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# Heterogeneous Firms and Substitution by Tasks: the Productivity Effect of Migrants

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## Abstract

Economic debate about the consequences of immigration in Germany has largely focused on the wage effects for natives at an aggregate level. Especially the role of imperfect substitutability of migrants and natives gained importance. A new topic is to focus on the firm level by estimating production functions in an equilibrium framework to gain information about substitution elasticity. Additionally recent literature emphasizes the impact of the task dimension beside the qualification of workers: migrants are heavily concentrated in agglomerations and work in different jobs than natives do. This gives an explanation on the micro level for imperfect substitutability. The task approach is thus a key to understand imperfect substitution on the firm level. Our contribution in this article is manifold: we examine the effects of the relative (dis-)advantages in performing certain tasks and draw implications on the labor market outcomes. Using this we construct a simple model with a monopolistic competition framework a la Dixit-Stiglitz considering heterogeneous firms with different productivity levels and two types of jobs for migrants and natives. Firms differ in the ability to employ migrants which gives rise to wage differences between natives and migrants. This wage differences lead to wage cost advantages for firms. In the long run equilibrium

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only those firms with survive in the market which have a sufficiently high productivity level or can compensate their lower productivity level by wage cost advantages. We show that the increase of productivity might be explained by a higher migrant share. Regional disparities in our model stem from the unequal distribution of migrants. Thus part of the agglomeration advantages can be explained by the empirical stable observation that migrants tend to move to cities. The conclusions of the model are in line with three empirical facts in Germany. Firstly, the average productivity of firms is higher in cities where also the migrant share is higher. Secondly, the wage difference between migrants and natives in a region is increasing in the share of migrants in that region. Thirdly, less productive firms are more likely to employ a higher share of migrants, as wage advantages and productivity acts as a substitute.

keywords: immigration, firm heterogeneity, skills, tasks, regional labor markets

JEL: R23, J15, J24, J61

## **Introduction**

The current labor market performance of migrants in Germany has stirred a lively public debate how policy could foster and improve the attachment of immigrants to the labor force. An often neglected aspect of this debate is that immigration and integration could be seen as two sides of a coin: effects of immigration on the labor market are subject to the process of integration, including acceptance and tolerance of locals, and vice versa.

Until 1973, during the economic boom, German firms focused on the recruitment of foreign labor force without demanding special (formal) skill or job requirements. Many of these "guest-worker" did not remigrate, on the opposite in many cases their families followed, concentrating in German agglomerations. However, workers with an immigration background face a risk to become unemployed nearly twice as high as Germans. Furthermore migrants seem to segregate in densely populated regions, working in different jobs as natives and mostly earning lower wages. Against this background, we ask what are the effects of immigration to firm productivity and wages?

Various studies analyze the effects of immigration and how immigrants perform in and adapt to the labor market in terms of wages (Borjas 1992, 2003, Borjas and Katz 2007, Card 2001, 2007, Bruecker and Jahn 2010, Südekum et al. 2008, D'Amuri et. al. 2010). Recently Peri and Sparber 2009 address the topic of comparative advantages as an explanation for different choices of occupation by migrants compared to natives even with the same formal qualification level. They observe that migrants with graduate degrees specialize in occupations demanding quantitative and analytical skills, whereas their native-born counterparts specialize in occupations requiring interactive and communication skills.

Similar Borjas concludes for US:” (...) *the growing divergence between immigrants and natives does not lie in which sector of the economy they are employed. Rather, the divergence is occurring in the **kinds of tasks** that immigrants and natives perform on the job*” (Borjas 1992, p28-29)

## **Related Literature and Empirical Evidence**

Recent work (Ottaviano and Peri, 2005, 2006, 2007, Card 2007) points at a positive and significant effect of immigration on the average wage of U.S. natives across U.S. states and metropolitan areas. Research to date on the links between immigration and economic outcomes has focused primarily on aggregate level. Studies on the firm level are scarce and do not consider that migrants concentrate in different occupations and firms with

heterogeneous requirement of skills. The occupation class is a central dimension of the German labour market: on the one side the choice of occupation determines wage and career possibilities to a large extent, on the other side firms try to select the “best matching” worker by including vocation and job in the advertisement of the vacancy. Abraham et al. 2011 state that especially in Germany the vocational dimension is a key element for theoretical explanation of the labour market. Occupations are ideal-typic indicators and descriptions of tasks of job vacancies. Every occupation paraphrases a spectrum of tasks that requires specific knowledge and required skills. There are plausible arguments that recruiting behavior or matching process might differ between different occupational groups (Stops and Mazzoni 2010).

Descriptive evidence for Germany shows that foreigners and natives with comparable qualifications work in different occupational segments (Steinhardt 2011). Even after residing long time in the host country, immigrants work more likely than natives in jobs that require lower skill level, even if they possess a higher skill level. According to empirical evidence, it seems more reasonable to consider different occupation groups defined by characteristic tasks dimensions additional to the skill dimension. In addition studies of recruitment behavior find that one of the reasons why unemployed persons in general face more problems to get a particular job is that they do not meet the job requirements in terms of qualification and experience levels (e.g. Gorter et al. 1993). There is additional evidence that the firm size plays a role for the amount of employed migrants (Holzer 1998).

Although the human capital framework illuminates both the determination of skill prices and the incentives for skill investment, however there is no further information what kinds of requirements workers have to satisfy, and which task dimension is crucial for doing a certain occupation. Going beyond the common approach using qualification as proxy for human capital, Lazear 1999 supports the view of a broader definition of human capital as a vector of different attributes including physical skills, education or cognitive abilities, language and communication skills.

A recent literature follows the idea linking tasks and activities that workers perform on the job to the skills needed to carry out these activities (Autor et al. 2003, Acemoglu and Autor 2010). The so called “task based approach” offers a framework to classify jobs according to their core task requirements and then consider the set of formal and informal skills required to carry out these tasks. One asset of this new approach is that it could be interpreted as micro foundation for linking the aggregate demand in the labor market to the specific skill demands of given job activities. One stylized fact observed by Autor et al. 2006 is that more skilled

workers perform different and more interactive (or communication) tasks relative to less skilled workers. Further there seems to be a spatial dimension in the distribution of tasks: for example management and other social tasks are strongly connected to others at the spatial level, which provides incentives to place those in relatively large cities where workers are easier able to benefit from interactions with others. Such tasks are more likely to be found in diversified and skilled cities where tasks have to be coordinated (e.g., Bacolod et al. 2009)

Regarding productivity effects of spatial proximity empirical evidence supports the view of a “real” urban wage premium in agglomerations due to positive human capital externalities (Glaeser and Maré 2001, Yankow 2006 and Gould 2007). Even if sorting of workers plays a not negligible role human capital externalities induce higher productivity associated with higher wages that do not reflect ability, or compensation for higher living costs. Moeller and Haas (2003) confirm the presence of an agglomeration wage premium for German cities, with a higher urban wage premium for high-skilled than for low-skilled workers. This is consistent with the recent results by Gould (2007) that an urban wage premium exists for white-collar but not for blue-collar workers.

Following this approach, we use the task qualification similar to Gathmann and Schoenberg 2009 and Dustmann et al. 2010 to classify the occupations by the intensity they use each type of attributes. We look deeper in the data to confirm first evidence for comparative (dis-) advantages for migrants compared to Germans in certain occupations or tasks. For the US as well as for the most European countries there has been an increase in demand for jobs requiring more complex and abstract skills coupled with a decrease in the demand for unskilled jobs in the last decade. In particular, non-routine manual jobs can also be undertaken by foreign workers who may have poor native language skills or who may not know the cultural specifics, social norms and institutions of the host country. A central finding by Peri and Sparber 2009 demonstrates that immigrants who do not speak the language of the host country are concentrated in more manual and less interactive tasks (especially unskilled workers) and tend to be paid lower wages than natives. Evidence for UK shows the phenomenon that immigrants downgrade substantially upon arrival and work in jobs and professions that are far below where they would be assigned based on their observable skills. For instance, 26% of the highly educated recent immigrants in the UK were employed in routine and semi-routine occupations, the two lowest paid occupation categories (Goos 2007, Goos et al. 2009, Dustmann et al. 2008). A special feature of the German labor market is that occupational mobility is not very high compared to other countries.

Our contribution combines the following aspects. We link a structural labor market equilibrium approach similar to the framework by Borjas 2003 with the branch of the literature that focuses on different job requirements by firms instead restricting to skills and qualification. This consideration is particular importance in the German case, because labor market is organized by occupation specific skills, so a certain level of formal education is necessary to enter most occupations. Further the choice of an occupation and so the occupation specific human capital is crucial for the labour market performance and the risk to become unemployed over the whole working life (Kambourov and Manovskii 2009, Schmillen and Möller 2011). Our paper builds on the model presented in Borjas 2003 and Ottaviano and Peri 2006, and takes a fresh look at the wage structure of migrants compared to Germans. Our interest is to determine wage effects of immigration considering different type of firms. The standard theory of equilibrium wages based on a labor demand and supply framework predicts that an inflow of immigrant labor into a certain skill group will reduce the relative wage of native workers belonging to that group, with the size of the wage reduction determined by the degree of substitution between skill groups as well as between immigrant and native workers with similar skills. Immigrant labor supply shocks are captured by changes in the share of foreign-born workers within each cluster, and wages of individual native workers might be affected by immigrants working in different firms and different skill/task groups.

Therefore we contribute to the literature in several ways. First, we allow for heterogeneous firms in a general equilibrium framework and second we investigate the impact on wages of disaggregated inflows concerning different type of tasks. To our knowledge, no prior study has addressed the composition of immigrant supply shocks within skill groups using the task approach to distinguish different type of occupations.

### **A Heterogeneous Firm Model with Wage Cost Advantages – Basic Framework**

The recent literature argues that migrants are imperfect substitutes for the native labor force (Borjas 2003, D'Amuri, Ottaviano and Peri, 2010). These studies use an aggregate production function to estimate the wage effect of migration. However an aggregate approach ignores that the distribution of migrants in firms is quite uneven: especially there are many firms that do not employ migrants at all, while there are other firms that employ migrants at a high percentage. For that reason our model builds on a heterogeneous firm framework. Workers of

the same group are assumed to be homogeneous, while workers of different groups are imperfect substitutes.

The labor force consists of migrants and natives and there are two kinds of jobs. Whereas most jobs - beside of very simple patterned assembly line work -require a certain job profile that is a combination of different tasks. Job 1 can be performed by both migrants and natives while the second job can only be performed by natives because special tasks are needed that natives have an advantage. A job is not necessarily understood as a different occupation, so by assumption migrants and natives do not differ regarding their productivity in job 1. The same productivity applies to the second job in the sense, that if a firm  $f$  has a share of job 1  $a_f$ , then the output  $q_f$  is related to the inputs by

$$a_f \cdot q_f = A \cdot l_1^f \text{ and } (1 - a_f) \cdot q_f = A \cdot l_2^f$$

where  $A$  is the total factor productivity and  $l_1^f, l_2^f$  are the labor demands for work of job 1 and job 2.

By assuming that natives and migrants separate in job 2 and 1, then two cases are possible. In the first case (figure 1) the wage in job 2 where only the natives are employed exceeds the wage of job 1 and thus the wage of migrants. In the second case the opposite holds and thus natives could gain a higher wage by switching into job 1. So natives will enter the job one market until the wage is equal in both markets. Thus both labor markets merge. For the following it is assumed that case one holds.

As in the well known Dixit-Stiglitz model of monopolistic competition the representative household maximizes a CES-aggregate over a continuum of product varieties indexed by  $\omega$ :

$$U = \left( \int c(\omega)^\rho d\omega \right)^{1/\rho}$$

with  $0 < \rho < 1$  and thus an elasticity of substitution  $\sigma = \frac{1}{1-\rho} > 1$ . The optimal demand for variety  $\omega$  is then

$$q(\omega) = Q \cdot P^\sigma \cdot p(\omega)^{-\sigma}$$

with an aggregate output  $Q \equiv U$  and an aggregate price index  $P = \left[ \int p(\omega)^{1-\sigma} d\omega \right]^{\frac{1}{1-\sigma}}$ .

Profit maximization implies the individual firm pricing behavior

$$p(\phi) = \frac{1}{\rho \cdot \phi}$$

where  $\phi$  are the inverse marginal costs needed to produce one unit of the symmetric good

$$\phi(a_f, w_1, w_2) := \frac{A}{a_f w_1 + (1 - a_f) w_2}$$

where  $w_1$  is the wage of migrants and  $w_2$  the wage of natives.



As the share of job 1 is not understood as occupation, it may depend on certain firm characteristics like the organizational structure or the firm manager's ability to integrate migrants and thus the share varies across firms. To model this, the factor is drawn stochastically at the moment of firm formation from a known distribution  $G(\cdot)$  with density  $g(\cdot)$ . This involves sunken entry costs  $e$  which are for simplicity an amount of natives' labor. Furthermore every year with probability  $\delta$  the firm may incur a negative productivity shock that forces it to instantly leave the market. Additionally there are per-period fixed costs  $F$ .

As in Melitz (2003) we define a weighted average of the inverse marginal costs for a symmetric good by:

$$\tilde{\phi}(w) = \left( \int_0^1 \phi(a, w_1, w_2)^{\sigma-1} \mu(a) da \right)^{\frac{1}{\sigma-1}}$$

with the density of firms in the market  $\mu(a)$ . The price niveau  $P$ , the summed output  $Q$ , revenue  $R$  and firm profit  $\Pi$  can then be stated, with the number of Firms  $M$ , as:

$$\begin{aligned} P &= M^{\frac{1}{1-\sigma}} \cdot p(\tilde{\phi}); \quad Q = M^{\frac{1}{\rho}} \cdot q(\tilde{\phi}) \\ R &= P \cdot Q = M \cdot r(\tilde{\phi}); \quad \Pi = M \cdot \pi(\tilde{\phi}) = M \cdot \bar{\pi}. \end{aligned}$$

So far the only difference between firms is the share of job 1 on total production. As the wage of migrants necessarily is lower than the wage of natives, a firm has cost advantages relative to a firm with a lower share of job 1. Therefore there may be a minimum share  $a^*$ , so that firms with a share of job 1 below this bound are forced to immediately exit the market because they are not able to generate any profit. Such an  $a^*$  need not necessarily exist, because it may be the case that even a firm with a share equal to zero may be profitable. But if such an  $a^*$  between zero and one exists with  $\pi(a^*) = 0$ , this leads to the zero-cutoff-condition:

$$\bar{\pi} = w_2 \cdot F \cdot \left( \left( \frac{\tilde{\phi}(\phi^*)}{\phi^*} \right)^{\sigma-1} - 1 \right)$$

where  $\phi^* = \phi(a^*, w_1, w_2)$  is the minimum inverse marginal cost relating to  $a^*$ .

In the steady state the profit of a firm is constant over time, so the expected lifetime profit of a new firm is given by:

$$E(\pi_f^{\text{life}}) = -e \cdot w_2 + \sum_{i=0}^{\infty} (1 - \delta)^i \cdot E(\pi_f) = \frac{E(\pi_f)}{\delta} - e \cdot w_2$$

The expected per period profit of a firm is given by

$$E(\pi_f) = 0 \cdot G(a^*) + (1 - G(a^*)) \cdot \bar{\pi}$$

and thus the free-entry-condition

$$\bar{\pi} = \frac{e \cdot \delta \cdot w_2}{1 - G(a^*)}$$

combined with the zero-cutoff-condition lead to:

$$\frac{e \cdot \delta}{F} = \int_{a^*}^1 \left( \left( \frac{a^* + \frac{w_2}{w_1} (1 - a^*)}{a + (1 - a) \frac{w_2}{w_1}} \right)^{\sigma-1} - 1 \right) g(a) da$$

As the right side is decreasing in  $a^*$  and increasing in the relative wage  $\frac{w_2}{w_1}$ , the deduced implicit function  $a^* \left( \frac{w_2}{w_1} \right)$  is increasing. A higher difference in wages therefore implies more competition in terms of exiting firms.

Looking at the number of firms in the economy  $M$  reveals

$$M = \frac{R}{\bar{r}} = \frac{w_1 L_1 + w_2 L_2}{\sigma \cdot w_2 \cdot \left( \frac{e \cdot \delta}{1 - G(a^*)} + F \right)} = \frac{L_1 + \frac{w_2}{w_1} \cdot L_2}{\frac{w_2}{w_1} \cdot \sigma \cdot \left( \frac{e \cdot \delta}{1 - G(a^*)} + F \right)}$$

The labor demand for migrants is

$$L_1^D = \int_{a^*}^1 M \cdot l_1(a) g(a) da = \frac{MQP^\sigma \rho^\sigma}{A} \int_{a^*}^1 a \cdot \phi(a)^\sigma g(a) da$$

and the demand for natives excluding the demand for fixed cost and market entry costs is

$$L_2^D = \frac{MQP^\sigma \rho^\sigma}{A} \int_{a^*}^1 (1 - a) \cdot \phi(a)^\sigma g(a) da$$

so that the relative labor demand is given by:

$$\frac{L_1^D}{L_2^D} = \frac{\int_{a^*}^1 a \cdot \phi(a)^\sigma g(a) da}{\int_{a^*}^1 (1 - a) \cdot \phi(a)^\sigma g(a) da} = \frac{\int_{a^*}^1 a \cdot \left( a + (1 - a) \cdot \frac{w_2}{w_1} \right)^{-\sigma} g(a) da}{\int_{a^*}^1 (1 - a) \cdot \left( a + (1 - a) \cdot \frac{w_2}{w_1} \right)^{-\sigma} g(a) da}$$

It can be seen that the right side is increasing both in  $a^*$  and  $\frac{w_2}{w_1}$ . The demand for fixed costs and market entry cost is given by

$$L_2^{F+e} = \frac{e \cdot \delta}{1 - G(a^*)} \cdot M + F \cdot M$$

so that the use of the general equilibrium firm number equation leads to:

$$\frac{L_1^D}{L_2^D} = \frac{L_1}{L_2 - M \cdot \left( \frac{e \cdot \delta}{1 - G(a^*)} + F \right)} = \frac{L_1}{L_2 - \frac{1}{\sigma} \cdot \left( \frac{L_1}{\frac{w_2}{w_1}} + L_2 \right)} = \frac{\frac{L_1}{L_2}}{\rho - \frac{1}{\sigma} \cdot \frac{w_2}{w_1} \cdot \frac{L_1}{L_2}}$$

The right side is increasing in  $\frac{L_1}{L_2}$ , because the denominator is positive, and decreasing in  $\frac{w_2}{w_1}$ .

The left side is increasing in  $a^*$  and in  $\frac{w_2}{w_1}$ , so especially using the monotonically increasing

implicit function  $a^* \left( \frac{w_2}{w_1} \right)$ , the left side increases with  $\frac{w_2}{w_1}$ . Therefore if the implicit function

$\frac{w_2}{w_1} \left( \frac{L_1}{L_2} \right)$  is increasing, which is the result one would expect, as for example a relative increase of the supply of migrants leads to a relative decrease of the wage of migrants and vice versa.

## Productivity Differences

In the next step the model is expanded by productivity differences. Therefore at the firm foundation a second stochastic parameter is independently drawn, namely the total factor productivity. For simplicity only two different levels are possible:  $A_h$  and  $A_l$  with  $A_h > A_l$ . The probability  $Ph = \Pr(A_f = A_h)$  that a firm  $f$  draws the high productivity level is known to the investors. The combination of the zero-cutoff-condition and the free-entry-condition then looks like:

$$\begin{aligned} \frac{e \cdot \delta}{F} = & (1 - Ph) \cdot \int_{a_1^*}^1 \left( \left( \frac{a_1^* + (1 - a_1^*) \cdot \frac{w_2}{w_1}}{a + (1 - a) \cdot \frac{w_2}{w_1}} \right)^{\sigma-1} - 1 \right) g(a) da + Ph \\ & \cdot \int_{a_2^*}^1 \left( \left( \frac{a_2^* + (1 - a_2^*) \cdot \frac{w_2}{w_1}}{a + (1 - a) \cdot \frac{w_2}{w_1}} \right)^{\sigma-1} - 1 \right) g(a) da \end{aligned}$$

with the convention that  $g(a) = 0$  for every  $a < 0$  or  $a > 1$ , where  $a_1^*, a_2^*$  are given by

$$\phi^* = \frac{A_l}{w_1 \cdot a_1^* + w_2 \cdot (1 - a_1^*)} = \frac{A_h}{w_1 \cdot a_2^* + w_2 \cdot (1 - a_2^*)},$$

which relates them to the minimal inverse marginal costs  $\phi^*$  necessary for staying in the market.

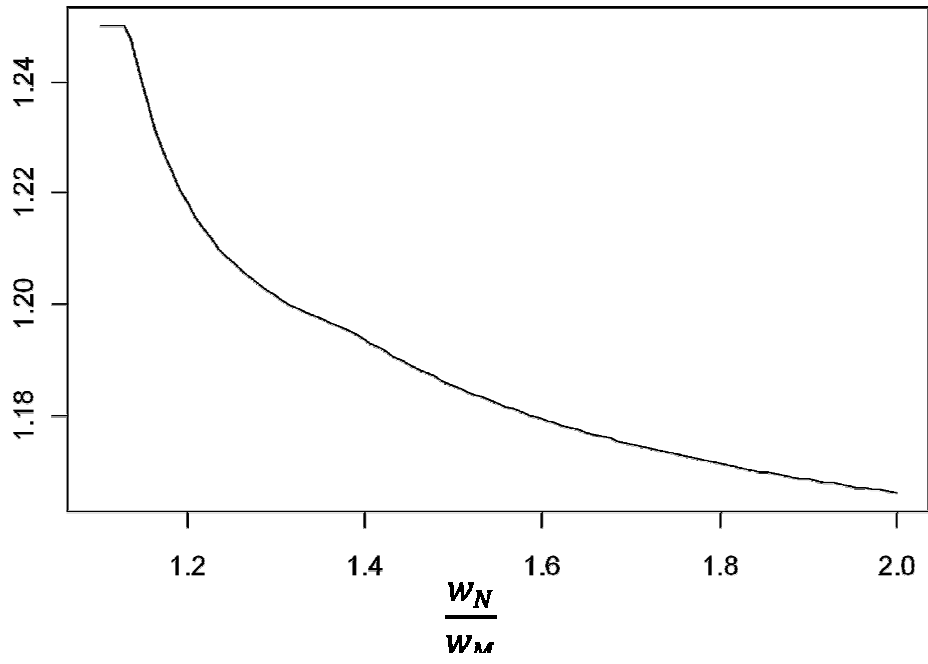
Now it is possible to calculate the resulting minimum shares of job 1 of both productivity groups for a given relative wage  $\frac{w_2}{w_1}$ . Starting with a relative wage of one, which means that there is no wage difference between natives and migrants, only two cases are possible. In the *first case* only the high productive firms are able to stay in the market, in the *second case* all firms will stay in the market.

Figure 1 shows simulation results where case one holds:

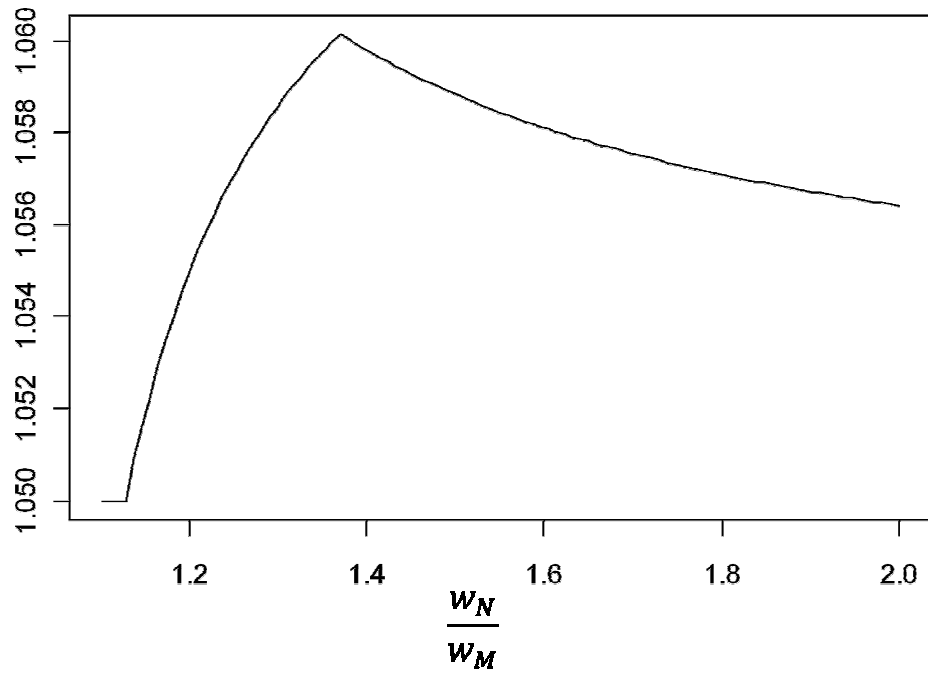
When  $\frac{w_2}{w_1} = 1$  only the high productive firms are producing, so  $a_1^* > 1$  and  $a_2^* < 0$ . When the relative wage increases at ca. 1.1 low productive firms start to enter the market if their share of job one is high enough, thus it is  $a_1^* < 1$ . At a relative wage about 1.39 some high productive firms have to exit the market as the competition effect described in the simpler model now applies to them and it is  $a_2^* > 0$ .

The second case is visualized in figure 2. Here at  $\frac{w_2}{w_1} = 1$  it holds  $a_1^* < 0$  and  $a_2^* < 0$  so every firm remains in the market. When the relative wage increases, the competition effect firstly starts to draw the less productive firms out of the market and begins to drop out highly productive firms only at a higher level.

average  
productivity  
level



average  
productivity  
level



## **Migrant diversity**

Aside from (statistical) discrimination, the main reason for a wage gap between natives and migrants might be missing market relevant skills due to the migration status. Most of the skills that are necessary to do some certain job are usually unobservable in the data sets that are typically available to labor market researchers. Which types of skills are missing is not clear and differs even between individuals. Assuming that migrants with the same nationality lack a more similar set of skills compared to the set of skills that a migrant with different nationality lacks. Then migrant diversity might be an indicator of the diversity of the skills that the labor market supplies. For example most migrants might not have sufficient language skills (e.g. fluently speaking German), while this might not be true for migrants from Switzerland or Austria. Another example is the formal training, which might be sufficient for the German labor market in some countries, while in some others formal training is very different. The nationality can therefore be used as an indicator of the assignment of migrants to certain labor market segment. Therefore two regions that are endowed with the same migrant share might perform differently due to the diversity of their migrants.

To investigate the implications of migrant diversity in the model developed here, it is worth to look back on the underlying labor market structure. Dividing the labor force only in natives and migrants two cases are possible: the segmented labor market where migrants receive a smaller wage than natives and the merged labor market case where both groups share the same wage. If one now differentiates the group of migrants further for simplicity in two groups, four cases are possible: 1. A segregation into three labor markets. 2. Both migrant labor markets merge. 3. One migrant labor market merges with the market for natives work. 4. All markets merge into one.

The second case is the main situation described by the model above and the corner solution of it is the fourth case here. So the interesting new situations are the first and the third case. In the third case, one group of migrants now shares the labor market with the natives and therefore they receive the same wage as them. Therefore in the model laid out above, a region with a higher diversity would behave as a region with fewer migrants, because one group of migrants would be added to the natives.

The effects in case 1 may be ambiguous. The result mainly depends on how complementary the skills of the two migrant groups are. Especially it is important, if one group is able to substitute natives in jobs, where the other migrant group is not able to compete. If this is the case the wage of natives should be lower than in a similar region with less diversity.

Therefore the implications of migrant diversity are qualitatively comparable to those in case three.

Summarizing the effects, migrant diversity has, depending on the case, either no effect or is broadly equivalent to a decrease of the migrant share. A more diverse region therefore tends to perform like a less diverse region with a lower migrant share.

### **Conclusions of the theoretical model**

To conclude it is first worth to notice that the implications of the model correspond with empirical evidence for Germany. Firstly the wage difference between migrants and natives should be higher the higher the migrant share. Figure 3 shows the average wages of natives and migrants in different types of regions. The wages and the wage differences are higher in agglomerated regions, which usually see a larger migrant share.

Secondly, the model implies that a less productive firm is more likely to employ migrants, as wage advantages and productivity are substitutes for each other. Less productive firms that cannot achieve the wage advantages by employing migrants are forced to exit the market.

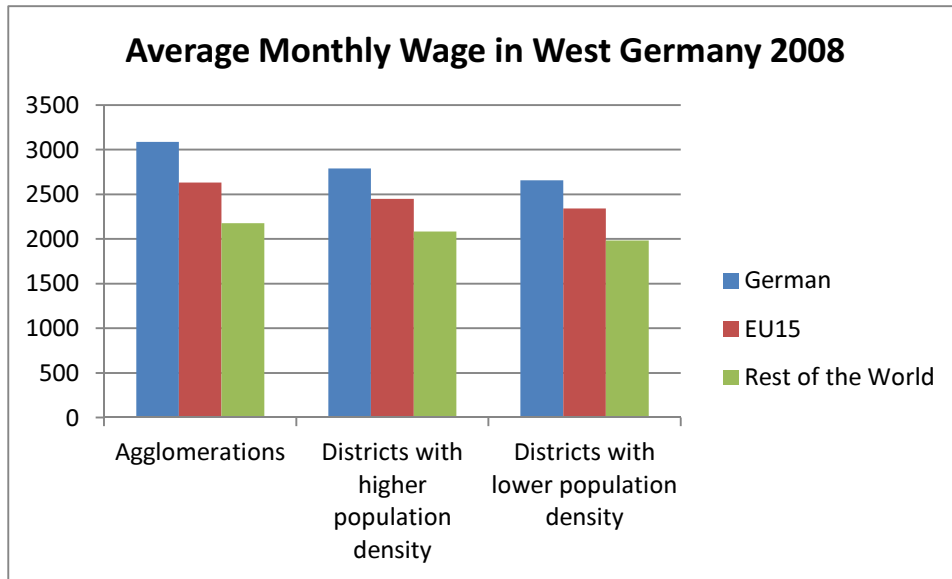


Figure 3. Average Monthly Wage in West Germany by Region Types, Source: SIAB (“Stichprobe der integrierten Arbeitsmarktbiografien”), own calculation.

However, the main conclusion of this model is that a higher average productivity level of firms may be caused by a higher migrant share. This could explain parts of regional disparities, because migrant shares are usually the higher, the more agglomerated a region is and furthermore a higher migrant shares lead to a higher difference in wages, as seen above. The mechanism of the model working here can be described by a firm specialization effect caused by wage advantages, which imposes restrictions on the firm structure. Small firms that are usually less productive are more threatened to exit the market by firms that can realize less wage costs than the more productive firms. Thus the number of less productive firms may decrease, while the highly productive firms still remain in the market, even if they don't have access to wage cost advantages. As it is seen in the model the results depend on the distribution of productivity. But if one thinks of classical small firms, like small bakeries, it seem at least reasonable to assume a clustering on certain productivity levels, where the requirements to remain in the market, especially the integration of migrants, might be much harder to fit in cities with a higher migrant share.



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