equals demand indicated by the firm's profit maximization condition (3).

$$\beta^{\frac{1}{\rho}} \alpha^{\frac{\rho-1}{\rho}} = w_l = w_l^* = (1+\lambda)\, b. \tag{11}$$

By use of the total differential of (11) one achieves the following equation:

$$\frac{\partial w_l}{\partial n} dn + \frac{\partial w_l}{\partial \delta} d\delta = b \left(\frac{\partial (1+\lambda)}{\partial n} dn + \frac{\partial (1+\lambda)}{\partial \delta} d\delta \right) + (1+\lambda) \left(\frac{\partial b}{\partial n} dn + \frac{\partial b}{\partial \delta} d\delta \right). \tag{12}$$

(12) can be transformed to (13) which illustrates how domestic low skilled employment is affected by changes of high skilled employment:[9]

$$\frac{dn}{d\delta} \frac{\delta}{n} = \frac{\xi_{w_l,\delta} - \left(\xi_{(1+\lambda),\delta} + \xi_{b,\delta} \right)}{\xi_{b,n} + \xi_{(1+\lambda),n} - \xi_{w_l,n}}. \tag{13}$$

The right hand side of (13) can be positive or negative which depends on the way how the government adjusts unemployment transfers to high skilled immigration. $\xi_{w_l,\delta}$ and $\xi_{w_l,n}$ describe the relative changes of the profit condition (3) to relative changes of high and low skilled employment, respectively. On the contrary, $\xi_{(1+\lambda),\delta}$, $\xi_{(1+\lambda),n}$ and $\xi_{b,\delta}$, $\xi_{b,n}$ reflect how relative changes of high and low skilled employment generate relative changes of the negotiated wage surplus λ and the unemployment transfer level b. In order to achieve precise results, I distinguish the two welfare state scenarios.

3.1 The Case of an Exogenous Benefit Level

Proposition 1 *Given an exogenous unemployment benefit level, a relative increase of high skilled immigration will lead to a proportional increase of low skilled employment.*

Proof. A positive influence of a relative increase of high skilled immigration on low skilled employment is reached when both numerator and denominator of (13) are either positive or

[9] Note that $\xi_{i,j} = \frac{\partial i}{\partial j} \frac{j}{i}$ for $i = w; (1+\lambda); b$ and $j = n; \delta$.

negative. Since b is exogenous and thus $\xi_{b,\delta} = \xi_{b,n} = 0$, (13) can be simplified to

$$\frac{d\widetilde{n}}{d\delta}\frac{\delta}{\widetilde{n}} = \frac{\xi_{w_l,\delta} - \xi_{(1+\lambda),\delta}}{\xi_{(1+\lambda),n} - \xi_{w_l,n}}. \tag{14}$$

where a tilde denotes a variable in the labor market equilibrium in the case of the exogenous benefit level. From the definition of α, it is known that $\xi_{\alpha,\delta} = -\rho(1-\alpha)$ and $\xi_{\alpha,n} = \rho(1-\alpha)$. By taking into account that $\xi_{(1+\lambda),\delta} - \xi_{w_l,\delta} = \xi_{\alpha,\delta}\left(\xi_{(1+\lambda),\alpha} - \xi_{w_l,\alpha}\right)$ and $\xi_{(1+\lambda),n} - \xi_{w_l,n} = \xi_{\alpha,n}\left(\xi_{(1+\lambda),\alpha} - \xi_{w_l,\alpha}\right)$, it easily follows that $\frac{d\widetilde{n}}{d\delta}\frac{\delta}{\widetilde{n}} = -\frac{\xi_{\alpha,\delta}}{\xi_{\alpha,n}} = -\frac{-\rho(1-\alpha)}{\rho(1-\alpha)} = 1$. ■

A relative increase of high skilled immigration leads to a proportional increase of low skilled employment. The result is driven by the complementarity between skilled and unskilled labor. Thus, the factor proportion $\frac{\widetilde{H}}{\widetilde{N}}$ and the low skilled labor share $\widetilde{\alpha}$ remain unchanged. Accordingly, the low and high skilled equilibrium wages are unaffected by high skilled immigration ($\frac{\partial \widetilde{w_l}}{\partial \delta} = \frac{\partial \widetilde{w_h}}{\partial \delta} = 0$). Additionally, the tax rate which is defined as $\widetilde{t} = \frac{\overline{b}(1-\widetilde{n})}{\overline{b}(1-\widetilde{n})+\widetilde{Y}}$ is negatively affected by a relative increase of high skilled workers since

$$\frac{\partial \widetilde{t}}{\partial \delta} = -\overline{b}\frac{\overbrace{\frac{\partial \widetilde{n}}{\partial \delta}\widetilde{Y}}^{>0} + \overbrace{\frac{\partial \widetilde{Y}}{\partial \delta}(1-\widetilde{n})}^{>0}}{\left(\overline{b}(1-\widetilde{n}) + \widetilde{Y}\right)^2} < 0. \tag{15}$$

3.2 The Case of an Exogenous Tax Rate

Proposition 2 *Given an exogenous egalitarian income tax rate, low skilled employment will be negatively affected by a relative increase of high skilled workers.*

Proof. A negative effect of an increase of high skilled immigration on low skilled employment is reached when the numerator and the denominator of (13) have different algebraic signs. According to (10) one can conclude that $\xi_{b,\delta} = \xi_{w_l,\delta} - \xi_{\alpha,\delta}$ and $\xi_{b,n} = \frac{1}{1-n} + \xi_{w_l,n} - \xi_{\alpha,n}$ and convert (13) to

$$\frac{d\widehat{n}}{d\delta}\frac{\delta}{\widehat{n}} = \frac{-\left(\xi_{(1+\lambda),\delta} - \xi_{\alpha,\delta}\right)}{\frac{1}{1-n} + \xi_{(1+\lambda),n} - \xi_{\alpha,n}}. \tag{16}$$

where a circumflex denotes a variable in the labor market equilibrium in the exogenous tax rate case. Due to the definitions for the wage surplus λ and the low skilled wage share α, one finds that $\xi_{(1+\lambda),\delta} - \xi_{\alpha,\delta} = -\left(\xi_{(1+\lambda),n} - \xi_{\alpha,n}\right) = (1-\alpha)\frac{\rho^2+2\alpha\rho(1-\rho)}{\alpha(1-\rho)+\rho}$ which is between 0 and 1. This guarantees that the numerator of (16) is positive and the denominator is negative.

Hence, the overall effect of a relative increase of high skilled immigration on low skilled employment is strictly negative. ■

By combing (10) and (11) one also finds that $\widehat{n} = \frac{\left(1-\bar{t}\right)\widehat{\alpha}(\rho+(1-\rho)\widehat{\alpha})}{\left(1-\bar{t}\right)\widehat{\alpha}(\rho+(1-\rho)\widehat{\alpha})+\bar{t}}$. Thus, as long as $\bar{t} > 0$, $\widehat{n} < 1$.

Furthermore, I can rewrite (16) as

$$\frac{d\widehat{n}}{d\delta}\frac{\delta}{\widehat{n}} = -\frac{1}{A-1} \tag{17}$$

where $A = \frac{\left(1-\bar{t}\right)(\rho+(1-\rho)\widehat{\alpha})\widehat{\alpha}+\bar{t}}{\bar{t}}\frac{\rho+(1-\rho)\widehat{\alpha}}{(1-\widehat{\alpha})(\rho^2+2\rho(1-\rho)\widehat{\alpha})}$. There exist two opposing effects: On the one hand, an increase of the number of high skilled workers increases low skilled employment for every given low skilled wage rate. However, this effect is dominated by increased unemployment benefits and a higher negotiated wage mark-up so that the total effect on low skilled employment is definitely negative. In order to study the effect on equilibrium wages, I further analyze how the equilibrium low skilled labor share is influenced by an increase of high skilled workers:

$$\frac{\partial\widehat{\alpha}}{\partial\delta} = \rho\left(1-\widehat{\alpha}\right)\left(\frac{d\widehat{n}}{d\delta}\frac{\delta}{\widehat{n}} - 1\right)\frac{\widehat{\alpha}}{\delta} < 0. \tag{18}$$

From (3) and (4) one can deduce that $\frac{\partial w_l}{\partial\alpha} < 0$ and $\frac{\partial w_h}{\partial\alpha} > 0$. Together with (18) one can therefore conclude that $\frac{\partial\widehat{w_l}}{\partial\delta} > 0$ and $\frac{\partial\widehat{w_h}}{\partial\delta} < 0$. The tax rate is assumed to be exogenous ($\widehat{t} = \bar{t}$), however it can be examined how the unemployment transfer level is influenced by immigration of high skilled. According to (3) and (6), $b = \beta^{\frac{1}{\rho}}\left(\rho\alpha^{\frac{\rho-1}{\rho}} + (1-\rho)\,\alpha^{\frac{2\rho-1}{\rho}}\right)$. Hence, $\frac{\partial b}{\partial\alpha} = -\left(1-\rho\right)\beta^{\frac{1}{\rho}}\alpha^{-\frac{1}{\rho}}\left(1-\frac{2\rho-1}{\rho}\alpha\right) < 0$. Together with (18) it follows that $\frac{\partial\widehat{b}}{\partial\delta} > 0$. High skilled immigration increases the unemployment benefit level because the additional income that is earned by migrants enlarges the tax base. Since in this case the tax rate is constant, an increase of tax revenues must result in an increase of expenditures. By contrast, since in equilibrium, unskilled unemployment rises, the expenditures for unemployed must also be divided among more individuals. One can conclude that the second effect is minor to the first effect as the total impact of immigration on unemployment benefits is positive.

4 Effects on Net Income

This section examines the effect of high skilled immigration on net income of the domestic work force. This analysis is important since changes according to net income may to a large degree influence a society's attitude towards immigration. Economic mainstream literature

with fully competitive labor markets and the absence of unemployment states that high skilled immigration typically increases low skilled wages whereas wages of domestic high skilled workers decrease.

However, results are ambiguous if one abstracts from perfect labor markets and allows for equilibrium unemployment. Both, domestic high and low skilled are affected due to changes on the labor market equilibrium on the one hand and the fiscal effects according to changes of the redistributive unemployment benefit scheme on the other.

In the model, high skilled income is limited to earnings on the high skilled labor market reduced by income taxation.

$$I_h = (1-t)\, w_h \tag{19}$$

Average low skilled net income contains taxed low skilled wage income as well as unemployment benefits.

$$I_l = (1-t)\,(w_l n + b\,(1-n)) \tag{20}$$

Differentiating (19) and (20) with respect to δ leads to:

$$\frac{\partial I_h}{\partial \delta} = -\frac{\partial t}{\partial \delta} w_h + (1-t)\,\frac{\partial w_h}{\partial \delta} \tag{21}$$

$$\frac{\partial I_l}{\partial \delta} = -\frac{\partial t}{\partial \delta}\,(w_l n + b\,(1-n)) + (1-t)\left(\frac{\partial w_l}{\partial \delta} n + \frac{\partial b}{\partial \delta}\,(1-n) + (w_l - b)\,\frac{\partial n}{\partial \delta}\right) \tag{22}$$

By analyzing how high skilled immigration affects net income of high and low skilled workers, I will again distinguish between the exogenous unemployment benefit case and the exogenous tax rate case.

4.1 The Case of an Exogenous Benefit Level

As has been shown in the previous section, in the exogenous unemployment benefit case, wages remain unchanged in response to an increase of high skilled workers. Therefore, (21) and (22) change to

$$\frac{\partial \widetilde{I_h}}{\partial \delta} = -\frac{\partial \widetilde{t}}{\partial \delta} \widetilde{w_h} > 0, \tag{23}$$

$$\frac{\partial \widetilde{I_l}}{\partial \delta} = -\frac{\partial \widetilde{t}}{\partial \delta}\left(\left(\widetilde{w}_l - \bar{b}\right)\widetilde{n} + \bar{b}\right) + \left(1-\widetilde{t}\right)\left(\widetilde{w}_l - \bar{b}\right)\frac{\partial \widetilde{n}}{\partial \delta} > 0. \tag{24}$$

It is straightforward that a high skilled worker's net income increases since he does not bear any wage loss but benefits from a reduction of the tax rate. Low skilled also gain from the tax reduction. However, a low skilled worker also directly benefits from the employment increase. since $\widetilde{w}_l > \overline{b}$.

Due to the results indicated by (23) and (24) one can conclude that in this case, high skilled immigration leads to a Pareto improvement since it makes both, high as well as all low skilled better off.

4.2 The Case of an Exogenous Tax Rate

The net income effects that are generated by high skilled immigration in the case of a constant egalitarian income tax rate are more uneven.

High skilled workers will be worse off due to high skilled immigration since the impact of high skilled immigrants on the factor proportion is additionally enlarged by the negative low skilled employment effect that even further deteriorates the high skilled wage. Apart from that, high skilled workers do not gain from the fiscal contribution of immigrants since the tax rate is now constant so that the fiscal revenues will be used for enlarged unemployment benefits. Taking this into account, (21) changes to

$$\frac{\partial \widehat{I_h}}{\partial \delta} = \left(1-\overline{t}\right) \frac{\partial \widehat{w_h}}{\partial \delta} < 0. \tag{25}$$

By contrast, low skilled workers will benefit due to higher wages and higher unemployment transfers. However, there is also a negative effect because of the employment loss that is generated by high skilled immigration. This is reflected by equation (26).

$$\frac{\partial \widehat{I_l}}{\partial \delta} = \left(1-\overline{t}\right) \left(\underbrace{\frac{\partial \widehat{w}_l}{\partial \delta}\widehat{n}}_{>0} + \underbrace{\frac{\partial \widehat{b}}{\partial \delta}\left(1-\widehat{n}\right)}_{>0} + \underbrace{\left(\widehat{w}_l - \widehat{b}\right)\frac{\partial \widehat{n}}{\partial \delta}}_{<0} \right). \tag{26}$$

It can be shown that the positive effects are dominant to the negative effects so that the aggregate net income of low skilled I_L is positively affected by high skilled immigration. Transformation of (26) leads to (Appendix A.1):

$$\frac{d\widehat{I}}{d\delta} = \frac{\widehat{Y}}{\delta}\left(\left(1-\overline{t}\right)\left(1-\rho\right)\widehat{\alpha}\left(1-\widehat{\alpha}\right) + \overline{t}\frac{\partial \widehat{b}}{\delta}\frac{\delta}{\overline{b}} \right) > 0. \tag{27}$$

Thus, in the exogenous tax rate case, domestic high skilled lose whereas low skilled benefit from immigration. Since the effects are not symmetric between high and low skilled work-

ers, one needs to weight the income gains and losses of both skill groups by the respective population size to calculate how total domestic income is affected by high skilled immigration.

$$\widehat{I} = \widehat{I}_h \cdot H_0 + \widehat{I}_l \cdot L_0 \tag{28}$$

According to (28), (19) and (20) and after some transformations one can find that

$$\widehat{I} = \frac{\widehat{Y}}{1+m_L}\left(1-(1-\widehat{\alpha})\left(1-\overline{t}\right)\frac{\delta-1}{\delta}\right). \tag{29}$$

Proposition 3 *Originating from equal immigration rates for high and low skilled ($\delta = 1$), an increase of the high skilled immigration rate relative to the low skilled immigration rate increases total domestic income in the constant tax rate case.*

Proof. Taking the first derivative of $\widehat{I}$ with respect to δ describes the overall effect of a marginal increase of high skilled immigration on total income (Appendix A.2).

$$\frac{d\widehat{I}}{d\delta} = \frac{\widehat{Y}}{(1+m_L)\,\delta}\left[\frac{m_H-m_L}{1+m_H}\left(1-\overline{t}\right)(1-\rho)\,\widehat{\alpha}\,(1-\widehat{\alpha})\left(1-\frac{\partial\widehat{n}}{\delta}\frac{\delta}{\widehat{n}}\right)+(1-\widehat{\alpha})\,\overline{t}+\widehat{\alpha}\frac{\partial\widehat{n}}{\delta}\frac{\delta}{\widehat{n}}\right] \tag{30}$$

Originating from equal immigration rates means that an increase of δ leads to a scenario where $m_H > m_L$ so that the first term in brackets on the right hand side of (30) is definitely positive. Thus, $\frac{d\widehat{I}}{d\delta} > 0$ if the following condition is fulfilled:

$$\overline{t}\,(1-\widehat{\alpha})+\widehat{\alpha}\frac{\partial\widehat{n}}{\partial\delta}\frac{\delta}{\widehat{n}} > 0. \tag{31}$$

Taking account of $\frac{\partial\widehat{n}}{\partial\delta}\frac{\delta}{\widehat{n}} = -\frac{1}{A-1}$ it follows that (31) is fulfilled if

$$\overline{t}\,(1-\widehat{\alpha})\,A > \widehat{\alpha}+\overline{t}\,(1-\widehat{\alpha}). \tag{32}$$

By inserting $A = \frac{\left(1-\overline{t}\right)(\rho+(1-\rho)\widehat{\alpha})\widehat{\alpha}+\overline{t}}{\overline{t}}\frac{\rho+(1-\rho)\widehat{\alpha}}{(1-\widehat{\alpha})(\rho^2+2\rho(1-\rho)\widehat{\alpha})}$ into (32) one can show that (31) is fulfilled since

$$\begin{aligned}\overline{t}\,(1-\widehat{\alpha})\,A &= \left(\widehat{\alpha}+\overline{t}\,(1-\widehat{\alpha})\right)\left[1+\underbrace{\frac{\overline{t}\,(1-\rho)\,(1-\widehat{\alpha})\,(\rho+(1-\rho)\,\widehat{\alpha})+(1-\rho)^2\,\widehat{\alpha}^2}{\rho^2+2\rho\,(1-\rho)\,\widehat{\alpha}}}_{>0}\right]\\ &> \widehat{\alpha}+\overline{t}\,(1-\widehat{\alpha})\end{aligned} \tag{33}$$

■

Hence, based on the assumptions of the model, an increase of high skilled immigration relative to low skilled immigration remains beneficial on the aggregate income level even if the contribution rate is constant and the unemployment benefit level is adjusted in the case of high skilled immigration. This leads to the conclusion that high skilled immigration can rather be harmful with regard to low skilled employment without leading to a reduction of overall income. On an aggregate level, the model predicts that the gains that are attributed to high skilled immigrants still dominate its costs.

5 Conclusions

By use of a simple theoretical model framework with imperfect low skilled labor markets this paper has analyzed how low skilled employment is affected by high skilled immigration in two different welfare state scenarios. The main finding is that high skilled immigration is extremely effective in diminishing unemployment of low skilled if the fiscal authorities of the respective country adjusts the tax rate to a fixed unemployment benefit level. In case of a constant tax rate, low skilled labor market distortions are even intensified by high skilled immigration leading to a reduction of low skilled employment.

A similar distinction must be made as one moves from employment to net income effects. In the first scenario of an exogenous unemployed benefit level, a general net income gain exists, whereas in the second scenario of a constant egalitarian tax rate, high skilled immigration affects the two skill groups, differently. In the latter case, I find that high skilled workers definitely lose whereas low skilled workers on average gain. Different from Kemnitz (2009), the effect of high skilled immigration on aggregate domestic income remains positive. However, I concude that in case of higher unemployment among low skilled and decreasing income of high skilled workers, opposition against immigrants is much larger than in the case of a constant unemployment benefit level where all income groups are positively affected by high skilled immigration.

The argument that distortions on the labor markets and equilibrium unemployment should not be neglected when studying the effects of immigration and particular high skilled immigration on the host economy attains additional support by the recent empirical literature. Ortega and Peri (2009) and Bertoli et. al. (2009) find that, according to a cross country estimation covering 14 OECD countries for the 1980 to 2005 period, employment is positively affected by immigration whereas no significant effect on wages can be identified.

With regard to immigration policy, the results make one propose that countries with larger fiscal discipline that do not expand the unemployment benefit level in response to the

enlarged tax base will construct guidelines that explicitly select workers with higher education since all incoem groups benefit from it. In contrast, those economies where a broadening of the welfare system is more realistic are probably more skeptical and try to avoid high skilled immigration. At least to some degree, this could explain the mentioned traditional and still existing differences between the Central European and Anglo-Saxon attitudes towards high skilled immigration. Additionally, the results can be regarded as a proposal for fiscal authorities how to react in response to an inflow of high skilled workers since only in case of a constant benefit level, a Pareto improvement is achieved.

Of course, the mentioned effects only to a small degree cover the important issues in the debate about an optimal immigration policy. A major extension could be made by the introduction of physical capital into the basic model framework because capital adjustments in response to immigration is empirically relevant (see e.g. Ortega and Peri (2009)) and capitalists as well as firms do play an influential role in the political process limiting and expanding the scope of high skilled immigrants.[10] The innovative strength of high skilled and intergenerational as well as international network effects have also not been analyzed in this paper but are definitely important in this context. The goal of this paper was to highlight the importance of imperfect labor markets, the interactions of different types of labor with heterogeneous skills as well as a redistributive unemployment pension scheme in the context of high skilled immigration and immigration policy. I hope that the framework presented in this paper can be helpful for future research on this topic trying to explain the individual attitudes that influence the different immigration policies of the developed countries.

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A Appendix

A.1 The Effect of High Skilled Immigration on Low Skilled Income

Differentiation of domestic low skilled income with respect to H has lead to

$$\frac{\partial \widehat{I_l}}{\partial \delta} = \left(1-\overline{t}\right)\left(\frac{\partial \widehat{w}_l}{\partial \delta}\widehat{n} + \frac{\partial \widehat{b}}{\partial \delta}\left(1-\widehat{n}\right) + \left(\widehat{w}_l - \widehat{b}\right)\frac{\partial \widehat{n}}{\partial \delta}\right). \tag{34}$$

After taking into account (10) and few transformations one finds that

$$\frac{\partial \widehat{I_l}}{\partial \delta} = \left(1-\overline{t}\right)\frac{\widehat{w}_l \widehat{n}}{\delta}\left(\frac{\partial \widehat{w}_l}{\partial \delta}\frac{\delta}{\widehat{w}_l} + \frac{\partial \widehat{b}}{\partial \delta}\frac{\delta}{\widehat{b}}\frac{\overline{t}}{1-\overline{t}}\frac{1}{\widehat{\alpha}} + \frac{\widehat{w}_l - \widehat{b}}{\widehat{w}_l}\frac{\partial \widehat{n}}{\partial \delta}\frac{\delta}{\widehat{n}}\right). \tag{35}$$

Since $\frac{\partial \widehat{w_l}}{\partial \delta}\frac{\delta}{\widehat{w_l}} = (1-\rho)\left(1-\widehat{\alpha}\right)\left(1-\frac{\partial \widehat{n}}{\partial \delta}\frac{\delta}{\widehat{n}}\right)$, $\widehat{\alpha} = \frac{\widehat{w_l}\widehat{n}}{\widehat{Y}}$ and $\frac{\widehat{w_l}-\widehat{b}}{\widehat{w_l}} = (1-\rho)\left(1-\widehat{\alpha}\right)$ it follows that

$$\frac{\partial \widehat{I_l}}{\partial \delta} = \frac{\widehat{Y}}{\delta}\left(\left(1-\overline{t}\right)(1-\rho)\,\widehat{\alpha}\left(1-\widehat{\alpha}\right) + \overline{t}\frac{\partial \widehat{b}}{\partial \delta}\frac{\delta}{\widehat{b}}\right) > 0. \tag{36}$$

A.2 The Effect of High Skilled Immigration on Domestic Income

Differentiating (28) with respect to H leads to

$$\begin{aligned}\frac{\partial \widehat{I}}{\partial \delta} &= \frac{1}{1+m_H}\frac{\partial \widehat{Y}}{\partial \delta}\left(1-\left(1-\widehat{\alpha}\right)\left(1-\overline{t}\right)\frac{\delta-1}{\delta}\right) \\ &\quad -\frac{\left(1-\overline{t}\right)}{1+m_H}\widehat{Y}\left(\frac{\delta-1}{\delta}\frac{\partial \widehat{(1-\alpha)}}{\partial \delta} + (1-\alpha)\frac{1}{\delta^2}\right)\end{aligned} \tag{37}$$

Note that $\widehat{w_h} = (1-\alpha)\,\frac{\widehat{Y}}{H}$. Thus,

$$\begin{aligned}\frac{\partial \widehat{I}}{\partial \delta} &= \frac{\widehat{Y}}{(1+m_H)\,\delta}\frac{\partial \widehat{Y}}{\partial \delta}\frac{\delta}{\widehat{Y}}\left(1-(1-\widehat{\alpha})\left(1-\overline{t}\right)\frac{\delta-1}{\delta}\right) \\ &\quad -\frac{\left(1-\overline{t}\right)(1-\widehat{\alpha})\,\widehat{Y}}{(1+m_H)\,\delta}\left(\frac{\delta-1}{\delta}\left(\frac{\partial\widehat{(1-\alpha)}}{\partial\delta}\frac{\delta}{\widehat{(1-\alpha)}}-1\right)+1\right). \qquad (38)\end{aligned}$$

Inserting $\frac{\partial \widehat{Y}}{\partial \delta}\frac{\delta}{\widehat{Y}} = 1-\widehat{\alpha}+\widehat{\alpha}\frac{\partial \widehat{n}}{\partial \delta}\frac{\delta}{\widehat{n}}$ and $\frac{\partial\widehat{(1-\alpha)}}{\partial\delta}\frac{\delta}{\widehat{(1-\alpha)}} = \rho\widehat{\alpha}\left(1-\frac{\partial \widehat{n}}{\partial \delta}\frac{\delta}{\widehat{n}}\right)$ reveals that

$$\frac{\partial \widehat{I}}{\partial \delta} = \frac{\widehat{Y}}{(1+m_H)\,\delta}\left(\left(1-\overline{t}\right)(1-\rho)\,\widehat{\alpha}\,(1-\widehat{\alpha})\,\frac{\delta-1}{\delta}\left(1-\frac{\partial \widehat{n}}{\partial \delta}\frac{\delta}{\widehat{n}}\right)+\overline{t}\,(1-\widehat{\alpha})+\widehat{\alpha}\frac{\partial \widehat{n}}{\partial \delta}\frac{\delta}{\widehat{n}}\right). \qquad (39)$$

Since $\frac{\delta-1}{\delta} = \frac{m_H-m_L}{1+m_H}$, one finds that

$$\frac{\partial \widehat{I}}{\partial \delta} = \frac{\widehat{Y}}{(1+m_H)\,\delta}\left(\left(1-\overline{t}\right)(1-\rho)\,\widehat{\alpha}\,(1-\widehat{\alpha})\,\frac{m_H-m_L}{1+m_H}\left(1-\frac{\partial \widehat{n}}{\partial \delta}\frac{\delta}{\widehat{n}}\right)+\overline{t}\,(1-\widehat{\alpha})+\widehat{\alpha}\frac{\partial \widehat{n}}{\partial \delta}\frac{\delta}{\widehat{n}}\right). \qquad (40)$$