High-Skilled Immigration and Imperfect Labor Markets: Theory and Cross-country Evidence

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1 Introduction

The share of the high-skilled in the immigrant population has substantially increased throughout the last decades. This is not only true for countries which pursued skill-selective immigration policies for long periods of time, but also for many European countries which have been characterized by less skilled immigration for decades (Boeri et al., 2012). As an example, the share of individuals with a tertiary education degree among the newly arrived immigrants in Germany has increased from 26 percent in 2000 to 43 percent in 2010, and slightly declined since then in the course of the recent immigration surge there which was triggered by the financial and economic crisis in the EU (Destatis, 2014). Similar trends of rising skill levels in the recently arrived immigrant population can be observed in almost all relevant destinations for migrants in Europe such as the UK, Ireland, Scandinavia and – slightly less so in Italy and Spain. Thus, although the skill levels of immigration stocks differ largely between the main European destinations and the US, the skill composition of recent arrivals tends to converge during the last decade.

This paper studies the labor market effects of a shift in the skill composition of the immigrant labor force drawing on estimates presented in detail in Brücker et al. (2014). The approach is based on a structural model of the labor market, which distinguishes different types of labor by skill levels, work experience and national origin. In contrast to many contributions in the literature, the approach presented here is based on a framework which addresses the impact of immigration on wages and employment simultaneously. It thus considers explicitly the impact of immigration on unemployment, an issue which has raised more and more attention since the financial crisis throughout all OECD destination countries. In this setting wages respond to changes in labor supply, but only imperfectly. As a consequence, the skill composition of the labor supply shock is highly relevant: an increase of the labor supply in the flexible segments of the labor market may raise overall employment since it increases labor demand in

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the less flexible segments of the labor market -- and vice versa. In many cases labor markets tend to be more flexible in the high-skilled segments.

In a setting with imperfect labor markets the wage and employment effects of immigration depend also on labor market institutions. Europe is characterized by substantial differences in these institutions. This paper applies therefore a comparative approach, estimating the labor markets effects of immigration in Denmark, Germany and the UK. These three countries represent different regimes of the welfare state in Europe. A comparative perspective therefore promises new insights on how different institutions may affect the labor market effects of high-skilled immigration.

The remainder of this brief paper is organized as follows: Section 2 briefly describes the institutional differences between the three countries considered in the analysis. Section 3 presents the framework which is applied here. Section 4 summarizes the estimation results. Section 5 simulates the impact of high-skilled immigration on wages and employment in comparison to a labor supply change at the average skill level of the immigrant labor force in all three countries. Section 6 concludes.

2 Institutional differences matter

The labor market effects of immigration depend inter alia on the way wages and employment respond to changes in labor supply. This in turn is affected by institutions. Based on Brücker et al. (2014) we compare here three countries, which represent the variety of European labor market institutions and the welfare state: Germany is -- together with France -- the main example for the continental European welfare state, with a high level of employment protection, relatively high levels of unemployment and mean-tested benefits and an intermediate level of collective bargaining coverage. Denmark is the archetype of the so-called “flexicurity” model, which is characterized by a very high level of unemployment benefits, but a lower level of employment protection compared to continental European countries. The coverage of collective bargaining is extremely high, since welfare benefits are linked to union membership. The UK represents the Anglo-saxonian tradition of labor market institutions and the welfare state in Europe: employment protection is low, unemployment and mean-tested-benefits are also well below levels of Denmark and Germany. The coverage of collective bargaining is moderate and wage agreements are settled at the firm level and not at the national or industry level as in Denmark and Germany. Among all three countries the institutions of the labor market and the welfare state of the UK are most similar to that of the

US, but important differences remain. In particular, the level of unemployment and mean-tested benefits is substantially higher than in the US.

All these institutions affect the way how wages respond to labor supply shocks, and, hence, the labor market effects of immigration. We thus expect that we will find different impacts of immigration in these three countries. Not only labor market institutions, but also institutions in other markets may affect the wage and employment response, e.g. competition in product markets. It is likely that the responsiveness of wages to labor supply changes increase with the degree of competition in the markets for goods and services. Among these three countries, Germany has a high level of product market regulation, but – relative to the country size – a high level of competition via the export and import markets. Denmark has a lower level of product market regulation and also a high export and import exposure. However, the share of employment in the public sector is much higher than in Germany and the UK. The UK has a very low level of product market regulation, but export shares and import penetration are low.

3 How to measure the market impact in a setting with imperfect labor markets[2]

Building on Boeri and Brücker (2005), Brücker and Jahn (2011) and Levine (1999) a wage-setting framework is applied here to analyze the wage and employment effects of immigration. The model replaces the conventional labor supply curve with a wage-setting function. This wage-setting function relies on the simple assumption that wages decline with the unemployment rate, albeit imperfectly. This relationship is empirically widely supported, both at the macro level (e.g. Layard and Nickell, 1986; Layard et al., 2005) and at the regional level (Blanchflower and Oswald, 1994, 2005). Theoretically, the assumption of a wage-setting function can be derived from right-to-manage models of collective bargaining (Nickell and Andrews, 1983) and efficiency wage theories derived from turnover cost (Salop, 1979) or shirking (Shapiro and Stiglitz, 1984) models. While the wage-setting-function can be motivated by different approaches, we use it here as simple measure for assessing the responsiveness of wages to changes in the unemployment rate, and, hence, implicitly to changes in labor supply.

The elasticity of wages with respect to the unemployment rate can be easily estimated empirically. This elasticity captures the responsiveness of wages to unemployment and labor

[2] For an in-depth and technical outline of the theoretical approach and the estimation strategy see Brücker et al. (2014) and Brücker/Jahn (2011).

supply shocks and is thus a good measure for the overall impact of labor market and other institutions on wage flexibility.

The responsiveness of wages may differ in different segments of the labor market: the elasticity of the wage with respect to a change in unemployment might be e.g. higher for the high-skilled in labour market segments with low levels of union coverage and relatively low e.g. for the medium and less skilled. Taking up a suggestion by Card (1995), the elasticities of the wage-setting curves are therefore estimated by skill groups. This is essential for identifying the impact of high-skilled immigration on labor markets.

Once having estimated the elasticities of wages with respect to unemployment, we have to consider for an identification of the labor market effects also the labor demand side. The intuition is the following: Assume that wages are fixed by a collective wage agreement between employers and employees. Once wages are fixed, firms adjust their employment such that profits are maximized. For an identification of the wage and employment effects, it is therefore necessary to estimate the elasticity of employment with respect to the wage level. Having both, the elasticities of the wage-setting curves and the elasticities of the labor demand equations, we can simulate the wage and employment impact of immigration in different segments of the labor market.

Following Ottaviano and Peri (2012) and many others, labor is distinguished by education, work experience and natives and immigrants. Drawing on the structure of European education systems, three skill-levels are considered: without vocational training or apprenticeship, with vocational training and apprenticeship, with a university or similar degrees. This allows assessing the wage and employmnt effects of immigration for different groups in the labor market.

The distinction between natives and immigrants is highly controversial in the literature. While Borjas et al. (2012) argue that natives and immigrants are perfect substitutes in the labor market once we control for education and work experience, Ottaviano and Peri (2012) and other provide evidence that they are not. The latter finding can be motivated by the fact that cultural differences, language proficiency, other unobserved human capital characteristics and labor market discrimination result in an imperfect substitution between immigrants and natives even if they share the same education and work experience. The estimation strategy applied here allows at least for this possibility. Note that this is relevant for the identification of the effects of high-skilled immigration: if immigrants and natives are perfect substitutes,

high-skilled immigrants perfectly compete with highly-skilled natives and thus may reduce their wages and employment opportunities. If they are not, the effects might be more concentrated on high-skilled immigrants rather than natives.

The parameters of the model are estimated based on micro data in all three countries. In Denmark social security data have been used which cover the universe of the labor force, in Germany a five percent sample of the labor force is employed which stems also from social security data sources. The UK estimates rely on LFS data.

4 Estimation results: country differences matter

Presenting all estimation results is beyond the scope of this paper, instead the main findings are summarized here: First, the wage flexibility measured by the elasticity of the wage-setting curve differs across countries: it is highest in the UK (-1.33), and similar in Denmark (-0.115) and Germany (-0.116).

Second, in Germany and the UK the elasticity of the wage rate with respect to unemployment increases with the skill level: it is -0.247 for the high-skilled compared to -0.072 for the less-skilled in the UK, and -0.167 for the high-skilled compared to -0.047 for the less-skilled. Interestingly enough, it is the other way around in the Danish case: the wage flexibility is highest there for the less-skilled (-0.121) und lowest for the high-skilled (-0.065). This can be traced back to high public sector employment of individuals with academic degrees and the high collective-bargaining coverage of high-skilled workers in Denmark in comparison to the two other countries.

Third, we find in all three countries that immigrants and natives are imperfect substitutes in the labor market. But the elasticities of substitution between immigrants and natives differ in the three countries: They are lowest in Germany (-6.71), higher in the UK (-8.89) and highest in Denmark (-16.9).[3] The elasticities of substitution might be also interpreted as a measure for the level of labour market assimilation of immigrants: The higher the elasticity of substitution, the more similar are immigrants to natives in terms of their labor market performance at given education and work experience levels. Thus, the findings suggest that the labor market performance of immigrants is much more similar to that of natives in Denmark compared to Germany.

[3] The findings are robust to many different specifications. Inter alia, all suggestions made by Borjas et al. (2012) have been considered.

Fourth, the elasticities of substitution between different work experience- and education groups are relatively similar in all three countries and in line with other findings in the literature.[4]

Summing up, the differences in the estimates suggest that high-skilled immigration has different effects on different groups in the labor market and different overall effects in the three countries considered.

5 Simulation results: high-skilled immigration can reduce unemployment

Based on the parameter estimates, the impact of immigration on wages and unemployment for different groups in the labor market are simulated. In the first scenario we simulate the effects of a one percent increase in the labor force through immigration at the given age and skill structure of the foreign population in the respective countries. This may be considered as the benchmark case. Note that this scenario might capture the average effects of immigration in these countries during the last decades. The effects of the recent immigration influx look different, since the skill levels of the new arrivals have increased substantially. The second scenario simulates a one percent increase in the labor force through high-skilled immigration, i.e. it is assumed that all immigrants have tertiary education degrees.

Moreover, a short- and a long-term scenario is simulated. The short-term scenario in Table 1 is based on the assumption that the capital stock remains constant, the long-term scenario in Table 2 relies on the assumption that the capital-output-ratio remains constant, which implies that the ratio of capital to labor remains constant after making adjustments for productivity changes. It's a well-established fact that the capital-output-ratio is constant at least in the long-run (Kaldor, 1961), and there is ample empirical evidence that the capital stock adjusts pretty fast to labor supply changes. Thus, the second scenario might provide a realistic picture of the labor market impact of immigration at least after a couple of years.

The estimates differ across countries: if the labor force increases by one percent at the given skill-level of the immigrant population, wages decline both in Denmark and Germany by 0.16 percent in the short-term, but by 0.27 percent in the UK. This reflects the higher wage flexibility of the UK labor market. A one percent immigration of high-skilled individuals reduces in Germany the short-term wage by 0.05 percent, but by 0.27 percent in Denmark and by 0.40 percent in the UK. This is the consequence of different degrees of wage flexibility in

[4] The parameter estimates are presented in detail in Brücker et al. (2014).

different labor market segments. In the long-term, the aggregate wage effects disappear due to the adjustment of the capital stock.

Compared to an immigration scenario with the average skill-composition, high-skilled immigration reduces the unemployment rate in Germany and the UK in the long-term. The unemployment rate declines through immigration by 0.3 percentage points in the scenario with high-skilled immigration in the UK compared to 0.08 percentage points in the scenario with the average skill-composition of the immigrant labor force. This can be traced back to the fact that immigration increases labor supply in the flexible segments of the labor markets there, raising labor demand in the less-skilled segments. In Germany, the unemployment rate increases in both scenarios in the long-term. But it increases by 0.14 percentage points in the scenario with the average skill level of the immigrant labor force, and by 0.09 percentage points if the immigrants are high-skilled. In Denmark we achieve the opposite results: in the scenario with the average skill composition of the immigrant labor force, the unemployment increases by 0.06 percentage points compared to 0.13 percentage points in the high-skilled scenario. The different results for Denmark can be traced back to the fact that wages are less flexible in the high-skilled segment of the labor market there, while they are much more flexible in this segment in the other two countries (Table 1 and Table 2).

Table 1 and Table 2 provide also a detailed breakdown of the effects for different groups in the labor market. Given the rather low elasticities of substitution between natives and immigrants, the adverse effects of immigration are largely concentrated on the immigrant labor force in all three countries. While the native labor force benefits in Germany and the UK at least in the long-term, the effects on natives are neutral or negligible in Denmark. Note that the elasticity of substitution between natives and immigrants is higher in Denmark compared to Germany and the UK. A change in the skill composition of the labor supply shocks affects also the distribution of the labor supply shock. Not surprisingly, the effects for the high-skilled are more favourable in the average skill-level compared to the high-skilled immigration scenario, while they converse is true for the less-skilled. Depending on wage flexibility and the elasticity of substitution between immigrants and natives, changing the skill composition affects also the distribution of the effects between natives and immigrants: in the high-skilled migration scenario, immigrants tend to suffer less in Germany compared to the average skill-level scenario. The effects are ambiguous in the UK, i.e. the wage effects are higher and the unemployment effects smaller in the high-skilled scenario. In Denmark

average wages decline more and the unemployment rate of immigrants increases more in the high-skilled scenario compared to the less skilled immigration scenario.

6 Conclusions

The simulations presented here address the different implications of high-skilled immigration compared to an increase in labour supply at the average skill level of the immigrant workforce. The average skill-level of immigrant workers is usually low relative to native workers in Europe, although the skill level tends to increase recently. We have analysed a shift in the factor proportions of the labor force on wages and employment under consideration of the elasticity of substitution between different groups in the labor force and different levels of wage flexibility in different segments of the labor market. The findings suggest that these elasticities differ largely across countries. This reflects different institutions of the labor market and the welfare state. The estimation results are rather plausible: while wage flexibility is rather high in the UK, it is relatively low in Denmark and Germany. Denmark seems to be an extraordinary case since wage flexibility is particularly low in the high-skilled segment of the labor market. Consequently, we find that in Germany and the UK high-skilled immigration has beneficial effects both in terms of reducing unemployment and inequality in wages and employment prospects compared to the average skill-level scenario.. High-skilled immigration reduces unemployment in the UK according to the simulations presented here. For Denmark the converse is true, high-skilled immigration has detrimental effects in the given institutional setting.

Other politically relevant findings are that higher wage flexibility increases the benefits from immigration and that the overall benefits also increase with the elasticity of substitution. Note that the elasticity of substation is an indication for the assimilation of immigrants into host country labor markets, which depends inter alia on labor market and related policies.

Whether these findings can be in one way or another transferred to the US, is of course speculative. However, the higher flexibility of labor market institutions suggests that the results for the US might look much more similar to those presented for the UK compared to those in Germany and Denmark.

The analysis presented here focuses on one channel by which high skilled immigration can affect labor markets, a change in factor proportions. There might be other channels as well, i.e. technological progress. Clearly, this is another important channel by which high-skilled

immigration can affect labor markets and the economy which is addressed by other research complementing the findings presented here.

Literature

Blanchard, O., Katz, L., 1992. Regional evolutions. Brook.Pap.Econ.Act.1,1–75.

Blanchflower, D., Oswald, A., 1994. The Wage Curve. MIT Press, Cambridge,MA.

Blanchflower, D., Oswald, A., 2005. The Wage Curve Reloaded. NBERWorkingPaper11338.

Boeri, T., Brücker, H., Docquier, F., Rapoport, H. (eds.), 2012. Brain drain and brain gain: the global competition to attract high-skilled migrants. Oxford: Oxford University Press.

Borjas, G., 2003. The labor demand curve is downward sloping: re-examining the impact of immigration on the labor market. Quarterly Journal of Economics 68 (4), 1335–1374.

Boeri, T., Brücker, H., 2005. Why are Europeans so tough on migrants? Econ.Policy20 (44), 631–703.

Borjas, G., 1987. Immigrants, minorities and labor market competition. Ind. Labor Relat. Rev. 40,382–392.

Borjas, G., 2003. The labor demand curve is downward sloping: re-examining the impact of immigration on the labor market. Q. J. Econ.68(4), 1335–1374.

Borjas, G.J., Grogger, J., Hanson, G.H., 2012. Comment: on estimating elasticities of substitution. J.Eur.Econ.Assoc. 10(1), 198–210.

Brücker, H., Jahn, E.J., Hauptmann, A., Upward, R. 2014. Migration and Imperfect Labor Markets: Theory and Cross-country Evidence from Denmark, Germany and the UK, European Economic Review 66, 205-255.

Brücker, H.,Jahn, E.,2011. Migration and wage-setting: reassessing the labormarket effects of migration. Scand.J.Econ.113(2),286–317.

Card, D., 1995. The Wage Curve: a review. J.Econ.Lit.33, 785–799.

Card, D., 2012. Comment: the elusive search for negative wage impacts of immigration. J.Eur.Econ.Assoc. 10(1), 211–215.

DESTATIS (2014), Microcensus 2012, special provision, Wiesbaden: Statistisches Bundesamt.

Layard, R., Nickell ,S., 1986. Unemployment in Britain .Economica 53 (210Supplement), S121–S169.

Layard,R., Nickell, S., Jackman, R., 2005. Unemployment: Macroeconomic Performance and the Labour Market, 2nd ed. Oxford University Press,Oxford.

Levine, P., 1999. The welfare economics of migration control. J. Popul.Econ. 12(1), 23–43.

Nickell, S., Andrews, M., 1983. Unions, real wages and employment in Britain 1951–1979. Oxf. Econ.Pap. 35 (Supplement), 183–206.

Salop, S., 1979. A model of the natural rate of unemployment. Am.Econ.Rev.69(1), 117–125.

Shapiro, C., Stiglitz, J., 1984. Equilibrium unemployment as a worker discipline device. Am.Econ.Rev. 74(3), 433–444.

Table 1 **Simulation of the short-run impact of 1 percent increase in the labor force: average-skilled vs. high-skilled immigration**

	Denmark				Germany				United Kingdom			
	wage change		U-rate change		wage change		U-rate change		wage change		U-rate change	
skill-composition:	average	high-skilled	average	high-skilled	average	high-skilled	average	high-skilled	average	high-skilled	average	high-skilled
	wage change in percent, change of unemployment rate in percentage points											
	total labor force											
All	-0.16	-0.27	0.12	0.23	-0.16	-0.05	0.34	0.15	-0.27	-0.40	0.17	0.05
less-skilled	-0.10	0.03	0.16	-0.01	-0.23	0.00	1.38	0.03	-0.06	0.03	0.15	-0.05
medium-skilled	-0.18	0.03	0.09	-0.01	-0.15	-0.01	0.22	0.01	-0.31	0.04	0.23	-0.02
high-skilled	-0.32	-3.90	0.25	3.03	-0.21	-1.96	0.09	1.05	-0.51	-1.18	0.14	0.32
	native labor force											
All	-0.13	-0.20	0.05	0.15	-0.07	-0.02	0.09	0.07	-0.16	-0.23	0.07	0.00
less-skilled	-0.08	0.03	0.05	-0.01	-0.04	0.00	0.28	0.03	-0.03	0.03	0.05	-0.05
medium-skilled	-0.14	0.03	0.04	-0.01	-0.07	-0.01	0.08	0.01	-0.19	0.04	0.11	-0.02
high-skilled	-0.25	-3.01	0.16	1.96	-0.10	-0.64	0.04	0.38	-0.33	-0.78	0.07	0.15
	immigrant labor force											
All	-1.23	-2.40	1.27	1.57	-0.94	-0.29	2.20	0.82	-1.03	-1.52	0.82	0.36
less-skilled	-1.12	0.03	1.30	-0.03	-0.60	-0.01	3.71	0.03	-0.67	0.03	1.64	-0.06
medium-skilled	-1.25	0.03	1.18	-0.02	-1.06	-0.01	1.65	0.02	-0.97	0.04	0.78	-0.03
high-skilled	-1.37	-16.18	1.54	18.67	-1.28	-14.49	0.68	9.36	-1.17	-2.66	0.39	0.84

Source: Own simulations based on the parameter estimates by Brücker et al. (2014).

Table 2 **Simulation of the short-run impact of 1 percent increase in the labor force: average-skilled vs. high-skilled immigration**

	Denmark				Germany				United Kingdom			
	wage change		U-rate change		wage change		U-rate change		wage change		U-rate change	
skill-structure:	average	high-skilled	average	high-skilled	average	high-skilled	average	high-skilled	average	high-skilled	average	high-skilled
	wages: change in percent, unemployment rate: change in percentage point											
	total labor force											
All	0.00	0.00	0.06	0.13	0.00	0.00	0.14	0.09	0.00	0.00	-0.08	-0.30
less-skilled	0.06	0.29	0.08	-0.15	-0.17	0.02	0.95	-0.11	0.15	0.34	-0.20	-0.56
medium-skilled	-0.02	0.31	0.04	-0.09	0.01	0.04	0.04	-0.05	-0.01	0.47	0.06	-0.28
high-skilled	-0.17	-3.64	0.18	2.91	-0.01	-1.89	0.02	1.03	-0.18	-0.70	0.07	0.21
	native labor force											
All	0.04	0.08	0.00	0.06	0.09	0.03	-0.10	0.01	0.11	0.16	-0.18	-0.35
less-skilled	0.08	0.29	-0.02	-0.13	0.02	0.01	-0.15	-0.11	0.19	0.35	-0.29	-0.55
medium-skilled	0.02	0.31	-0.01	-0.08	0.10	0.04	-0.10	-0.05	0.11	0.47	-0.05	-0.26
high-skilled	-0.09	-2.75	0.09	1.85	0.10	-0.57	-0.02	0.36	0.00	-0.30	0.00	0.06
	immigrant labor force											
All	-1.08	-2.14	1.10	1.29	-0.81	-0.25	1.91	0.72	-0.74	-1.10	0.59	0.03
less-skilled	-0.97	0.27	1.11	-0.35	-0.53	0.02	3.28	-0.11	-0.48	0.31	1.18	-0.74
medium-skilled	-1.09	0.29	1.03	-0.26	-0.90	0.04	1.41	-0.06	-0.69	0.45	0.56	-0.36
high-skilled	-1.22	-15.94	1.38	18.40	-1.09	-14.43	0.58	9.33	-0.84	-2.19	0.28	0.69

Source: Own simulations based on the parameter estimates in Brücker et al. (2014).