Does High Skilled Immigration Harm Low Skilled Employment and Overall Income?

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Abstract

We study the effects of high skilled immigration on employment and net income in the receiving economy where the market for low skilled labour is distorted by union wage setting and a redistributive unemployment benefit scheme. Based on the empirical fact that high and low skilled workers are close albeit imperfect substitutes, we show that high skilled immigration can either be beneficial or harmful, both in terms of employment and net income. More precisely, we conclude that a Pareto improvement can be achieved if the unemployment benefit level remains unaffected by high skilled immigration whereas an overall loss in net income cannot be ruled out if we suggest unemployment benefits to be funded by an exogenous egalitarian tax rate.

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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 a more and more 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 and can 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 that 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 with 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 so unfavorable in some countries? By answering this question we must take into account that in democracies, immigration policies to a large extent reflect the individual preferences of voters. Thus, it is important to analyze the factors that determine the individual attitudes to high skilled immigration. These factors can be decomposed in non economic aspects such as cultural preferences and political ideology and economic aspects like changes of employment, wages and the welfare state (Schewe and Slaughter (2001), O'Rourck and Sinnott (2006), Fachini and Mayda (2008)). With regard to the latter, it is obvious 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] It is straightforward that the more individuals are disadvantaged, the larger is the opposition against high skilled immigration.

In this paper, we analyze the economic factors that affect the attitudes towards high skilled immigration. Therefore, we examine the employment as well as the respective net income effects that are caused by an inflow of high skilled workers. We consider a CES production

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[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.

technology with high and low skilled labour as the only relevant factors of production. Both factors are assumed to be close but imperfect substitutes which is common in empirical research on labour economics (see e.g. Katz and Murphy (1992), Johnson (1995), Card and Lemieux (2001) and Doquier et al. (2010)). We further assume that the market for low skilled labour is distorted by wage setting of a monopoly trade unions as well as by an unemployment pension scheme. According to the latter, we 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. We distinguish between an *exogenous unemployment benefit case, an exogenous tax rate case* and an *exogenous replacement ratio case.* The distinction is important since the impact of high skilled immigration on employment as well as net income may change substantially if we switch from one case to the other. More precisely, we provide proof that in case of a constant unemployment benefit or a constant replacement ratio, 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. We achieve an opposite result if we assume the exogenous tax rate case. We show that, if the tax rate by which unemployment benefits are funded is exogenously fixed, there is a negative employment effect for low skilled. With regard to net income, low skilled individuals on average will be better off whereas high skilled workers will definitely lose.

The innovation of our paper is the opportunity to allow for different adjustment channels of an unemployment pension scheme in a model framework with an imperfect low skilled labour market. Thus, we combine two strings of the recent economic literature on immigration theory. Following Fuest and Thum (2000) and Fuest and Thum (2001) we conclude that immigration has a substantial impact on unionized wage setting and thus besides wages also influence low skilled employment. However, contrary to our supposition, these authors assume that (low skilled) immigrants perfectly compete with domestic union workers on the labour market whereas in our model, union workers and (high skilled) immigrants complement each other. Furthermore, since we point at the relevance of fiscal redistribution in the context of immigration, our paper is in the tradition of Facchini and Mayda (2009). Similarly, they model different scenarios through which the fiscal authority can adjust its redistribution parameters in response to immigration. However, unlike Facchini and Mayda (2009) who consider a redistributive welfare state and perfect labour markets, we point at redistribution in the context of the funding of unemployment pensions in a distorted low skilled labour market.

The paper most closely related to ours is Kemnitz (2009) who analyses the domestic welfare losses affected by high skilled immigration. In a one sector, two factor economy with imperfect labour markets, he proves that high skilled immigration affects low skilled employment negatively and thus has a negative gross income effect on the domestic population. However, these results are driven by the critical assumption that the funding rate of unemployment benefits is exogenous. In this context, our model is more general and allows for different adjustment channels.

The forthcoming part of our 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, we deduce the net income effects for high as well as low skilled individuals. Section 5 concludes.

2 Model Framework

2.1 Production Technology

We consider a one good economy where the only relevant factors of production are high skilled labour H and low skilled labour N. An aggregate good Y is produced with standard CES-technology:

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

The market for high skilled labour is by assumption fully competitive and high skilled labour supply is completely inelastic. Therefore, the number of employed high skilled workers equals the high skilled population. By contrast, the low skilled labour market is distorted by wage bargaining between a representative trade union and a representative firm. The latter faces a perfectly competitive product market and chooses low skilled employment according to its profit maximization condition for a given low skilled wage. The profit maximization condition of the representative firm is

$$w = \beta^{\frac{1}{\rho}} \alpha^{\frac{\rho-1}{\rho}} \tag{2}$$

where α is the low skilled wage share $\left(\alpha = \frac{\beta N^\rho}{\beta N^\rho + (1-\beta)H^\rho}\right)$. The use of α is advantageous since it also indicates the wage elasticity of labour demand. The higher α, the more elastically low skilled labour demand reacts on changes of the low skilled wage rate.[3]

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[3]Let $\eta_{N,w}$ be the wage elasticity of labour demand, the labour share is: $a = 1 - \frac{1}{(1-\rho)\left|\eta_{N,w}\right|}$.

2.2 Union Wage Setting

We assume 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, we assume that the total low skilled labour force is unionized so that the trade union takes into account the income of employed as well as unemployed.[4] We normalize the constant low skilled labour force potential to unity and suppose the trade union to have a utility function of the following kind:

$$U = (1 - t)(wN + b(1 - N)). \tag{3}$$

b describes the 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 employed and unemployed income is reduced by the same tax rate, it can as well be interpreted as a consumption tax. We assume the low skilled workforce to be risk neutral and utility is regarded to be equal to net income. The trade union maximizes (3) by taking into account the firms' labour demand at a given wage rate which is the inverse of (2). As a result, the optimal wage can be calculated to be:

$$w^* = \frac{(1 - \alpha)(1 - \rho)}{\rho + \alpha(1 - \rho)} b = (1 + \lambda) b. \tag{4}$$

From (4) we can conclude that the wage surplus through 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 labour demand in absolute terms are positively related. The higher the wage elasticity of labour demand, the larger are the employment losses if the wage is set above the outside option. An increase of H decreases the wage elasticity of labour demand and is thus responded by a higher low skilled wage.[5]

However, since there is a constant low skilled labour force which is limited to one, the optimal wage rate set by the union has a lower end at the full employment wage $\widetilde{w} = \beta(\beta + (1 - \beta)H^\rho)^{\frac{1-\rho}{\rho}}$. This is feasible since any further reduction in wage would not yield any employment gain. Thus, we can formulize the wage rate to be

$$w = \max\{(1 + \lambda) b; \widetilde{w}\}. \tag{5}$$

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[4]Similarlily, we could assume that a group of potential non-union workers and union members receive the same wage and are marked by the same unemployment rate.

[5]Let $\eta_{N,w}$ be wage elasticity of labour demand, the wage set by the trade union can be calculated to be $w = \frac{|\eta_{N,W}|}{|\eta_{N,W}| - 1} b.$

(5) indicates that wage setting above the market clearing wage rate $\widetilde{w}$ only exists if the transfer level b is sufficietly large $(b \geq \frac{\widetilde{w}}{1+\lambda})$. Since equilibrium unemployment is a fundamental feature of European labour markets, we 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. Thus, we assume that employment is in any case smaller than one. This is reasonable since otherwise labour market imperfections would not have any effect on the labour 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. We assume that the government funds aggregate unemployment benefits by raising taxes on the entire income of the economy.[6] This of course leads to income redistribution since, contrary to the overall funding of the insurance system, only low skilled workers benefit from it in case they become unemployed.

$$b\left(1-t\right)\left(1-N\right) = t\left(wN + w_h H\right) \tag{6}$$

Since we assume 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, (6) can be manipulated to:

$$b\left(1-t\right)\left(1-N\right) = \frac{twN}{\alpha}. \tag{7}$$

The government has two variables under control, the egalitarian tax rate and the unemployment benefit level. The latter can be regarded in absolute terms or as a constant replacement ratio. For the results of the theoretical model it is essential to know how the government adopts these variables to changes of the employment level. We distinguish the following cases:

- *an exogenous unemployment benefit* $(b = \bar{b})$,

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

- *an exogenous replacement ratio* $(\frac{b}{w} = \bar{\theta})$.

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[6]Income contains gross earning of high and low skilled as well as unemployment benefits. Since we abstract from savings, this can also be interpreted as a taxation of consumption. By this, we avoid unpleasant incentive effects since net wages are always above net unemployment benefits.

Of course, these are the extreme scenarios of a general adoption process and one could also assume intermediate cases where the government adjust 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

Now we consider the three opportunities of the government to adjust its balanced budget in order to analyze the effects of high skilled immigration on low skilled employment in equilibrium. In the labour market equilibrium, labour supply represented by the wage setting equation (5) equals labour demand indicated by the firm's profit condition (2).

$$\beta^{\frac{1}{\rho}} \alpha^{\frac{\rho-1}{\rho}} = w = w^* = (1 + \lambda) b. \tag{8}$$

By use of the total differential of (8) we achieve the following equation:

$$\frac{\partial w}{\partial N} dN + \frac{\partial w}{\partial H} dH = b \left(\frac{\partial (1+\lambda)}{\partial N} dN + \frac{\partial (1+\lambda)}{\partial H} dH \right) + (1+\lambda) \left(\frac{\partial b}{\partial N} dN + \frac{\partial b}{\partial H} dH \right). \tag{9}$$

which we dan simply transform to (10) which illustrates how domestic low skilled employment is relatively affected by relative changes of high skilled employment:[7]

$$\frac{dN}{dH} \frac{H}{N} = \frac{\xi_{w,H} - \left(\xi_{(1+\lambda),H} + \xi_{b,H} \right)}{\xi_{b,N} + \xi_{(1+\lambda),N} - \xi_{w,N}}. \tag{10}$$

The right hand side of (10) can be positive or negative which depends on the way how the government adopts unemployment transfers to high skilled immigration. $\xi_{w,H}$ and $\xi_{w,N}$ describe the relative changes of the profit condition (2) to relative changes of high and low skilled employment, respectively. On the contrary, $\xi_{(1+\lambda),H}$, $\xi_{(1+\lambda),N}$ and $\xi_{b,H}$, $\xi_{b,N}$ 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, we distinguish the three cases mentioned in the previous section.

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[7]Note that $\xi_{i,j} = \frac{\partial i}{\partial j} \frac{j}{i}$ for $i = w; (1+\lambda); b$ and $j = N; H$

3.1 The Case of An Exogenous Benefit Level

Proposition 1 *Given an exogenous unemployment benefit level, low skilled employment will be positively affected by an increase of high skilled workers.*

Proof. A positive influence of high skilled immigration on low skilled employment is reached when both numerator and denominator of (10) are either positive or negative. Since b is exogenous and thus $\xi_{b,H} = \xi_{b,N} = 0$, we can simplify (10) to

$$\frac{dN}{dH}\frac{H}{N} = \frac{\xi_{w,H} - \xi_{(1+\lambda),H}}{\xi_{(1+\lambda),N} - \xi_{w,N}}. \tag{11}$$

By taking into account that $\xi_{(1+\lambda),H} - \xi_{w,H} = \xi_{\alpha,H}\left(\xi_{(1+\lambda),\alpha} - \xi_{w,\alpha}\right)$ and $\xi_{(1+\lambda),N} - \xi_{w,N} = \xi_{\alpha,N}\left(\xi_{(1+\lambda),\alpha} - \xi_{w,\alpha}\right)$, it easily follows that $\frac{dN}{dH}\frac{H}{N} = -\frac{\xi_{\alpha,H}}{\xi_{\alpha,N}} = 1$. ∎

An increase of high skilled labour will lead to a proportional increase of low skilled employment. The result is driven by the complementarity between skilled and unskilled labour. The low skilled wage as well as the low skilled income share remain unaffected by high skilled immigration.

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 an increase of high skilled workers.*

Proof. A negative influence of high skilled immigration on low skilled employment is reached when the numerator and the denominator of (10) have different algebraic signs. Note that the denominator of (10) is positive since $\xi_{b,N} = \frac{1}{1-N} - (1-\alpha) > 0$ and $\xi_{(1+\lambda),N} - \xi_{w,N} > 0$[8]. The numerator is negative since $\xi_{w,H} - \xi_{b,H} = -\rho(1-\alpha) < 0$ and $\xi_{(1+\lambda),H} > 0$. Hence, the overall effect of high skilled immigration on low skilled employment is strictly negative. ∎

In fact, there exist two opposing effects: On the one hand, an increase of high skilled workers will increase 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.

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[8] $\xi_{(1+\lambda),N} - \xi_{w,N} = \frac{(1-\rho)(1-\alpha)\rho(1-(1-\rho)\alpha)}{((1-\rho)\alpha+\rho)} > 0$

3.3 The Case of an Exogenous Replacement Ratio

We obtain an exceptional case if we suppose a constant replacement ratio. By definition, the wage mark-up is also exogenously determined:

$$1 + \lambda = \frac{1}{\theta} \tag{12}$$

Due to this, one can explicitly compute the employment rate as a function of H, ρ and θ.

$$N = \left[\frac{(\theta - \rho)}{(1 - \theta)} \right]^{\frac{1}{\rho}} H \tag{13}$$

According to (13), there only exists an equilibrium where $0 \leq N \leq 1$ if $\rho \leq \theta \leq \frac{1 + \rho H^\rho}{1 + H^\rho}$. If this condition is fulfilled, an increase of low skilled labour N increases linearly in skilled employment H. Therefore, the high and low skilled wage rate as well as the benefit level will not be influenced by high skilled immigration whereas the tax rate will decrease. Thus, an increase of high skilled labour causes the same effects as in the case when a constant unemployment benefit level is suggested.

Furthermore, (13) bares some features which are not in line with mainstream economic theory. As can easily be deduced, N increases in θ. This ambiguous result is driven by the fact that the wage mark-up factor $1 + \lambda$ is ceteris paribus negatively affected by N. An increase of the replacement ratio decreases the wage mark-up, exogenously. Hence, in equilibrium, employment must increase. Similarly, an inflow of high skilled labour will only result in higher employment since the wage mark-up factor is exogenously determined by the reciprocal of the constant replacement ratio.

4 Effects on Net Income

This chapter examines the effect of high skilled immigration on net incomes 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 labour 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 less ambiguous if one abstracts from perfect labour markets and

allows for equilibrium unemployment. Both high and low skilled are affected due to changes of employment and wages on the one hand and the fiscal effects according to changes of the redistributive unemployment benefit scheme on the other.

In our model, high skilled income is limited to earnings on the high skilled labour market reduced by income taxation. Low skilled net income contains taxed earnings on the low skilled labour market as well as unemployment income. Based on the results of the previous chapter, it is straightforward that net incomes of high and low skilled workers depend on how the unemployment benefit scheme adopts to high skilled immigration. In the following, we will therefore distinguish between a constant benefit and a constant replacement ratio, on the one hand and a constant tax rate, on the other.

With regard to the *exogenous benefit level (replacement ratio) case,* net income can easily be identified. In this scenario, as has been shown in the previous section, high skilled immigration is accompanied by a proportional increase of low skilled employment whereas gross wages of high and low skilled workers remain unchanged. Additional to the positive low skilled employment effect, all income groups gain from a reduction of the tax rate so that high and low skilled workers' net incomes as well as net unemployment benefits increase. Thus, high skilled immigration is a Pareto improvement.

The net income effects that are generated by high skilled immigration in the case of a constant egalitarian income tax rate are, however, less easy to evaluate. High skilled workers will be definitively worse off due to high skilled immigration since the change in 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 a fiscal relief since the tax rate is now fixed. The negative effect of high skilled immigration on domestic high skilled net income I_H is described by equation (14).[9]

$$\frac{dI_H}{dH}\frac{H}{I_H} = -\left(1-\rho\right)\alpha\left(1-\xi_{N,H}\right) < 0 \tag{14}$$

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. It can be shown that the first effect is dominant so that the aggregate net income of low skilled I_L is positively affected by high skilled immigration:

$$\frac{dI_L}{dH}\frac{H}{I_L} = \frac{\left(1-\rho\right)\alpha\left(1-\alpha\right)\left(1-t\right) + t\xi_{b,H}}{\alpha\left(1-t\right) + t} > 0. \tag{15}$$

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[9]See Appendix A1 to A3 for analytical derivations of (14), (15) and (16)!

Whether the net income gain for low skilled outweighs the net income loss of high skilled cannot be solved analytically. A sufficient condition for a domestic net income gain is:

$$t > \frac{-\alpha \left(m \left(1 - \alpha \right) \left(1 - \rho \right) \left(1 - \xi_{N,H} \right) + \xi_{N,H} \right)}{1 - \left(1 - \alpha \right) \left(1 - \rho \right) \left(1 - \xi_{N,H} \right)} \tag{16}$$

where m describes the share of the high skilled labour force that is captured by immigrants. From (16) we can deduce that degree of fiscal redistribution from employed to unemployed is relevant in this context. The higher the tax rate, the rather high skilled immigration is beneficial for the host economy.

All in all, we show that, with regard to net income, high skilled immigration is beneficial only in the *exogenous unemployment benefit (replacement ratio) case*. In case of an exogenous egalitarian income tax rate, we find that high skilled immigration creates losers and winners and an indefinite aggregate effect on domestic net income. The results thus indicate that opposition towards an immigration of high skilled is presumably higher in the latter case.

5   Conclusions

By use of a simple theoretical model framework with imperfect low skilled labour markets, this paper has analyzed how low skilled employment is affected by high skilled immigration in 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 fixes unemployment benefits and adopts the tax rate by which the public budget is funded. In case of a constant tax rate, labour 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 a fixed benefit level (or a fixed replacement ratio), a general net income gain exists, whereas in the second scenario of a constant egalitarian tax rate, it is uncertain whether high skilled immigration affects the economy positively. In the latter case, we find that high skilled workers definitely lose. Thus, a general aggregate income surplus from high skilled immigration as it is proposed by models with full employment on all labour markets cannot be guaranteed.

The argument that distortions on the labour 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 litera-

ture. 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 strongly positively affected by immigration whereas no significant effect on wages can be identified.

With regard to immigration policy, the results make us propose that countries with larger fiscal discipline that do not expand the unemployment benefit level in response to the enlarged tax base will rather regard high skilled immigration as a positive phenomenon and therefore design an immigration policy that explicitly select workers with higher education. In contrast, those economies where a broadening of the welfare system is more realistic are probably more sceptical 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 attitude 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 (constant replacement rate), 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. Our goal was to highlight the importance of imperfect labour markets, the interactions of different types of labour with heterogenous skills as well as a redistributive unemployment pension scheme in the context of high skilled immigration and immigration policy. We 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 countries.

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A   Appendix

A.1   The Effect of High Skilled Immigration on Domestic High Skilled Net Income (Exogenous Tax Rate Case):

The equation for domestic high skilled net income is equal to:

$$I_H = (1 - t)\, w_H H_0. \tag{17}$$

Since $w_H = \frac{(1-\alpha)H}{\alpha N} w$ and together with (2), it follows that

$$I_H = (1 - t)(1 - \alpha)\left(\frac{\beta}{\alpha}\right)^{\frac{1}{\beta}} \frac{N}{H} H_0. \tag{18}$$

A relative increase of high skilled thus has the following effect on the domestic high skilled workforce's income:

$$\frac{dI_H}{dH}\frac{H}{I_H} = \xi_{(1-\alpha),H} - \frac{1}{\rho}\xi_{\alpha,H} + \xi_{N,H} - 1 \tag{19}$$

from which follows:

$$\frac{dI_H}{dH}\frac{H}{I_H} = -\left(1-\rho\right)\alpha\left(1-\xi_{N,H}\right) < 0. \tag{20}$$

Since an inflow of high skilled workers negatively affects low skilled employment in the scenario of a constant egalitarian income tax rate, high skilled immigration reduces net income of the domestic high skilled population as is illustrated by (20).

A.2 The Effect Of High Skilled Immigration on Domestic Low Skilled Net Income (Exogenous Tax Rate Case)

The equation for aggregate domestic low skilled net income is equal to

$$I_L = \left(1-t\right)\left(wN + b\left(1-N\right)\right) \tag{21}$$

which can with regard to (5) be simplified to

$$I_L = \left(1-t\right)\left(1-\lambda N\right)b. \tag{22}$$

A relative increase of high skilled thus has the following effect on the domestic low skilled workforce:

$$\frac{dI_L}{dH}\frac{H}{I_L} = \xi_{(1-\lambda N),H} + \xi_{b,H} = \frac{\lambda}{1-\lambda N}\left(\frac{1+\lambda}{\lambda}\xi_{(1+\lambda),H} + \xi_{N,H}\right) + \xi_{b,H.} \tag{23}$$

Under consideration of the equilibrium employment level ($N = \frac{(1-t)\alpha}{(1-t)\alpha+t(1+\lambda)}$) and by taking into account that $\xi_{(1+\lambda),H} = \xi_{w,H} - \xi_{b,H}$, we conclude that

$$\frac{dI_L}{dH}\frac{H}{I_L} = \frac{\left(1-\rho\right)\alpha\left(1-\alpha\right)\left(1-t\right) + t\xi_{b,H}}{\alpha\left(1-t\right)+t} > 0. \tag{24}$$

(24) is positive since $\xi_{N,H}$ is negative and $\xi_{b,H}$ is positive. Therefore, high skilled immigration affects the domestic low skilled population positively.

A.3 The Effect of High Skilled Immigration on Aggregate Domestic Net Income (Exogenous Tax Rate Case)

Aggregate domestic net income is the sum of domestic high and low skilled gross earning as well as tax payments of high skilled immigrants

$$I = w_H H_0 + wN + t w_H (H - H_0) \tag{25}$$

which can be transformed to

$$I = Y \left[(1 - \alpha) \frac{H_0}{H} + \alpha + t (1 - \alpha) \frac{H - H_0}{H} \right]. \tag{26}$$

Differentiating I with respect to H leads to:

$$\frac{dI}{dH} = \frac{Y}{H} \left(m (1 - t) (1 - \alpha) \alpha (1 - \rho) + \alpha \xi_{N,H} + t (1 - \alpha) \right) \tag{27}$$

where m indicates the proportion of immigrants to total high skilled $(m = \frac{H - H_0}{H})$. The first and the third summands of the right hand side of (27) are positive, however, the second is negative. Therefore, the total effect is indefinite. As can simply be calculated, the right hand side of (27) becomes positive if:

$$t > \frac{-\alpha \left(m (1 - \alpha) (1 - \rho) \left(1 - \xi_{N,H} \right) + \xi_{N,H} \right)}{1 - (1 - \alpha) (1 - \rho) \left(1 - \xi_{N,H} \right)}. \tag{28}$$