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Where Enterprises Lead, People Follow? Links between Migration and German FDI

by

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Abstract

Globalization has affected the integration of markets through many different channels, including movements of factors and trade in goods. From a theoretical point of view, the interaction between the different channels of integration can take different forms. The aim of this paper is to analyze the interaction between different channels of integration empirically. More specifically, we use state-level German data to answer the question whether and how migration and FDI decisions and thus integration of labor and capital markets are linked. Our findings suggest that FDI and migration have similar determinants. Moreover, there is substantial evidence that factors cluster.

Keywords: migration, foreign direct investment, network effects

JEL-classification: F0, F21, F22

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1 Motivation

The phrase 'Where enterprises lead, finance follows', coined by Joan Robinson in the 1950s, has long guided empirical research on the links between foreign activities of manufacturing and financial firms. Yet, globalization has affected trade and factor flows on an even more universal scale. Hence, focus of the debate has shifted to links between foreign direct investment and migration, links between different forms of capital flows, and links between trade and factor movements.

In this paper, we address the first of these issues by asking to what extent foreign direct investment (FDI)[1] and migration are linked. Typically, gravity-type empirical models show similar determinants of FDI and migration, which suggests that different channels of integration are linked. These papers do not analyze though whether different channels of integration are substitutes or complements.[2] In this paper, we analyze explicitly the links between different channels of integration.

Theoretical models differ in their predictions or assumptions on whether different types of factor flows are complements or substitutes. Neo-classical open economy models, for instance, often assume different channels of integration to be substitutes. In these models, factor price equalization can be facilitated through trade in goods or through movements of factors. (See, e.g., Burda (2002) for a recent contribution.) Ricardian models, in contrast, yield a complementary

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1 In the following, we will use the term FDI to denote the stock of German inward and outward investment.

2 Barry (2002) analyzes the link between FDI and migration but the focus of his work differs from ours. His focus is on the effects of migration on the infrastructure of countries, which gives rise to congestion effects.

relationship. Different factors move to the same region because this region has access to a superior technology (Davis and Weinstein 2002). Agglomeration effects can lead to complementarities as well. In Gross and Schmitt (2003), for instance, factors of production from one source country cluster in specific destination countries because of labor market imperfections.

So far, the joint implications of these models for capital and labor flows have not been tested empirically. One reason for this missing evidence is the lack of sufficiently disaggregated regional data which would allow studying bilateral factor movements simultaneously. In this paper, we use a new dataset which allows analyzing links between migration and FDI on a fairly disaggregated level. We use (i) data on bilateral inward and outward migration of Germans and foreigners between the 16 German federal states and more than 40 partner countries, and (ii) firm-level data on inward and outward FDI into Germany that can be aggregated on a state-level. This provides us with a unique dataset which allows testing linkages between migration and FDI.

Our paper has five main parts. In the following part 2, we review the theoretical and empirical literature on flows of different factors as alternative channels of integration. In part 3, we describe our dataset. In part 4, we present our empirical results. We particularly take account of the interaction between migration and FDI. Part 5 provides some robustness tests, and Part 6 summarizes our main results. We find that FDI and migration share common determinants. Moreover, there is evidence that factors from the same country cluster in specific markets.

2 Literature Review

2.1 Theoretical Work

Despite the focus of recent policy debates on possible linkages between capital flows and migration,[3] economic theory provides relatively little guidance for analyzing the two channels of integration simultaneously. (See Burda (2002) or Davis and Weinstein (2002) for recent reviews of the literature.) Theory either disregards market frictions or analyzes different channels of integration separately. If frictions are assumed away, integration and factor price equalization can equivalently arise through trade or through movements of capital and labor. In contrast, models that assume frictions on capital or labor markets when analyzing a particular channel of integration typically disregard alternative channels of integration.

Some recent contributions offer interesting insights into the possible links between migration and capital flows though. Using a neo-classical model with constant returns to scale in production, Burda (2002) models a situation in which capital and labor mobility are alternative channels of economic integration. In his model, capital and (homogenous) labor are used as substitutes in the production of final goods. All countries use the same production technology. Two regions ('Eastern' and 'Western' Europe) are assumed to differ in their factor endowments with the West (East) being relatively capital (labor) abundant. Hence, before integration, factor returns differ across regions.

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[3] See, e.g., Tüselmann (1998).

In this scenario, economic integration can contribute to factor price equalization across countries either through the movement of capital or through the movement of labor. Absent costs of integration, the two channels of integration would be equivalent. The main point of Burda's model is that factor mobility is not costless and that the welfare implications of different channels of integration depend on the relative costs of relocating capital and labor. In terms of the links between capital flows and migration, the prediction of this model would be that countries experience net inflows of labor and net outflows of capital (or vice versa) until the marginal costs and benefits of importing and exporting these factors of production are equalized. Net factor flows of a given country would not move into the same direction. There would be a negative relationship between migration and capital flows.

The opposite conclusion is reached by Davis and Weinstein (2002). In their Ricardian model, factor flows are modeled as migration of a single composite factor. Hence, the model does not distinguish between capital and labor. The implicit assumption is that factors of production are complements to each other. They drop the assumption that all countries use the same production technology while maintaining the assumption that production has constant returns to scale. Davis and Weinstein assume that one country, the U.S., has access to a superior technology compared to the rest of the world. Hence, all factors of production have an incentive to re-locate to the U.S. if markets are opened up, and the U.S. would experience a net inflow of all factors of production simultaneously.

In this framework, integration through factor mobility is not pareto-improving. While factor movements would make the world as a whole better off, the U.S.

would loose its monopoly power which stems from having access to a superior technology.[4] In terms of the relationship between capital flows and migration, the prediction of this model would be that countries experience net inflows of labor and net inflows of capital at the same time (or vice versa). Net factor flows of a given country would move into the same direction. There would be a positive relationship between migration and capital flows, which is a prediction in stark contrast to the implications of the model by Burda (2002).

An aspect which is ignored in both models reviewed so far are agglomeration effects that can create regional clusters of capital flows or migration.[5] As in Davis and Weinstein (2002), such agglomeration effects might create a positive relationship between capital and labor flows but the economic rationale behind this link would be entirely different from the mechanism underlying their model.

To see how agglomeration effects can create a positive relationship between capital and labor flows, consider a model suggested by Gross and Schmitt (2003). In their model, migrants cluster in certain host markets if labor market segmentation supports a higher wage in the migrants' relevant labor market. A key assumption is that there is a labor market segment in which job characteristics linked to the home country (personnel contacts, language etc.) matter. Demand for labor in this market segment comes from employers which have the same cultural background as the migrants. Labor markets are characterized by asymmetries in information in the

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[4] Note that the U.S. would benefit from increased trade integration because this allows exploiting its technological superiority.

[5] Although Burda models (variable) adjustment costs, these are costs which do not change with the stocks of factors that have been accumulated in a given host country.

sense that output depends on the effort of workers and that employers cannot observe directly the number of shirkers.

The model by Gross and Schmitt (2003) is interesting for our analysis since it not only suggests a link between stocks and flows of migrants but also a positive relationship between stocks of foreign capital and migration. More specifically, the model has a couple of testable implications:

- Migrants are more likely to cluster in countries in which labor market segmentation resulting from cultural differences is important.
- There is a positive relationship between migration and FDI.
- The relationship between migration and FDI is non-linear. This non-linearity arises because the positive impact of the presence of home-country firms in the foreign market evaporates as the community of home country firms grows large relative to the foreign market.

Both classes of models, the Ricardian model and models that stress the importance of agglomeration effects, predict that capital and labor move in parallel. Still, it should be possible to distinguish between the two frameworks empirically for two regions:

First, the Ricardian model used by Davis and Weinstein does not imply any causality between capital flows and migration. Rather, both capital and labor are attracted to the high-technology region. There is no direct interaction between the two types of factor flows. Models that stress agglomeration effects, in contrast, would predict causality patterns between capital flows and migration as the presence of home-country firms in the foreign country would make migration to that country more attractive.

Second, market frictions in the form of information costs that lead to agglomeration effects imply non-linearities in the link between capital and labor flows. In addition, flows and stocks of factors are not independent. Rather, the model by Gross and Schmitt (2003) suggests that the attractiveness of countries as destinations for home-country migrants first increases and then decreases in the stock of home-country FDI. These non-linear effects are absent in standard Ricardian models of integration which ignore market imperfections.

At the same time, predictions of the two strands of the literature which focus, on the one hand, on technological differences and differences in factor endowments, and, on the other hand, on cultural and network effects in explaining factor flows are not mutually exclusive. Combining the implications of these models would suggest that cultural proximity and network effects are likely to create clusters of factor migration. These determinants of factor flows interact with the incentives to migrate and to re-locate capital that are being stressed by more standard models of integration.

2.2 Empirical Work

As regards empirical work on determinants of FDI and migration, few attempts have been made to analyze these factor flows simultaneously. Yet, the fact that gravity-type equations have turned out to be successful tools for analyzing both capital flows and migration can be taken as indirect evidence that the two factor flows might be linked. While a complete review of the growing empirical body of evidence explaining determinants of FDI and migration would be beyond the scope of this paper, the following paragraphs will highlight a few approaches which are directly related to our own empirical analysis below.

Whereas both capital flows and migration decision have been studied on the basis of aggregated data,[6] recent literature has studied both types of factor flows on the basis of bilateral data. Empirical work using bilateral data shows that factors such as distance and cultural similarity are important.[7] Variables that show up to be significant in these papers are factors that capture the size of markets, the geographic or cultural proximity of markets, and other factors that affect the returns to capital flows or to migration. Most of these variables (such as distance) are variables that are also significant in gravity-type equations explaining foreign trade.

As far as the theoretical underpinnings of gravity-type equations are concerned, most work has focused on the impact of distance on international trade. Anderson and van Wincoop (2003), for instance, stress the impact of remoteness on foreign trade. Other recent contributions have analyzed the impact of distance on FDI and international capital flows. Helpman et al. (2003) have a theoretical model that can explain the choice between FDI and foreign trade with distance being one of the key variables. Martin and Rey (2001) study international portfolio allocation decisions in a framework that closely resembles gravity-type models.

Empirical literature has also tested more directly the implications of theoretical models featuring market imperfections. Recent work by Gross and Schmitt (2003) on migration is particularly interesting from the point of view of this paper because they include proxies for cultural similarity and because they account for non-

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6 See, for instance, Lane and Milesi-Ferretti (2003) or Hatton and Williamson (2002).

7 See Helpman et al. (2003) and Buch et al. (2003) for evidence on FDI or Helliwell (1997) for evidence on migration.

linearities. Gross and Schmitt analyze migration flows for 12 destination and a number of source countries. Their results show that cultural similarity has a positive impact on migration and that interaction terms between cultural similarity and the size of the immigrant population in the host country are negative. This confirms the prediction of their theoretical model that network effects should matter less in culturally similar countries. However, the size of the immigrant population at which these positive network effects evaporates is relatively small. Beyond a 5% share of residents with the same cultural background in the number of total immigrants, no significant network effects are found. While Gross and Schmitt (2003) use migration data only to test the predictions of their theoretical model sketched above, our data will allow testing for links between FDI and migration.

Bhattacharya and Groznik (2002) explain the regional pattern of U.S. investment abroad and link investment decisions to patterns of immigration into the U.S. They find that U.S. investments in a foreign country are positively affected by the income of the immigrant group from that country that lives in the U.S. Including this variable, other variables capturing cultural and geographic proximity become insignificant. This result suggests that patterns of migration and patterns of capital flows are linked.

A link between FDI and migration is also found by Shatz (2003) who studies the importance of FDI for California as compared to the rest of the United States. As one control variable, he uses the stock of the foreign-borne population, and he finds that a high share of the foreign-borne population increases FDI.

3 Descriptive Statistics

In this section, we describe the dataset that we use for our empirical analysis. We start with a description of Germany's net factor flows. We describe how we have

constructed our dataset for bilateral FDI and migration on a state level, and we present the regional patterns that we find in these data.

3.1 Aggregated Factor Flows

As the third largest economy worldwide, Germany accounts for a significant share of global factor flows. According to data compiled by Gross and Schmitt (2003), Germany has attracted about 30% of global immigration flows of the major destination countries between 1988 and 1996.[8] Germany's share in global FDI is also quite large. In 2001, 7% of worldwide FDI stocks were invested in Germany, whereas 7.8% of worldwide FDI stocks were invested by German companies in foreign countries (UNCTAD 2002). Overall, Germany's share in global capital flows stood at about 10% in the 1990s.

Since one way to discriminate between alternative theoretical models of channels of integration is to look at the direction of net factor flows, Graph 1 summarizes German net factor flows for the past three decades. These data show that Germany has not been a net importer of both capital and labor at the same time. Moreover, there is no clear correlation pattern between the different factor flows.

Germany has been a net importer of capital in the 1990s. After years of strong capital outflows in the 1980s, financing German re-unification was the main reason behind the reversal of net capital flows. On average, annual net capital inflows into Germany in the 1990s were 6.6 billion Euro or 0.38% of the average German GDP in the 1990s. Germany has also been a net importer of labor in the 1990s, experiencing average annual net immigration of 205,000 persons or 0.26% of the

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[8] Germany's share in global emigration is smaller, even if one includes foreign workers returning to their home country for retirement.

total population. However, net migration patterns have also been relatively volatile over time. In 1997 and 1998, for instance, there has been net emigration by about 50,000 persons annually. Similarly, migration patterns in the 1980s have been fairly volatile.

From this first glance at the data, no clear picture emerges. For Germany, capital flows and migration seem to have been substitutes in the 1980s and complements in the 1990s. In the 1980s, capital and labor flows have tended to move into opposite directions and have been negatively correlated (correlation coefficient of –0.50), supporting the argument made by Burda (2002) that labor and capital flows are substitutes. In the 1990s, in contrast, there has been a weak positive correlation between the two factor flows instead (correlation of 0.25). This pattern is different from that observed for the U.S. which experienced inflows of both factors in both decades (Davis and Weinstein 2002). Hence, these stylized facts suggest that the relationship between different factors flows is more complex than simple Ricardian or neoclassical open economy models would suggest.

3.2 Data Description

In the empirical analysis of this paper, we will go beyond the aggregated data presented above and analyze FDI and migration in the level of the German federal state. The data on FDI used in the regression analysis of Section 4 are drawn from the micro-database International Capital Links of the Deutsche Bundesbank. The database provides a detailed breakdown of the assets and liabilities of foreign affiliates of German firms. For the purpose of this paper, we focus on direct and indirect foreign direct investment (Mittelbare und unmittelbare über Holding gehaltene Direktinvestitionen). This variable gives the sum of equity capital of

foreign affiliates, capital reserves, and retained earnings. Data are end-of-period stocks.

Data for migration have been obtained from Germany's Federal Statistical Office. These data are available at the level of the individual federal state, and they are broken down into inward and outward migration of Germans and foreigners. According to German statistics, people moving across borders are counted as migrants if they enroll[9] at a German town hall stating that their last residency was in a foreign country or if they are deleted form the register and state to move to a foreign country. Hence, the data do not include people commuting across borders or staying abroad for only a short period of time. Unfortunately, we do not have information in the stocks of Germans living abroad or on foreigners living in Germany. In Section 4.3, we will thus explain how we compute gross and net stocks of migrants in order to obtain proxies for the community of Germans living abroad and of foreigners living in Germany, respectively.

Although we have firm-level data on inward and outward foreign direct investment stocks of Germany, we use these data on a semi-aggregated level in order to match the regional dimension of this dataset with our data on migration. Since our FDI dataset provides us with information on the state in which the reporting company is located, we aggregate the foreign direct investment stocks of all firms in a given state. For Germany's 16 federal states, this provides us with a maximum of 792 pairs of states and foreign countries since migration data are not available for all countries.

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[9] Enrollment in the community register is compulsory in Germany.

Generally, our FDI data cover the period 1990–2000. Although we cannot trace a particular company over time because company codes after 1996 differ from earlier codes, we can still use the time series for the aggregated data since these are not affected by the re-classification.

One objection to the way in which we derive FDI stocks on a state level is that companies report their FDI to the Landeszentralbank of the state in which their headquarters are based. The location of companies' headquarters, in turn, may differ from the location of their main production units. In other words, the geography of our FDI data may be flawed.

However, we find a relative similar distribution of FDI and migration across states. This strengthens our confidence that the bias potentially created by firms' reporting practices is not too large. Comparing the shares of each state in total emigration of foreigners and Germans to the shares in stocks of FDI abroad (as well as the changes in FDI stocks) as is done in Graph 2 shows similar shares for most German states. The main exceptions are Hessen, which reports 22% of the stock of German outward FDI and only 9% of the stock of outward migration, and Saarland and Bremen, for which the shares in the emigration of Germans are higher than the respective FDI shares.

Before going into the details of our empirical analysis, we have to address the issue that the German data that we are using – which cover the 1990s – might be influenced by the fact that re-unification took place at the beginning of this decade. In contrast to the U.S., Germany has probably been closer to its long-run equilibrium in the 1980s than in the 1990s. In the 1990s, there has also been substantial movement of factors within Germany, which has mainly taken the form

of migration from the East towards the West and capital flows in the opposite direction.

We adopt three strategies to capture the re-unification effect. First, we analyze the relationship between labor and capital flows on the level of the federal state (Bundesland). Thus, we can control for specific developments in East Germany. Second, we use FDI data instead of total capital flows. This allows focusing on those types of capital which are mostly unrelated to public policy decisions. FDI should be particularly unrelated to the significant public debt that the German government has issued to finance transfers of the social system. Third, we estimate the determinants of inflows and outflows of factors separately. Hence, inflows of FDI into East Germany that have been triggered by re-unification are not combined with FDI outflows, as would be the case in an analysis of net factor flows. Inflows and outflows of FDI are rather treated separately in our regressions.

3.3 Regional Structure of Factor Flows

Graph 3 shows the location of German outward FDI, the origin of German inward FDI and migration. Generally, German outward FDI is concentrated in industrialized countries. The United States and the European Union – in particular Austria, France, Italy, Spain and the UK – are the most popular locations for German industry abroad. The transition economies of Central Europe have also attracted significant amounts of German FDI.[10] The enlargement perspective and the proximity of these markets to Germany have been the two main reasons why

[10] These include Czech Republic, Hungary, Poland, Slovak Republic, and Slovenia.

German firms have invested in Eastern Europe. The German outward FDI position in Africa and in the Middle-East remains relatively low, in contrast.

The parallel to German inward position can be easily drawn. In fact, German inward FDI comes mostly from developed countries with the United States, the United Kingdom and France being the main investors in Germany. The transition economies, in particular the Czech Republic are also of particular importance.

The regional migration patterns presented in Graph 3c–3f, show quite remarkable differences between the regional pattern of the migration of Germans and of foreigners. As for FDI, the United States, Canada and the European Union (in particular the Benelux countries), France, Spain, and Poland, account for the bulk of the emigration of Germans. The destination of foreign emigrants is much more concentrated in Eastern Europe and Turkey. The U.S. in particular is much less important for the emigration of foreigners from Germany than it is for the emigration of German nationals. This could to some extent be reflecting the importance of the U.S. as a destination of German outward FDI.

Overall, Germany is the biggest receiving country of migrants in Europe. The regional pattern of immigration has considerably changed over time. This change is due to the fall of the iron curtain in the early 1990s. In the 1970s and 1980s, most immigrants came from Western European countries and, from Turkey. By the end of the 1990s, this pattern had changed. In 1999, the majority of foreign immigrants came from Eastern Europe and the Turkey whereas the vast majority of German immigrants came from European countries, Poland, Russia, and the United States. This pattern is mirror-imaged by the patterns of emigration.

Changes in the regional pattern of emigration are also shown in Table 1. These data show that, within the group of European countries, migration to and from EU

countries has declined between the 1970s and the 1980s. This decline, which is related to the opening up of Eastern Europe, has started already in the 1980s and has affected migration patterns of foreigners to a larger degree than those of Germans.

As regards links between FDI and migration, Graph 3 points towards similarities between the inward and outward German FDI and the flows of German and foreign migrants. This correlation and the causality between FDI and migration are analyzed in the next sections.

4 Empirical Results

4.1 The Empirical Model

Our empirical analysis is based on a gravity model which is similar to the models used by Gross and Schmitt (2003), Bhattacharya and Groznik (2002), or Loungani et al. (2002). We use FDI stocks and migration as our dependent variables and control for factors that capture (i) market size and development, (ii) cultural and geographic distance, and (iii) stability and regulations. We define these variables as follows:

(i) Market size and development:

- *Gross Domestic Product* (GDP) controls for market size both at home and abroad. Data are converted into US-Dollar. Generally, we expect this variable to have a positive impact on FDI and migration.
- *GDP per capita* is included to control for the state of development of source and destination countries and German states, respectively. GDP and GDP per capita have been obtained from the 2002 CD-ROM *World Development Indicators (WDI)* of the World Bank (for the destination country) and from

the Statistisches Bundesamt (for the German states). Data are converted into US-Dollar. For FDI, theory suggests that GDP per capita might have a positive or a negative impact, depending on the relative importance of using a foreign country as a location for production or as a market for final products. For migration, we would expect that migrants move from low-income to high-income countries in order to equalize wages and living standards.

- The share of the population aged between 15 and 64 in total population (*population share*) in the respective foreign countries is included as a determinant of the migration of foreigners. The expected impact of this variable is positive, since people in this middle age group are more likely to migrate than young or old inhabitants.
- As robustness tests, we control for the level of *education* in the foreign countries. The data we use give the gross enrollment rates in primary, secondary, and tertiary education. The gross enrollment rate is the ratio of total enrollment regardless of age relative to the population of the age that officially corresponds to the level of education shown. Data for population shares and for the level of education have been taken from the *WDI* CD-ROM of the World Bank.
- Finally, we control for the level of *unemployment* in the source (destination) region. We expect that low unemployment in the destination region encourages inward and discourages outward migration. Since we do not have unemployment data for all destination countries, we include this variable as a robustness check only. Data for the foreign countries have been obtained

from the *WDI* CD-ROM of the World Bank, data for the German states are taken from the *Statistisches Bundesamt*.

(ii) Geographic and cultural distance:

- Greater *distance* measured by geographical distance in km is expected to lead to lower migration and smaller stocks of FDI. Larger distance could be an impediment because it leads to higher communication and information costs and restricts face-to-face communication and networking. Moreover, a greater distance also reflects differences in culture, language, and institutions, which is also likely to decrease factor flows.[11]
- The presence of a *common border* between the German state and the host country is included as a proxy for adjacency. The expected coefficient of this 0/1-dummy is positive because adjacent countries are expected to be more integrated. We also include a dummy variable which is set equal to one if Germany as a whole borders a foreign country as a robustness test.
- A 0/1-dummy for countries in which German is an official language is likewise expected to have a positive impact on factor flows since speaking a *common language* eases communication and also captures cultural similarity in a broader sense.

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[11] The data are taken from http://www.wcrl.ars.usda.gov/cec/java/capitals.htm. Distances are calculated with the following formula where lat_i and $long_i$ are respectively latitude and longitude of Berlin and lat_j and $long_j$ those of the main economic center of country j (usually its capital): dist = 6370 * ARCOS(COS (lat_j / 57.2958) * COS (lat_i / 57.2958) * COS (MIN (360 - ABS ($long_j$ - $long_i$) , ABS ($long_j$ - $long_i$)) / 57.2958) + SIN (lat_j / 57.2958) * SIN (lat_i / 57.2958))

- We also include a 0/1-dummy variable *EU* which is set equal to one for countries that are members of the European Union. The expected sign is positive since the creation of a Single Market should have promoted the integration of factor markets.
- In addition, we use robustness tests to control for cultural similarity. Hofstede (1991) has developed an index which includes measures of "uncertainty avoidance", "power distance", "masculinity-femininity", and "individualism-collectivism". Data are available for around 40 countries and have been obtained from survey data collected from multinational corporations. We use two measures for cultural similarity. First, we take the average of the four indicators. Second, we compute the deviation of these averages for each country from the index we obtain for Germany. Since we do not have these data for each country in our sample, we include the cultural index only to check the robustness of our results.

(iii) Stability and regulations:

- *Risk* as a composite index of country risk is the political risk index taken from various issues of Euromoney. This index has a higher score when country risk is small. Since lower risk should encourage integration, the expected coefficient is positive.
- *Freedom* is an index running from 1 through 7, whereby a value of 1 indicates the highest degree of political freedom and liberty. The data have been obtained from Freedom House (www.freedomhouse.org). As companies and people could have a preference for countries with a more liberal political environment, we expect to find a negative link between freedom and factor outflows and a positive link for inflows.

- In addition, we include a dummy for capital controls as a regulatory proxy which we *expect* to affect FDI but not migration. *Capital controls* is a 0/1-dummy, which is set equal to one if countries impose controls on cross-border financial credits. This dummy variable is expected to enter with a negative sign. The data are based on the IMF's *Annual Survey of Exchange Rate Restrictions*. Data prior to 1996 have kindly been provided by Gian-Maria Milesi-Ferretti, data after 1996 have been obtained from the IMF publications.
- Ideally, we would also like to control for regulatory factors which affect migration. However, as far as outward migration is concerned, we could not find a consistent database which contains information about the regulatory restrictions affecting migration out of Germany. For inward migration, we use information on the implementation of bilateral agreements on *vocational training*. These are expected to have increased factor flows. Such agreements have been concluded between Germany and Greece (1988), Spain (1991), Italy (1992), Turkey (1993), and Portugal (1994).

As dependent variables, we use German inward and outward FDI as well as inward and outward migration. Our empirical analysis proceeds in three steps:

First, we estimate the determinants of FDI and migration separately, using cross-section regressions for each of the years 1992–1999. Using cross-section regressions instead of panel, regressions has the advantage that we can include time-invariant factors such as geographic distance or cultural similarity, which would drop out in panel fixed effects regressions. Moreover, we can check directly whether the determinants of factors flows have changed over time.

Second, we include stocks of migrants and FDI stocks as additional explanatory variables. This allows addressing the question whether migrants cluster in specific states and whether nationality has an impact on these clustering effects. We also run these regressions using two-stage least squares and seemingly unrelated regressions in order to account for the potential endogeneity of the additional explanatory variables.

Third, we use panel estimation techniques to further check the robustness of our results and to test whether there are causal relationships between migration and changes in FDI.

4.2 Baseline Regressions

In our baseline regressions, we estimate determinants of FDI and migration separately. We run the following regression:

$$(1) \quad log(Y_{ijt}) = \beta_0 + \beta_1 X_{it} + \beta_2 X_{jt} + \beta_3 X_{ij} + \varepsilon_{ijt}$$

where subscripts *i, j,* and *t* denote the German state, the foreign country, and the year, respectively. We use inward and outward migration and FDI as the dependent variable (Y_{ijt}). FDI data have been aggregated across individual firms for each year, host country, and German state. The set of regressors consists of variable capturing economic conditions in the German state (X_{it}) and in the foreign country (X_{jt}) as well as variables capturing bilateral characteristics (X_{ij}). These bilateral characteristics (such as distance) are typically time-invariant.

Although we run these regressions for each year in the 1990s, only results for the first and the last year under study are reported in Table 2 in order to save space. Result for the interim years are very similar to those reported in the Table. Overall, our baseline regressions have a high explanatory power, with the adjusted R^2

varying between 0.55 and 0.74 in 1999. We can thus explain about two-thirds of factor flows in and out of Germany. The sample size is between 293 and 792 observations (in 1999). Generally, the number of state-country-pairs for which we have positive entries has increased during the 1990s.

In addition to the good explanatory power of our model, we find that almost all of the variables under study are significant and have the expected signs. With a few exceptions, effects are also similar for migration and FDI.

4.2.1 Market Size and Income Level

Size, measured through GDP of the German state and of the host country, has a positive and significant effect on all four types of factor movements considered.

As regards the income level, we would expect to find large emigration to high-income regions and large immigration from low-income regions. For GDP per capita abroad, we indeed find the expected negative effect for immigration. However, there is also a negative impact of this variable on emigration. Similarly, GDP per capita of the German state has the same (positive) effect on immigration and emigration. These findings contradict the expectation that income differentials alone shape migration patterns They do, moreover, show that the migration decisions of Germans and foreigners react in a similar way to GDP per capita.

For FDI stocks, the expected coefficient on GDP per capita is not clear a priori. On the one hand, firms might seek the benefits of low labor costs, hence moving to low-income states. On the other hand, they might be attracted to regions with a high market potential and thus those with high-income. For inward FDI, the impact of per capita GDP on investment is clear in our data. Both, GDP per capita of the foreign country and of the German state have a positive and significant effect. This reflects that the bulk of FDI takes place between developed countries and not, as

theory might suggest, between the capital-rich developed and the capital-strained developing countries. For outward FDI, we find the same positive effect of the income level of the German state. German firms do seek, however, also markets with low labor costs as destinations for FDI. Hence, the coefficient on GDP per capita abroad is negative (but not always significant).

The result that a higher GDP per capita of the German state increases factor flows is due to the fact that the integration of the West German states into international capital and labor markets is deeper than that of the East German states. If we additionally include a dummy variable for the East German states (results not reported), GDP per capita at the state level becomes insignificant. The dummy variable itself is highly significant and negative for all years as far as the migration flows are concerned. Hence, even though pressure for integration has presumably been higher in East than in West Germany, this has not led to increased international factor flows.[12] This remains true even if we use the ratio of migrants to total (state) population as the dependent variable. The lower degree of integration of East German states into global factor flows is also shown by the fact that international migration relative to the total population has been lower in East Germany than in Germany as a whole.

The picture looks different for FDI. For outward FDI, the East German dummy is insignificant for the years 1991–1993 but it becomes significant in subsequent years. For inward FDI, the East German dummy is insignificant for most of the years, and it is positive and significant in the years 1995 and 1997. This result is

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[12] Note that this argument disregards the possibility that East Germans might migrate first to the West and then to foreign countries.

more in line with expectations since we would expect to see more investment in the relatively capital-poor East German states than in West Germany.

In order to check whether there are significant differences in the determinants of migration and FDI for East and West Germany, we additionally split the sample and estimate the determinants separately for the two regions. As indicated already by the regressions with the dummy for East German, GDP per capita of the German state is insignificant in both sets of regressions. This confirms that the negative impact of GDP per capita for the full sample indeed captures the special situation of the East German states.

Most other results for migration, in contrast, are very similar for East and West German states. The exceptions are the results for freedom and the effect of the EU dummy. Freedom tends to have a negative impact on the migration of East Germans but not of West Germans. A positive EU effect, in contrast, is confined to West Germans. Interestingly, results for FDI are driven entirely by the West German states in the sample. For FDI of East Germany, we find insignificant effects throughout (GDP of the foreign country being the exception). One main reason for this is the small sample size. For outward FDI of East German states, we have only 54 observations as compared to over 400 observations for the West German states. The respective numbers for inward FDI are 71 and 262.

4.2.2 Border and Distance Effects

Migration and FDI react similarly to the presence of a common border and to distance. Greater distance between the source and the host region lowers migration and FDI, and the presence of a common (state) border has a positive impact. The coefficient on the state border dummy is close to one or even higher. Hence,

migration and FDI to and from bordering countries are about three times as high as in comparable countries that do not share a border with Germany $e^1 = 2.72$.

It is interesting to note that the 'border effect' is confined to countries directly bordering German states. Unlike previous work, which does not use state-level data, we can distinguish a state like Hessen, which does not border any foreign country, from a state like Bayern, which borders Austria and the Czech Republic. Also, we can distinguish migration from Schleswig-Holstein to the bordering Denmark from that of Bayern to its bordering countries.

If we replace the state-border dummy with a dummy variable which is set equal to one if Germany as a whole shares a common border with a foreign country, the positive border effect for migration disappears. The general border dummy has no significant impact on the migration of Germans, and the impact on the migration of foreigners is negative. If we include both the border and the state-border dummy (which have a correlation coefficient of 0.27), we obtain a negative general border effect and a positive state-border effect for migration. Hence, although our migration data do not include commuters, who live in bordering regions, close proximity still has an impact on (long-term) migration decisions. This close proximity is less important for FDI, where we find the same positive impact of the common border dummy as for the state border dummy.

For distance, we find coefficients between –0.12 and –0.96. Although these coefficients vary somewhat over time, migration of Germans and outward FDI seem to be less sensitive to distance than the migration of foreigners or inward FDI. For the migration of Germans and outward FDI of German firms, we find coefficients which are in the range between –0.12 to –0.39, for the migration of foreigners and inward FDI of foreign firms, we find coefficients between –0.32 and

–0.96. Germans thus seem to be somewhat less sensitive to larger distances than foreigners. Interestingly, these differences between Germans and foreigners have become smaller over time, and, in 1999, all distance coefficients were in the range of –0.3 to –0.4.

4.2.3 Regulations and Cultural Proximity

Proxies for regulations and cultural proximity that are included in the baseline regressions have, to some extent, different effects on migration and FDI. High country risk tends to lower German firms' outward FDI. Inward FDI, in contrast, is generally unaffected by risk. As regards the impact of risk on migration, we find that Germans tend to emigrate to safe countries while German immigrants often come from risky countries – as expected. These patterns are similar for migration of foreigners, but here we obtain a larger number of insignificant coefficients.

Greater political freedom has a positive impact (i.e. the coefficient estimate is negative) on the migration of Germans and on outward FDI. This holds in particular towards the end of the sample period. For the migration and the FDI decisions of foreigners, in contrast, freedom is often insignificant or even positive.

With regard to the effects of the EU dummy, we find some interesting effects. Migration of Germans and outward FDI tend to be higher for EU countries than for other regions, ceteris paribus. For the location decisions of foreigners, the EU effect was mostly negative for the early years of the sample but turned positive around 1994 (for inward FDI, it mostly remained insignificant). Note that this effect is not the result of the fact that Austria, Finland, and Sweden became members of the EU in 1994 since we also find it in regressions in which the EU dummy has been set equal to one for all current EU members for the entire 1990s.

Moreover, speaking a common language has a positive and significant impact on the migration decisions of Germans and on FDI but not on the migration of foreigners (with the exception of the immigration of foreigners in the late 1990s). Note that we consider only whether German is the official language spoken in a host country. The fact whether there is a large German-speaking population in a particular foreign country is not considered in our baseline regressions because we lack country-by-country information on the percentage of the foreign population that speaks German. We will, however, account for the fact whether Germans live abroad in our analysis of clustering effects (Section 4.3).

4.2.4 Seemingly Unrelated Regressions

We additionally estimate the determinants of the emigration of Germans and of outward FDI as well as of the immigration of foreigners and of inward FDI in a system of seemingly unrelated regressions (SUREG). Since movements of both factors are influenced by the same determinants, there might be contemporary information from omitted variables in the residuals of both equations. The SUREG system can exploit this information by imposing a joint variance covariance structure. Information in the residuals of the two individual equations is used as a weighting matrix. Large changes in the coefficients relative to the single equation approach would suggest that information has remained unexploited in the latter.

Results for the years 1992 and 1999 are given in Table 3. While the majority of coefficients is very stable in comparison to the cross section regressions, there are also a couple of results which change in terms of significance. The capital controls dummy, for instance, is now often insignificant. In each regression (with the exception of inward FDI in 1999), the significance of a few coefficient estimates change. The only two variables which give consistent results throughout are GDP

(both at home and abroad) and the share of the middle-aged population abroad. This provides some piece of evidence that FDI and migration cannot be treated in isolation.

Results of the Breusch Pagan test for independent equations reported in Table 3 support this conclusion and show more clearly where the interdependencies are. Whereas the test does not reject the hypothesis that immigration of foreigners and inward FDI can be explained independently in two separate regressions, the test rejects independence for emigration of Germans and outward FDI. Hence, we use more direct tests of the interdependence between the emigration of Germans and outward FDI in the following sections.

4.3 Do Factors Cluster?

Theoretical and empirical work reviewed above suggests that factor flows might cluster in specific countries due to asymmetries in information that create positive "spill-overs" and agglomeration effects. We test whether there is evidence for such clustering in our data by adding cumulative and agglomeration effects flows of Germans living abroad and of foreigners living in Germany as well as FDI stocks as additional explanatory variables.

Our analysis of clustering effects proceeds in two steps. First, we run essentially the same cross-section regressions as above but use stocks of migrants and FDI as additional explanatory variables. Second, we address the potential endogeneity of these stocks by using instrumental variable (IV) estimators.

Since we do not have information on the stocks of Germans living abroad and of the foreigners living in Germany on a bilateral basis, we need to construct proxies for migration stocks. We use both a net and a gross concept:

First, cumulative net migration flows are obtained by calculating cumulative net migration in and out of Germany from 1974 onwards. For the East German states, we have data only from 1990 onwards. Since migration was severely restricted in previous years, we can assume that earlier stocks of migrants have been small. Generally, net cumulative flows can turn negative for some countries and some periods of time. Overall, about 50% of our observations of cumulative net emigration flows for Germans are negative as compared to less than 10% for the immigration of foreigners. Logs of negative values are thus obtained by taking the log of the absolute value of the respective variable and by multiplying the logged variable with the sign of the original variable.[13] Implicitly, this assumes that positive and negative values can be treated symmetrically. Moreover, negative net cumulative emigration flows are particularly large for countries such as Poland, Romania, and Russia, for which there has been significant underreporting of German outward migration prior to the start of our sample period. At the same time, there has been quite large inward migration of Germans during the 1990s, hence, net migration flows have been negative during this period.[14] These large negative net stocks do certainly not proxy the stocks of Germans living in these

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[13] Moreover, data are multiplied by a factor 10 to avoid taking the log of values between –1 and +1.

[14] There has been substantial migration of Germans to these countries in the past. Furthermore, re-arrangements of borders after both World Wars left many Germans as minorities in these countries. According to German law, descendants of German emigrants retain their German nationality under certain conditions. Hence, these German nationals could return to Germany when borders opened up in the 1990s.

three countries. We drop these three countries from the analysis that uses cumulative net flows.[15]

Second, we use gross cumulative flows as a proxy for migration stocks. Hence, we simply compute the sum of Germans living abroad and of foreigners living in Germany without taking return migration into account. Using gross stocks of migrants has the advantage that we do not obtain negative migration stocks while, at the same time, obtaining a variable which is highly correlated with the numbers of German living abroad (and of foreigners living in Germany). Hence, for gross stocks, we can use all countries in our sample. Also, gross stocks might be a better proxy for the overall volume of migration activity (and thus presumably also of the stock of migrants living abroad) than net stocks. In the extreme, our measure of net migration stocks might be zero even if gross migration is substantial, i.e. if there is large inward and outward migration that is of similar magnitude. The disadvantage of using gross flows is that gross cumulated flows overstate stocks of migrants for countries where return migration is important. Also, even with the gross flows, we cannot capture developments before 1974 and 1990, respectively, for the West and East German states.

In order to avoid contemporaneous correlations, we lag (gross or net) migration stocks by one period.

Table 4 reports a couple of different specifications. A priori, we would expect that more Germans living abroad and higher outward FDI stocks have a positive impact

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[15] A comparison of regressions for the sample including and excluding these countries shows that our baseline results are not affected by dropping these three countries.

on emigration decisions of Germans. Hence, we include both of these variables separately as well as in combination (columns 1–3 of Table 4). In addition, we check whether more Germans living abroad and more outward FDI increase the attractiveness of countries as destinations for the emigration of foreigners from Germany (columns 4–5). Finding significant effects for emigration of foreigners could have two different interpretations. Either, the stocks of Germans living abroad might be capturing omitted factors that are unrelated to cultural similarity and can thus not be taken as evidence for clustering effects. Or, outward stocks might indeed capture cultural similarity and thus attract foreigners who have lived in Germany to those markets. According to this interpretation, foreigners who lived in Germany would have assimilated to some extent to their German environment. Ultimately, this hypothesis would have to be tested by using data on flows of foreign migrants from countries other than Germany to those host countries where a lot of Germans live. Since this information is not contained in our dataset, we leave this for future research.

As regards inward factor flows, we expect immigration of foreigners to be positively related to more foreigners of the same nationality living in Germany and to larger inward FDI stocks from this country (columns 6–8). We also include regressions explaining the immigration of Germans (columns 9 and 10). The last two columns of Table 4 explain outward FDI stocks, including the number of Germans living in the host country (column 11) and inward FDI stocks, including the number of foreigners from the source country living in Germany (column 12) as regressors. Table 4 shows the results for the first and the last year for which we have observations. Panel a of Table 4 reports the results for net cumulative stocks, Panel b reports the results using gross cumulative stocks of migrants. The definition of FDI stocks does not differ between these Tables.

Generally, results suggest that clustering is important and that nationality matters:

- Large migration of Germans in the past has a positive impact on the emigration of Germans. This holds for all years under study. FDI abroad has a positive and significant impact on the emigration of Germans as well, but it becomes insignificant when gross migration stocks are added. Multicollinearity between FDI stocks and stocks of migrants is a likely reason for this.
- Emigration of foreigners out of Germany is also positively affected by the presence of a large community of Germans abroad. German outward FDI, in contrast, does not have an impact on the emigration of foreigners.
- Immigration of foreigners is not affected by inward stocks of foreign direct investment or by net cumulative immigration in the past. High gross stocks of foreigners living in Germany does have a positive impact on immigration of foreigners though. One reason for the missing effect of net stocks could be that net stocks are biased downward for those countries with a large presence of foreigners prior to 1974. Immigration from Turkey, Greece, Spain, and Italy, for instance, was large in the 1960s. To the extent that some of these earlier migrants have returned home for retirement since 1974, net stocks of migrants would be biased downward.
- For the immigration of Germans, we obtain the interesting effects that the net stock of foreigners living in Germany have a (very small but statistically significant) negative impact while gross stocks have a positive impact.
- Finally, the effect of stocks of migrants on FDI stocks depends on the measure of migration stocks used. For outward FDI, there is no effect of cumulative net migration but a positive effect of cumulative gross migration.

For inward FDI, we have the opposite result: cumulative net migration has a positive effect but cumulative gross migration has no significant effect.

These results are consistent with the hypothesis that cultural factors and nationality play a role as determinants of international factor movements. Communities of Germans living abroad are particularly important. The more Germans live abroad – proxied either through gross or through net cumulative emigration in the past – the more Germans emigrate to these countries. We find a similar effect also for the emigration of foreigners who have previously lived in Germany. This latter effect is interesting because it suggests that foreigners living in Germany assimilate to the German culture. One of the main factors driving this form of assimilation could be the fact that children of foreigners living in Germany learn both German and their native language. Hence, in terms of cultural assimilation, these German-born foreigners combine both German characteristics and characteristics of their home countries.[16]

We find a somewhat similar pattern of cultural assimilation also for immigration: both immigration of foreigners as well as immigration of Germans is higher from those countries which have reported large inflows of foreign migrants in the past. This effect is confined to gross cumulative flows, however. For cumulative net flows, we find an insignificant effect (for foreigners) and even a negative effect (for Germans).

We also find links between FDI and migration which point to the importance of cultural factors. However, there is only one result which is robust across

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[16] As is typically the case in studies of agglomeration effects, however, we cannot preclude the hypothesis that stocks of migrants capture omitted variables rather than cultural factors.

specifications: higher stocks of inward FDI do not have an impact on inward migration. For outward FDI stocks, results are not clear cut. This, however, might be due to the fact that we have so far ignored the potential endogeneity of FDI. We turn to this issue below (Section 4.3.2).

In addition, we test whether there is evidence for non-linearities in our data (results are not reported). We include the square of the stocks of FDI and of migration. Our expectation would be that there might be negative returns to scale, i.e. if many immigrants have clustered in a particular host country already, the additional clustering effects of new migrants would be relatively small. Hence, the squared term is expected to be negative. However, we do not find evidence for this. If anything, some of the squared terms that we include are positive. This would imply that the greater the migrant community is, the greater are the positive spill-overs and clustering effects. The problem with this interpretation is though that the stock variables themselves and their squared terms are highly collinear. This makes it difficult to disentangle the effects of the two variables, and some of the squared terms might be picking up the effects of the original variable (which often become insignificant). Generally, qualitative results for the remaining variables are unaffected when including our additional control variables. The distance coefficient tends to become smaller (while remaining significant) because some of its impact is now picked up by the stock variables.

In summary, the following picture emerges. Outward FDI stocks and stocks of German migrants living abroad are positively linked. Inward FDI stocks and stocks of foreigners living in Germany are not linked, in contrast. One reason for the missing link with regard to inward factor flows could be that we look at a much more heterogeneous sample in terms of cultural similarity than for the outward flows of Germans factors. These results are also supported by those of the

seemingly unrelated regressions reported in Table 3, which show a relationship between outward FDI and outward migration but not between inward FDI and inward migration.[17] So far, however, we cannot say anything about possible patterns of causality between FDI and migration over time. This is an issue to which we turn next.

4.4 Panel Estimators

So far, we have established that there is more FDI into countries which have had a large immigration of Germans in the past. Yet, it could be argued that the cross-section regressions that we have presented above do not sufficiently address the issue of causality between FDI and migration. Although, for instance, Frankel and Romer (1999) use cross-section instrumental variable estimates in order to infer the causal effects of trade on economic growth, this type of regression cannot address the issue of causality over time.

In order to test for causality over time, we first of all take the first differences of our FDI data in order to obtain stationary time series. We then apply Granger tests for non-causality to panel data for migration and FDI. To test for Granger-non-causality, we use the panel model by Holtz-Eakin et al. (1988):

$$(2) \quad y_{i,t} = \alpha_0 + \sum_{j=1}^{m} \alpha_j y_{i,t-j} + \sum_{j=1}^{m} \delta_j x_{i,t-j} + f_i + u_{i,t},$$

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[17] We have also confirmed the main qualitative results obtained so far through instrumental variable regressions. Lacking good instruments, however, we refrain from interpreting these results further.

where $i = 1,\ldots,N$ denotes the number of cross-sections of the panel, f_i is a country-specific fixed effect, and u_{it} is an error term. By calculating first differences of the data, fixed effects can be eliminated:

$$(3) \quad y_{i,t} - y_{i,t-1} = \sum_{j=1}^{m} \alpha_j (y_{i,t-j} - y_{i,t-j-1}) + \sum_{j=1}^{m} \delta_j (x_{i,t-j} - x_{i,t-j-1}) + (u_{it} - u_{i,t-1})$$

Within this model, x Granger-causes y if the joint hypothesis $\delta_j = 0 \; \forall \; j$ cannot be rejected. Since the residuals are, by definition, correlated with the endogenous variables, an instrumental variable estimator is warranted. Also, the problem of lagged endogenous regressors has to be addressed. Whereas in a lot of applications the resulting so-called Nickell-bias can be neglected because the time dimension is relatively large as compared to the cross-section dimension, this does not hold in our case. The small numbers of years that we use implies that our panel is of a "short and wide"-type, and simply using OLS would lead to inconsistent and biased estimators. Therefore, we follow Judson and Owen (1999) who show that, for an unbalanced panel with $T \leq 10$, Arellano and Bond's one-step GMM-estimator (Arellano and Bond, 1991) outperforms alternative estimators.

In order to take into account that migration and FDI flows might be endogenous, we treat them as predetermined variables. Moreover, in Table 5 we report robust standard errors, and we include a second lag of the dependent variable if necessary to ensure that there is no second order autocorrelation. We report results using one and two lags of the respective right-hand-side variable. Note that the Sargan test on overidentifying restrictions typically fails. This is a common problem in dynamic panel studies (Arellano and Bond 1991).

The results that we present in the cross-section regressions (Table 4) seem to indicate that outward FDI stocks affect outward migration and – although somewhat less robust – that emigration affects outward FDI. However, these results cannot be interpreted in terms of causality since they do not take the time dimension of our data into account. Results of the Granger non-causality tests rather give the following picture:

- With regard to outward FDI and emigration of Germans, causality seems to run from migration to FDI.
- With regard to inward FDI and immigration of foreigners, causality seems to run from FDI to migration, and not vice versa.

How can we square these results with those of the cross-section regressions? Apart from the fact that both sets of regressions support the presence of agglomeration effects, it is important to note that the set-up of the regressions differs. The Granger tests for non-causality are based on first differences of the data. For migration, this does not require any adjustments since these are flow data already. For FDI, in contrast, we have to compute first differences and thus 'quasi-flows' from the original data. [18] Bearing in mind that the results of the cross-section and the panel regressions are therefore not fully comparable, the following stories are consistent with our findings:

- Cross-section and IV-regression results show that stocks of Germans living abroad and stocks of outward FDI are positively linked. Results of our panel

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[18] Note that, strictly speaking, the first difference of our FDI stocks is not the same as the flow of FDI between two regions. See Wezel (2003) for details on the computation of FDI flows from the Bundesbank stock statistics.

regressions suggest that the process of factor accumulation is driven by the migration of Germans. In this sense, people lead, and enterprises follow.

- For the immigration of foreigners and inward FDI, results of the OLS and the IV regressions have shown no significant links between the stock variables. The panel regression suggest, in contrast, that there is some process of factor accumulation taking place. This process of factor accumulation seems to be driven by foreign direct investment. In this sense, enterprises would lead and people would follow.

We also run several panel estimates to check the robustness of the coefficient estimates obtained from the cross-section regressions. Using the Hausman test to check whether the random or the fixed effects estimator would be more appropriate gives clear indications that a fixed effects estimator would be the preferred specification. However, one disadvantage of the fixed effects estimator is that we cannot infer the impact of variables that are time-invariant (distance etc.). Therefore, we use a random effects panel estimator (GLS), which matches our qualitative cross-section results quite closely.

In terms of the links between stocks and flows of migrants and FDI, the GLS results confirm some of the findings of the cross-section regressions reported in Table 4: There is a positive link between the emigration of Germans and the stocks of people and FDI abroad. Similar, albeit weaker, positive effects are found for the emigration of foreigners out of Germany. For immigration, we confirm a negative impact of net stocks of immigrants on the inward migration of Germans. Interestingly, this negative effect also comes out of the regressions for inward migration of foreigners. Immigration of foreigners and Germans is higher the larger is the stock of inward FDI. Finally, there is no significant impact of migration stocks on outward FDI but a positive impact on inward FDI.

5 Robustness Tests

In the baseline specification reported in Table 2, we have not included a couple of variables which could be important in explaining FDI or migration. The main reason why we have omitted these variables is that we do not have observations for the full set of countries. We lack, for instance, information about the regulatory policies of foreign countries vis-à-vis the immigration of Germans or information about the level of education at the level of the German state. We can test for the importance of some potential variables of interest though, and this section presents the main results (which are not reported but are available upon request). Specifically, we test whether splitting up the freedom index into its components affects our results, whether unemployment and the deregulation of immigration have affected factor flows, and whether cultural similarity and the level of education in the host country matter.

One objection to the use of the indicator of political freedom could be that it is an ordinal variable, i.e. the increase in the index from 1 to 2 does not imply necessarily the same loss in political freedom as the increase from 6 to 7. Therefore, we have additionally split freedom into three indicators of a high degree of political freedom ($1 < \text{freedom} < 3$), a medium degree ($4 < \text{freedom} < 6$), and a low degree ($\text{freedom} = 7$). In order to avoid collinearity among the regressors, we include only two of these variables at a time. We find that countries with a particularly low degree of political freedom discourage migration but not FDI.

The level of unemployment has an insignificant effect on migration and FDI in most of the specifications. There are four exceptions: both emigration and immigration of foreigners are negatively related to the unemployment rate abroad. For emigration of foreigners, this effect is in line with our expectations since the

probability of finding a job in the home country declines if unemployment rises. For the immigration of foreigners, in contrast, the negative effect of unemployment at home runs counter to expectations. In two instances, we find a significant effect of the unemployment rate in the German state. The immigration of Germans is discouraged by higher unemployment whereas inward FDI is encouraged. Both results are in line with expectations.

Additionally, we test whether deregulation of immigration has had a significant impact on migration decisions. We include a dummy variable which is set equal to one after the signing of treaties on vocational training between Germany and five source countries. These treaties did indeed have a positive impact on the flow of foreigners into Germany, which could be taken as evidence on the links between deregulation and migration. However, immigration of Germans from the respective source countries has increased as well, suggesting that the dummies capture omitted variables.

Moreover, we explicitly control for the degree of cultural similarity between Germany and different source or destination countries by including the index of cultural similarity developed by Hofstede (1991). We use both the absolute value of this index as well as the difference between the index for a given host country and Germany. Results do not depend on whether we use cultural similarity or the difference between the two indicators. While emigration of Germans seems to be affected positively by cultural similarity, there is no significant impact on the emigration of foreigners. Also, immigration of foreigners and of Germans as well as outward FDI are not affected by cultural similarity. The impact on inward FDI is even negative. The theoretical model by Gross and Schmidt (2003) also suggests that the presence of a stock of migrants is more important in countries where the degree of cultural similarity is small. We check whether this hypothesis is

confirmed by our data by adding an interaction term between cultural similarity and the stocks of migrants. Due to a high degree of collinearity between this variable and its components, however, we do not find strong evidence that cultural similarity has a non-linear effect on migration.

Finally, we test for the impact of the level of education in the foreign country. Perhaps contrary to the conventional wisdom that emigration into Germany takes place mainly in the low-skilled sector, we find that high enrollment rates in tertiary education abroad have a positive impact of both inward and outward migration of foreigners. The impact of high enrollment rates in secondary education is negative. Primary education is insignificant. For the migration of Germans, we partly find the reversed pattern as high primary enrollment rates have a positive and significant impact on inward and outward migration while the impact of secondary and tertiary education is either insignificant or negative.[19] Hence, migration of foreigners comes from and goes to countries with widespread higher education while Germans move in and out of countries with widespread basic education.

6 Summary

Globalization has stimulated international factor flows on a rather unprecedented scale. In particular, foreign direct investment has increased, mainly among developed countries. Migration across borders has increased as well, albeit at a smaller degree. This parallel increase in cross-border factor flows raises the question how different channels of integration interact. From a theoretical

[19] Similarly, secondary and tertiary enrollment rates have a negative impact of outward FDI. For inward FDI, secondary enrollment is positive and significant.

perspective, different factors flows might be substitutes or complements, and it is ultimately an empirical question which relationship prevails.

In order to shed light on the links between FDI and migration, this paper has used a new dataset which allows analyzing different factor flows simultaneously and on a fairly disaggregated level, i.e. at the level of the German state.

The aim of the paper has been two-fold. First, we have analyzed determinants of German FDI and migration separately. Essentially, these regressions confirm that gravity-type variables are important determinants of international factor movements. Second, we have explored the interaction between different factors, focusing in particular on the question whether there is evidence for a clustering of migrants and FDI in specific source and destination regions.

One main result of this paper is that integration of markets is to a significant degree shaped by cultural factors and, to a lesser degree, by regulations. Hence, the standard neoclassical model, which assumes that factors can relocate across borders at no costs, is not applicable to many real-world questions. Moreover, implicit barriers to integration seem to be fairly persistent, as evidenced by the lower degree of integration of East German states into global markets as compared to West German states.

Another result of our paper is that barriers to integration tend to have similar effects on FDI and on migration, suggesting complementarity rather than substitutability between the two. This conclusion is strengthened by the finding that clustering seems to be important, and we find a couple of effects which point towards the importance of nationality for the strength of clustering effects. Germans, for instance, migrate to foreign countries which were the destination of German migration in the past and which have a significant presence of German firms.

Interestingly, we find a similar positive impact of a 'German community' abroad on the emigration decisions of foreigners who have lived in Germany formerly.

As regards links between FDI and migration, our evidence points towards a relatively strong link between the stocks of German migrants and stocks of German FDI abroad. For the immigration of foreigners and inward FDI, the evidence is much weaker. In terms of causality between FDI and migration over time, our results remain somewhat inconclusive: while it seems as if outward migration of Germans triggers outward FDI, the reverse direction of causality seems to hold true for inward FDI and inward migration of foreigners.

Relating our findings to earlier research, we do find support for the hypothesis coming out of theoretical work by Gross and Schmitt (2003) that migration and FDI are positively related. We even find causality patterns in the data. In this sense, our results can be taken as evidence against Ricardian-type models that postulate simultaneous movements of factors into specific countries but no patterns of causality in the data (see, e.g. Davis and Weinstein (2002)). However, with regard to the predictions of the model by Gross and Schmitt (2003) in terms of non-linearities, our findings are very mixed. Their results suggest, for instance, that interaction terms between similarity and the size of the immigrant population in the host country are significant. Our results do not give a consistent pattern for these non-linear effects. However, we do not see this as a general rejection of the hypothesis that non-linearities matter but we rather acknowledge that measuring these effects and the degree of cultural similarity remains a somewhat open issue.

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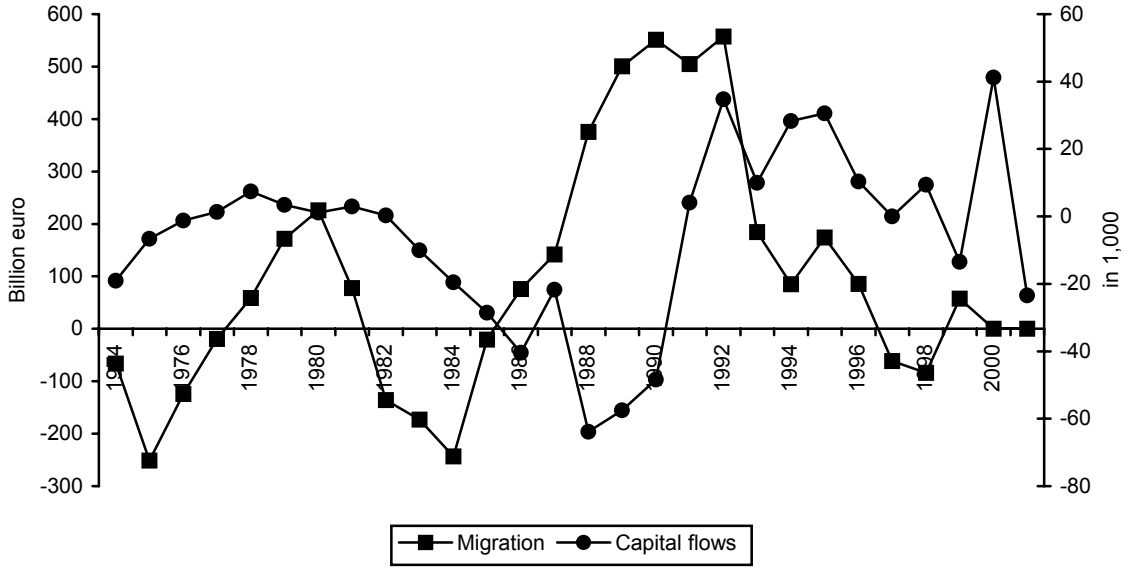
Appendix

Graph 1: German Net Factor Flows 1974–2001



Sources: IMF (2003), Statistisches Bundesamt (2001), own calculations.

Table 1: Changes in the Regional Structure of Migration

	1975–1979	1980–1989	1990–1999	1975–1979	1980–1989	1990–1999	1975–1979	1980–1989	1990–1999
	Total			Germans			Foreigners		
Immigration									
Europe	82.00	78.43	74.17	73.15	80.14	62.67	83.87	77.97	78.00
European OECD countries	59.14	38.16	23.71	27.52	19.51	12.07	65.81	43.28	27.57
Other European countries									
Non-Europe	17.76	21.08	25.02	25.66	18.42	35.99	16.09	21.81	21.37
Africa	3.32	3.80	4.15	6.29	3.37	1.65	2.70	3.92	4.98
America	6.34	6.43	4.51	12.71	10.81	6.36	5.00	5.23	3.90
United States	4.02	4.10	2.65	6.93	6.60	4.07	3.41	3.41	2.18
Asia	7.54	10.42	16.05	5.19	3.32	27.45	8.03	12.36	12.25
Australia and Oceania	0.56	0.43	0.31	1.47	0.91	0.52	0.36	0.30	0.24
Unallocated countries	0.25	0.49	0.55	1.19	1.45	0.63	0.05	0.23	0.53
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Emigration									
Europe	85.74	78.01	75.73	55.07	52.44	51.32	89.23	82.02	80.12
European OECD countries	67.67	53.19	32.06	51.73	48.21	40.49	69.48	53.97	30.54
Other European countries									
Non-Europe	14.07	20.78	20.67	43.65	41.36	32.97	10.70	17.55	18.46
Africa	2.46	3.63	4.21	7.70	6.29	3.49	1.86	3.21	4.34
America	6.45	8.30	7.10	25.82	25.44	18.65	4.24	5.61	5.02
United States	4.29	5.56	4.71	15.69	16.81	12.87	3.00	3.80	3.24
Asia	4.58	8.00	8.76	7.39	6.11	9.11	4.26	8.30	8.70
Australia and Oceania	0.58	0.85	0.60	2.73	3.51	1.72	0.34	0.43	0.39
Unallocated countries	0.19	1.21	2.99	1.28	6.21	13.84	0.07	0.43	1.03
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Statistisches Bundesamt (2001), own calculations.

Table 2: Baseline Cross-Section Regression Results

The dependent variables are the flows of German and foreigners migrating into and out of Germany and the FDI inward and outward stocks of Germany. Data have been aggregated at a state level. The dependent variables, GDP, GDP per capita, distance, and risk are in logs. The index 'S' denotes variables at the level of the German states. *t*-statistics based on robust standard errors are given in brackets. *** (**, *) = significant at the 1 (5, 10) % level.

	1	2	3	4	5	6	7	8	9	10	11	12
	1992						1999					
	Emigration		Immigration		FDI stocks		Emigration		Immigration		FDI stocks	
	German	Foreigners	German	Foreigners	Outward	Inward	German	Foreigners	German	Foreigners	Outward	Inward
Constant	–18.84***	–18.20***	–16.39***	–18.41***	–23.89***	–18.91***	–20.07***	–24.94***	–15.60***	–21.00***	–15.85***	–24.59***
	(–13.93)	(–7.81)	(–10.95)	(–8.22)	(–6.47)	(–4.74)	(–17.75)	(–11.33)	(–12.46)	(–11.03)	(–6.57)	(–5.12)
GDP	0.52***	0.45***	–0.64***	0.52***	0.73***	0.99***	0.66***	0.62***	0.65***	0.59***	0.88***	0.95***
	(15,85)	(12.43)	(14.80)	(16.57)	(8.39)	(9.01)	(22.40)	(21.70)	(18.54)	(22.18)	(12.91)	(9.53)
GDP per capita	–0.30***	–1.42***	–0.16	–1.40***	–0.16	0.67***	–0.06	–0.56***	–0.17**	–0.63***	–0.21	0.80***
	(–3.59)	(–11.30)	(–1.36)	(–11.05)	(–0.91)	(2.72)	(–0.87)	(–7.79)	(–2.11)	(–9.35)	(–1.25)	(2.86)
GDP_S	1.02***	1.16***	1.05***	1.09***	1.37***	0.99***	1.05***	1.17***	1.13***	1.13***	1.67***	0.98***
	(24.06)	(20.53)	(19.95)	(21.41)	(13.70)	(8.26)	(27.27)	(27.77)	(25.08)	(29.41)	(18.71)	(6.95)
GDP per capita	0.99***	1.90***	0.47***	1.10***	1.53*	2.02***	0.69***	0.89***	0.44***	0.70***	2.95***	1.40***
	(8.40)	(12.64)	(3.47)	(8.88)	(3.23)	(5.35)	(5.16)	(5.68)	(2.81)	(5.14)	(7.83)	(2.66)
Distance	–0.12**	–0.58***	–0.22***	–0.66***	–0.10	–0.96***	–0.27***	–0.32***	–0.29***	–0.31***	–0.39***	–0.46**
	(–2.56)	(–8.95)	(–4.28)	(–11.68)	(–1.01)	(–5.56)	(–6.93)	(–6.35)	(–7.05)	(–6.87)	(–4.66)	(–2.56)
State border	1.47***	1.77***	1.60***	1.17***	0.79**	1.64***	1.67***	0.94***	1.67***	1.02***	0.74**	1.25***
	(5.64)	(3.71)	(7.41)	(3.04)	(2.94)	(3.77)	(6.64)	(3.71)	(7.07)	(4.75)	(2.12)	(4.06)
Risk	0.93***	2.00***	–0.99***	1.43***	1.49***	–0.07	–0.14	–0.67**	–1.24***	–1.25***	0.16	–0.21
	(6.28)	(8.81)	(–4.03)	(6.94)	(3.25)	(–0.13)	(–0.81)	(–2.39)	(–4.93)	(–5.55)	(0.32)	(–0.16)
Freedom	0.01	0.00	–0.05	0.07	–0.02	–0.23	–0.14***	0.02	–0.20***	0.02	–0.35***	0.15
	(0.12)	(–0.07)	(–0.89)	(1.09)	(–0.23)	(–1.03)	(–4.92)	(0.51)	(–5.76)	(0.49)	(–5.44)	(0.71)
EU	0.56***	–0.98***	0.33**	–0.68***	1.24***	–1.22**	0.22*	0.70***	0.29**	0.76***	0.29	0.87*
	(4.41)	(–5.49)	(2.36)	(–4.19)	(4.00)	(–2.47)	(1.95)	(5.32)	(2.60)	(6.55)	(1.16)	(2.00)
Common language	1.72***	–0.38*	1.24***	–0.09	1.73***	0.36	1.33***	0.15	1.18***	0.42***	0.54	0.48
	(10.57)	(–1.70)	(8.12)	(–0.47)	(5.06)	(0.69)	(12.27)	(1.13)	(10.90)	(3.23)	(1.16)	(1.06)
Capital controls					–0.10	–0.58					–0.43*	–1.20***
					(–0.30)	(–1.20)					(–1.85)	(–3.13)
Population share		0.22***		0.21***				0.21***		0.20***		
		(9.49)		(9.26)				(10.09)		(11.15)		
R^2	0.75	0.67	0.59	0.68	0.61	0.62	0.74	0.68	0.66	0.73	0.64	0.55
N	579	633	635	708	362	299	734	792	756	792	459	293

Table 3: Seemingly Unrelated Regressions (SUREG)

Breusch-Pagan test is the test for independent equations; i.e., that the disturbance covariance matrix is diagonal. See also Table 2.

		1992	1999	1992	1999
		Emigration Germans / Outward FDI		Immigration foreigners / Inward FDI	
Migration	GDP	0.56***	0.69***	0.42***	0.56***
		(14.87)	(19.58)	(8.38)	(13.95)
	GDP per capita	–0.22***	–0.14**	–1.07***	–0.89***
		(–2.62)	(–1.80)	(–8.30)	(–8.08)
	GDP_S	1.06***	1.01***	1.15***	1.14***
		(21.05)	(20.94)	(16.78)	(19.90)
	GDP per capita	0.51**	0.12	0.70***	0.71***
		(2.57)	(0.65)	(3.90)	(3.66)
	Distance	–0.05	–0.21***	–0.57***	–0.29***
		(–1.01)	(–4.28)	(–7.03)	(–4.29)
	State border	1.52***	1.72***	0.97***	0.74***
		(5.32)	(6.60)	(2.82)	(2.63)
	Risk	0.51***	0.40	0.02	0.46
		(2.60)	(1.41)	(0.08)	(1.07)
	Freedom	–0.00	–0.09**	–0.18*	0.20***
		(–0.13)	(–2.38)	(–1.68)	(2.96)
	EU	0.57***	0.01	–0.27	0.33**
		(3.83)	(0.12)	(–1.35)	(1.97)
	Common language	1.61***	1.15***	–0.11	0.56**
		(6.95)	(4.49)	(–0.40)	(2.43)
	Population shares			0.13***	0.23***
				(4.44)	(9.00)
	Constant	–21.35***	–24.47***	–10.01***	–27.48***
		(–14.66)	(–17.88)	(–3.47)	(–9.72)
	R^2	0.72	0.71	0.69	0.84
FDI	GDP	0.47***	0.87***	0.98***	0.94***
		(9.32)	(13.85)	(9.54)	(9.42)
	GDP per capita	–0.11	–0.17	0.66***	0.80***
		(–0.64)	(–1.26)	(2.76)	(3.09)
	GDP_S	1.38***	1.64***	0.98***	0.98***
		(13.56)	(19.10)	(7.42)	(6.94)
	GDP per capita	1.36***	2.94***	2.04***	1.39***
		(3.45)	(8.69)	(5.83)	(2.94)
	Distance	–0.01	–0.38***	–0.96***	–0.45***
		(–0.07)	(–4.37)	(–6.05)	(–2.85)
	State border	0.86	0.75*	1.61**	1.24*
		(1.49)	(1.62)	(2.42)	(1.78)
	Risk	1.35***	0.10	–0.08	–0.22
		(3.38)	(0.20)	(–0.15)	(–0.22)
	Freedom	0.01	–0.33***	–0.23	0.14
		(0.11)	(–4.66)	(–1.19)	(0.95)
	EU	1.43***	0.31	–1.23***	0.87**
		(4.71)	(1.19)	(–2.83)	(2.12)
	Common language	1.93***	0.49	0.33	0.48
		(4.07)	(1.08)	(0.61)	(0.86)
	Capital controls	–0.16	–0.32	–0.61	–1.27***
		(–0.53)	(–0.91)	(–1.46)	(–2.91)
	Constant	–25.69***	–15.70***	–18.53***	–24.47***
		(–7.64)	(–6.29)	(–4.46)	(–5.54)
	R^2	0.61	0.63	0.61	0.55
	N	347	448	295	293
	Breusch–Pagan test	15.01***	35.31***	0.32	0.27

Table 4: Cross-Section Regressions for 1999, Including Stocks

In Panel a, migration stocks are the cumulative net flows of German migrants abroad (for emigration) and the cumulative net flows of foreigners in Germany (for immigration). Countries Poland, Romania, and Russia have been dropped due to large negative net migration during the 1990s. In Panel b, migration stocks are the cumulative gross flows of German abroad and of foreigners into Germany. In this Panel, all countries are included. FDI stocks and migration stocks have been lagged by one period. See also Table 2.

a) Net Stocks

	1	2	3	4	5	6	7	8	9	10	11	12
			Emigration					Immigration			FDI	
	German	German	German	Foreigners	Foreigners	Foreigners	Foreigners	Foreigners	German	Germans	Outward	Inward
Constant	–18.48***	–21.14***	–24.55***	–22.92***	–35.86***	–20.68***	–24.26***	–23.95***	–15.35***	–18.86***	–14.77***	–26.78***
	(–16.38)	(–15.06)	(–18.99)	(–9.90)	(–14.63)	(–9.81)	(–7.60)	(–8.42)	(–13.00)	(–8.44)	(–5.00)	(–4.81)
Migration stocks	0.04***	0.04***		0.02**		0.00	0.02		–0.02***		0.01	0.06**
	(5.86)	(5.25)		(2.15)		(0.12)	(0.21)		(–5.54)		(0.35)	(2.56)
FDI stocks		0.15***	0.14***		0.02		0.02	0.02		0.01		
		(5.98)	(5.55)		(0.88)		(0.64)	(0.65)		(0.21)		
GDP	0.58***	0.47***	0.48***	0.61***	0.54***	0.57***	0.59***	0.59***	0.56***	0.64***	0.89***	0.92***
	(21.30)	(12.95)	(12.33)	(20.52)	(12.82)	(21.10)	(11.31)	(11.46)	(17.50)	(11.56)	(12.55)	(8.81)
GDP per capita	–0.11*	–0.27**	–0.22***	–0.47***	–0.79***	–0.53***	–0.69***	–0.69***	–0.23***	–0.56***	–0.08	0.60**
	(–1.65)	(–3.34)	(–2.87)	(–6.55)	(–8.49)	(–8.20)	(–3.45)	(–3.55)	(–3.15)	(–2.81)	(–0.44)	(2.09)
GDP_S	1.05***	0.73***	0.77***	1.17***	1.07***	1.12***	1.07***	1.07***	1.11***	1.03***	1.68***	1.01***
	(28.64)	(13.20)	(13.39)	(27.43)	(17.51)	(29.05)	(17.57)	(17.59)	(27.69)	(14.86)	(17.78)	(7.05)
GDP per capita_S	0.76***	–0.08	–0.12	0.93***	0.25	0.69***	0.70***	0.69***	0.46***	0.75***	2.74***	1.25**
	(6.17)	(–0.50)	(–0.68)	(5.74)	(1.29)	(4.92)	(3.82)	(3.82)	(3.14)	(4.07)	(6.60)	(2.34)
Distance	–0.16***	–0.02	–0.05	–0.26***	–0.13***	–0.26***	–0.18**	–0.18***	–0.23***	–0.30***	–0.3611***	–0.45**
	(–4.83)	(–0.63)	(–1.37)	(–5.33)	(–2.64)	(–5.51)	(–2.47)	(–2.67)	(–6.54)	(–4.78)	(–4.03)	(–2.43)
State border	1.35***	1.23****	1.32***	0.63*	0.73***	0.85***	0.95***	0.95***	1.65***	1.57***	1.07***	1.12***
	(5.69)	(6.40)	(6.66)	(2.63)	(3.45)	(3.95)	(4.21)	(4.23)	(6.30)	(5.91)	(3.32)	(3.53)
Risk	–0.05	1.10**	1.63***	–1.18***	1.21***	–1.56***	–0.50	–0.54	–0.69***	1.01	–0.72	0.69
	(–0.25)	(3.50)	(5.38)	(–3.88)	(3.21)	(–6.33)	(–0.61)	(–0.70)	(–3.69)	(1.41)	(–1.01)	(0.41)
Freedom	–0.11***	0.03	0.05	0.03	0.15	0.04	0.17***	0.17**	–0.15**	–0.12*	–0.35***	0.12
	(–4.07)	(0.82)	(1.41)	(0.83)	(3.13)	(1.09)	(2.06)	(2.06)	(–4.57)	(–1.86)	(–5.05)	(0.55)
EU	0.38***	0.19*	0.20*	0.83***	0.62***	0.89***	0.56***	0.56***	0.46***	0.06	0.43	0.59
	(3.87)	(1.91)	(1.85)	(6.34)	(4.77)	(7.83)	(3.99)	(3.98)	(4.73)	(0.45)	(1.61)	(1.31)
Common language	1.31***	1.12***	1.22***	0.17	0.13	0.49***	0.50**	0.51***	1.38***	1.11***	0.48	0.38
	(12.22)	(10.65)	(11.68)	(1.35)	(1.01)	(3.76)	(3.10)	(3.20)	(12.52)	(9.08)	(1.02)	(0.86)
Capital controls											–0.45*	–1.35***
											(–1.92)	(–3.39)
Population shares				0.20***	0.27***	0.21***	0.21***	0.20***				
				(9.11)	(11.39)	(9.85)	(7.58)	(8.22)				
R^2	0.78	0.81	0.80	0.68	0.67	0.72	0.75	0.75	0.70	0.73	0.64	0.57
N	683	464	466	735	475	742	311	311	707	309	421	276

b) Gross Stocks

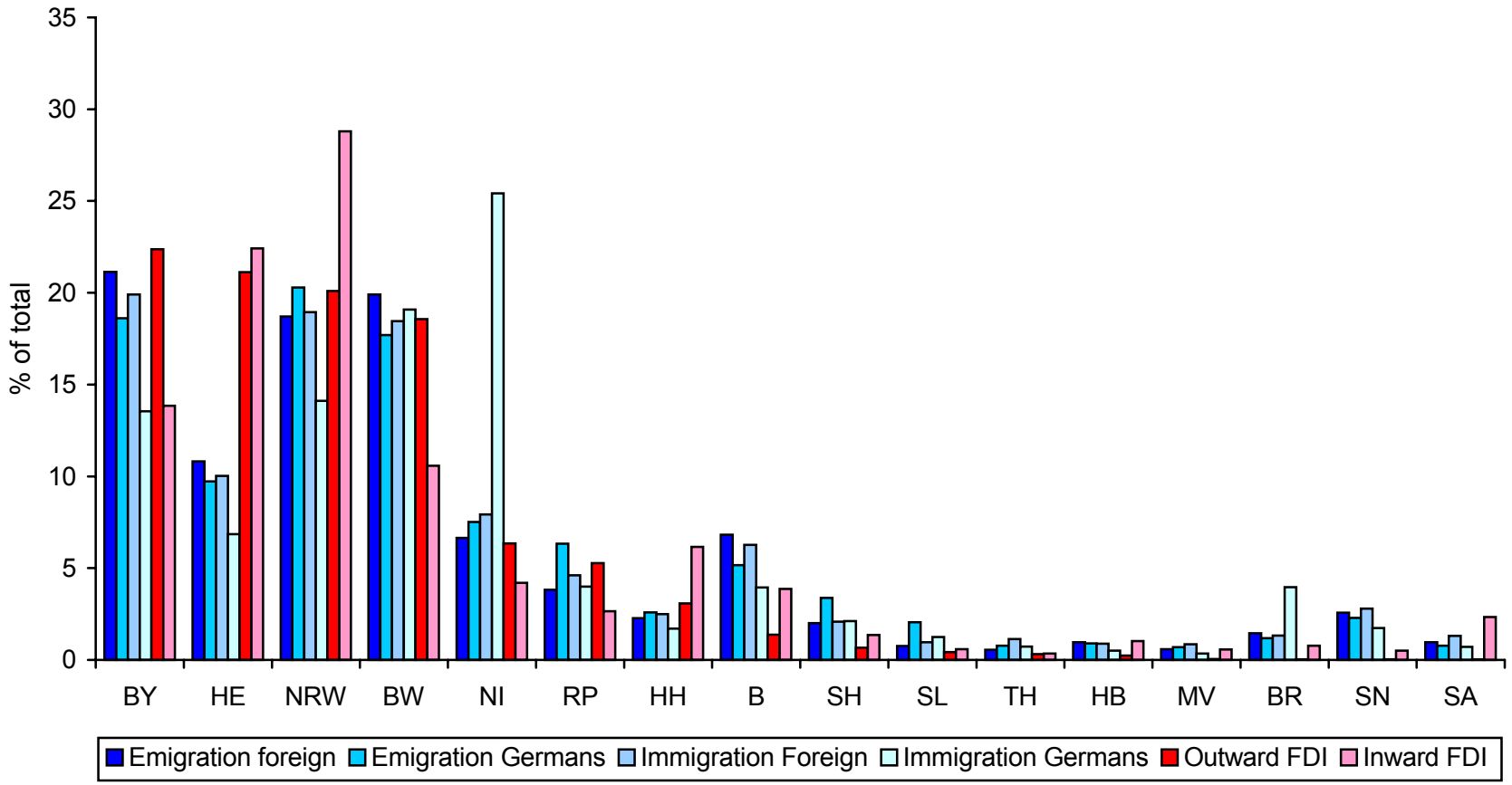
	1	2	3	4	5	6	7	8	9	10	11	12
			Emigration					Immigration			FDI	
	German	German	German	Foreigners	Foreigners	Foreigners	Foreigners	Foreigners	German	Germans	Outward	Inward
Constant	–9.84***	–6.62***	–22.27***	–19.51***	–37.35***	–12.70***	–13.46***	–24.93***	–15.80***	–13.71***	–3.39	–25.23***
	(–11.13)	(–5.89)	(–15.75)	(–9.70)	(–15.07)	(–11.35)	(–7.34)	(–8.84)	(–13.82)	(–6.50)	(–0.97)	(–5.22)
Migration stocks	0.61***	0.68***		0.36**		0.63***	0.69***		0.33***		0.48***	–0.10
	(24.04)	(21.24)		(10.65)		(36.52)	(25.62)		(11.77)		(5.71)	(-0.73)
FDI stocks		–0.01	0.15***		0.03		–0.01	–0.00		–0.02		
		(–0.11)	(5.71)		(1.09)		(–0.98)	(–0.08)		(–0.57)		
GDP	0.22***	0.20***	0.57***	0.35***	0.58***	0.19***	0.18***	0.61***	0.45***	0.74***	0.52***	1.01***
	(8.76)	(7.09)	(13.81)	(9.82)	(14.35)	(10.28)	(5.44)	(12.61)	(12.77)	(13.16)	(5.69)	(7.79)
GDP per capita	–0.08*	–0.07	–0.19**	–0.60***	–0.91***	–0.18***	–0.13*	–0.94***	0.01	–0.45**	–0.13	0.71**
	(–1.95)	(–1.28)	(–2.02)	(–9.46)	(–10.15)	(–4.96)	(–1.80)	(–5.47)	(0.16)	(–2.49)	(–0.88)	(2.28)
GDP_S	0.33***	0.25***	0.76***	0.71***	1.06***	0.37***	0.30***	1.07***	0.74***	1.03***	1.13***	1.10***
	(8.18)	(5.60)	(12.39)	(13.18)	(17.64)	(11.78)	(6.60)	(17.35)	(13.83)	(14.63)	(8.86)	(5.45)
GDP per capita_S	–0.71***	–0.51***	–0.21	0.12	0.19	–0.53***	–0.67***	0.74***	–0.25	0.85***	2.61***	1.61***
	(–6.18)	(–3.96)	(–1.09)	(0.82)	(0.97)	(–5.83)	(–5.29)	(4.04)	(–1.59)	(4.54)	(7.07)	(2.64)
Distance	–0.22***	–0.26***	–0.15***	–0.27***	–0.18***	–0.12***	–0.07*	–0.26***	–0.14***	–0.44***	–0.46***	–0.50***
	(–8.39)	(–8.25)	(–3.53)	(–5.92)	(–3.58)	(–4.68)	(–1.89)	(–3.81)	(–4.17)	(–6.21)	(–5.70)	(–2.83)
State border	0.53***	0.36**	1.47***	0.27	0.86***	0.27***	0.26**	1.04***	1.29***	1.60***	–0.11	1.33***
	(3.87)	(2.45)	(6.38)	(1.22)	(3.86)	(2.90)	(2.41)	(4.64)	(7.08)	(6.15)	(–0.31)	(3.80)
Risk	0.05	–0.22	0.70**	–0.47*	1.32***	–0.75***	–0.83***	0.20	–0.77**	–0.60	–0.19	–0.12
	(0.37)	(–1.02)	(2.09)	(–1.91)	(4.82)	(–7.05)	(–3.81)	(0.41)	(–2.94)	(–1.09)	(–0.34)	(–0.09)
Freedom	–0.15***	–0.15***	–0.03	0.03	0.11**	–0.01	–0.02	0.11	–0.17***	–0.30***	–0.38***	0.16
	(–6.85)	(–4.97)	(–0.81)	(0.98)	(2.37)	(–0.26)	(–0.54)	(1.41)	(–5.25)	(–3.95)	(–6.11)	(0.77)
EU	–0.21***	–0.25***	0.04	0.44***	0.48***	0.14***	0.08	0.36**	0.01	–0.10	–0.06	0.89**
	(–3.03)	(–3.48)	(0.37)	(3.64)	(3.61)	(2.06)	(0.99)	(2.57)	(0.12)	(–0.70)	(–0.25)	(2.04)
Common language	0.37***	0.26***	1.15***	–0.44***	0.06	–0.05	–0.01	0.44**	0.94***	1.09***	–0.00	0.58
	(4.76)	(2.82)	(10.90)	(–3.17)	(0.43)	(–0.43)	(–0.04)	(2.60)	(9.23)	(8.22)	(–0.00)	(1.21)
Capital controls											–0.05	–1.16**
											(–0.22)	(–3.00)
Population shares				0.23***	0.29***	0.11***	0.12***	0.22***				
				(11.53)	(12.22)	(10.53)	(7.80)	(8.54)				
R^2	0.88	0.89	0.74	0.73	0.67	0.90	0.92	0.75	0.71	0.69	0.68	0.55
N	726	499	499	780	509	792	328	328	756	326	459	293

Table 5: Granger Tests for Non-Causality

z-values in brackets. AR(1) and AR(2) = Arellano-Bond test that average autocovariance in residuals of order 1 (2) is 0 (z-values). Sargan test of over-identifying restrictions gives chi2 value.

LHS	RHS	Coefficient on LHS variable		Coefficient on RHS variables			AR(1)	AR(2)	Sargan Test	Causality?
		LD	L2D	D1	LD	L2D				
Emigration Germans	Outward FDI	0.07* (1.68)		0.00001 (0.02)	–0.0002 (–0.41)		–7.82***	0.66	97.48***	No
Outward FDI	Emigration Germans	0.01 (0.63)		2.06 (1.32)	1.50* (1.87)		–14.33***	–0.29	110.55***	Yes
Emigration Germans	Outward FDI	0.04 (0.85)		–0.001 (–1.62)	–0.0004 (–0.63)	0.0007 (1.46)	–7.29***	0.04	53.00***	No
Outward FDI	Emigration Germans	0.01 (0.45)		3.17* (1.72)	1.92* (2.05)	–0.27 (–0.39)	–14.07***	–0.50	107.14***	Yes
Immigration Foreigners	Inward FDI	0.43*** (13.11)		0.001* (2.52)	0.001*** (3.55)		–5.63***	–1.23	125.12***	Yes
Inward FDI	Immigration Foreigners	–0.11*** (–3.35)	–0.13*** (–4.15)	4.20** (2.15)	1.13 (1.19)		–12.05***	0.23	91.50***	Yes
Immigration Foreigners	Inward FDI	0.25*** (5.84)	–0.13*** (–5.01)	0.001** (2.53)	0.002*** (3.29)	0.001** (2.23)	–4.68***	–0.94	104.45***	Yes
Inward FDI	Immigration Foreigners	–0.11*** (–3.37)	–0.13*** (–4.15)	2.73 (1.37)	0.91 (0.95)	–0.98 (–1.09)	–11.92***	0.21	92.86***	No

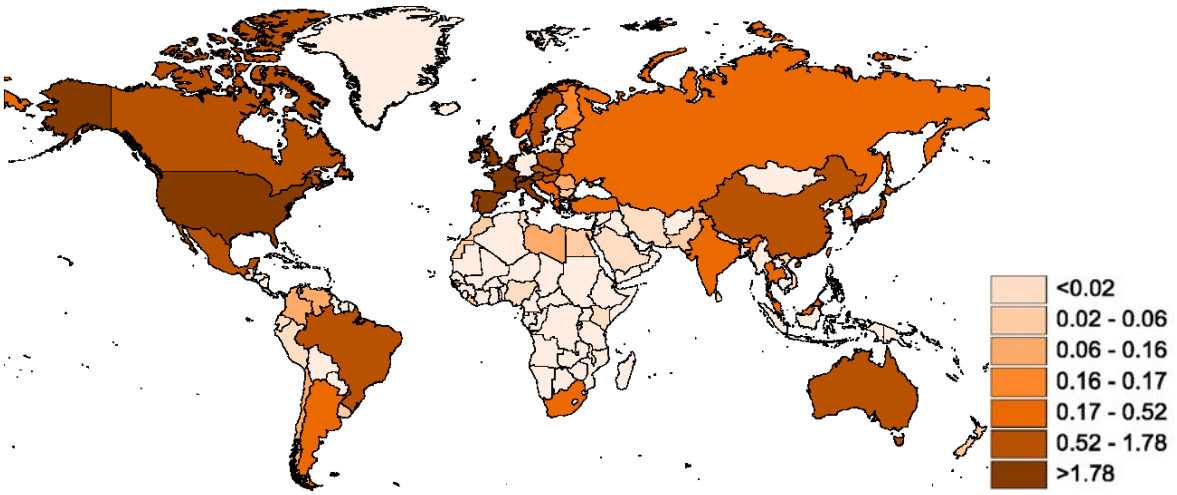
Graph 2: Regional Distribution of FDI and Migration by German State, 1999



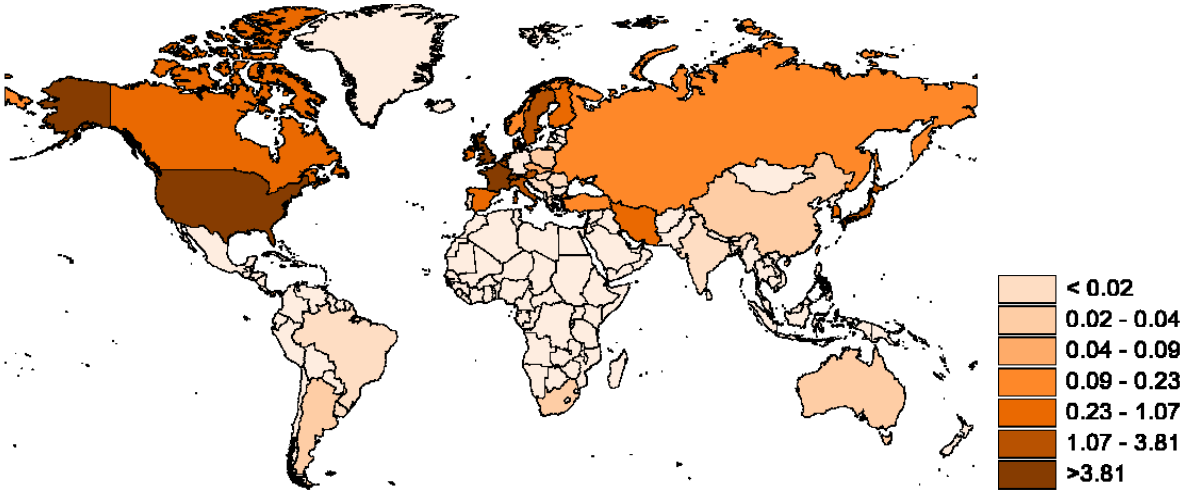
Graph 3 – Regional Distribution of German FDI and Migration, 1999

These maps show the countries ordered by their importance for German FDI and migration, respectively. Each class contains the same number of countries. Therefore, the cut-off points are not the identical across the different maps. The exception to this rule is the first group of countries, which contains all countries for which no significant FDI or migration is being reported.

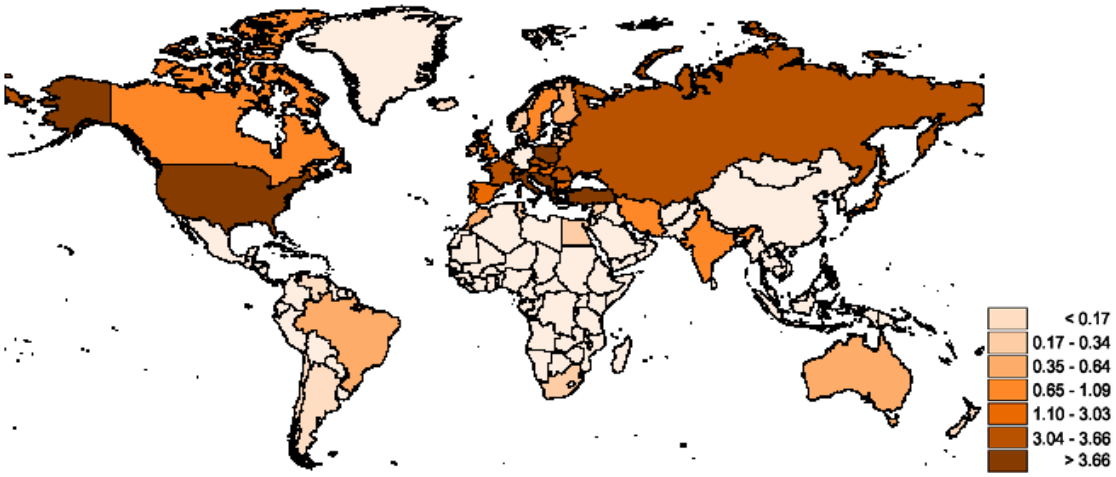
a) German Outward FDI Stock (1999, % of Total German Outward FDI Stock)



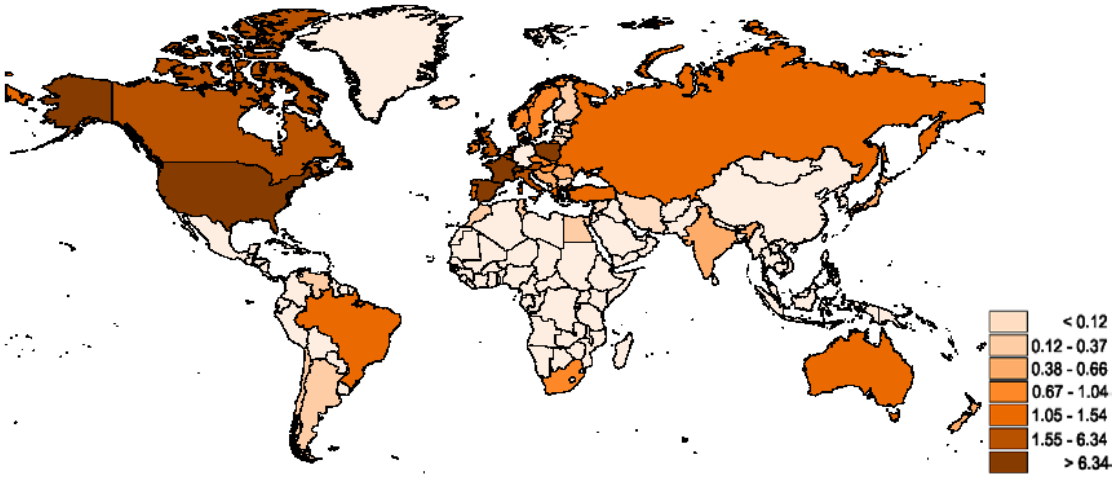
b) German Inward FDI Stock (1999, % of Total German Inward FDI Stock)



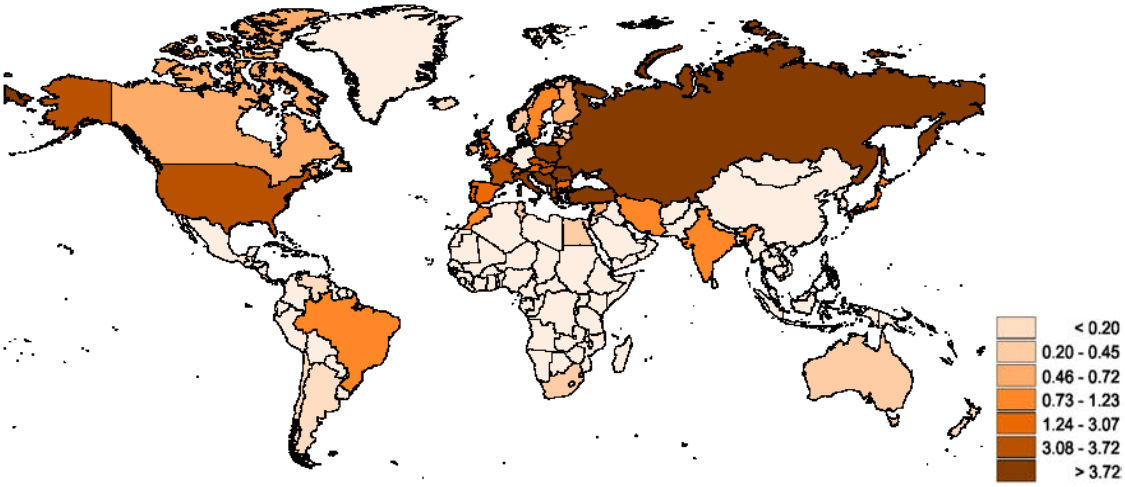
c) Emigration of Foreigners (1999, % of Total Emigration of Foreigners)



d) Emigration of German (1999, % of Total Emigration of Germans)



e) Immigration of Foreigners (1999, % of Total Immigration of Foreigners)



f) Immigration of Germans (1999, % of Total Immigration of Germans)