CENTRO STUDI LUCA D'AGLIANO
DEVELOPMENT STUDIES WORKING PAPERS

N. 266

November 2008

Does citizenship matter?
The economic impact of naturalizations in Germany

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Economics

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The paper analyzes whether citizenship acquisition affects the labor market performance of immigrants in Germany. The study uses actual micro data from the IAB employment sample, which covers more than 80% of the whole labor force in Germany. The econometric analysis is carried out using both cross-sectional and panel data techniques, which allow to disentangle the effects of self-selection and legal impact of citizenship acquisition. The estimates from a simple OLS specification suggest the existence of a wage premium of naturalized immigrants. Panel estimates show an immediate positive naturalization effect on wages and an accelerated wage growth in the years after the naturalization event. Both results are consistent with the argument that naturalization increases the labor market opportunities of immigrants in various ways.

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1 Introduction

The analysis of citizenship has had a long tradition within the moral and political theory. The socio-political importance of citizenship in the civic society was emphasized amongst others by John Locke (1690) who distinguishes between active and passive membership in a society. He argues that only the access by explicit commitment and contract makes an individual a full member of a nation state. This position has by now been embraced by almost all legal systems of modern states, which differentiate their inhabitants in natives and foreigners. While the process of acquiring citizenship differs by country, in all states citizenship status is connected with a number of legal rights. An example is the entitlement to vote which is in modern societies typically associated to citizenship. For this reason naturalization, which is defined as the acquisition of citizenship by a foreigner, can affect the socio-economic integration of immigrants in a country in various ways.

Whereas social scientists spent significant efforts to analyze the political and sociological implications of naturalizations, economists neglected this topic a long time.[1] One of the first economic studies that deals with the topic of citizenship is due to Chiswick (1978), who has analyzed the economic assimilation of immigrants. Using cross-sectional data from the U.S. census for the year 1970, Chiswick examines the assimilation process of immigrants by comparing the earnings of native and foreign-born men. Overall, Chiswick finds a positive effect of naturalization on earnings that becomes insignificant when he controls for years of residence. In the following years the economic literature on immigrant assimilation mainly focused on skill and language acquisition. Recently, economists have renewed their interest in the topic of naturalizations. However, most of them looked at this issue in the U.S. or Canada (see Bratsberg et al. (2002), DeVoretz and Pivenenko (2005a), DeVoretz and Pivenenko (2005b), DeVoretz (2008), Mazzolari (2007)). For European countries exist only few empirical studies that analyze the economic impact of naturalizations like Kogan (2003) for Austria and Sweden, Bevelander and Veenman (2006) for the Netherlands and Scott (2006) for Sweden.

A drawback of most existing studies is that they are based on cross-sectional data, which does not allow to control for self-selection concerning unobservable characteristics within the group of immigrants. The study of Bratsberg et al. (2002) is the first to use cross-sectional as well as longitudinal data to estimate the effect of naturalization on wage growth of foreign-

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[1] For a comprehensive overview of sociological studies about naturalizations see Yang (1994).

born men. The authors show that naturalization has a significant positive effect on the earnings of immigrants even after controlling for differences in unobserved individual characteristics. Bratsberg et al. (2002) show that wage growth accelerates after the acquisition of citizenship, indicating the existence of barriers to entry in certain jobs for immigrants without U.S. citizenship. In his longitudinal analysis for Sweden, Scott (2006) finds as well a positive effect of naturalization on wages of immigrants. In contrast to the findings of Bratsberg et al. (2002), he concludes that the true naturalization premium of immigrants is largely caused by selection on part of the individual and not by legal implications. For the case of Germany, there is up to the present no empirical evidence on whether the acquisition of citizenship has any effects on the labor market outcomes for immigrants. Furthermore, it remains unclear what is the role played by unobserved characteristics to explain the naturalized immigrants` wage premium. The purpose of this to paper is to address this question by estimating the impact of naturalization on wage growth of immigrants in Germany. The data used are actual official micro data and come from the employment sample of the institute for employment research (IAB). The econometric analysis is carried out using both cross-sectional and panel data techniques, which allow to disentangle the effects of self-selection and legal impact of citizenship acquisition.

The rest of the paper is organized as follows: Section 2 presents stylized facts on naturalization in Germany by outlining the legal framework and the quantitative dimension of the phenomenon. Section 3 contains some theoretical considerations about the relationship between legal status and labor market performance. The data is presented in section 4. In section 5 descriptive statistics are presented. Section 6 contains the results of pooled and longitudinal estimations while chapter 7 concludes the paper, discussing the policy implications of the analysis.

2 Naturalizations in Germany

2.1 Citizenship law

Until the beginning of the 1990s, the German citizenship law was characterized by the principle of the Jus Sanguinis, i.e. the principle of descent. According to this, citizenship is recognized to any individual who is born to a parent who is a national or citizen of Germany. Foreigners had no entitlement to naturalize derived from law. Birth and prolonged residence in Germany did not establish any right to access German citizenship. The only possibility to

acquire citizenship for foreigners was to marry a German person or to get an extraordinary entitlement by the relevant official authority (see Brubaker 1992, pp. 77-84).

After initial changes in the alien legislation in 1990, the legal situation in Germany changed substantially in 1999 when a fundamental reform of the citizenship law was conducted. The reform adds the Principle of Jus Soli to the existing law. Thanks to this reform, children of immigrants who are born in Germany attain by birth the German passport. A special provision allows them to retain the citizenship of their parents till the age of 23. Not later than this age they have to decide between one of the two citizenships. This solution has been called the "option model". Furthermore, the new law entitles every immigrant to naturalize if she/he fulfils a number of requirements. These requirements are: residence of at least 8 years in Germany, possession of an appropriate residence permit, sufficient knowledge of the German language, the ability to support themselves without recourse to social assistance or unemployment benefits, allegiance to German constitution and no serious criminal offences. Finally, they must also give up their previous citizenship.[2] During the last years this has been the most frequently used channel by which immigrants naturalized in Germany (see Steinhardt 2007, pp. 544-545). Recently Germany has implemented a standardized naturalization test which is obligatory since September 2008 for all immigrants who want to naturalize. The multiple choice test includes various questions on German history, geography, politics and society.

2.2 Quantitative dimension

Figure 1 shows the number of annual naturalizations in Germany during the time period from 1981 to 2007. As it is clear from the figure naturalizations played a minor role during the 1980s, with less than 50,000 naturalizations per year. With the beginning of the 1990s, the picture changes and the number of naturalizations increased continuously with a peak in 1995 when 313,000 people acquired the German citizenship. However, the overall figures include ethnic Germans, the so-called Spätaussiedler. These are immigrants of German origin from the former Soviet Union (see Steinhardt 2007, pp. 545-546). This group is not of interest for our analysis, because they receive in general automatically the German citizenship without any precondition when they enter the country. For this reason, the diagram shows separately

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[2] For this requirement exists a set of exceptions.

the number of foreigners that naturalized.[3] With the coming into effect of the new citizenship law on the 1st of January 2000 the number of naturalized foreigners increased strongly. Although the number of naturalizations declined in the subsequent years almost continuously it is remarkable that between 2000 and 2006 on average 143.000 foreigners per year decided to become German citizens, compared to 92.000 per year during the period 1994 and 1999. Overall almost 1,700,000 foreigners naturalized during the period 1994 and 2007.

Figure 1: Naturalizations in Germany 1981-2007
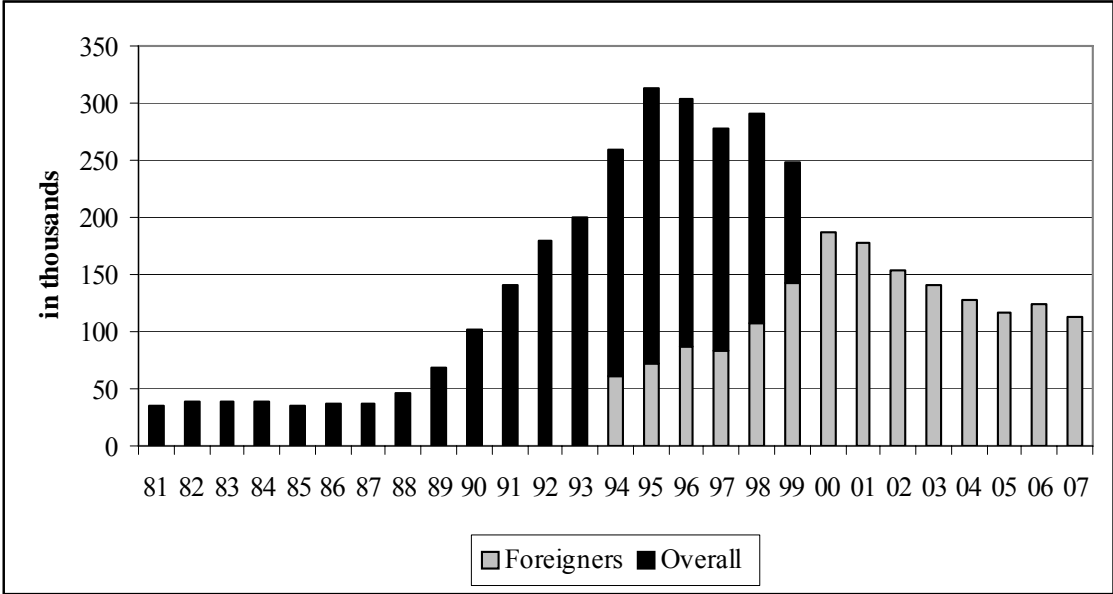
Source: own calculations with data of the Federal Statistical Office

To interpret these figures it is useful to incorporate the size of the foreign population within the country. This is done calculating the naturalization rate which is annually defined as the number of naturalizations in relation to the number of foreigners within the country. It now becomes obvious that the share of immigrants in Germany who naturalize is relative low compared to other European countries. While in 2006 the naturalization rate in Germany was 1.7% countries like France (4.2%), the Netherlands (4.2%), Great Britain (4.5%), Austria (3.2%) and Sweden (10.7%) exhibit significant higher naturalization rates.[4] This might be due to national differences in legal frameworks, the socio-economic structure of the immigrant populations and eventually the public opinion towards naturalization.[5]

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[3] The numbers of naturalized foreigners have been constructed by the author. Due to time inconsistencies related to immigration and naturalization of ethnic Germans, the depicted figures can contain some inaccuracies. The figures before 1994 were not reconstructable due to legal reasons.
[4] Figures derived from own calculations with data from Eurostat.
[5] The topic of naturalization in German debates has been frequently connected to fears and concerns which might lower the incentive for foreigners to naturalize. A prominent example is the debate on naturalization tests in

Since the 1990ties the leading country of origin among naturalized foreigners in Germany has been Turkey. That is consistent with the fact that Turks are by far the largest group within the foreign population in Germany. In 2000, 44.4% of all naturalized immigrants were of Turkish origin. Second largest group within naturalized immigrants are people of Asian origin (26.5%). The leading countries within this group are Iran, Afghanistan and Lebanon. Third major group are Ex-Yugoslavs who accounted for 9.7% of the naturalized immigrants in 2000. In contrast to this, the share of naturalized immigrants from an EU country is with 4.3% comparatively low (see Steinhardt 2007, pp.546-548).[6] The aggregate figures therefore demonstrate that the topic of naturalization in Germany is mainly related to immigrants from outside the European Union.

3 Legal status and labor market performance

In the following, some theoretical arguments are discussed to explain why the naturalization could change the economic well-being of an immigrant. Since in many cases the effect depends strongly on the legal requirements and consequences of naturalization within a country, the following discussion refers explicitly to the situation in Germany. In general, three groups of immigrants working and living in Germany can be distinguished: citizens of the European Union, nationals of associated states like Turkey, and Third Country Nationals (see Hailbronner 2007, pp. 3-4). The fact that the legal status and labor market access differ strongly among these groups has to be taken into account in the empirical analysis.

The first obvious channel by which naturalization can affect productivity is unrestricted access to the labor market (see Yang 1994, pp. 452-453; Bratsberg 2002, pp. 569-570). Due to legal reasons access to a number of jobs in the public sector requires the possession of the German passport. For example, activities in the justice, national defense and in administrative departments are general reserved to German citizens.[7] To some extent this also holds for certain jobs within the independent personal services like dentists, doctors, pharmacists, lawyers and architects. However, these restrictions do not apply to European citizens.[8]

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early 2008 which focused on the question: "How can we avoid that immigrants with unfavorable characteristics will become German citizens?"

[6] This relationship holds also true for the period 2000 to 2007. However, the share of naturalized Turks has been continuously decreasing while the share of naturalized immigrants from the EU has increased slightly due to the EU enlargement in 2004.

[7] This regulation applies as well to EU citizens. The general possibility for EU citizens to become civil servants can be restricted for strict sovereign activities (see §39 section 4 Treaty establishing the European Community (TEC)).

[8] I would like to thank Marcel Kau from the University of Konstanz, who helped to clarify the actual legal situation in Germany.

Furthermore, a number of jobs require unrestricted mobility of employees without bureaucratic hurdles. This is especially related to jobs in the transport sector or cross-border services that are associated with a high frequency of travel. For this reason, the possession of the German passport is not a legal engagement criterion, but a functional precondition. Therefore, the naturalization reduces institutional and functional labor market barriers and enables free job choice of immigrants.

In addition to this, naturalization can lead to a reduction of costs from the perspective of the employer. In the case of foreign employees with a temporary work or residence permit this happens in two ways. First, naturalization results in a decline in the administrative costs of the employer. This is caused by the fact that the administrative effort of the employer for foreign workers is in this case significantly higher than for workers with a German passport. For instance an employer who wants to engage a foreigner from outside Europe has always to conduct a so-called priority test, which ensures that no national or European worker is available to do the job (see Hailbronner 2007, pp. 17-18).[9] This issue has already been raised by the German Federal Government in its annual report in 2000, when it pointed out that employers abstain from employing foreigners due to legal and bureaucratic hurdles. Second, naturalization reduces the transaction costs of the employer (see Cahuc and Zylberberg 2004). From the perspective of the employer a German passport alleviates the insecurity about the individual and occupational future of the employees, since it guarantees that the employed immigrant has the right to live and work permanently in Germany. Both these arguments imply that an employer, who has the choice between two job applicants with equal qualifications and skills, prefers the one with the German passport.

In the literature about the effect of naturalization impacts the first component of this cost reduction argument has already been addressed (see Bratsberg et al. 2002, p. 569; Mazzolari 2007, p. 20). In general, it is associated with the phenomenon of discrimination. However, following Becker's (1973 pp. 13-17) definition, this behavior of the employer cannot be judged as discriminatory. The higher administration costs of foreign employees are an objective reason to prefer employees with a German passport. Despite this it has to be assumed that some employers have a taste for discrimination that sums up to the market wage rate (see Becker pp. 39-40). However, in contrast to the U.S. by law legally employed foreigners are in Germany treated equally to natives in the job. This is true for aspects of

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[9] The test guarantees the so-called primacy of natives ("Inländerprimat"), which is part of the foreigner legislation in Germany since 1965.

employment provisions as well as for trade union agreements (see Hailbronner 2007, p. 20). To sum up, naturalization can increase the labor market opportunities of an employee with migration background in several ways. Due the existing provisions on the free mobility of workers within the EU the distinction is to a lesser extent about having a German or a foreign nationality, but about being a member of a European Union country or a Third Country National.

Furthermore, naturalization provides job relevant information to the employer. With the decision to naturalize, the individual expresses his wish to live permanently in Germany, demonstrates sufficient language skills, proved that he has already lived for a number of years within the country, commits to the German constitution and has been able to support himself without needing social assistance or unemployment benefits prior to naturalization. This information is in general positively reviewed by the employer since it documents a certain degree of identification and integration. Because an employer cannot observe the productivity of an employee every transaction on the labor market is connected with an extent of uncertainty from the perspective of the employer prior to hiring. For this reason an employer uses the observables characteristics of a job applicant to estimate the conditional probability of competence (see Spence 1974, pp. 5-9). These characteristics can be all information about the individual to which the employer has access prior to hiring. In general, these are education, employment history and personal characteristics. While some of these characteristics, e.g. education, are partially or completely controllable by the individual, others are not (e.g. sex). From the perspective of the employee, it is reasonable to make those adjustments that will improve his or her position in the job lottery (see Spence 1974, pp. 9-14). The citizenship status is a personal characteristic which can be altered by an individual, and which conveys significant information potential if it is not determined by birth. The naturalization act therefore can be interpreted as a signaling device, which can be used by employers for selection purposes.

An aspect by which the productivity can increase directly is connected to the location decision of naturalized employees. In almost all cases, immigrants who naturalize have already decided in advance that they stay in Germany over a longer period or for lifetime. In general, this long-term location decision encourages immigrants to foster their investment in education, language and country specific skills (Mincer and Polachek 1974). The accumulation of human capital should have a positive impact on the labor market performance and should lead to assimilation in earnings to natives. The following empirical

analysis will try to address these different impact channels by integrating the time dimension explicitly in the analysis. If naturalization has a positive impact on labor market opportunities, naturalized employees should exhibit some change in their performance in the labor market after the naturalization. If on the other hand the investment in country-specific human capital affects the productivity positively naturalized employees should feature also stronger wage growth before the acquisition of German citizenship.

4 Data

The data is from the current version of the employment sample of the IAB, which is a 2 percent random sample of all employees covered by social security during the period 1975 to 2001. According to this restriction the sample comprehends no self-employed, family workers and civil servants. Overall the dataset covers more than 80% of the whole labor force in Germany. The sample contains various sociodemographic characteristics at the individual level like daily wage, education and age (see Bender and Haas 2002). The legal basis of the dataset is the integrated reporting procedure regarding pension, unemployment and health insurance.[10] Therefore, the data are highly reliable in comparison to survey data. However, the reliability differs between particular variables.

Generally, it can be distinguished between characteristics that are collected due to insurance purposes (e.g. wage, employment duration), and information that has only a statistical use (e.g. education). Characteristics of the first category are related to payments to the social security system. This entails that employer and employee are interested in an accurate description.[11] Furthermore, the declaration of the employee is checked by the social insurance companies, the pension fund and the employment agencies through various plausibility tests.[12] In contrast to this, the reliability of the statistical characteristics that are related to the employee relies nearly completely on the accurateness of the employer.[13] The imprecise data entry is enforced by the fact that the reporting person changes with every new job of an individual. In general, two types of error are possible: wrong information is recorded or

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[10] The reporting procedure demands from every employer that he notifies all employees that are subject to social security contributions within a certain time limit to the social insurance carriers. The data collection is a multistage process beginning with the employer reporting the information to the insurance companies. Afterwards the data is submitted to the pension funds, which in turn send selected variables to the employment agency. These data is then used to construct the employment sample (see Bender et al. 1996, pp. 4-5, Federal Statistical Office Germany 2006, p. 6).

[11] The employee gets a copy of the report that is sent by the employer to the social insurance companies.

[12] Since 2001 a common programme called "Kernprüfprogramm" is used by the social insurance carriers to check the accurateness of the reported information.

[13] Statistical characteristics of the company are collected by specialists of the employment agencies.

wrong information is transferred (see Cramer 1985 pp. 62-65, Koch and Meineken 2003 pp. 160-162, Drews 2006 pp. 4-6). This leads to a substantial degree of inconsistency in the data concerning all individual characteristics that are not related to payments.

A consequence of this misrepresentation is that a number of employees in the database have more than one change of citizenship during the whole observation period.[14] For this reason, various procedures had to be implemented to erase implausible information concerning the nationality of employees. As a first step, the original specification of the nationality variable from the weakly anonymous version of the employment sample was imported. This reduced the number of missing values significantly, since the anonymous version contains detailed information about the nationality of employees from the New Laender as well. Secondly, an algorithm was developed and implemented to replace missings and inconsistent data concerning the nationality within one period.[15] Thirdly, inconsistent nationality information that was embedded between two periods was replaced.[16] The result of the implementation of these methods was a reduction of employees with multiple citizenship change.[17] However, the share of this group remains still quite high. Despite of this no additional data preparation was conducted, since every data adjustment raises the risk of introducing new errors. Furthermore multiple citizenship change in the dataset is as well caused by employees with double citizenship, because their reported nationality presumably differs case by case.

Following the data cleaning various procedures were implemented which allow us to identify the time, number and direction of citizenship change. These were then used to remove all natives from the data set. A native employee is herby defined as an individual who possess a German passport throughout the whole observation period. In addition to this, employees who exhibit multiple citizenship change have been removed from the data set. By this individuals with ambiguous citizenship status or double citizenship are excluded from the analysis. The same holds true for employees who change from a foreign nationality to another alien citizenship at a certain point of time or who expatriate.[18] Subsequently the dataset contains only records of employees who have a foreign nationality throughout the whole observation

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[14] For example: during the observation period changes the nationality of an employee from German to Turkish and back again.

[15] This is related to cases where an employee has different nationalities within one reporting period in parallel spells, e.g. Turkish in the main job, and German in the side job. The criterion used for the replacement of inconsistent data was the main job.

[16] For example: If an employee had the German nationality in 1999 and 2001, but the Turkish nationality in 2000, the information was changed in 2000 to German.

[17] At this point I like to thank Nils Drews from the IAB, who provided me with some useful algorithms.

[18] The latter is related to people with original German nationality who acquired a foreign nationality at some point of time.

period and of foreign employees who naturalize at a certain point of time.[19] After this, cross-sections were drawn for every year. This was done by using the annual notification of an employee at the end of every year whereas only the information of the main job was recognized.[20] Afterwards the dataset contains for every employee at most one notification per year. The final structure of the dataset is an unbalanced panel.

Work experience was approximated by subtracting the average age of labor market entrance from the actual age of an employee by education categories using data from the IAB education report (see Reinberg and Hummel 1999). Due to anonymization purposes the dataset gives no information about the age of employees who are at a certain point of time older than 62 or younger than 15.[21] For this reason, an algorithm was developed and implemented to approximate the age of these employees. For people marked younger than 15 the date of birth was identified by subtracting 15 years from the first year of coverage, while the date of birth of employees marked elder than 62 was calculated by subtracting 65 years from the last year of coverage. The presumption underlying this procedure is that nobody younger than 14 or older than 65 years is covered by the sample. Especially the latter supposition does not seem to be very realistic, but this pragmatic approximation allows us to include the lower and upper age groups. Since the employment sample does not contain any information about hours worked only fully employed people were considered in the data set. Eventually, the sample was restricted to men, because of the significant differences between men and women concerning the employment history.

Overall, the dataset includes about 500.000 observations during the period 1975 to 2001 which correspond to more than 60,000 individuals. About 11% of all employees have acquired citizenship at a certain point of time (see appendix 1). On average, each employee is observed 15 times during the whole observation period. While the minimum lies at 1 observation, the maximum observation period is 27 years. Concerning differences between non-naturalized and naturalized immigrants the last group exhibits a higher average observation period which is beneficial for disentangling wage growth pre and post naturalization.

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[19] The final data set contains no ethnic Germans, the so-called Spätaussiedler.
[20] The advantage of using the annual notification is that every employee who works over two years is captured.
[21] These people are marked throughout the whole data set with the category older than 62 or younger than 15.

5 Descriptive statistics

Table 1 shows the education background of all employees covered in the final data set for the whole observation period. The figures clearly indicate that employees who naturalize possess a higher qualification profile than employees who keep their foreign nationality. However, the figures do not differentiate between time before and after naturalization. Therefore, the figures mean that during 1975 and 2001 on average 50.86% of the foreign employees recorded no apprenticeship, while only 33.47% of employees who decided to naturalize at a certain point of time have no professional education. The difference in qualification becomes apparent in the highest educational category: the share of individuals with a university degree is within the group of employees who naturalize more than two times higher than within the group of foreign employees. These results are consistent with other evaluations for Germany on the basis of different data sources like the Microcensus (see Steinhardt 2007, p. 548).

Table 1: Sociodemographic characteristics

	Foreign employees	Employees who naturalize
Education (share in %)		
Without apprenticeship	50.86	33.47
Secondary school with apprenticeship	26.84	41.96
Abitur without apprenticeship	0.61	0.94
Abitur with apprenticeship	0.74	1.77
Technical college degree	0.91	2.36
University degree	2.50	5.43
Missings	17.53	14.06
Occupational Status (share in %)		
Apprenticeship	3.17	5.17
Unskilled worker	59.46	40.03
Skilled worker	25.79	28.64
Foreman	0.42	1.14
White collar employee	9.42	22.09
Home work	0.02	0.03
Part-time work	1.69	2.06
Missings	0.02	0.02

Source: own calculations with data of the IAB employment sample 1975-2001

The big discrepancy in the formal qualification of the two groups corresponds to differences in the occupational status (see lower part of table 1). Only 9.4% of the foreigners are white collar employees, whereas 22% of the immigrants who naturalize belong to this category. The vast majority of the foreign employees are unskilled workers. Surprisingly, within both groups the fraction of foreman is very small, while the share of skilled workers is nearly the

same (26-29%). The disparity between both groups, therefore, relates mostly on the lowest and highest occupational categories.

Table 2 shows that the average age of a foreign employee is 39 when he acquires the status of German citizen. Compared to the results of other studies this age is relatively high. This can be explained by the fact that the dataset is restricted to the male workforce liable to social insurance. Other data sources like the naturalization statistics of the Federal Statistical Office contain all groups of the population. Especially the inclusion of children and young individuals who are still in the educational system leads to a lower average age of the naturalized migrants in these data sets.

Table 2: Average age at naturalization

	Average age	Min	Max
Age at naturalization	38.98 (10.51)	16	65

Standard deviation in parentheses
Source: own calculations with data of the IAB employment sample 1975-2001

It may be expected that the displayed difference in formal qualification and occupational status between foreigners and immigrants who naturalize is reflected in wages. For this reason table 3 shows the average annual wages for both groups. It becomes obvious that on average employees who naturalize earn higher wages than foreign employees. With almost 4 Euros the wage premium is quite substantial. This corresponds to large sociodemographic differences between the two groups. For the sake of comparison, the table also presents the average wage of German employees.[22] As expected, the average wage of native Germans is higher than that of foreigners and as well as that of immigrants who naturalize. The interesting question is henceforward, whether the naturalization act itself has an impact on the economic performance of immigrants. Therefore, the lower part of table 3 exhibits as well the average wages of employees who naturalize before and after becoming German citizens.

The figures show that on average employees who naturalize earn higher wages already before the naturalization act, as compared to foreigners who do not naturalize at all. However, at the point the wage premium is relative small. In contrast to this, the average wage after citizenship acquisition is considerable higher than before the naturalization and than the

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[22] For this purpose all elementary data preparation steps were conducted without erasing the German employees from the sample.

average wage of foreigners - it even reaches the level of native German employees. This could be a first indicator that citizenship plays a substantial role in the German labor market.

Table 3: Average daily wages

	Average daily wage (in Euro)
Foreign employees	67.38 (22.79)
Employees who naturalize	71.03 (27.67)
German employees	77.72 (25.56)
Before naturalization	68.24 (26.62)
After naturalization	77.20 (28.96)

Standard deviation in parentheses
Wages were deflated by using the consumer price index of the former federal territory on the basis 1995.
Source: own calculations with data of the IAB employment sample 1975-2001

To which extent can the huge wage gap between naturalized and foreign employees be explained by different educational attainment? A first answer can be provided by a Blinder-Oaxaca decomposition, which is a popular tool to decompose a wage differential between two groups into differences in endowment and estimated coefficients (see Oaxaca (1973), Blinder (1973)). This method has been already used by DeVoretz and Pivenenko (2005b, p.454-461) to explain the wage differences between natives and naturalized immigrants in Canada. We will use an extended version that also includes an interaction term (see Daymont and Andrisani 1984). This is done by:

$$(1) \quad \Delta \ln(\overline{W}) = \ln(\overline{W}_N) - \ln(\overline{W}_F) = \overline{X}_N \beta_N - \overline{X}_F \beta_F = (\overline{X}_N - \overline{X}_F)\beta_F + \overline{X}_F(\beta_N - \beta_F) + (\overline{X}_N - \overline{X}_F)(\beta_N - \beta_F)$$

As the benchmark we take the average (in logarithms) daily wage of naturalized employees. The first component of the decomposition represents the differences due to characteristics, while the second term captures the effect of different returns to these characteristics. The third term is the interaction between coefficients and endowment.

Table 4: Blinder-Oaxaca wage decomposition between naturalized and foreign employees

Educational endowment	Coefficients	Interaction	Wage differential
0.0449	0.0491	0.0273	0.1213

The basic wage equation used for the decomposition contains only education and year dummies. Results are not reported here.
Source: own calculations with data of the IAB employment sample 1975-2001

The decomposition indicates that 37% of the wage gap between naturalized and foreign employees is explained by differences in educational endowment (see table 4). This reveals a strong positive self-selection among immigrant employees concerning human capital. In addition to this, it has to be assumed that the probability for naturalization also varies with unobservable characteristics. Immigrants with positive unobservable characteristics like motivation or ambition should have a higher preference for naturalization. The following empirical analysis therefore has to consider processes of self-selection on observables as well as on unobservables. In the next section several econometric specifications will be estimated to analyze the relationship between naturalization and wages.

6 Results

The following estimations are based on a standard Mincer wage equation derived from human capital theory (see Mincer 1974). In this type of regression the most important independent variables are education and labor market experience. Furthermore, we control for a number of sociodemographic and labor market characteristics. In the first part of the empirical analysis a simple pooled OLS regression is carried out to gain first insights about the impact of naturalization on wages. All observations are pooled together without taking the panel structure of the data into account. Therefore, this basic regression does not allow to control for processes of self-selection concerning unobservable characteristics.

The basic regression is based on the following equation:

(2) $\ln w_{it} = \alpha_0 + \alpha_1 N_{it} + \alpha_2 ED_{it} + \alpha_3 EX_{it} + \alpha_4 EX^2_{it} + \alpha_5 Y_t + \beta \mathbf{Z}_{it} + \varepsilon_{it}$

where the dependent variable $\ln w_{it}$ describes the average daily wage of individual i at time t in logarithms. The naturalization of an individual is captured by the term N_{it} which is a dummy indicating if an employee is naturalized at time t. It is not only set to unity in the year when the naturalization takes place but also in all years after the naturalization act. This term captures the advantage of employees who acquired German citizenship. ED_{it} and EX_{it} describe the education and labor market experience of individual i over time. The inclusion of the term Y_t, which is a time dummy, allows to control for cyclical effects on the dependent variable. The term $\mathbf{Z}_{it}$ is a vector of control variables containing individual and macro

characteristics like occupation, occupational status, economic sector, region and nation.[23] Table 5 shows the results for the basic pooled OLS regression.

Table 5: Pooled OLS 1975-2001

	(1)	(2)	(3)	(4)	(5)	(6)
Naturalized	0.0585*	0.0587*	0.0627*	0.0346*	0.0230*	0.0195*
	(0.0026)	(0.0027)	(0.0027)	(0.0025)	(0.0023)	(0.0022)
R^2	0.4441	0.4516	0.4647	0.5324	0.5853	0.6233
Control Variables:						
Human Capital	Yes	Yes	Yes	Yes	Yes	Yes
Nationality	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	Yes	Yes	Yes	Yes	Yes
Region	No	No	Yes	Yes	Yes	Yes
Occupational Status	No	No	No	Yes	Yes	Yes
Occupation	No	No	No	No	Yes	Yes
Economic Sector	No	No	No	No	No	Yes

Number of observations: 507.325
Human capital includes education, labor market experience and its square.
Robust standard errors in parentheses
* significant at 1% level
rounded to 4. decimal place
Source: own calculations with data of the IAB employment sample 1975-2001

The variable of interest N_{it} is significant and has the expected sign. Since the basic reference category of the naturalization and nationality variable is Third Country National, the results can be interpreted as follows: Naturalized employees earn 5.85% higher wages than Third Country Nationals.[24] The addition of the other control variables reduces the size of the coefficient as expected. In the end remains a significant wage advantage of naturalized immigrants over Third Country Nationals of 1.95%. It therefore becomes obvious that the huge wage premium of naturalized foreigners can be largely explained by differences in observables characteristics like education and occupation. The results of the pooled OLS estimation indicate, nevertheless, that naturalization has a positive impact on the wages of employees.

Table 6 shows the results of naturalization for selected national groups including the full set of control variables.[25] It becomes obvious that the naturalization effect has the biggest size for Third Country Nationals. Employees originating from of a country outside of the EU earn 3.56% higher wages than non naturalized Third Country Nationals. Furthermore, the

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[23] Vector $\mathbf{Z}_{it}$ contains a term that controls whether an employee is of Turkish origin, belongs to a country of the European Union or is a so called Third Country national.
[24] (exp (0.0585)-1)= 0.0602
[25] For the classification of foreign groups within Germany see section 3.

estimates cannot reveal a naturalization premium for Turks. This can be explained by the fact that the labor market access for this group is more generous than for Third Country Nationals due to a number of bilateral agreements between Germany and Turkey. In addition to this, the estimates exhibit that naturalization seems to have a relative strong negative impact effect for EU foreigners.[26] This is an interesting result indicating a negative self-selection process within the group of EU foreigners. An explanation might be that the naturalizations of EU foreigners might be less driven by the aim of improving labor market opportunities, but by non-labor market issues.[27] Overall, the results show that especially groups with strong constraints on the labor market seem to profit by the naturalization act. Legal status and labor market access therefore seem to be the most important channel by which naturalization affects the productivity of immigrants.

Table 6: Pooled OLS by selected groups

	Third Country Nationals	Turkish Nationals	EU Nationals
Naturalized	0.0356* (0.0029)	0.0082 (0.0056)	-0.0612* (0.0046)
R^2	0.5911	0.6727	0.6317
N	189,262	176,717	140,158

Control Variables: Human capital, year, region, occupational status, occupation, economic sector
Robust standard errors in parentheses
* significant at 1% level
rounded to 4. decimal place
Source: own calculations with data of the IAB employment sample 1975-2001

However, the cross-sectional analysis did not allow us to observe how the individual wages change over time nor did we control for individual heterogeneity. We performed a Breusch-Pagan Lagrangian Multiplier Test and come to the result that the variance of the individual error term differs from zero indicating that the estimation should account for unobserved heterogeneity of the individuals (see Wooldridge 2002, pp. 264-265). Following Bratsberg et al. (2002) a longitudinal analysis based on the following equation is carried out:

$$(3) \qquad \ln w_{it} = \alpha_0 + \alpha_1 N_{it} + \alpha_2 Ni_t (EX_{it} - EX_{iN}) + \alpha_3 CA_i EX_{it} + \alpha_4 ED_{it}$$
$$+ \alpha_5 EX_{it} + \alpha_6 EX^2_{it} + \alpha_7 Y_t + \beta Z_{it} + \mu_i + \varepsilon_{it}$$

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[26] The EU foreigners include citizens of other associated states like the USA or Switzerland since these countries has signed association contracts with Germany simplifying the labor market access.
[27] The free movement of workers and services within the EU enables unrestricted labor market access to EU immigrants even without the German passport. In general the same holds true for the access to social services like unemployment or child benefits (see Hailbronner 2007, pp.24-28).

with μ_i describing the individual specific time invariant component of the error term and ε_{it} is an idiosyncratic disturbance. The term CA_i is a time-constant dummy set to unity if the employee i naturalizes at a certain point during the observation period. While EX_{it} denotes the labor market experience of individual at time t, EX_{iN} describes the experience of individual i at the time of the naturalization act. In addition to the former equation, this approach allows to differentiate the effect of naturalization by time. The inclusion of the additional terms allows to make detailed statements about the question by which channel the naturalization affect wages: If α_1 is positive, there is an immediate positive wage effect. In the case of a positive α_2 the wage growth after naturalization is accelerated. Both outcomes could be explained by increased labor market opportunities as a result of possessing German citizenship. In the case of a positive α_3 the wages of naturalized employees grow faster even before the naturalization act. This can be explained with an increased investment in human capital even prior to naturalization (see Bratsberg et al. 2002, p. 573). At first, a random effects estimation was conducted.

Table 7: Random effects 1975-2001

Dependent variable: ln w_i	
Naturalized	0.0206* (0.0024)
Experience since naturalization	0.0034* (0.0004)
Prior naturalization	0.0007* (0.0001)
Number of observations	507,325
Number of Groups	61,312
R^2 overall	0.5775
within	0.6108
between	0.5775

Robust standard errors in parentheses
Regressions also include education, labor market experience and its square, occupation, occupational status, region, economic sector, nationality and year.
* significant at 1% level
rounded to 4 decimal place
Source: own calculations with data of the IAB employment sample 1975-2001

Table 7 shows that naturalization has an immediate positive effect on the wages of employees. Naturalization leads to a statistically significant 2.06% boost in wages. In addition to this, the estimation indicates that naturalized employees exhibit a rapid wage growth in the years after naturalization. Wage growth after naturalization is 0.34 percentage points higher per year. Reconsidering the fact that a foreign employee is by average 39 when he acquires the status of German citizenship (see table 2) reveals that the effect after the naturalization is rather large. Both results are consistent with the argument that naturalization increases the labor market

opportunities of immigrants in various ways. In addition to this, naturalized employees seem to exhibit as well a slightly faster wage growth prior to naturalization.

In the following we assess whether the random effects estimation is the adequate technique. This can be done by a Hausman Test, which test for a correlation between the time-constant error term and the exogenous variables (see Wooldridge 2002, pp. 251-252). The result of the test supports the use of individual fixed effects. For this reason a fixed effects estimation was conducted.

Table 8: Fixed effects 1975-2001

Dependent variable: ln w_i	
Naturalized	0.0076* (0.0027)
Experience since naturalization	0.0029* (0.0004)
Prior naturalization	-0.0009* (0.0002)
Number of observations	507,325
Number of Groups	61,312
R^2 overall	0.5120
within	0.6160
between	0.5011

Robust standard errors in parentheses
Regressions also include education, labor market experience and its square, occupation, occupational status, region and economic sector.
* significant at 1% level
rounded to 4. decimal place
Source: own calculations with data of the IAB employment sample 1975-2001

Table 8 shows that all coefficients of interest remain highly significant. While the size of the immediate effect is clearly smaller than the one in the random effects estimation the impact of citizenship acquisition during the following periods continues to be present. The fact that the naturalization premium reduces with the use of fixed effects indicates that that the unobserved productivity of employees is positively correlated with the naturalization variable. An explanation for this is that immigrants with positive production related characteristics like ambition or ability are more likely to naturalize.

Concerning the prior effect of naturalization, the estimations yield surprisingly a small, significant, negative coefficient. This indicates that immigrants who naturalize do not have a steeper experience-earnings profile prior to naturalization than immigrants who not naturalize at all. In contrary, the results suggest that it is slightly flatter. There are two possible explanations for this result: First, the included education variable combines information about the highest school and professional graduation of an employee. These can change over time and therefore the education variable might capture a notable share of the investment in human

capital prior to citizenship acquisition. In other words: the coefficient might have a different sign and size with a time-constant education variable. The second explanation is the naturalization pattern of immigrants in Germany. While in countries like Canada most of the permanent immigrants have ascended citizenship, Germany is characterized by a huge share of long-term immigrants that fulfill the requirements for naturalization, but prefer to stay foreigners (DeVoretz and Pivenenko 2005b, p. 437, Constant et al. 2007, p. 2-4).[28] Regardless of this, they invest in country-specific human capital due to their permanent location decision. For this reason it is a reasonable result that naturalized immigrants do not exhibit a stronger wage growth even prior to naturalization. Overall, the panel estimation has shown that despite controlling for individual heterogeneity the wage impact of naturalization remains highly significant and positive.

7 Conclusions

The analysis of the impact of naturalization has shown that citizenship is an economically relevant factor in Germany. The descriptive analysis exhibits a sizable wage premium of naturalized immigrants, but indicates that educational differences between naturalized and non-naturalized immigrants are an important determinant. It has become obvious that especially high qualified foreigners tend to naturalize. The estimation of a pooled OLS reveals that the wage premium of naturalized foreigners can be partly explained by differences in sociodemographic characteristics. However, there remains a significant wage effect of naturalization, but the impact varies across immigrant groups. The wage premium has the largest size for immigrants from non-associated countries outside the EU. This indicates that especially immigrant groups who face strong restrictions to the German labor market profit by the naturalization act.

The longitudinal analysis, which enables us to control for self-selection concerning unobservable characteristics within the foreign workforce, confirms that the possession of the German passport is an advantage in the German labor market. The analysis shows that naturalization has an immediate positive effect on the wages of employees. In addition to this, the estimation indicates that naturalized employees exhibit a faster wage growth in the years after the naturalization event.

The findings of the analysis have clear implications for the integration policy in Germany. Until now we had no empirical evidence about the role that naturalization plays in the

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[28] The study of Constant et al. (2007) comes to the result that the length of stay in Germany negatively affects the probability of Turkish and ex-Yugoslav immigrants to naturalize or to already have naturalized.

economic assimilation process of immigrants. Our results now clearly demonstrate for the first time that naturalization has a significant impact on the assimilation in earnings. The argument that naturalization designates the end of a successful integration process is herby falsified. Undisputed the naturalization act demands already certain integration from the immigrant like the acquisition of language skills, but it enables as well to further integration by increased labor market opportunities. Therefore the naturalization is neither the beginning nor the end of integration, but an important part within the integration process. Policy makers can react to these findings by two ways: firstly by allowing unrestricted labor market access for all immigrants legally residing in Germany irrespective of their passport. The other well-known solution would be to increase the naturalization rates which are relative low compared to other European countries. This can be done by relaxing the requirements for naturalizations or promoting the possibilities and advantages of naturalization within the immigrant population.

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Appendix 1: Data set

Period: 1975-2001	**Persons**		**Spells**		**Years of coverage**		
	Frequency	Percent	Frequency	Percent	Min	Max	Average
Employees	61,312	100	507,325	100	1	27	15.3
Foreigners	54,612	89.07	426,069	83.98	1	"	15.0
Naturalized immigrants	6,700	10.93	81,256	16.02	2	"	16.8

Source: own calculations with data of the IAB employment sample 1975-2001