

Why do firms recruit internationally?

Results from the IZA International Employer Survey 2000*

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Abstract

The paper studies the demand for foreign university graduates at the firm level. Using a unique dataset on recruitment policies of larger firms in four European countries, the determinants of demand for internationally mobile highly skilled employees are established. I investigate the number, origin, skills, and functions of foreign graduates, as well as the experiences of firms recruiting internationally. A number of hypotheses regarding the demand for international workers are formulated and assessed. Among the motives for recruiting foreign highly-skilled employees, their special and complementary skills, most importantly international competence, rank prominently.

Zusammenfassung

Der Aufsatz betrachtet die firmenspezifische Nachfrage nach ausländischen Hochschulabsolventen. Mittels einer einzigartigen Erhebung zu personalpolitischen Strategien von größeren Unternehmen in vier europäischen Ländern werden die Bestimmungsfaktoren der Nachfrage nach international mobilien hochqualifizierten Arbeitnehmern bestimmt. Ich untersuche die Anzahl, Herkunft, Ausbildung und Einsatzgebiete von ausländischen Hochschulabgängern, sowie die Erfahrungen, die von international rekrutierenden Unternehmen gemacht werden. Eine Reihe von Hypothesen zur Nachfrage nach ausländischen Arbeitnehmern werden formuliert und getestet. Die speziellen und komplementären Fähigkeiten von ausländischen Hochschulabsolventen, besonders die internationale Kompetenz, erweisen sich als sehr wichtige Beweggründe für ihre Rekrutierung.

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1. Introduction

The issue of international mobility of the highly skilled is a hotly debated topic of European labor and education policy; witness the recent public discussion of the Green Card initiative in Germany. Scientific research on the topic is lagging behind, however, partly because adequate data are hard to come by. Thus, many basic facts about mobility of the highly skilled, defined here as those with a university diploma, remain unclear (for some exceptions see Bittner and Reisch, 1991, Walwei and Werner, 1992, List, 1995, and Jahr, Schomburg, and Teichler, 2001). For firms, i.e. on the demand side for employees with university education, the lack of data is especially severe. As a consequence, little is known about questions such as the extent to, and reasons for which firms recruit internationally, and what role international competence or international transfer of know-how play for a firm's success in a globally competitive environment.

The *IZA International Employer Survey 2000* is an attempt to overcome this empirical deficit. The survey was financed jointly by the German Ministry of Education and Research and IZA. Fieldwork for this unique Europe-wide firm survey of 850 firms by Infratest Burke took place in the autumn of 2000 using computer assisted telephone interviews. 340 of the surveyed firms were based in Germany, whereas 170 were from France, the United Kingdom, and the Netherlands, respectively.

The paper introduces the data set, and then analyzes firms' decisions with regards to hiring foreign university graduates. Why do some firms recruit internationally, while others do not, or only on a limited scale? What importance do firms attribute to the institutional barriers for hiring non-EU-graduates? What roles do lack of social acceptance and problems of integration play? How do firms assess their own demand for highly skilled foreigners in the coming years? Answers to these questions promote our understanding of the economy-wide importance of migration of highly qualified people, and help us to define the relevant costs and benefits. If one believes in the argument that large firms, and multinationals in particular, are able to influence and shape immigration policy, the paper also contributes to an explanation of the shifts in policy on high skilled migration that can be observed at present in the surveyed countries.

2. Theoretical considerations

A timely discussion of the importance of international mobility of highly qualified workers, here employees with a university diploma, needs to account for the consequences of globalization and technological change. Both

phenomena have profound implications on the way specialized labor is utilized in production.

- (Shortage of skilled labor) Technological change has been skill-biased, i.e. it has shifted the demand for labor in favor of highly skilled workers. This process can lead to temporary shortages that can be met by means of international labor mobility, at least as long as not all countries or regions are equally affected.¹
- (Diffusion of knowledge) The speed of technological change, together with increasing competition, imply that, on one hand, it becomes increasingly important to have access to advanced key technologies, while, on the other hand, the time available for adaptation becomes shorter. The mobility of highly qualified employees can facilitate the fast diffusion of knowledge.
- (International competence) The increasingly international dimension of competition creates an increasing demand for international knowledge. Such knowledge includes the command of foreign languages, markets, and cultures etc.
- (Agglomeration effects) The occurrence of externalities and spillovers in the information society tends to favor local spatial concentration, contradicting the occasionally voiced expectation that information and communication technologies reduce the need for spatial mobility.
- (Mass customization) Another effect of technological change is the declining importance of mass production. Increasingly, products are adjusted to the individual customer, requiring increased flexibility as well as spatial mobility.

The overall effects of globalization suggest an increased demand for internationally mobile highly qualified employees.

For a different angle on the same issue, one can characterize the relationship between domestic and foreign highly qualified workers as either complementary or substitutable. It is possible that foreign workers possess skills and knowledge that domestic workers do not have. (At a given point in time, the validity of this proposition can be easily determined. Under a dynamic perspective, such a judgment is more difficult, since most skills can be trained *in principle*. For instance, international competence can be obtained if firms send their workers abroad for training.) In this case foreign and domestic employees are not rivals but *complements*.

¹ Of course, in a perfect Walrasian world, there are never “shortages”, as long as the price mechanism is allowed to work. I find the concept of shortages meaningful nevertheless in a world of highly heterogeneous skilled labor markets, where it takes years to train, information is imperfect, and wages are, for whatever reason, slow to adjust.

On the other hand, it is also possible that foreign workers possess the same skills and knowledge as domestic workers. Recruitment of foreigners will occur for example when they demand lower wages, or when there is a shortage of domestic labor. In this case, foreign and domestic highly qualified workers are rivals, or *substitutes*. If foreign and domestic employees are complements, then increased hiring of foreign employees is advantageous for domestic employees because their marginal product rises. This is not the case if there is a substitutive relationship.

From the firms' perspective, the recruitment in foreign labor markets is associated with costs and benefits. Benefits accrue regardless of whether foreign highly qualified employees are substitutes or complements. However, the nature (and therefore potentially also the amount) of the benefits is different.

In the case of a complementary relationship the employment of foreign highly qualified employees positively affects the other factors' productivity, including the domestic workers' one. With a substitutive relationship, this effect does not exist. Here, the firms gain either via a reduction in wages or – arguably more realistically – via the lacking or decreased upward pressure for wages in times of shortage of skilled labor. Moreover, capital productivity rises.

An alternative point of view emphasizes the heterogeneity of workers. If there is the possibility to recruit both domestic and foreign graduates, then vacancies can be filled with better workers, because of the larger pool of applicants. Consequently, the employees' skills will on average better match the employers' needs and average productivity increases. Likewise, the „superstar“ phenomenon is based on heterogeneity; despite high costs and uncertain probability of success, it can be worthwhile in some cases to compete for international stars (or those who have the potential of becoming one), for example for the sake of reputation gains.

The benefits have to be compared to the perceived costs of recruiting internationally. Some firms may expect such high costs that an employment of foreigners is never considered. The costs not only include those of setting up a recruitment network abroad, but also direct or indirect follow-up costs such as communication problems, lacking social acceptance by colleagues in the firm, information costs, uncertainty with respect to qualifications, or difficulties in obtaining a work permit.

3. The IZA International Employer Survey 2000

The *IZA International Employer Survey 2000*, to the best of our knowledge, is the first dataset of its kind. It contains observations for 850 firms, 340 in Germany, and 170 in France, the United Kingdom, and the Nether-

lands, respectively. A firm is defined as the area of recruitment competence of the head of human resources. The sample is confined to five selected industries and to firms with at least 100 employees. All firms without highly qualified employees were excluded, whereas the employment of foreign highly qualified workers was no precondition for inclusion in the sample.² The five selected industries (with target / actual percentages in parentheses) are:

- Chemical Industry (20% / 20%)
- Manufacturing (30% / 31%)
- Financial Services (20% / 22%)
- Information Technology (20% / 16%)
- Research and Development (10% / 9%)

Moreover, the sample was stratified by firm size (firms with 100–499 employees and firms with 500 and more employees, each group accounting for 50% of the sample). In the realized sample, 9% of the cases fell below the lower bound (they are kept in the analysis). The effective fraction of firms with 100–499 employees is 52%, and the fraction of firms with more than 500 employees is 39%. Table 1 displays the proportion of employees with a university diploma among all employees in the interviewed firms. It can be seen that Germany, with a share of 28%, is located close to the overall average, whereas the share is particularly high in France.³

Table 1
Firms' average proportion of employees with university diploma among all employees

	%	N
Germany	28.13	311
France	39.38	132
UK	31.36	129
Netherlands	19.66	150
Total	29.00	722

Own calculations

Source: *IZA International Employer Survey 2000*.

² Details on the sampling frame, the directories of target populations, the response rates etc. are given in the full report (Winkelmann et. al., 2001).

³ There is no immediate correspondence to the proportion of university graduates in the population of the four countries. According to OECD (1998), the 1996 ratio of graduates with at least a first university degree to the population at the typical age of graduation was 16 percent in Germany, 20 percent in the Netherlands, and 34 percent in the United Kingdom. Hence, the Netherlands are ranked in the middle, but they have the lowest share in Table 1. No figure is available for France.

The numbers in Table 1 warrant a few additional comments that are relevant throughout the paper. First, the effective sample size is much lower than the nominal sample size of 850. The reason is that for some firms, no information on the number of employees (for the domestic units of operation in the recruitment area of the managers) could be obtained, while for others, information on the number of employees with university diploma is missing. The statistics shown here are always based on all non-missing observations for the particular variable.⁴ Secondly, in Table 1 and elsewhere, means of percentages are given, where each firm contributes one observation, regardless of size. Alternatively, one could weigh by firm size. In the particular case, the proportions wouldn't be affected much by weighting by firm size: the overall correlation between firm size and the proportion of employees with university diploma is very small (+0.02). Weights are usually employed in order to obtain representative statistics for an underlying population (for example all workers in an economy). However, since the base sample is already stratified and non-representative (large firms in five selected sectors of the economy), nothing is really gained by weighting, and here and elsewhere, the reported statistics are unweighted.

Table 2 shows the proportion of firms that employ foreign university graduates at all, as well as the proportion of foreign university graduates among all employees with university diploma (i.e., all graduates) in firms with foreign graduates, for the four surveyed countries respectively.⁵ It can be seen that in Germany about 39% of the surveyed firms employ foreign university graduates. In these firms the average proportion among all university graduates is 9%. The average proportion taken over German firms (rather than only those with foreign university graduates) is thus 3.5% (=9% x 39%). The international comparison indicates that the United Kingdom leads with respect to the incidence of foreign university graduates, while the Netherlands has the highest proportion of foreign graduates in firms that employ foreign graduates (almost 17%).

The incidence and proportions across the various industries are displayed in Table 3, separately for German firms and for all firms. The industries „Information Technology (IT)“ and „Research and Development (R&D)“ show by far the highest proportions both of firms with foreign graduates and of foreign graduates among all university graduates. Across all surveyed firms, the average proportion of foreign university graduates is 6.4% for the

⁴ A full analysis of potential selection bias due to missing observations is provided in the full report (Winkelmann et al. 2001). The non-responses appear mostly non-systematic, and the effect of this problem on the main conclusions should be minor.

⁵ Foreign university graduates include employees, who have studied and received a diploma abroad and in addition don't hold the citizenship of the country where the firm is located.

Table 2
Firms' employment of foreign university graduates by country
 (in percent)

	Share of all firms employing foreign graduates	Average proportion of foreign graduates among all graduates in firms with foreign graduates
Germany	38.91	9.13
France	34.39	10.86
United Kingdom	49.65	10.91
Netherlands	33.33	16.73
Total	38.80	11.08

Own calculations, Source: IZA *International Employer Survey 2000*.

IT-industry, and 9.9% for R&D. But note also that even in those industries where one would expect most foreign graduates, the average proportion is still quite small and does not exceed 10%. It is also interesting that in Germany the incidence of foreign university graduates is relatively high in the IT and R&D industries, while the proportions of foreign university graduates in firms with foreign graduates are below the overall average in both of these industries.

Table 3
Firms' employment of foreign university graduates,
Germany and all countries, by industry (in percent)

Industry	Share of all firms employing foreign graduates		Average proportion of foreign graduates among all graduates in firms with foreign graduates	
	Germany	Other	Germany	Other
Chemical Industry	40.98	41.84	9.93	12.44
Manufacturing	30.17	31.62	7.08	8.78
Financial Services	30.77	30.77	4.98	5.42
Information Technology	57.14	55.59	10.18	13.76
Research&Development	68.42	58.82	12.56	14.28
Total	38.91	38.73	9.13	10.75

Own calculations, Source: IZA *International Employer Survey 2000*.

Next, Table 4 shows some statistics that characterize the firms' international orientation. In 18.2 % of all German firms the interviewed person's competence for personnel affairs includes foreign subsidiaries. We call such

firms “multinational firms”. 9.3 % of sampled firms in France, the UK and the Netherlands are multinational by this criterion. Foreign ownership (full or partial) exists for 34.6 % of all German and 44.4% of all other firms. Similarly, the share of foreign business among all business is somewhat lower in German firms (32.2% on average) than in other firms (43% on average). Not surprisingly, perhaps, English counts in most firms and in all countries among the main languages spoken at the management level. Finally, a non-negligible fraction of firms who employ foreign graduates has its main competitor in a foreign country (17.6% of all German firms and 38.2% of all other firms).

Table 4
Internationality of firms (sample averages)

	Germany	Other
Multinational company (yes=1)	18.2	9.3
Foreign ownership (yes=1)	34.6	44.4
Main competitor abroad (yes=1)*	17.6	38.2
English among main languages at management level (yes=1)*	85.2	90.4
Share of foreign business	32.2	43.0

Sample of all firms. The starred questions have only been answered by firms with foreign graduates.
Own calculations, Source: *IZA International Employer Survey 2000*.

4. The demand for foreign university graduates

In this part of the paper, the reasons for the recruitment of foreign graduates as well as its extent are studied. Two dimensions of demand are distinguished. A first dimension is whether firms employ foreign graduates or not. The second dimension is the proportion of foreign graduates among all university graduates among firms that employ foreign graduates. These two dimensions reflect a two-stage decision process of recruitment.

A good understanding of the demand for foreign graduates will shed light on a number of questions. On the one hand, it can help to explain why the employment of foreign graduates is relatively low at present. But this understanding is also necessary for estimating potential future trends in employment of foreign graduates. Finally, knowledge about the determinants of demand can be used to evaluate the two basic hypotheses: are foreign highly qualified employees predominantly in demand due to local shortages of skilled labor (in which case they are substitutes), or are they sought after for their different competences and qualifications (in which case they are complements)?

The approach of this section provides two types of evidence. The first is qualitative in nature, as questions were directly asked on perceived reasons for recruiting internationally. Second, a quantitative analysis relates a firm's demand for foreign graduates with its measured characteristics. While much of this section focuses on the German experience, the section concludes with an international comparison.

4.1 Subjective reasons

One of the advantages of a custom-made survey is the possibility to ask the interview partner directly about the reason for international recruitment. Table 5 shows the response to a number of items (these questions were only asked of firms that actually employ foreign university graduates). For example, it follows from the first row that 51.6 % of German firms disagree with the statement "We hire foreign employees because overall they are the best applicants". The highest proportion of "strong agreement" was attributed with 46 % to the statement "We hire foreign employees because they speak foreign languages" (or 72 % if strong agreement and some agreement are combined).

Table 5
Subjective reasons for employing foreign university graduates by German firms (in percent)

	Strongly agree	Somewhat agree	disagree
We employ foreign graduates because ...			
... overall they are the best applicants.	8.87	39.52	51.61
... there is a lack of good German applicants.	11.11	43.65	45.24
... they know foreign markets.	34.92	28.57	36.51
... they speak foreign languages.	46.46	25.20	28.35
... they speak English well.	33.07	33.07	33.86
... the type of knowledge required for these jobs is not produced by the German education system	4.72	23.62	71.65
... their skills better fit our work tasks	14.96	36.22	48.82
... they have lower wage demands.	0.79	9.45	89.76
... they work harder.	1.60	12.00	86.40

Subsample: All German firms that employ foreign university graduates.
 Own calculations, Source: *IZA International Employer Survey 2000*.

Altogether the results lead to some first conclusions concerning the motives for international recruitment by German firms. Particularly high rates of agreement are obtained for all statements that emphasize aspects of international competence (knowledge for foreign markets, command of foreign languages, especially English). Smaller rates of agreement were expressed for statements that emphasize the comparison with German applicants (“they are the best applicants”, “there is a lack of good German applicants”). I interpret these results as evidence in favor of the complementarity hypothesis and against the substitution hypothesis.

Two further results deserve attention. First, one can ask what sort of competence of foreign university graduates is of particular interest to German firms. Besides international competence, the specific transfer of expertise or know-how is a potential candidate. However, this factor seems to play only a minor role from the firms’ point of view. Only 4.7% of the firms strongly agree that foreign graduates have a type of knowledge that „is not produced by the German education system“.⁶

Second, there does not seem to be any evidence for a superior work ethic of foreigners. 86.4% of all surveyed firms do not think that foreign graduate „work harder“ than domestic university graduates. By contrast, the literature on immigration often starts from the presumption of a positive selection that gives immigrants an edge in terms of motivation (for example Chiswick, 1978). Of course, the answer does not preclude that foreign graduates indeed have a higher-than-average motivation, but only that they are employed for that reason.

4.2 Quantitative determinants of demand

In this part of the paper, a different strategy will be pursued. Rather than asking what firms think they do, I now look at „objective“ measures of behavior. As mentioned before, I follow the logic of a two-stage decision process. First, I examine how firms with and without foreign graduates differ. In a next step, I examine whether, and to what extent, the different proportions of foreign graduates among all graduates employed by firms can be explained by various characteristics of the firm.

In the German subsample, there are 128 firms (39%) with foreign graduates and 210 firms (61%) without. Table 6 shows the results of a multivari-

⁶ The question leaves open the possibility that German firms hire foreigners because they have skills not produced by the German work environment. Also, the firms included in the survey, because of their size and sector affiliation, are likely to attract the best university graduates, and may have less reason to „complain“ than smaller firms in other sectors.

ate regression. Although the dependent variable (foreign graduates yes) is binary, a linear model was estimated rather than a Probit model for the sake of simplicity, as the estimated parameters directly show the specific effects of a variable on the probability of employing foreign graduates. The problem of heteroskedasticity in the linear probability model is addressed by the use of robust standard errors (Greene, 2000). The table shows that the proportion of foreign business, the proportion of highly qualified workers and the firm size are highly significant. For instance, the estimated probability that a firm with at least 1000 employees employs foreign graduates is by 31 percentage points higher than the corresponding probability for a firm with 99 employees or less.

Table 6
Linear Probability Model
Dependent variable: Firm employs foreign university graduates

	Parameter	<i>t</i> -value
Multinational company (yes=1)	0.076	0.871
Share of foreign business	0.004	3.363
Foreign ownership (yes=1)	0.032	0.514
Share of university graduates among all employees	0.004	2.994
Foreign language important criterion in recruitment (yes=1)	0.082	0.913
Experience abroad important criterion in recruitment (yes=1)	-0.096	-1.386
Firm is engaged in Research&Development (yes=1)	0.124	1.741
Telework (yes=1)	-0.031	-0.445
<i>Sector:</i>		
Manufacturing	-0.046	-0.600
Financial Services	-0.006	-0.057
Information Technology	0.193	1.785
Research&Development	0.237	1.539
<i>Firm size:</i>		
100 – 249 employees	-0.015	-0.135
250 – 499 employees	0.137	1.115
500 – 999 employees	0.286	2.369
>1000 employees	0.306	2.387
Constant	-0.214	-1.389
R-square	0.2681	

Own calculations, Source: *IZA International Employer Survey 2000*. Sample of German firms (N = 225). *t*-values are based on robust (White-Huber) standard errors.

What is the interpretation of these results? Again, the international orientation of the firm seems to play a decisive role for the demand of interna-

tional highly qualified workers. The previous argument that foreign graduates are hired primarily because of their international competence (and thus as complements for domestic highly qualified workers) is supported. On the other hand, the proportion of highly qualified workers among all employees is an important determinant for the employment of foreign highly qualified workers as well. Implicitly, this could signal a lack of qualified domestic applicants among firms with above-average demand. However, this variable could also proxy for a firm's progressiveness and use of advanced technologies. Such firms might recruit internationally at least partly in order to transfer know-how. Unfortunately, the two interpretations cannot be distinguished with the available information.

Clearly, the regression leaves many questions unanswered. The coefficient of determination is 0.27. Although such a value is not uncommon in cross-section analyses, it nevertheless means that a major part of the dependent variable's variation is unexplained by the model. Consequently, the next sub-section analyses some further dimensions of demand, namely where the foreign graduates come from, what skills they bring and in what functions they are employed, that will provide further clarification on the main reasons for recruiting internationally. Before that, though, the second stage of the decision process of firms will be examined.

4.3 Determinants of the proportion of foreign graduates among all university graduates

If one restricts the analysis to the 128 German firms that actually employ foreign graduates (79 of which have valid responses to all variables), major differences regarding the extent of employment can be found. The proportion of foreign graduates among all university graduates varies between 0.7% and 86%. Some dimensions of this variation have already been discussed. Table 3, for instance, has shown that the proportion of foreign graduates depends on the sector, varying between 5% in the financial services sector and 13% in the research sector. At this point, we will establish to what extent observable firm characteristics are linked to the proportion of foreign highly qualified workers among all highly qualified workers.

Table 7 shows OLS estimates as well as two-step Heckman estimates that correct for potential selectivity effects. The concern for selectivity bias stems from the fact that the two decisions, employing foreign graduates at all (see section 4.2), and the extent of foreign employment given that the first decision was positive, may be correlated. In the Heckman model, coefficients from a stage-1 probit model are used to impute a so-called Mill's-ratio, which is then included among the regressors of a stage-2 regression for

the subset of firms with foreign graduates.⁷ Under the assumptions of the model, the two-stage estimator is consistent.

Table 7
OLS Results. Dependent variable:
Share of foreign graduates among all university graduates

	OLS		Heckman two-step	
	Parameter	t-value	Parameter	t-value
Multinational company	-1.646	-0.569	-0.433	-0.127
Share of foreign business	0.122	2.308	0.186	1.641
Foreign ownership	-0.685	-0.249	-0.095	-0.033
Share of university graduates	-0.034	-0.479	0.042	0.305
Foreign language important	-0.501	-0.088	1.354	0.225
Experience abroad important	-2.891	-0.998	-4.441	-1.202
Research&Development	3.827	0.747	6.355	1.009
Telework ¹	-1.707	-0.593	-2.357	-0.799
<i>Sector:</i>				
Manufacturing	2.734	0.797	1.732	0.478
Financial Services	7.880	0.984	6.630	0.862
Information Technology	7.678	1.441	9.995	1.570
Research&Development	15.501	2.695	18.544	2.480
<i>Firm size:</i>				
100 – 249 employees	-6.189	-1.084	-7.267	-1.296
250 – 499 employees	-6.367	-1.083	-4.278	-0.657
500 – 999 employees	-4.185	-0.706	0.273	0.030
>1000 employees	-9.182	-1.571	-4.728	-0.519
Constant	4.871	0.536	-13.683	-0.443
Mill's ratio			8.129	0.637
R-square	0.2498			

Subsample: All German firms employing foreign graduates (N=79). Own calculations, Source: IZA International Employer Survey 2000.

¹ Telework is a situation where an employee works regularly outside of the company's premises (such as in a home office) and communication is maintained by e-mail or inter-/intranet.

Overall, the results are weaker than those for the binary first-stage model. Indeed, a formal F-test cannot reject the null hypothesis that the slope coefficients are jointly insignificant (p-value = 0.232). The main reason for the lack of precision is the smaller sample size, as the regression is limited to the 79 German firms that employ foreign graduates and furthermore provide valid information on all variables involved in the model. OLS or the Heckman-two-step estimates lead to similar conclusions. There are two individually significant effects. The share of foreign graduates is increasing in the share of foreign business. This effect is compatible with the interpreta-

⁷ The stage-1 estimates are not shown here.

tion that foreign graduates are hired because of their international competence and their knowledge of foreign markets. Second, the share of foreign graduates is significantly higher in the research sector than it is in chemical industry (the reference sector). No significant firm size effect is found, although the point estimates indicate a smaller share of foreign graduates in larger firms, *ceteris paribus*.

4.4 International comparison

So far, the analysis of the demand for foreign university graduates has focused on the subsample of German firms. The international comparison raises a few additional questions, first and foremost, why the share of firms with foreign graduates (i.e., the propensity to recruit internationally) differs between the four countries (see Table 2). In principle, two hypotheses can be considered. On the one hand, the differences could have their origin in country-specific differences, such as traditions (including colonial past) and institutions. On the other hand, the differences could result from different industrial structures, orientation towards foreign markets and firm size composition of the sample. The latter effects can be accounted for with the information collected by the survey.

The regression results reported in Table 8 make such a comparison. In a first model, the indicator variable „foreign graduates yes / no“ is regressed on three dummy variables for the countries France, Britain, and the Netherlands, with Germany left out as country of reference. This model should in principle replicate the results of Table 2. In practice, there are some small discrepancies because a different sample (of only 425 firms) was used. This limitation was necessary in order to make the comparison between the different columns of Table 8 possible by using the same sample in both models and accounting for missing values.

As in Table 2, Great Britain has the highest proportion of firms with foreign graduates among the four countries. Its share exceeds the German share by 11.1 percentage points, even though the difference is – with a *t*-value of 1.5 – insignificant. In a second model, the country dummies are augmented by the full set of previously used explanatory variables. The country coefficients now measure the differences in the probability to employ foreign graduates between two firms that operate in different countries but are identical in all other respects (i.e. same size, same industry, etc.). This is the *adjusted* country-difference.

Rather than being able to explain away the between-country differences, the adjustment actually reinforces them. The differences between Germany and the other countries tend to become larger. The effect is especially strong with regard to Great Britain: the difference in comparison to Germany in-

creases from 11.1 to 15.8 percentage points. The difference is now statistically significant at the 10-percent level. The high internationality of British firms with regard to recruiting becomes especially evident. Because of the values taken by the explanatory variables, one would expect that British firms' recruitment should tend to be less internationally oriented than the recruitment of German firms. Empirically, the opposite can be observed, so that the "unexplained" country effect is larger after the adjustment.

Table 8
OLS Results
Dependent variable: Firm employs foreign university graduates

	Parameter	<i>t</i> -value	Parameter	<i>t</i> -value
France	-0.017	-0.268	-0.048	-0.767
United Kingdom	0.111	1.531	0.158	1.787
Netherlands	0.012	0.197	0.050	0.900
Multinational company			0.092	1.296
Share of foreign business			0.003	3.641
Foreign ownership			0.066	1.433
Share of university graduates among all employees			0.004	4.341
Foreign language important criterion in recruitment			0.065	0.988
Experience abroad important criterion in recruitment			-0.025	-0.485
Firm is engaged in Research & Development			0.054	1.031
Telework			0.040	0.782
<i>Sector:</i>				
Manufacturing			-0.076	-1.358
Financial Services			-0.103	-1.368
Information Technology			0.063	0.753
Research&Development			0.118	0.978
<i>Firm size:</i>				
100 – 249 employees			0.082	1.052
250 – 499 employees			0.137	1.562
500 – 999 employees			0.275	3.168
>1000 employees			0.306	3.339
Constant	0.351	10.925	-0.151	-1.406
R-square	0.0162		0.2220	

Own calculations, Source: *IZA International Employer Survey 2000*. *t*-values are based on robust (White-Huber) standard errors. N = 425.

Altogether one has to admit that the estimation results in this section can only insufficiently explain the demand for internationally mobile skilled workers. Neither can the variation in the demand for foreign graduates by German firms be fully explained, nor does the multivariate regression produce sufficient explanations for the different recruiting patterns in the four

countries. To improve our understanding of firms' demand for foreign graduates, it seems necessary to consider different types of evidence as well. In this spirit, I will examine in the next section the distribution over countries of origin of foreign graduates, their fields of study and their functions and positions within the firm. Certainly the reasons for recruitment should manifest themselves in the characteristics of those foreign graduates who are eventually recruited, their functions within the firms and the positions they have achieved.

5. Additional dimensions of international demand

5. 1 Country of origin

The country of origin is a first, admittedly imperfect indicator for the specific knowledge and competence of foreign graduates. If, for instance, one follows the argument that foreign graduates are recruited because of their knowledge of foreign markets, one should find that the home country distribution of foreign graduates is related to the respective bilateral trade relations. If, on the other hand, the transfer of know-how on advanced technologies is the most important factor, one expects foreigners to originate mostly from the countries leading in that technology. If one recruits because of a local shortage of skilled labor, it is more important in which country of origin there is a surplus of skilled labor and/or a willingness to migrate, for instance because of large salary differentials. The migration of engineers from Eastern Europe would be an example for the latter category. In practice, these basic motivations will hardly ever occur in pure form. One should allow for a variety of reasons and attempt to identify whether a single factor seems more important than others.

The IZA-survey question about the country of origin of foreign graduates has two components. First, respondents were asked to list all the countries from which some foreign graduates in the firm originate. In the likely case of multiple origins, it was then asked from which of the aforementioned countries most foreign graduates originate. Table 9 shows the distribution of the answers for the German subsample. For example, 42% of the surveyed firms with foreign graduates employ foreign graduates from France, but only for 12% of the firms is France the most important country of origin. One should be cautious not to interpret these numbers as proportions of French foreign graduates among all foreign graduates. The collection of such detailed quantitative information would have been highly problematic in the context of a computer assisted telephone interview.

An analysis of Table 9 reveals a substantial variety of countries of origin. On the whole, recruitment from EU countries (including Switzerland) dom-

inate. On the other hand, Eastern Europe is an important region of origin as well. 41% of all firms with foreign graduates employ university graduates from Eastern Europe. For 18% of all firms, Eastern Europe is the most important region of origin. Eastern Europe is thus clearly more important than other non-EU regions such as North America and Asia, which are for 8% and 5% of all firms, respectively, the most important origins of foreign graduates.

Table 9
**Country / Region of origin of foreign graduates
 in German firms (relative frequency)**

	Any foreign graduate from ...	Most foreign graduates from ...
France	41.94	11.65
Netherlands	21.77	5.83
United Kingdom	40.32	8.74
Austria	29.84	10.68
Switzerland	18.55	0.97
Other EU-countries	53.23	24.27
Eastern Europe	41.13	18.45
North America	37.10	7.77
Asia	29.84	4.85
North Africa	16.94	1.94
Others	16.94	4.85

Own calculations, Source: *IZA International Employer Survey 2000*.

Table 10 offers a comparison of the regions of origin of foreign graduates in the four countries that were part of the survey. The 10 initial countries / regions are aggregated into two groups: foreign graduates from EU countries and foreign graduates from non-EU countries. French firms have the largest proportion of all firms that employ foreign graduates exclusively from EU member countries (plus Switzerland). In this sense, France is indeed living up to her reputation as the “center of Europe”.

Germany, on the other hand, has the smallest proportion of firms that exclusively employ foreign graduates from EU-countries and by far the largest share of firms that mostly or only employ foreign graduates from non-EU countries (and, see below, in many cases, from Eastern Europe). This applies to more than 36% of all surveyed German firms. Hence, despite all legal restrictions that might have existed, international recruitment of foreign graduates was common as a matter of fact before the Green Card was introduced.

In Table 11, the group of non-EU foreigners is further disaggregated by region of origin. Eastern Europe is a major region of origin of foreign graduates in German firms. In 56% of all firms that predominantly or exclusively employ foreign graduates from non-EU countries, Eastern Europe is the most important region of origin. North America and Asia follow at some distance. In the other three countries, Eastern Europe plays a much less important role. In these countries, North America is most important, followed by Asia.

Table 10
International comparison of region of origin of foreign graduates (relative frequency)

	EU member states*		Other countries	
	only	mostly	mostly	only
Germany	31.78	31.78	13.08	23.36
France	53.19	21.28	19.15	6.38
UK	42.22	33.33	2.22	22.22
Netherlands	34.21	42.11	5.26	18.42
Total	38.4	31.65	10.97	18.99

Own calculations, Source: *IZA International Employer Survey 2000*. (* plus Switzerland)

Table 11
Most important regions of origin for firms with predominately or exclusively non-EU foreign university graduates (relative frequency)

	Eastern Europe	North America	Asia	Africa
Germany	55.8	23.5	14.7	5.9
Other	10.0	45.0	35.0	10.0
Total	38.9	31.4	22.2	7.4

Own calculations, Source: *IZA International Employer Survey 2000*.

In conclusion, it is evident that an examination of the country of origin alone is not sufficient in order to gain additional knowledge of the reasons for hiring highly qualified foreign employees. The empirical findings regarding the countries of origin from where firms recruit point to arguments related to the employees' personal competences (know-how in key technologies, international competence) as well as to domestic shortages of skilled labor.

5.2 Field of Study

The *IZA International Employer Survey 2000* investigates the fields of study separately for domestic and foreign university graduates. The total number of all possible fields was summarized into six broad categories. This data is collected only for firms with foreign graduates. The procedure is analogous to the variable „country of origin“. First the survey asks if certain fields of study actually occur among a firm's university graduates. In the case of multiple answers, a follow-up question determines the quantitatively most important field of study.

As can be seen in the first two columns of Table 12, for domestic graduates in German firms, business studies are most frequently named (70%), followed by Computer Sciences (65%). The ranking changes if one considers the field of study from which most domestic graduates are recruited. Here, engineering leads with a share of 36% of all firms. The next two columns of Table 12 give the corresponding proportions for foreign graduates. Naturally, the responses are fewer since foreign graduates, as a rule, constitute only a fraction of domestic university graduates, and it thus is more likely that certain fields of study are not represented at all among foreign graduates. Apart from that, it turns out that the field distribution of domestic and foreign graduates are surprisingly similar.

Table 12
Subject in which domestic and foreign university graduates obtained their degree (relative frequency)

	Any domestic graduates with degree in	Most domestic graduates with degree in	Any foreign graduates with degree in	Most foreign graduates with degree in
Engineering	56.25	36.07	45.24	36.07
Mathematics,				
Natural Sciences	56.25	13.11	38.89	14.75
Computer Sciences	64.84	15.57	47.62	22.95
Law	21.88	1.64	4.76	n.n.
Business Studies	69.53	22.13	40.48	15.57
Medicine	11.72	3.28	7.14	3.28
Others	14.84	8.20	9.52	7.38

Subsample: All German firms employing foreign graduates.

Own calculations, Source: *IZA International Employer Survey 2000*.

If one takes a look at the most frequent fields of study, the main difference is a reversal of ranking between the subject of business studies, which is most frequent for domestic graduates in 22% of firms, and most frequent

for foreign graduates in 16% of firms, and the subject of computer studies, which is most frequent for domestic graduates in 16% of firms, and most frequent for foreign graduates in 23% of firms. Additional systematic patterns appear if one differentiates according to the region of origin of foreign graduates. For example, computer science is mentioned as the most important field of study in 32% of all firms that mostly employ foreign graduates from non-EU countries. On the other hand, engineering is the most important field of study in 42% of all firms that recruit mostly from EU countries. We know from Table 11 that a large part of non-EU graduates comes from Eastern Europe. Thus, in a rather indirect way, the result may reflect trends such as the recruitment of computer specialists from Eastern Europe.

5.3 Functions within the firm

Naturally, the functions within a firm are closely connected to the employees' field of study. Thus, it does not come as a surprise that a comparison of the functions generally supports the previous results. The distribution of domestic and foreign highly qualified workers among the six functions I examine is rather similar, especially if one compares the most frequent function. Table 13 shows a slight concentration of foreign university graduates in functions that are related to information technologies.

Table 13
Functions of domestic and foreign university graduates
(relative frequency)

	Any domestic graduates employed in	Most domestic graduates employed in	Any foreign graduates employed in	Most foreign graduates employed in
Research&Development	59.84	42.06	52.34	40.50
Information Technology	32.28	10.32	25.00	14.05
Production	22.83	7.14	14.06	7.44
Marketing, Distribution	39.37	19.84	35.94	17.36
Administration	29.92	6.35	18.75	7.44
Other	14.96	14.29	15.62	13.22

Subsample: German firms with foreign graduates.

Own calculations, Source: *IZA International Employer Survey 2000*.

On the other hand, some clearer patterns appear again when we differentiate according to the region of origin. For example, in firms that mostly or only employ graduates from EU countries, those foreign graduates are especially concentrated in the functions of marketing and distribution. In

firms that mostly or only employ graduates from non-EU countries, those foreign graduates are especially concentrated in the functions of research and development, together with „other functions“, which possibly includes tasks that are not connected with one's original training. Thus, knowledge of foreign markets may indeed play an important role, especially when recruiting from within Europe, whereas such knowledge is less important in firms employing graduates from non-EU countries.

6. Reasons for lack of demand

Up to now we have assumed that the number of foreign graduates observed in a firm corresponds to actual demand. On the other hand, one could call for a distinction to be made between „potential demand“ and „realized demand“. Consequently, there is the question as to why there might be a discrepancy between the two. We will call these factors „reasons for non-recruitment“. These were examined in the form of statements, which the respondents could affirm or negate. A mostly identical catalogue of possible answers was introduced to firms with foreign graduates and firms without foreign graduates. For the first group, the relevant question was: „If you hire foreign employees with a university degree: in which of the following areas do you see potential problems?“ while for the second group of firms, the same possible answers were introduced with the question: „What are your reasons for not hiring foreign employees with a university degree?“

Table 14 shows the results for German firms. 47% of all firms employing foreign graduates, for instance, identify language difficulties as a potential problem. Language problems, as well as socio-cultural differences, are the most commonly named personality-related problem for these firms. Problems related to discrimination, such as a lack of acceptance from superiors, subordinates or customers only play a minor role. A lack of knowledge of foreign education systems and careers are named by approximately one fourth of all firms.

Interestingly, firms that do not employ foreign graduates do not attach special importance to those kinds of problems. For these firms, a lack of applicants or the lack of demand for foreign graduates play the decisive role. These firms are not even conscious of the problems that might arise because they do not encounter them during their daily business routines. These problems only gain importance if the firm actually starts to recruit internationally.

For both kinds of firms, however, it is true that difficulties in obtaining a work permit for non-EU foreigners are given as a reason for non-recruitment. Among the firms that do not employ foreign graduates and that iden-

tify difficulties in obtaining a work permit, 89% state that they would recruit internationally if the regulations were simplified. Among the firms that employ foreign graduates and identify difficulties in obtaining a work permit, 71% state that they would recruit even more international applicants if the regulations were simplified. This opens up a range of possible actions for policy.

Table 14
Reasons for non-recruiting (relative frequency)

	Firms without foreign graduates	Firms with foreign graduates
Language problems	12.9	46.8
Socio-cultural differences	9.8	52.1
Acceptance by superiors	1.2	8.5
Acceptance by subordinates	2.4	14.8
Acceptance by customers	4.9	14.8
Difficulties in judging foreign professional careers	3.7	24.4
Lack of knowledge of foreign education systems	4.9	27.6
High recruiting costs	1.8	19.1
Difficulties in obtaining work permits	60.9	65.2
No applicants	54.3	n.a
No demand, jobs are filled with German applicants	19.1	n.a

Own calculations, Source: *IZA International Employer Survey 2000*.

7. Summary and conclusion

This study has offered various insights into the demand for internationally mobile, foreign highly qualified employees from the firms' point of view. In Germany, about 39% of all surveyed firms employ foreign university graduates. In these firms, the average share of foreign graduates among all graduates is about 9%. Thus, the employment of foreign graduates is not high, but it is far from negligible. Especially for research and development and information technology, whether as an industry or a function within a firm, foreign university graduates are of importance. If one measures greater international orientation by the incidence of firms with foreign graduates, then Britain, in international comparison, tends to be more internationally oriented than others. Regarding the regions of origin of foreign highly qualified workers, clear differences regarding the recruiting countries' characteristics exist. German firms tend to recruit more Eastern Europeans graduates than firms in the other countries.

Starting from this stocktaking, the main questions were analyzed: Why do firms recruit highly qualified workers in foreign labor markets? What are the determinants of demand? The investigation was guided by two hypotheses. According to the first, foreign graduates are substitutes to domestic graduates and fill in for local shortages. According to the second, firms recruit internationally in order to gain access to knowledge, such as international competence or know-how in advanced technologies, which is not available nationally. Foreign graduates are then complements to domestic graduates.

The differentiation between those two hypotheses is not only academic. It is also of practical relevance for policy. In one case the shortage of skilled labor has to be identified accurately and, if possible, well in advance. In the other case the major challenge is to make one's home country attractive for highly qualified workers in the long term. Especially under the second hypothesis, one has to reckon with a steady increase in the demand for the employment of foreign graduates if „globalization“ remains a strong force. The appropriate policy response would be a reduction in restrictions to international mobility for this type of workers.

As was to be expected, the conclusions are mixed. The empirical evidence does not completely exclude either hypothesis. Among the subjective reasons given by firms' managers for recruiting abroad, „international competence“ ranks prominently. In accordance, the proportion of foreign business by a company is found to be an important determinant of international recruitment. On the other hand, the proportion of highly qualified workers is a good indicator of demand for foreign graduates as well. This could mean that firms with a large share of highly qualified workers are more likely to be affected by skill shortages.

The survey analyses in this paper dealt with the situation of firms in the autumn of 2000. Some questions attempted to provide an idea of future trends: 69% of all German firms expected the number of university graduates to increase during the next two years. 60% held the opinion that the proportion of foreign graduates among all graduates would increase during the next two years. Taking these factors into account, the relevance of research into international mobility of the highly skilled, and with it into the firms' human resources strategies, will even increase in the future. It is left to hope that this paper, while providing a first step in this direction, will encourage further research on the international personnel policy of firms, a topic that has been neglected so far.

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