

# Are Trade and Migration Substitutes or Complements? - The Case of Germany, 1970-1998

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## Abstract

Whether trade and factor movements are substitutes or complements is a well researched topic on a theoretical level. Traditional trade theory suggests that both are substitutes. Modern trade theory and extensions of traditional models conclude that there is a complementary relationship. This paper studies trade and labour migration between Germany and its main source countries for foreign workforce, namely Spain, Portugal, Greece, Italy, and Turkey. The results indicate that there is a substitutional link between trade and foreign labour force. There is no significant impact of labor migration on trade but an increasing trade volume has significantly negative effects on labour migration.

**Keywords:** trade, migration, trade theory, Germany

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## 1. MOTIVATION

The links between trade and factor movements are of increasing importance in a globalizing environment. Regarding labour mobility two aspects are interesting. First, what effects on trade between two countries arise if there is an observable immigration of labour. And second, is trade liberalization an option for reducing labour migration as traditional trade theory suggests.

Although quite a lot of research has been done regarding theoretical analysis, only a few studies deal with this question empirically. This paper analyzes the relationship between labour migration and trade in the case of Germany. The aim is to shed some light on the relationship between trade and migration for the considered time period from 1970 until 1998.

The paper is structured as follows. The second section gives an overview about the development of immigration to Germany. Special emphasis is given to the recruitment agreements of the 1960s and 1970s that had long-run effects on labour migration. The third section presents standard trade models and their conclusions regarding complementary or substitutional links between trade and migration. Empirical contributions regarding this topic are introduced in section four. Afterwards the model and the regression results for Germany are presented in section five and six. Section seven concludes.

## 2. GERMANY - AN IMMIGRATION COUNTRY

The labour market policy of Germany in the 1960s and 1970s was characterized by a recruitment policy that promoted the inflow of foreign workers. Labour migration was based on bilateral recruitment agreements that existed with Italy (1955), Spain (1960), Greece(1960), Turkey(1961), Morocco (1963), Portugal (1964), Tunisia (1965), and Yugoslavia (1968).<sup>1</sup> The early agreements aimed at avoiding a workforce shortage especially in 1959/60. Aims of the following agreements were the promotion of economic growth and an increasing living standard in Germany. Furthermore, reforms on the labour market regarding a shortening of working hours and life working time were supported by increased immigration. But also the improvement of bilateral diplomatic relations was important. This is especially true for the agreement between Germany and Turkey.<sup>2</sup> These bilateral recruitment agreements reduced significantly the costs of labour migration. Guest workers were offered jobs in Germany together with a work permit of limited duration. Additionally there were other arrangements like reimbursement of travel costs or provision of accommodation.<sup>3</sup>

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<sup>1</sup>Beger (2000)[p.27]

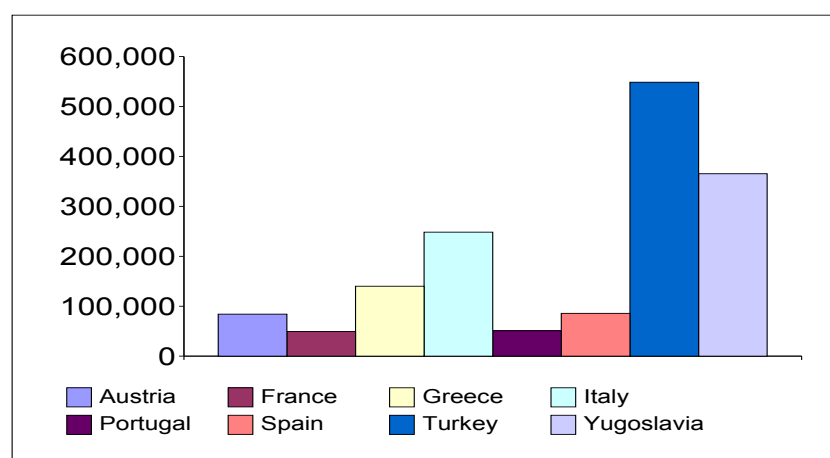
<sup>2</sup>A comprehensive overview about migration policy in the 1960s and 1970s is provided by Schoenwaelder (2003)[p.127].

<sup>3</sup>Dustmann (1996)[p.21]

Within the following years the character of immigration changed from temporary to permanent, due to the following points. Firstly recruitment agreements did not set a limit for the duration of stay.<sup>4</sup> Secondly family reunification was not restricted. And thirdly the prolongation of work contracts with foreigners was not impeded by administrative barriers, in order to avoid additional costs for corporations caused by limited employment contracts for foreign workers.

Furthermore, social, humanitarian, and diplomatic concerns about sending a large number of immigrants back into their home countries arose at the beginning of the 1970s. Not until 1973 migration policy changed and a further active

FIGURE 1. Average Foreign workforce in Germany - Main Source Countries, 1970-1998



*Source:* Federal Statistical Office Germany, own calculations

recruitment of foreign workers was stopped. In 1983 and 1984 legal arrangements encouraged return migration of unemployed foreign workers through direct financial incentives.<sup>5</sup>

Migration between Germany and Turkey was determined by an EWG association agreement, which was followed by several legal decisions. As a result migration can not be restricted by "working stays" that are limited in time.<sup>6</sup>

Figure 1 shows the average number of foreign workforce for a time period from 1970 until 1998. The main source countries are Turkey, Yugoslavia, Italy,

<sup>4</sup>An exception in this case was the agreement between Germany and Turkey where initially a maximum stay of two years was given. But in 1964 this restriction was put aside by a subsequent treaty. Schoenwaelder (2003)[p.128]

<sup>5</sup>Dustmann (1996)[p.222-224]

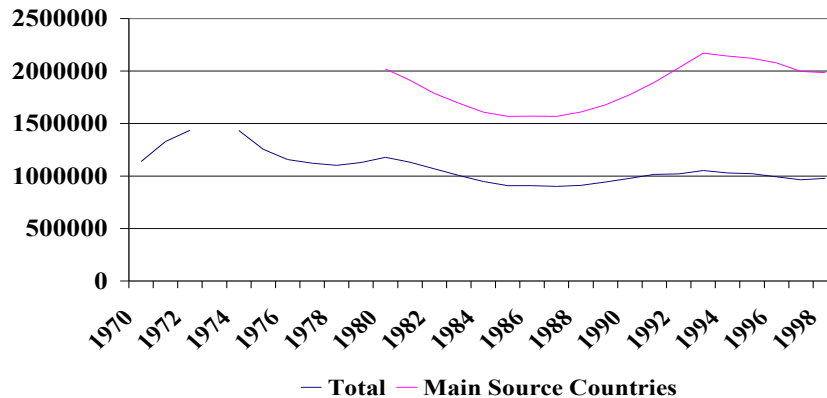
<sup>6</sup>Hailbronner (1997)[S. 228-229]

Spain, Portugal, Greece, and Austria. Included in the estimation sample are Turkey, Italy, Spain, Portugal and Greece. Yugoslavia is omitted due to data problems.

The number of foreign workers started from a level of 2.6 million in 1973 and declined until the early 1985 towards a level of 1.6 million people. Following Muenz et al. (1997) this was due to the babyboom-generation entering the labour markets and due to changes in the production structure. Especially sectors in which foreigners were employed were particularly affected by structural changes.

Until the end of the 1980s the number of foreign workers rose only slightly. After 1990/91 employment of foreigners increased due to the economic development of Germany that was based on the German unification. In recent years especially temporary migration from Eastern Europe has been supported by new bilateral legal arrangements.<sup>7</sup>

FIGURE 2. Foreign workforce in Germany, 1970-1998



Source: Federal Statistical Office Germany, Federal Institute for Employment Germany, own calculations

Figure 2 shows the development of labour migration to Germany. The upper line shows the development of the total stock of foreign labour force. Labour force from the countries included in the estimation sample is pictured by the lower line. A fraction of about 54 percent of the foreign workforce is covered by the chosen sample.

<sup>7</sup>An overview about migration to Germany is provided by Muenz et al. (1997)[p.42-45].

### 3. TRADE THEORY

Starting with the contributions by Mundell (1957) and Markusen (1983) the relationship between trade and factor movements has been a subject for many researchers on a theoretical level. In this section an overview about different trade models and their implications for the relationship between trade and factor movement is given.

**3.1. Ricardian Models.** In Ricardian models<sup>8</sup> trade occurs because of differences in production technology. At free trade each country exports the good for which it has an advantage in productivity. If there is also free movement of factors, there will be a factor inflow regarding the factor intensively used in the export sector. The reason is the higher factor reward in the sector with higher productivity. The initial comparative advantage is enhanced by the resulting endowment differences. Trade is augmented by factor movements. Transferred to the case of Germany and its considered migration partners, it seems unlikely that advances in production technology lead to emigration from Germany and inward capital flows.

**3.2. Heckscher-Ohlin Model.** In the standard Heckscher-Ohlin model trade occurs due to differences in factor endowment. Each country has a comparative advantage in that sector of production in which its abundant factor is intensively used. Trade leads to a convergence of goods prices which implies factor price equalization. From this it follows that the incentives for factor movements are reduced.

At the assumption of constant good prices changes in the endowment of the economy's scarce factor of production is followed by an expansion of the production in the import sector and a decrease in export sector production. Thus factor movement is trade reducing.

Adding trade costs and/or costs for factor movement does not change the result of substitutability.<sup>9</sup>

**3.3. Specific-Factors Model.** Models with specific factors account for intersectoral immobility of factors. In these models there are two sectors of production. In each sector one sector specific factor of production is employed. Furthermore there is a general factor with free intersectoral movement. Within this framework Venables (1999) has analyzed the effects of trade liberalization regarding the movement of the general and the specific factors considering endowment differences and barriers to trade in goods. Apart from the general result of substitutability in some cases a complementary link between factor movements and trade is possible under certain conditions.<sup>10</sup>

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<sup>8</sup>see Markusen (1983)

<sup>9</sup>Venables (1999)[p.25-32]

<sup>10</sup>Venables (1999)[p. 29-34]

**3.4. Models with Increasing Returns to Scale.** Increasing returns to scale can be external or internal.

External increasing returns to scale occur not in an individual firm but on an industry level.<sup>11</sup> Because every individual firm is small, the assumption of competitive markets still holds. With free trade and external increasing returns to scale both countries will specialize in order to gain from specialization. The reward of the factor intensively used in the respective sector will increase. Thus there is an incentive for factors, to move. Factor movement is followed by an increase in the output regarding both countries and thus an increase of trade. Factor movements and trade are complements.

Internal increasing returns to scale are considered in the standard model of the "New Trade Theory". There are two countries with labour as the only factor of production within two sectors. One sector of production has constant returns to scale, the other one has internal increasing returns to scale. In the presence of monopolistic competition and internal increasing returns to scale the bigger economy will be a net exporter in the monopolistically-competitive sector.<sup>12</sup> The real factor reward will be higher in this region and this way there will be factor movement, making the two countries more unequal in endowment and thus increasing the basis for trade. In this case factor movements and trade are complements.

This result is also supported by two other effects. First a "market access"-effect. That is according to the "Linder Hypothesis", that enterprises tend to locate near their biggest markets in order to reduce transport costs.<sup>13</sup> Second a "cost of living" effect. The more the industry is concentrated, the lower are the goods prices and the cheaper are the costs of living.<sup>14</sup> These effects support trade as well as factor movements.

**3.5. Summary.** According to trade models that are based on technological differences trade and factor movements are complements.

The opposite is suggested by the standard trade model of Heckscher and Ohlin. This model suggests that with existing endowment differences trade and factor movements serve as substitutes. However, the results from extensions of the Heckscher-Ohlin model are ambiguous. Conclusions drawn from the Specific Factors Model with endowment differences are also not clear. Here trade and factor movements may be substitutes or complements, depending on the factor in question, its mobility and consumption patterns.

Models of the New Trade Theory, incorporating increasing returns to scale and monopolistic competition as well as other agglomeration forces suggest strongly that trade and factor movements are complementary.

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<sup>11</sup>Markusen et al. (1995)[p.175-178; 389/390]

<sup>12</sup>Krugman (1995)[p. 1261]

<sup>13</sup>for a survey see Krugman (1995)[p. 1261]

<sup>14</sup>Venables (1999)[37]

#### 4. EMPIRICAL CONTRIBUTIONS

This section refers to empirical studies that focus on the relationship between trade and migration. The studies concentrate on a quantitative aspect: an increase (decrease) of goods trade increases or decreases factor movements or vice versa.<sup>15</sup>

Collins et al. (1999) analyse trade and factor movements between overseas countries and Europe for the time period from 1870 to 1940. Separate regressions were run for the pre-war years from 1919 to 1939 and for the inter-war years 1919-1939. The results show that there is only a weak economic link between factor and trade flows. Regarding migration the relationship towards trade points at complementarity. Regarding capital mobility only in very few cases there was a significant substitutional link. Altogether the results indicate complementarity of trade and factor movements.<sup>16</sup>

Kohli (1999) models immigration of labour and trade in the framework of a production theory approach. In this case foreign labour and imports are viewed as an input to technology. The empirical part refers to the case of Switzerland. For a time period from 1950 to 1986 Kohli (1999) finds, that imports and labour immigration are complements.<sup>17</sup>

Mundra (2003) has a view on bilateral trade between the US and 47 trading partners for a time period from 1973 to 1980.<sup>18</sup> The empirical analysis is based on a semiparametric dynamic panel model. It becomes evident, that immigration promotes imports regarding finished and intermediate goods. Furthermore the trade enhancing effect was stronger the higher the proportion of skilled immigrants was. This could be due to a more efficient use of information, more entrepreneurship and maybe higher income, that allow to buy imported goods. Regarding exports a positive effect of immigration could only be shown for finished goods. Altogether the economic links between migration and trade are of complementary nature.

Bowen & Wu (2004) analyze changes in exports in relation to changes in total immigration and alternatively net immigration. The data include fourteen OECD countries for a period from 1980 until 2001. The results indicate a complementary relationship between immigration and trade. However, an interaction term of a guest worker dummy variable and immigration has a negative impact on trade. This impact outweighs the positive coefficient of immigration regarding net immigration but not regarding total immigration. Thus the result of complementarity is not without uncertainty for guest worker

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<sup>15</sup>For a survey of different concepts of substitutability and complementarity see Wong (1986)[p. 41].

<sup>16</sup>Collins et al. (1999)[p. 247]

<sup>17</sup>Kohli (1999)[p. 135]

<sup>18</sup>Mundra (2003)[p. 12]

countries. Thus Bowen & Wu (2004) presume an increased likelihood of a substitutional link for countries that promoted guest worker programs.

To sum up empirical contributions about migration and trade mainly point out that migration complements trade. This seems to be the case also for the links between foreign direct investment and trade.<sup>19</sup> Only on a sectoral level Goldberg & Klein (1999) finds substitutional links for foreign direct investment depending on the analysed sector and the respective country.

## 5. EFFECTS OF MIGRATION ON TRADE

The following estimations are based on annual data for Germany and its main source countries of foreign labour, namely Turkey, Spain, Italy, Portugal, and Greece. The data covers a time period from 1970 until 1998.

Two aspects have to be considered in the analysis. First it should be tested, whether the time series contain unit roots. Second the possible endogeneity of trade variables and the stock of foreign workforce should be taken into account.

To test for unit roots the Im-Pesaran-Shin test is carried out. It indicates, that for all time series apart from the stock of migrants the null hypothesis of a unit root can not be rejected. Regarding the stock of migrants the null hypothesis is rejected, indicating that at least in some countries the time series for the stock of migrants is stationary. This is confirmed by the augmented Dickey-Fuller test and the Phillips-Perron test carried out for single time series of this variable.

Testing for a cointegration relationship between trade and exogenous variables show that this is not the case. The errors of the regression are not stationary, as it would be the case if the variables are cointegrated. Thus all variables enter the regression as first differences.

The second aspect refers to the problem of endogeneity between trade variables and the stock of foreign workforce. Based on trade theory there is the presumption, that trade and factor movements are endogenous. If both variables are endogenous, OLS estimates will be biased and inconsistent. One possible approach is it to use instrumental variables based on OLS estimates for the endogenous regressor, that is in this case for the stock of foreign workforce denoted by  $L$ . Choosing this approach one has to keep in mind the possible small sample bias of the instrumental variable estimator. Thus it should be tested, whether endogeneity of the stock of foreign workforce leads to inconsistent OLS estimates. This is done by the Durbin-Wu-Hausman test for exogeneity.<sup>20</sup> The suspected endogenous variable on the right hand side is estimated by exogenous regressors. The resulting residuals are included in a regression of the original model. In our case the coefficient of these residuals is

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<sup>19</sup>see Pfaffermayr (1996) and Goldberg & Klein (1999)

<sup>20</sup>Davidson & Kinnon (1993)

not significantly different from zero. Thus the null hypothesis of the Durbin-Wu-Hausman test can not be rejected and OLS estimates are consistent.

Following the effects of labour migration on trade are analyzed with the help of two estimation equations. The first one relates changes in the export quota to changes in the stock of foreign workforce. The second one is equivalent and refers to imports. Table 1 gives an overview about the variables considered in both regressions. The index  $t$  denotes time and the index  $i$  refers to the particular partner country.

TABLE 1. List of Variables

|                    |   |
|--------------------|---|
| <b>Regressants</b> |   |
| $EXPQ_{i,t}$       | bilateral export quota                  |
| $IMPQ_{i,t}$       | bilateral import quota                  |
| <b>Regressors</b>  |   |
| $L_{i,t}$          | stock of foreign labour                 |
| $Emig_{i,t}$       | emigration from Germany to country $i$  |
| $Imig_{i,t}$       | immigration from country $i$ to Germany |
| $E_{i,t}$          | endowment differences                   |
| $GDPS_{i,t}$       | overall country size                    |
| $GDPR_{i,t}$       | relative country size                   |
| $Unification_t$    | dummy variable for German Unification   |

Following a short introduction of the variables is given.

$EXPQ_{i,t}$  denotes the export quota for trade between Germany and the particular partner country. The exports are given as fractions of the German gross domestic product. Thus trends due to technological developments are eliminated under the assumption that they affect both exports and GDP in the same way. Trade data was kindly provided by the German Institute for Economic Research (2001) and is given on a sectoral level classified by the International Standard Industrial Classification (ISIC). The data has been transformed from OECD Foreign Trade Statistics that is provided in the Standard International Trade Classification scheme (SITC). Since 1991 trade data includes trade of Eastern Germany. GDP data for Germany is taken from The World Bank (2003).

$L_{i,t}$  refers to the number of workers from country  $i$  working in Germany. This statistic includes all workers that are subject to social insurance contribution and has been provided by the Statistical Federal Office Germany. Other studies<sup>21</sup> analyze the relationship between migration and trade with the help of migration quotas. In our case this would be misleading, because one major reason for migration especially from Turkey is family reunification.<sup>22</sup>

<sup>21</sup>see Collins et al. (1999)

<sup>22</sup>Bundesregierung (2003)[p.25]

$Emig_{i,t}$  denotes the emigration quota from Germany into the particular country as a fraction of the population of the partner country. Correspondingly  $Imig_{i,t}$  denotes the overall immigration quota. Data are from Statistical Federal Office Germany (2000). Overall migration flows are taken into account because they are assumed to promote trade. Mundra (2003) emphasizes that immigrants provide better information about their home country and thus lower the transaction costs of trade. Furthermore he presumes that immigrants have a demand of products from their home countries.<sup>23</sup>

$E_{i,t}$  measures endowment differences between country  $i$  and Germany. These are measured by differences in the capital-labour-ratio. Workforce is measured by total labour force. Capital is measured by gross fixed capital formation which corresponds to gross domestic investment. Data for gross fixed capital formation is missing for Turkey from 1970 until 1987 and for Germany, Spain and Portugal in 1970. Data for workforce and gross fixed capital formation is taken from The World Bank (2003).

The gravity model character of the equations regarding trade is pictured with the following variables.  $GDPS_{i,t}$  refers to the overall size of both trading countries, while  $G DPR_{i,t}$  measures the size of the particular partner country relative to the size of Germany. As a proxy for size GDP data is employed. For both variables a positive coefficient is expected.

To account for the effect German unification might have had on trade, in both regressions a dummy variable is added.  $Unification_t$  has a value of 1 for the period 1990 until 2000 and is expected to have a negative impact on trade due to rising domestic demand.

The regression equation for exports and for imports is log-linear. All variables enter the regression as first differences. In order to test for cross-section specific effects, a Breusch-Pagan test is performed. The null hypothesis is that the errors are not affected by cross-section specific effects. The null hypothesis could not be rejected on a one percent level and thus it has been estimated by OLS. The equation for exports takes the following form.

$$\begin{aligned} \Delta \ln EXPQ_{i,t} &= \beta_0 + \beta_1 \Delta \ln L_{i,t} + \beta_2 \Delta \ln Emig_{i,t} + \beta_3 \Delta \ln Imig_{i,t} + \beta_4 \Delta \ln E_{i,t} + \\ (5.1) \quad &\beta_5 \Delta \ln GDPS_{i,t} + \beta_6 \Delta \ln G DPR_{i,t} + \beta_7 Unification_t + u_{i,t} \end{aligned}$$

The regression model specifies the annual change in the export quota in relation to the annual change in the stock of foreign workforce, changes in flow variables for immigration and emigration, changes in endowment differences, changes in overall and relative country size and a dummy variable for German unification. The regression regarding imports differs only regarding the dependent variable, which is the change in the import quota.

Table 2 shows the regression results regarding exports and imports.

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<sup>23</sup>Mundra (2003)[p. 6-8]

TABLE 2. Estimation Results

| Variable                                     | Exports     |             | Imports     |             |
|--|-------------|-------------|-------------|-------------|
|  | Coefficient | (Std. Err.) | Coefficient | (Std. Err.) |
| Intercept                                    | -0.032      | (0.031)     | 0.006       | (0.031)     |
| $L_{i,t}$                                    | -0.121      | (0.226)     | -0.222      | (0.230)     |
| $Imig_{i,t}$                                 | 0.140*      | (0.055)     | 0.013       | (0.056)     |
| $Emig_{i,t}$                                 | -0.082      | (0.050)     | 0.021       | (0.051)     |
| $E_{i,t}$                                    | 0.019       | (0.034)     | 0.116**     | (0.035)     |
| $GDPS_{i,t}$                                 | 3.572**     | (0.514)     | 1.438**     | (0.522)     |
| $GDPR_{i,t}$                                 | 3.660**     | (0.911)     | 3.043**     | (0.926)     |
| $Unification_t$                              | -0.017      | (0.029)     | -0.039      | (0.030)     |
| N  | 100         |             | 100         |             |
| R <sup>2</sup>                               | 0.493       |             | 0.302       |             |
| F (7,92)                                     | 12.789      |             | 5.681       |             |
| Significance levels : † : 10% * : 5% ** : 1% |             |             |             |             |

The coefficient of changes in foreign labour force is negative but not significant. The missing significance is not surprising, because the magnitude of the changes in the stock of foreign workforce is relatively small. Furthermore there was the restriction, that the conditions regarding payment and working conditions had to be the same as for workers of German origin.

Considering migration quotas as a determinant for exports showed that immigration and exports are positively correlated. Emigration was not significant. For imports immigration and emigration were not significant. The suggestion that immigrants prefer home country products and thus enhance imports significantly was not confirmed by the data.

Endowment differences have a positive impact on exports and imports. Thus endowment differences enhance trade. The impact is stronger for imports and in this case significant.

Furthermore overall and relative country size play an important role for determining trade volumes. Changes in overall as well as in relative size have a significant positive effect on changes in trade volumes.

German Unification had a significant negative impact on trade. This is not surprising, because domestic demand rose significantly with German Unification and caused a fall in trade volume.

## 6. EFFECTS OF TRADE ON MIGRATION

The second part deals with the question what effects changes in the trade volume have on changes in the stock of foreign workforce.

Changes in the stock of foreign workforce are assumed to occur due to the development of migration incentives and the development of migration policy.

Table 3 lists the variables that enter the regression.

TABLE 3. List of Variables

|                   |  |
|-------------------|--|
| <b>Regressant</b> |  |
| $L_{i,t}$         | stock of foreign workforce                               |
| <b>Regressors</b> |  |
| $W_{i,t}$         | ratio of GDP per capita                                  |
| $Trade_{i,t}$     | sum of exports and imports as fraction of the German GDP |
| $MST_{i,t-1}$     | stock of migrants already living in Germany              |
| $U_t$             | unemployment rate of Germany                             |
| $Guest_{i,t}$     | dummy variable for bilateral guest worker agreement      |
| $Free_{i,t}$      | dummy variable for free intra EU-movement of workers     |

Regarding migration incentives the following variables are included.

First we consider changes in the GDP per capita ratios as a proxy for changes in wage differentials. Neoclassical migration theory suggests that the higher the wage differentials the higher are the incentives for migration. The respective variable is denoted  $W_{i,t}$ . The wage differential is expected to have a positive influence on the dependent variable.

The development on the labour market in Germany is pictured by changes in the rate of unemployment  $U_t$ . It is assumed that a negative development on the labour market also affects the stock of employed foreign workforce negatively because the risk of being unemployed has increased. Unemployment rates are taken from The World Bank (2003).

$Trade_{i,t}$  denotes the volume of trade between country  $i$  and Germany. It is the sum of exports and imports between both countries as a fraction of the German GDP. On the one hand classical trade theory suggests that trade liberalization substitutes for factor movement because goods prices and thus factor prices converge. This points to a negative impact of the trade variable on the stock of foreign workforce. On the other hand models with increasing returns to scale suggest, that intensive bilateral trade promotes factor movement. This complementary relationship is supported by the assumption, that intensive bilateral trade indicates strong ties between two countries that may exist also in other areas and promote migration.

The friends and relative effect is pictured by  $MST$  which denotes the number of previous migrants of the particular country that live in Germany. The variable enters the regression with a one period lag. The friends and relative effect points out that costs of migration are decreasing with the stock of migrants already living in the receiving country. This is due to the network between people, that share a common background. Migration costs for every following migrant are reduced because these networks provide information

and help regarding finding a job and a social environment. The decreasing migration costs enhance the incentives for migration.

Changes in migration policy are pictured by two dummy variables. First the dummy variable  $Guest_{i,t}$  indicates if there was a bilateral agreement about recruitment of workers for Germany. Such bilateral agreements existed for all countries in the sample until 1973. Second the dummy variable  $Free_{i,t}$  denotes whether free movement of workers was possible. Free movement of workers between Germany and the particular country was introduced for Greece in 1992, and for Spain and Portugal in 1995.

The regression equation is as follows. All variables enter the log-linear equation as first differences.

$$(6.1) \quad \Delta \ln L_{i,t} = \beta_0 + \beta_1 \Delta \ln W_{i,t} + \beta_2 \Delta \ln U_t + \beta_3 \Delta \ln Trade_{i,t} + \beta_4 \Delta \ln MST_{i,t-1} + \beta_5 Guest_{i,t} + \beta_6 Free_{i,t} + u_{i,t}$$

The results are shown in table 4.

TABLE 4. Estimation results

| Variable                                     | Coefficient        | (Std. Err.) |
|--|--------------------|-------------|
| Intercept                                    | -0.017**           | (0.006)     |
| $W_{i,t}$                                    | 0.399*             | (0.171)     |
| $U_t$  | -0.219**           | (0.029)     |
| $Trade_{i,t}$                                | -0.104**           | (0.036)     |
| $MST_{i,t-1}$                                | 0.478**            | (0.072)     |
| $Guest_{i,t}$                                | 0.046 <sup>†</sup> | (0.025)     |
| $Free_{i,t}$                                 | 0.008              | (0.009)     |
| N  | 125                |             |
| R <sup>2</sup>                               | 0.518              |             |
| F <sub>(6,118)</sub>                         | 21.104             |             |
| Significance levels : † : 10% * : 5% ** : 1% |                    |             |

As expected, changes in wage differentials have a positive impact on changes in the stock of foreign workforce. The variable is significant on a five percent level. Furthermore the effect of changes in the rate of unemployment is negative and highly significant. A worsening of the labour market situation is connected with less employed migrant workers.

The volume of trade between both countries has a significant negative impact. This indicates, that trade liberalization is followed by a decrease of foreign workforce.

The friends- and relatives effect can be shown quite clearly by the positive and highly significant coefficient of the variable  $MST_{i,t}$ . Positive changes in

number of migrants already living in the receiving country lead to an increase in foreign workforce.

Furthermore the dummy variable for bilateral guest worker agreements is positive and significant. In contrast to this the dummy variable for free movement of workers in the context of the EU Southern enlargement was not significant. A reason for this could be that at the accession of Spain, Greece and Portugal already a significant proportion of their population had migrated.

## 7. SUMMARY

This paper presents an analysis of the relationship between labour migration and trade for the case of Germany. The considered time period is 1970 until 1998. Subject of the analysis are on the one hand effects of labour migration on trade and on the other hand effects of trade intensity on labour migration.

The starting point of this analysis were the different suggestions of trade theory regarding the relationship between trade and factor movements. In the course of the analysis most main determinants mentioned in trade theory proved to be difficult to quantify. Thus effects of migration on trade were analyzed mainly by taking variables that are relevant for trade, like factor endowment and gravity model variables, into account.

Labour migration had no significant impact on exports or imports. Reasons for this could be the minor magnitude of the endowment change and the special legal conditions. Taking changes in overall immigration into account a positive correlation between immigration and trade variables is confirmed. But immigration includes a large number of migrants due to family reunification and therefore is not an appropriate variable to test the link between factor movements and trade.

The results indicate that in the case of Germany trade reduces labour migration significantly. A growing trade volume for instance due to increasing European integration narrows wage differentials and thus decreases labour migration. This effect was supported on the one hand by migration policy, that encouraged return migration after 1984. On the other hand labour market developments also reduced the number of foreign workers significantly.

## REFERENCES

- Beger, K.-U. (2000). *Migration und Integration: Eine Einführung in das Wanderungsgeschehen und die Integration der Zugewanderten in Deutschland*. Opladen: Leske + Budrich.
- Bowen, H. P., & Wu, J. P. (2004). *Does it Matter Where Immigrants Work? Traded Goods, Non-traded Goods, and Sector Specific Employment*. Bonn: Center for European Integration Studies. (Working Paper No. B16-2004)
- Bundesregierung. (2003). *Migrationsbericht der Beauftragten der Bundesregierung fuer Migration, Fluechtlinge und Integration im Auftrag der Bundesregierung*. (<http://www.integrationsbeauftragte.de/gra/publikationen/publikationen.php>)

- Collins, W. J., O'Rourke, K., & Williamson, J. G. (1999). Were Trade and Factor Mobility Substitutes in History. In *Migration* (p. 227-262). Cambridge: Cambridge University Press.
- Davidson, R., & Kinnon, J. G. M. (1993). *Estimation and Inference in Econometrics*. Oxford University Press.
- Dustmann, C. (1996). Return Migration: the European Experience. *Economic Policy*, 213-250.
- German Institute for Economic Research. (2001). *Foreign Trade Data*.
- Goldberg, L. S., & Klein, M. W. (1999). *International Trade and Factor Mobility: An Empirical Investigation*. Cambridge: NBER. (Working Paper No. 7196)
- Hailbronner, K. (1997). Der aufenthaltsrechtliche Status der verschiedenen Gruppen von Einwanderern in der Bundesrepublik Deutschland. In *Einwanderungsland Bundesrepublik in der Europaeischen Union* (p. 9-31). Osnabrueck: Universitaetsverlag Rasch.
- Kohli, U. (1999). Trade and Migration: A Production-Theory Approach. In *Migration* (p. 117-150). Cambridge: Cambridge University Press.
- Krugman, P. (1995). Increasing Returns, Imperfect Competition and the Positive Theory of International Trade. In *Handbook of International Economics* (p. 1243-1277). Elsevier Science.
- Markusen, J. R. (1983). Factor Movements and Commodity Trade as Complements. *American Economic Review*, 47, 321-335.
- Markusen, J. R., Melvin, J. R., Kaempfer, W. H., & Maskus, K. E. (1995). *International Trade: Theory and Evidence*. McGraw -Hill.
- Muenz, R., Seifert, W., & Ulrich, R. (1997). *Zuwanderung nach Deutschland: Strukturen, Wirkungen, Perspektiven*. Campus Verlag.
- Mundell, R. A. (1957). International Trade and Factor Mobility. *American Economic Review*, 47, 321-335.
- Mundra, K. (2003). *Immigration and International Trade: a Semiparametric Empirical Investigation*. ([www.quantlet.org/hizirjsp/mundra/mundra.pdf](http://www.quantlet.org/hizirjsp/mundra/mundra.pdf))
- Pfaffermayr, M. (1996). Foreign Outward Direct Investment and Exports in Austrian Manufacturing: Substitutes or Complements? *Weltwirtschaftliches Archiv*, 132, 501-520.
- Schoenwaelder, K. (2003). Zukunftsblindheit oder Steuerungsversagen? Zur Ausländerpolitik der Bundesregierungen der 1960er und frühen 1970er Jahre. In *Migration steuern und verwalten* (p. 123-144). Göttingen: URR Unipress GmbH.
- Statistical Federal Office Germany. (2000). *Sonderauswertung*.
- The World Bank. (2003). *World Development Indicators*. (<http://www.worldbank.org>)
- Venables, A. J. (1999). Trade Liberalization and Factor Mobility. In *Migration* (p. 23-48). Cambridge: Cambridge University Press.
- Wong, K.-Y. (1986). Are International Trade and Factor Mobility Substitutes. *Journal of International Economics*, 21, 25-43.