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Results from the *IZA International Employer Survey 2000*

Rainer Winkelmann

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ABSTRACT

Why Do Firms Recruit Internationally? Results from the IZA International Employer Survey 2000*

The paper studies the demand for foreign graduates at the firm level. Using a unique dataset on recruitment policies of firms in four European countries, the determinants of demand for internationally mobile high-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 for the international demand are formulated and assessed. Foreign highly-skilled employees are recruited mainly because of their special skills, be it international competence or technical know-how, that are not available domestically.

JEL Classification: F22, J61, L20

Keywords: Foreign graduates, labor shortage, transfer of knowledge

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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 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 international highly skilled employees, the lack of data is especially severe. As a consequence, little is known on questions such as the extent, and the 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. Field work for this unique Europe-wide firm survey of 850 firms took place in the autumn of 2000 by 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 international highly qualified employees. Why do some firms recruit internationally, while others do not, or only at a limited scale? What importance do firms attribute to the institutional barriers for hiring non-EU-citizens? What roles do lack of social acceptance and problems of integration play? How do firms assess their own demand for highly skilled foreigners over the next 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 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 mobility, at least as long as not all countries or regions are equally affected.
- (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.
- 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.
- 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 speak for 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*.

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. Hence, 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 wages but also factors 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 Netherlands, 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. The five selected industries (with target/actual percentages in brackets) 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, 7% of the cases fell below the lower bound. The fraction of firms with 100-499 employees is 52%, and the fraction of firms with more than 500 employees is 39%. For 2% of the firms information on size is not available.

Table 1 displays the proportion of highly qualified employees (HQE) among all employees in the interviewed firms. For the purpose of this survey the category “highly qualified employee” comprises all employees with university degree, regardless of type. It can be seen that, with a share of 28 %, Germany is located close to the overall average.

Table 1: Average Proportion of HQE among all employees

Germany	28.13
France	39.38
UK	31.36
Netherlands	19.66
Total	29.00

Own calculations

Source: IZA International Employer Survey 2000.

Foreign highly qualified employees (FHQE) are a subset of all highly qualified employees. FHQE are those employees who received their degree abroad and in addition do not hold the citizenship of the country where the firm is located. Table 2 shows the proportion of firms that employ FHQE as well as the proportion of FHQE among all highly qualified employees in firms with FHQE, for the four surveyed countries respectively.

Table 2: Employment of foreign highly qualified employees by country (in percent)

	Share of all firms employing FHQE	Average proportion of FHQE in firms with FQHE
Germany	38.91	9.13
France	34.39	10.86
UK	49.65	10.91
Netherlands	33.33	16.73
Total	38.80	11.08

Own calculations, Source: IZA International Employer Survey 2000.

It can be seen that in Germany about 39% of the surveyed firms employ FHQE. In these firms the average proportion among all HQEs is 9%. The average proportion taken over German firms (rather than only those with FHQEs) is thus

3.5% (=9% x 39%). The international comparison indicates that the United Kingdom leads with respect to the incidence of FHQE, while the Netherlands has the highest the proportion of FHQE in firms that employ FHQE (almost 17%).

Table 3: Employment of foreign highly qualified workers, Germany and all countries, by industry (in percent)

Industry	Share of all firms employing FHQE		Average proportion of FHQE in firms with FHQE	
	Germany	All	Germany	All
Chemical Industry	40.98	41.51	9.93	12.23
Manufacturing	30.17	30.95	7.08	8.73
Financial Services	30.77	30.77	4.98	6.08
IT	57.14	50.81	10.18	12.65
R&D	68.42	61.43	12.56	16.14
Total	38.91	38.80	9.13	11.08

Own calculations, Source: IZA International Employer Survey 2000.

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 FHQE and of FHQE among all HQE. Across all surveyed firms, the average proportion of FHQEs is 6.4% for the IT-industry, and 9.9% for R&D. But also note that even in those industries where one would suspect most FHQE, the average proportion is still quite small and does not exceed 10%. It is also interesting that in Germany the incidence of FHQE is relatively high in the IT and R&D industries, while the proportions of FHQE in firms with FHQE are below the overall average in both of these industries.

Next, Table 4 introduces some figures that describe the firms’ international exposure. In 17.9% of all German firms the interviewed person’s competence for personnel affairs includes foreign subsidiaries. We call such firms “multinational firms”. The ownership structure is a separate issue. In this regard, 34.6% of all firms are at least partially owned by foreigners. Finally, foreign business accounts on average for 32.2% of all business.

Table 4: Internationality of firms (in percent)

	Share
Multinational company	17.9
Foreign ownership	34.6
Main competitor abroad*	17.6
English as most important language on management level*	85.2
Share of foreign business	32.2

Subsample: German firms (*German firms with FHQE)

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

Table 5 deals with a further dimension of entrepreneurial activities that might also be important for the demand for internationally mobile FHQE, namely the firms' technological orientation. Most of the surveyed firms invest actively in the field of R&D. For the bulk of these firms this has been reflected in patent registrations. The table shows that the operational use of the internet meanwhile is spread almost universally, whereas less than half of the firms make use of telework, although the proportion cannot be neglected either with 43%.

**Table 5: Technological orientation of firms
(in percent)**

Firm engaged in own R&D	76.5
Telework	42.9
Registration of patents during the last two years	61.5
Marketing and sales via internet	86.7

Subsample: German firms with FHQE

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

4. The demand for foreign highly qualified employees

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

A good understanding of the demand for FHQE will shed light on a number of questions. On the one hand, it can help to explain why the demand for FHQE is relatively low at present. But it is also a necessity for estimating potential future developments in demand. Finally, the 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 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 FHQE with its measured characteristics. While much of this section focuses on the German experience, the section concludes with an international comparison.

Subjective reasons

One of the advantages of a custom-made survey is the possibility to ask the interview partner directly about the reasons for international recruitment. Table 6 shows the responses to a number of items (these questions were only asked to firms that actually employ FHQE). For example, it follows from the first row that 51.6% of the 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).

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 of 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”). We interpret these results as evidence in favour of the complementarity hypothesis and against the substitution hypothesis.

Table 6: Subjective reasons for the employment of foreign highly qualified workers (in percent)

	Strongly agree	Somewhat agree	disagree
We employ foreign workers 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 FHQE.

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

Two further results deserve attention. First, one can ask what sort of competence of FHQE is of particular interest to German firms. Besides the 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 FHQE have a type of knowledge that "is not produced by the German education system".

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 FHQE "work harder" than domestic HQE. 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 FHQE indeed have a higher-than-average motivation, but only that they are employed for that reason.

Quantitative determinants of demand

In this part of the study, a different strategy will be pursued. Rather than asking what firms think they do, we now look at "objective" measures. As mentioned before, we follow the logic of a two-stage decision process. First, we examine how firms with and without FHQE differ. After that, we examine whether, and to what extent, the different proportions in firms with FHQE can be explained by various characteristics of the firm.

In the German subsample, there are 128 firms (39%) with FHQE and 210 firms (61%) without. Table 7 shows the results of a multivariate regression. Although the dependent variable (FHQE yes) is binary, a linear model was estimated rather than a Probit for the sake of simplicity, as the estimated parameters directly show the specific effects of a variable on the probability of employing FHQE. 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 FHQE is 31 % higher than the corresponding probability for a firm with 99 employees or less.

How can these results be interpreted? Again, the international orientation of a firm seems to play the decisive role for the demand of international highly qualified workers. The previous argument that FHQE 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 in part in order to transfer know-how. Unfortunately, these two interpretations cannot be distinguished with the amount of information available here.

Table 7: OLS Results
 Dependent variable: Firm employs foreign highly qualified workers

	Par.	t-value
Multinational company	0.076	0.871
Share of foreign business	0.004	3.363
Foreign ownership	0.032	0.514
Share of HQE	0.004	2.994
Foreign language important	0.082	0.913
Experience abroad important	-0.096	-1.386
Engaged in R&D	0.124	1.741
Telework	-0.031	-0.445
Manufacturing	-0.046	-0.600
Financial Services	-0.006	-0.057
Information Technology	0.193	1.785
R&D	0.237	1.539
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
Number of observations	225	
R-square	0.2681	
Regression with robust standard errors (White)		

Own calculations, Source: IZA International Employer Survey 2000.

Clearly, the regression leaves many questions unanswered. The R-squared 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 FHQE 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.

Determinants of the FHQE share

If one restricts the analysis to the 128 German firms that actually employ FHQE, major differences regarding the extent of employment can be found. The proportion of FHQE among all HQE 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 FHQE fluctuates with the industry between 5% in financial services and 13% in the R&D industry. At this point, we will establish the parameters that determine the proportion of foreign highly qualified workers among all highly qualified workers.

Table 8 shows the OLS estimates. Overall, the results are weaker than the results of the binary first-stage model. One reason is the smaller sample size, as the regression is limited to the 79 German firms that employ FHQE and furthermore provided valid information on all variables involved in the model.

The t-values exceed the critical value for a 5 or 10% significance level only in one case. A firm size of more than 1000 employees is associated with a proportion of FHQE that is significantly below the proportion in firms with 99 or fewer employees. There are plausible reasons for the negative effect of firm size. One can imagine, for instance, that the factor "international competence" is subject to increasing returns to scale. Given a basic stock of employees with knowledge of foreign markets one can expand general employment and production (by increasing exports, say) without a need to employ additional FHQE. According to this view, FHQE give rise to technologically determined fixed costs unrelated to firm size that arise once one wants to operate internationally. Incidentally, the observed inverse relationship between firm size and proportion of FHQE among all HQE is less plausible if international recruiting is driven by skill shortages rather than specific skills, unless factors

such as internal training reduced large firms' exposure to shortages relative to smaller firms.

Table 8: OLS Results
 Dependent variable: Share of foreign highly qualified workers among all highly qualified workers

	Par.	t-value
Multinational company	-1.646	-0.818
Share of foreign business	0.122	1.574
Foreign ownership	-0.685	-0.280
Share of HQE	-0.034	-0.459
Foreign language important	-0.501	-0.145
Experience abroad important	-2.891	-1.220
R&D	3.827	1.295
Telework	-1.707	-0.752
Manufacturing	2.734	1.371
Financial Services	7.880	0.999
Information Technology	7.678	1.231
R&D	15.501	1.080
100-249 employees	-6.189	-1.214
250-499 employees	-6.367	-1.313
500-999 employees	-4.185	-0.758
>1000 employees	-9.182	-1.982
Constant	4.871	0.718
Number of observation	79	
R-square	0.2498	
Regression with robust standard errors (White)		

Subsample: All German firms employing FHQE
 Own calculations, Source: *IZA International Employer Survey 2000*.

International comparison

So far, the analysis of the demand for FHQE has focused on the German subsample. The international comparison raises a few additional questions, first and foremost, why the share of firms with FHQE (i.e., the propensity to recruit internationally) differs between the four countries. In principle, two hypotheses can be considered. On the one hand, the differences could have their roots 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.

Table 9: OLS Results
Dependent variable: Firm employs foreign highly qualified workers

	Par.	t-value	Par.	t-value
France	-0.017	-0.268	-0.048	-0.767
UK	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 HQE			0.004	4.341
Foreign language important			0.065	0.988
Experience abroad important			-0.025	-0.485
R&D			0.054	1.031
Telework			0.040	0.782
Manufacturing			-0.076	-1.358
Financial Services			-0.103	-1.368
Information Technology			0.063	0.753
R&D			0.118	0.978
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
Number of Observations		425		425
R-square		0.0162		0.2220
Regression with robust standard errors (White)				

Own calculations, Source: IZA International Employer Survey 2000.

The regression results reported in Table 9 make such a comparison. In a first model, the indicator variable „FHQE 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 9

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 FHQE 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 FHQE 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 increases from 11.1 to 15.8 percentage points. 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.

Altogether it has been affirmed that the estimation results in this section can only insufficiently explain the demand for internationally mobile skilled workers. Neither the variation in the demand for FHQE in German firms can be fully explained, nor does the multivariate regression produce explanations for the different patterns of recruiting in the four countries. Regarding these factors, it seems necessary to take into consideration alternative evidence of possible determinants for demand that can, however, not directly be integrated into a regression framework. Thus, in the next section, the countries of origin of FHQE, their fields of study and their functions and positions within the firms that employ them will be examined. Certainly the reasons for recruitment should manifest themselves in the characteristics of the FHQE, their functions within the firms and the positions they have achieved.

5. Additional dimensions of international demand

Country of origin

The country of origin of FHQE can be seen as a first, if incomplete, indicator for the specific knowledge and competence of FHQE. If, for instance, one follows the argument that FHQE are recruited because of their knowledge of foreign markets, one expects that the distribution of FHQE according to their home countries is related to the respective bilateral trade relations. If, on the other hand, the transfer of know-how related to future technologies is the most important factor, one expects foreigners to originate mostly from the leading industrial countries. 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 or in which countries there is 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 prioritize the arguments.

The IZA-survey question about the country of origin of FHQE has two components. First, respondents were asked to list all the countries from which some FHQE in the firm originate. In the likely case of multiple origins, it was then asked from which of the aforementioned countries most of the FHQE originate. Table 10 shows the distribution of the answers for the German subsample. For example, 42% of the surveyed firms with FHQE employ FHQE from France, but only for 12% of the firms is France the most important country of origin. One should caution not to interpret these numbers as the proportion of French FHQE among all FHQE. 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 10 reveals a wide variation of different countries of origin, although EU countries dominate. On the other hand, Eastern Europe is an important region of origin as well. 41% of all firms with FHQE employ highly qualified workers 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, from which for 8% and 5% of all firms the most FHQE originate, respectively.

Table 10: Country/Region of origin of FHQE in German firms
(in percent)

	Any FHQE from...	Most FHQE from...
France	41.94	11.65
Netherlands	21.77	5.83
UK	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 11 offers a comparison of the regions of origin of the FHQE for the four countries that were examined in the survey. The 10 initial countries/regions are aggregated into two groups: FHQE from EU countries and FHQE from non-EU countries. France has the largest proportion of all firms that employ FHQE exclusively from EU member countries (plus Switzerland). In this sense, France is indeed acting in correspondence with her reputation as the „center of Europe“.

Germany, on the other hand, has the smallest proportion of firms that exclusively employ FHQE from EU-countries and very clearly the largest share of firms that predominantly or exclusively employ FHQE from non-EU countries. More than 36% of all German firms find themselves in this situation. This may

seem astonishing since it is commonly claimed that obtaining a work permit in Germany can be highly problematic, and since the recruitment of these FHQE from non-EU countries has taken place prior to the German Green Card initiative. The data clearly show that recruiting internationally was possible even within the previous legal framework.

Table 11: International comparison of region of origin of FHQE
(in percent)

	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.

In Table 12, the group of non-EU foreigners is further disaggregated by region of origin. As expected, Eastern Europe plays a prominent role for German firms. In 56% of all firms that predominantly or exclusively employ FHQE from non-EU-countries, Eastern Europe is the most important region of origin. North America and Asia follow with 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.

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.

Table 12: Most important regions of origin for firms with predominately or exclusively non-EU highly qualified employees (in percent)

	Eastern Europe	North America	Asia	Africa
Germany	55.8	23.5	14.7	5.9
F, UK, NL	10.0	45.0	35.0	10.0
Total	38.9	31.4	22.2	7.4

N.B.: The responses for France, UK and the Netherlands are too few that separate listing would make sense. They were thus pooled.

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

Field of Study

The *IZA International Employer Survey 2000* investigates the fields of study separately for domestic and foreign HQE. The total number of all possible fields was summarized into six broad categories. This data is collected only for firms with FHQE. 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 HQE. In the case of multiple answers, the quantitatively most important field of study is specified.

As can be seen in Table 13, business studies are most frequently named in German firms with 70% for domestic highly qualified employees, followed by Computer Sciences with 65%. The ranking changes if one considers the field of study from which most HQE are recruited. Here, engineering leads with a share of 36% of all firms.

The last two columns of Table 13 offer a comparison to foreign HQE. Naturally, the responses are fewer since FHQE, as a rule, constitute only a fraction of domestic highly qualified workers and it thus is more probable that certain fields of study are not represented. Apart from that, it turns out that the field distribution of domestic and foreign HQE are surprisingly similar.

Table 13: Subject in which domestic and foreign highly qualified employees took their degree (in percent)

	Domestic HQE		Foreign HQE	
	Any HQE with degree in	Most HQE with degree in	Any FHQE with degree in	Most FHQE 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 FHQE
Own calculations, Source: IZA International Employer Survey 2000.

If one takes a look at the most popular fields of study, the main difference is a switch between the subject of business studies, which is most frequent for domestic HQE in 22% of firms, and most frequent for FHQE in 16% of firms, and the subject of computer studies, which is most frequent for domestic HQE in 16% of firms, and most frequent for FHQE in 23% of firms. Clearer patterns can be seen if one differentiates according to the region of origin of the FHQE. This information is not directly available, but an approximate indication can be obtained by calculating the last column of Table 13 separately for firms that predominantly or exclusively recruit from EU countries and for firms that predominantly or exclusively recruit from non-EU countries. The result is shown in Table 14.

Indeed, the differences are now more pronounced. Computer science, for example, is the predominant field of study for firms that mostly employ FHQE from non-EU countries. 32% of all firms in this group name computer science as the quantitatively most important field of study among the FHQE. Engineering is the most important field of study for 42% of all firms that recruit mostly from EU countries. We know from Table 10 that a large part of non-EU

employees comes from Eastern Europe. The results thus hint at the recruitment of computer specialists from Eastern Europe.

Table 14: Most frequent subject of FHQE classified by region of origin
(in percent)

	Only or mostly FHQE from	
	EU-countries	Non-EU-countries
Engineering	41.54	23.68
Mathematics and Natural Science	18.46	13.16
Computer Science	13.85	31.58
Business Studies	16.92	15.79
Medicine	1.54	7.89
Others	7.69	7.89
Total	100	100

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

Functions within the firm

Naturally, the functions within a firm are closely connected with 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 we examine is rather similar, especially if one compares the most frequent occupation. The only exception is a concentration of foreign HQE in functions that are related to information technologies.

Table 15: Functions of domestic and foreign highly qualified employees
(in percent)

	Domestic HQE		Foreign HQE	
	All responses	Most frequent response	All responses	Most frequent response
R&D	59.84	42.06	52.34	40.50
IT	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 FHQE

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

On the other hand, some new aspects can be seen in Table 16 when we differentiate according to the region of origin. FHQE are especially concentrated in the fields of marketing and distribution in firms that predominantly or exclusively employ FHQE from EU countries. This is an indication that the knowledge of foreign markets does indeed play an important role, especially when recruiting from within Europe, whereas such knowledge is less important in firms employing FHQE from non-EU countries. In these firms, R&D is most important together with “other functions”, which possibly include menial tasks that are not connected with one’s original training or subject of study.

**Table 16: Most frequent function of FHQE classified by region of origin
(in percent)**

	Only or mostly FHQE from	
	EU-countries	Non-EU-countries
R&D	38.71	43.59
IT	12.90	12.82
Production	8.06	5.13
Marketing, Distribution	29.03	5.13
Administration	4.84	12.82
Other	6.45	20.51
Total	100	100

Own calculations, Source: IZA International Employer Survey 2000.

6. Reasons for lack of demand

Up to now we have assumed that the number of FHQE observed in a firm corresponds to the 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 FHQE and firms without FHQE. 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 17 shows the results for German firms. 47% of all firms employing FHQE, 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 a fourth of all firms.

Table 17: Reasons for non-recruiting
(in percent)

	Firms without FHQE	Firms with FHQE	t-value
Language problems	12.9	46.8	6.444
Socio-cultural differences	9.8	52.1	8.439
Acceptance by superiors	1.2	8.5	2.934
Acceptance by subordinates	2.4	14.8	3.840
Acceptance by customers	4.9	14.8	2.770
Difficulties in judging foreign professional careers	3.7	24.4	5.305
Lack of knowledge of foreign education systems	4.9	27.6	5.434
High recruiting costs	1.8	19.1	5.083
Difficulties in obtaining work permits	60.9	65.2	0.741
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.

Interestingly, firms that do not employ FHQE do not attach special importance to those kinds of problems. For these firms, a lack of applicants or the lack of demand for FHQE 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 FHQE and that identify difficulties in obtaining a work permit, 89% state that they would recruit internationally if the regulations were simplified. Among the firms that employ FHQE 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.

7. Summary and conclusion

This study has offered an insight into the demand for internationally mobile, foreign highly qualified employees from the firms' point of view. How high is the demand? In Germany, about 39% of all surveyed firms employ foreign highly qualified workers. In these firms, the average share of highly qualified workers is about 9%. The average share among all German firms that were surveyed is 3.5 %. Thus, in practice, international mobility is not outstandingly high, but it is far from negligible. Especially for R&D and IT, whether as an industry or a function within a firm, foreign highly qualified workers are of importance. If one measures greater international orientation by the incidence of firms with foreign highly qualified employees, 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 put a relatively higher weight on the recruitment of Eastern Europeans 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 hypothesis, firms recruit internationally in order to gain access to knowledge that is not available nationally. The lack of availability may result, on the one hand, from the fact that the knowledge is not yet available nationally as it concerns key technologies with a promising future. The employees' mobility is then part of the international process of the diffusion of knowledge. On the other hand, the demanded knowledge may also concern the

knowledge of foreign markets, foreign languages etc., in short: international competence. In both cases, the firms gain access to skills that behave complementary to those of the domestic highly qualified workers. The other hypothesis is based on a possible domestic shortage of skilled labor. In this case, foreign highly qualified workers are sought after as a substitute for domestic personnel.

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 regarding the second hypothesis and the ever-increasing degree of globalization one has to reckon with a steady increase in the demand for international mobility. Regarding this case, it is then important to reduce the institutional obstacles to international mobility.

In order to be able to empirically distinguish between these two central hypotheses – substitution versus complementarity - three kinds of evidence were evaluated. First, the firms were asked directly for their subjective reasons for recruiting internationally. After that, multivariate regressions were used to examine if the patterns of demand can be explained through characteristics of the firm. Finally, conclusions regarding the reasons for demand were derived by investigating the characteristics of foreign highly qualified workers themselves, such as their subject of study or function within the firm.

Like one may have expected, the conclusions are mixed. The empirical evidence does not allow excluding any one of the hypotheses. The different reasons overlap and all contribute towards demand. Among the subjective reasons for recruiting, international competence plays an important role. Among the characteristics of the firm, the proportion of foreign business and the general proportion of highly qualified workers can be identified as the most important determinants of demand. While the first factor supports the „international competence hypothesis“, the interpretation of the second is ambiguous. The proportion of highly qualified workers can be an indicator for the degree of orientation towards technology within the firm and thus supports the hypothesis of „know-how-transfer“. On the other hand, it could also mean that firms with a large share of highly qualified workers are more likely to be affected by skill shortages.

Next, we investigated the characteristics of foreign highly qualified employees. A comparison with their domestic colleagues' subjects of study and functions within the firm showed that the similarities outweighed the differences. There is, however, a certain concentration among IT-related subjects and IT-related functions, especially in firms that mostly recruit from non-EU countries, and that predominantly recruit from Eastern Europe. This could be interpreted as evidence for a possible response to the shortage of skilled labor in this area.

The study dealt with the situation of firms in the autumn of 2000. It does, however, also allow limited statements on how the demand for foreign highly qualified workers will develop in the future. There are a number of starting points for those predictions. On the one hand, the study identifies the effects of globalization on the demand for foreign highly qualified workers, for instance by calculating the share of foreign business or the proportion of foreign highly qualified workers. Assuming that the trend towards globalization will continue, a further increase in demand can be prognosticated. A second starting point derives from a subjective assessment by the firms, which was directly included in the questionnaire. Among the German firms that were questioned, 69% held the opinion that the number of highly qualified workers within their firms will increase during the next two years. 60% held the opinion that the proportion of foreign highly qualified workers among all highly qualified employees will 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 study, while providing 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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