IAW-Diskussionspapiere

Discussion Paper

31

Openness and Growth: The Long Shadow of the Berlin Wall

Claudia M. Buch
Farid Toubal

May 2007

ISSN: 1617-5654

Institut für
Angewandte
Wirtschaftsforschung

Ob dem Himmelreich 1
72074 Tübingen
T: (0 70 71) 98 96-0
F: (0 70 71) 98 96-99
E-Mail: iaw@iaw.edu
Internet: www.iaw.edu

IAW-Diskussionspapiere

Das Institut für Angewandte Wirtschaftsforschung (IAW) Tübingen ist ein unabhängiges außeruniversitäres Forschungsinstitut, das am 17. Juli 1957 auf Initiative von Professor Dr. Hans Peter gegründet wurde. Es hat die Aufgabe, Forschungsergebnisse aus dem Gebiet der Wirtschafts- und Sozialwissenschaften auf Fragen der Wirtschaft anzuwenden. Die Tätigkeit des Instituts konzentriert sich auf empirische Wirtschaftsforschung und Politikberatung.

Dieses **IAW-Diskussionspapier** können Sie auch von unserer IAW-Homepage als pdf-Datei herunterladen:

http://www.iaw.edu/Publikationen/IAW-Diskussionspapiere

ISSN 1617-5654

Weitere Publikationen des IAW:

- IAW-News (erscheinen 4x jährlich)
- IAW-Report (erscheinen 2x jährlich)
- IAW-Wohnungsmonitor Baden-Württemberg (erscheint 1x jährlich kostenlos)
- IAW-Forschungsberichte

Möchten Sie regelmäßig eine unserer Publikationen erhalten, dann wenden Sie sich bitte an uns:

IAW Tübingen, Ob dem Himmelreich 1, 72074 Tübingen,
Telefon 07071 / 98 96-0
Fax 07071 / 98 96-99
E-Mail: iaw@iaw.edu

Aktuelle Informationen finden Sie auch im Internet unter: http://www.iaw.edu

---

Openness and Growth: The Long Shadow of the Berlin Wall*

Claudia M. Buch (University of Tübingen and IAW)+

Farid Toubal (University of Paris I and Paris School of Economics)‡

May 2007

Abstract

The question whether international openness causes higher domestic growth has been subject to intense discussions in the empirical growth literature. This paper addresses this issue using the fall of the Berlin wall in 1990 as a natural experiment. We analyze whether the slow-down in convergence in per capita income between East and West Germany since the mid-1990s and the lower international openness of East Germany are linked. We address the endogeneity of openness by adapting the methodology proposed by Frankel and Romer (1999) in a panel framework. We instrument openness with time-invariant exogenous geographic variables and time-varying exogenous policy variables. We also distinguish different channels of integration. Our paper has three main findings. First, geographic variables have a significant impact on regional openness. Second, controlling for geography, East German states are less integrated into international markets along all dimensions of integration considered. Third, the degree of openness for trade has a positive impact on regional income per capita.

Key words: openness, growth, German re-unification

JEL-classification: F2, F43

---

* This paper has partly been written during visits of the authors to the research centre of the Deutsche Bundesbank. The hospitality of the Bundesbank as well as access to its Micro-Database Foreign Direct Investment (MiDi) are gratefully acknowledged. The project has benefited from financial support through the German Science Foundation under the project "Multinational Enterprises: New Theories and Empirical Evidence from German Firm-Level Data" (BU 1256/6-1). Ira Brammen, Leena Graeger, and Nico Zorell have provided most efficient research assistance. All errors are in our own responsibility.

+ Corresponding author: University of Tuebingen, Department of Economics, Mohlstrasse 36, 72074 Tübingen, Germany. Phone: +49 7071 2972962, e-mail: claudia.buch@uni-tuebingen.de.

‡ University of Paris I, Panthéon-Sorbonne and Paris School of Economics. Centre d'Economie de la Sorbonne, 106-112 Boulevard de l'hôpital, Paris, France. e-mail: toubal@univ-paris1.fr.

1 Motivation

Does international openness have a positive impact on economic growth? This question has been subject to intense discussions in the empirical growth literature. In this paper, we argue that the fall of the Berlin wall in 1990 can be taken as a natural experiment to re-assess this question. Earlier work has used German reunification as a natural experiment to assess the importance of border effects. The German-German border has, for instance, caused a significant decline in population growth of cities located along that border (Redding and Sturm 2005), and it has lowered the volume of trade (Nitsch 2004). Here, we assess whether the lower degree of international openness of the East German states and their lower GDP per capita are linked. Our paper is motivated by two observations.

First, following the initial re-unification boom in the early 1990s, the convergence of per capita incomes between East and West Germany has slowed down (Figure 1). Up until the mid-1990s, growth rates in East Germany have been above those of West Germany. Since the mid-1990s, however, growth rates have been similar to those observed in the West. Unemployment has been persistently above the West German level. Only the most recent upturn in 2006 has been shared by the two regions.

Second, the East German states remain less integrated into international goods and factor markets than their West German counterparts. On average, East German states have a trade share of 10-13% of GDP compared to 24% for their West German counterparts (see Figure 2).[1] The increasing importance of foreign direct investment and multinational firms is largely a West German phenomenon. In 2003, East German firms accounted for only 0.2% of the stock of German outward FDI, and 2.7% of the stock of inward FDI in Germany has been

[1] Unless indicated otherwise, these data have been obtained from the German Federal Statistical Office and from the Micro-Database Foreign Direct Investment (*MiDi*) of the Deutsche Bundesbank.

invested in the East German states. The share of foreigners in the total population is around 2% in the East, compared to 9% for Germany as a whole. These numbers are below the share of East Germany (excluding Berlin) in German GDP (about 11%).

In this paper, we analyze whether the slow-down in convergence in per capita income between East and West Germany and the lower international openness of East Germany are linked. One reason for the slow-down in growth could be the phasing out of investment subsidies since the mid-1990s (Sinn 2002). However, the relatively weak growth performance of East Germany could also be the result of its low degree of integration into international markets. This could prevent East German firms from exploiting scale economies and benefiting from an international division of labor.

The question whether higher trade openness increases countries' economic growth has received a great deal of attention. (See, e.g., the recent surveys by Baldwin (2003) and Rodriguez (2006).) Rodriguez argues that finding a positive link between openness and growth depends strongly on the construction of "*indicators of openness that were in effect inappropriate measures of trade restrictions or on a questionable use of econometric methodologies.*" (Rodriguez, 2000, p. 4). The nature of the relationship between openness and growth is complex because the degree of openness of a country is closely linked to its income level. Any measure of openness that relates trade to GDP is linked to GDP growth. In order to deal with the endogeneity of the openness variable, Dollar and Kraay (2003) suggest instrumenting the openness variable by its lagged value. Unfortunately, their instrumentation strategy is not appropriate because openness might be serially correlated over time (Lee et al. 2004). Alternatively, Frankel and Romer (1999) have suggested using the geographic component of trade as an instrument for actual trade. Their cross-country results show that the instrumented trade ratios have a positive and significant impact on growth. According to Rodriguez and Rodrik (2000), their instrumentation strategy is still questionable because the

predicted trade share might affect growth via, for instance, their relation to health condition and diseases, or the quality of institutions. Lee et al. (2004) follow an alternative route by using a so-called "*identification through heterogeneity*" methodology to identify the effect of trade on growth. The methodology is based on heteroskedasticity of structural shocks, and the paper shows a small but positive impact of trade on growth.

In this paper, we apply a methodology that is similar to the one proposed by Frankel and Romer (1999). However, we depart from earlier literature on the link between trade and growth in three regards. First, we use German state-level rather than cross-country data to test the impact of openness on growth. This has the advantage of keeping constant differences in institutions, regulations, cultural, and public health factors. Second, in addition to testing the impact of trade on growth, we use foreign direct investment and migration as alternative measures of international integration. Third, in studying regional data for Germany, we can use not only the geographic component of foreign trade as an instrument for actual trade. We can also use an exogenous variable measuring the impact of policy on trade. One shortcoming of the original approach by Frankel and Romer (1999) is that it cannot address the impact of trade policy on growth. Here, we argue that the isolation of the East German states from the Western world before 1990 provides us with a unique opportunity to analyze the impact of the shift in policies that occurred in the early 1990s on the link between openness and growth. We capture this by adding a trend to the growth regression that is specific to East German states. It has the advantage to be exogenous to growth.

In Section Two, we present stylized facts on factor endowments, openness, and growth of the German states. In Section Three, we set up our empirical method. Section Four gives the regression results, and Section Five concludes. Our paper has three main findings. First, geographic variables have a significant impact on openness. Second, controlling for geography, East German states are less integrated into international markets along all three

dimensions of integration – trade, FDI, and migration – considered. Third, greater openness for trade and FDI has a significantly positive impact on per capita income at the regional level.

2 Stylized Facts

Prior to the fall of the Berlin wall, East Germany has been well integrated into foreign trade among the formerly communist countries of Central and Eastern Europe. Exports over GDP were higher in East Germany (40%) than in West Germany (29%) in 1989 (Sinn and Sinn 1993). Yet, trade among these countries was not guided by market principles and took place under heavily distorted prices. Hence, the integration into international trade that started in the early 1990s necessitated a significant re-direction of trade flows, and trade relative to GDP fell significantly. In this section, we review the stylized facts regarding the openness and the growth performance of the German states.

2.1 Growth and GDP per Capita

The early years following German re-unification in 1990 have been a success story in terms of convergence. Until the mid-1990s, GDP per capita in the East German states has converged rather rapidly to the West German average. However, growth rates in East and West Germany have leveled off since then (Figure 1). On average, nominal GDP per capita in East Germany was 20,000 € in 2005, compared to 29,000 € in the West (Table 1b). Differences in living standards are less pronounced than these numbers suggests due to lower price levels in the East.

Different factor intensities can partly explain these differences. Measured relative to the total stock of employees, the capital intensity in East Germany was 83% of the West German level in the year 2003 (Table 1a).

When the Berlin wall came down, differences in factor endowments between East and West Germany were even more pronounced, and the resulting factor prices differentials have triggered cross-border movements of capital, labor, and goods. From a theoretical point of view, the direction of factor movements is not clear a priori. According to the standard neoclassical model, factors of production will move to regions where they are relatively scarce. If, however, agglomeration effects and network externalities matter, factors of production may also cluster in specific regions. (For theoretical discussions in the context of German reunification see Burda (2006) and Uhlig (2006).)

With the lifting of barriers to the integration of markets in the early 1990s, an adjustment to a new long-run steady state has indeed started. This adjustment process has two main characteristics. First, trade and factor movements were re-oriented from the formerly socialist countries towards the rest of the world. Second, integration with West Germany has been much more rapid than integration with the rest of the world. Official statistics measure mainly the integration into international markets. Intra-German flows of goods and factors of production are more difficult to trace. Hence, our focus is on the *international* dimension of the integration process, and we distinguish international trade, foreign direct investment, and immigration as the main three channels of integration.[2]

2.2 Openness and Channels of Integration

As regards the first channel of international integration, international trade, Figure 2 shows that all East German states had significantly lower export shares than the West German states in 1991. Whereas the average export share in the West was 17% of GDP, the corresponding share was only 3.5% for East Germany. During the 1990s, this gap has narrowed. By the year

---

[2] Ideally, we would also use data on other capital flows such as portfolio investment and international bank lending. However, such data are unavailable on a regional basis.

2004, the East German export share was 12% of state GDP, compared to 26% in the West. *Sachsen* had even caught up to states like *Schleswig-Holstein* and *Hessen* with an export share of 17%. Similar differences are evident for imports. On average, the West German states imported goods and services by the equivalent of 23% of their state GDP. For the East German states, the corresponding ratio was only 13%.

Overall, the share of East Germany in German foreign trade is 5-6%, which is below the share of these states in German GDP (11%). A priori, one might expect that the low degree of trade integration has had a negative impact on growth since Eastern Germany cannot use the benefits of an international division of labor to a full extent. However, developments across the East German states are also quite heterogeneous, and some states have already reached the degree of integration into international trade comparable to the less-integrated West German states. This might reflect regulatory differences in terms of policies towards foreign investors, different traditions, and historical industry clusters. The region around Dresden in *Sachsen*, for instance, is specialized on high-tech production, and a convergence to earlier patterns of regional specialization could be observed.

Capital flows are the second channel of international integration. Overall, East Germany has received massive inflows of capital from abroad. Private capital flows have reached levels of 15% of East German GDP in the late 1990s (Sinn 2002). Most of these capital inflows have originated in West Germany. In contrast, East Germany has not attracted much FDI. Also, East German firms do not hold many foreign affiliates. The middle panel of Figure 2 shows large differences with respect to the share of FDI between East and West German states.

With regard to outward FDI, East Germany is underrepresented compared to its share in

German GDP.[3] East German multinationals account for less than 1% of the total turnover, the FDI volume, or the number of employees of German multinational firms. Their share in the total number of parents is a bit higher (1.7%). However, these shares are small compared to the share of East Germany in GDP (11%, all figures excluding Berlin). The relatively low share of East German firms in outward FDI is, in fact, not surprising, given that firms start entering foreign markets through exporting and given the relatively low export shares of East Germany. FDI typically follows later on. The average size of firms in East Germany is below that of West Germany, and recent empirical and theoretical work shows that the presence on foreign markets and firm size are positively correlated (Helpman et al. 2004). With regard to inward FDI, East Germany has been somewhat more important, having attracted about 3% of total FDI by the year 2003.

The third channel of international integration is migration. For migration, we also have estimates on intra-German migration. According to these numbers, East Germany has recorded net emigration of about 50,000 persons each year between 1991 and 2004 (Schneider 2005). Moreover, internal migration has been biased towards the relatively young and high-skilled. At the same time, East Germany has remained a relatively unpopular destination for immigrants from abroad (Figure 2). For West Germany, total immigrants accounted for 8% of the total population in 2004; for East Germany, the corresponding number was only about 2.6%.

---

[3] Data on FDI are drawn from the firm-level database *MiDi* of the Deutsche Bundesbank. They may give a misleading picture of actual FDI for two reasons. First, because of reporting limits, small FDI projects are not covered. Second, the regional dimension of the data for *inward* FDI may be biased since firms report their FDI to the regional branches of the Bundesbank in the state where they are headquartered. Yet, the location of the firms' headquarters may not coincide with the state in which they have their main production units. We believe that this bias is not too large since, for Germany as a whole (foreign and domestic firms), headquarters and affiliates are located in the same state in about 76% of the cases (Monopolkommision 2006: p. 119).

In sum, the stylized facts give the following picture:

- Growth performance has weakened since the mid-1990s, and differences in GDP per capita persist.
- East Germany is less integrated into international trade than West Germany.
- Few parents of German multinational firms are based in East Germany, and East German states have a below-average share in German inward FDI.
- International migration is relatively small in East Germany.

3 Empirical Method

Openness for trade, capital flows, and migration can have a significant impact on economic growth. Historically, periods of high growth in the world economy have been associated with a rapid expansion of international trade (Helpman 2004). From a theoretical point of view, improved utilization of scarce resources, improvements in technologies, and the exploitation of economies of scale can explain a causal effect of trade on growth. FDI can be important for growth because it is one channel through which technology spills over to the domestic market. Hence, it may contribute to sources of growth stressed in innovation-based growth models.

Estimating the link between openness and growth empirically is difficult though because the two are endogenously determined. Frankel and Romer (1999) have thus proposed to measure the causal impact of trade on growth by employing instrumental variable regressions and by using the geographic component in bilateral trade as a proxy for total trade. Here, we apply a similar methodology to trade, migration, and FDI. In contrast to Frankel and Romer (1999) who use data for a cross-section of countries, we use panel data for the German states.

The method is based on a two-step estimation model. In a first step, a bilateral openness equation is specified. Predicted bilateral openness measures from this equation are then aggregated to obtain a measure of aggregated openness which is related to a set of exogenous variables only. In a second step, predicted aggregated openness is used as an instrument in a regression explaining the impact of openness on GDP per capita.

We provide the descriptive statistics of our main variables (Table 2), a correlation matrix between the openness and the predicted aggregated openness variables (Table 4) and the data sources in Appendix.

3.1 The Openness Equation

Bilateral trade, FDI, and migration between German state *i* and a foreign country *j* are explained by the following gravity-type equation:

$$\tau_{ijt} = a_0 + a_1 X_{ij} + a_2 X_{it} + a_3 X_{jt} + a_4 X_i + a_5 X_j + a_6 East \cdot T + \varepsilon_{ijt} \qquad (1)$$

where τ_{ijt} is a measure of bilateral openness, X_i is a set of time-invariant bilateral explanatory variables (log of distance, 0/1 dummy for the presence of a common state border 0/1 dummy for landlocked states), X_{it} is a set of time-varying explanatory variables for the German state *i* (log of population), X_{jt} is a corresponding set of explanatory variables for the foreign country *j*, X_i (X_j) are time-invariant explanatory variables for the German state and the foreign country such as the log of area, and $East \cdot T$ is a vector of interaction terms between a 0/1 dummy for East German states and year fixed effects.

In Frankel and Romer (1999), the cross-section equivalent of equation (1) serves as the basis for constructing an instrument for the foreign trade share which is related to exogenous geographic variables only. One shortcoming of their approach is that they cannot say anything about the impact of economic policy on the link between trade and growth. In our set-up, we

also have a policy-related variable at hand which fulfills the requirement of being related to the volume of trade *and* being exogenous. The *East* dummy variable captures an exogenous shift in trade policies that happened in the early 1990s. As the influence of the isolation from Western markets becomes less important over time, we allow the impact of this variable to vary over time by specifying a multiplicative term between the *East* dummy and the year specific effects.

Our approach is also broader than the one used by Frankel and Romer (1999) since, in addition to the bilateral trade share (exports and imports over the GDP of the German state), we also use information on the stock of immigrants (normalized by state population), and on the stock of FDI (relative to state-level GDP). We also use information for regions which share the same institutions and political conditions.

Equation (1) is estimated using a pooled OLS regression with robust standard errors. The predicted values from this equation are used to obtain a measure of the geographic component of bilateral openness. Re-writing (1) in matrix form $\tau_{ijt} = \mathbf{a}'\mathbf{X}_{ijt} + \varepsilon_{ijt}$ where $\mathbf{a}$ is the vector of coefficients and $\mathbf{X}_{ijt}$ is the vector of right-hand-side variables, state *i*'s overall openness is given by

$$\hat{\Gamma}_{it} = \sum_{j \neq i} e^{\hat{\mathbf{a}}\mathbf{X}_{ijt}} . \qquad (2)$$

The explanatory variables included in (1) are exogenous to economic growth of state *i*. This implies that predicted openness can be used as an instrument in a growth regression if predicted openness and actual openness are sufficiently correlated.

3.2 The Growth Equation

We measure the impact of openness on economic performance by estimating the determinants of GDP per capita at the state level. Hence, we take into account the point made by Henry

(2006) that, according to the neoclassical growth model, greater openness should have a one-time shift effect on growth and a permanent impact on income per capita. For notational convenience, we label the equation estimating the determinants of GDP per capita the 'growth' equation in the remainder of this paper. With a proxy for expected aggregated openness at hand, the growth equation can be specified similar to Frankel and Romer (1999):

$$\ln\left(\frac{Y}{L}\right)_{it} = a + b\Gamma_{it} + c_1 \ln L_{it} + c_2 \ln A_i + u_{it} \qquad (3)$$

where $\left(\frac{Y}{L}\right)_{it}$ is income per capita in state *i*, Γ_i is the actual degree of openness, L_{it} is state population, and A_i is the size of state *i* in km². Our dataset is defined over a panel of the 15 German states and a time period of 14 years (1991-2004).

In vector form, the equation to be estimated can be written as $y_i = X_i \beta + u_i$, where $y_i = \left(y_{i1}, \cdots, y_{iT}\right)'$, $x_i = \left(x_{i1}, \cdots, x_{iT}\right)'$, and $u_i = \left(u_{i1}, \cdots, u_{iT}\right)'$. We estimate this equation using an instrumental variables estimator with $\hat{\Gamma}_i$ serving as an instrument for Γ_i. Since the standard errors of the IV estimator are inconsistent in the presence of heteroskedasticity, we use a Generalized Method of Moment (GMM) technique. GMM allows for consistent and efficient estimation in the presence of arbitrary heteroskedasticity. Our central assumption is that the openness instruments $\hat{\Gamma}_i$ are exogenous and can be expressed as $E\left(\hat{\Gamma}_i u_i\right) = 0$. The *N* instruments give us a set of *N* moments, $g_i\left(\hat{\beta}\right) = \hat{\Gamma}_i' \hat{u}_i$ where g_i is $N \times 1$. There are *N* orthogonality conditions, which correspond to sample moments that can be written as $\bar{g}\left(\hat{\beta}\right) = \frac{1}{n}\sum_{i=1}^{n} g_i\left(\hat{\beta}\right) = \frac{1}{n}\hat{\Gamma}' \hat{u}$. Taking into account each predicted openness indicator separately, the number of instruments corresponds to the number of endogenous variables, and the

growth equation is perfectly identified. Hence, it is possible to find an estimator $\hat{\beta}$ that solves $\bar{g}\left(\hat{\beta}\right)=0$. The GMM estimator is, in this case, an IV estimator.

If the growth equation is overidentified, meaning that we introduce all predicted openness indicators in the growth equation, the former strategy will not be possible. In this case, the GMM estimator for β is the estimator $\hat{\beta}$ that minimizes the GMM objective function, $J(\hat{\beta}) = n\bar{g}(\hat{\beta})'W\bar{g}(\hat{\beta})$. *W* is the *optimal* N×N weighting matrix that minimizes the asymptotic variance of the estimator. In order to implement the GMM estimator, we assume that the heteroskedasticity is of unknown form.

We assess the validity of the predicted openness variables as instruments in two ways. First, we have a look at *F*-statistics of the joint significance of the excluded instruments on the first stage (Bound et al. 1995). According to Staiger and Stock (1997), an *F*-test statistics below 10 indicates weak explanatory power of the excluded instruments in the first stage. Second, we assess the orthogonality of the instrument variables using the Hansen J-test of overidentification.

4 Regression Results

We apply the methodology described above to a state-country panel dataset for Germany for the years 1991-2004. The bilateral openness equation is specified for each combination of German federal states and foreign countries; the growth equation is specified for a state-level panel dataset.

4.1 The Openness Equation

Table 3 reports the results for the openness equation. We include a dummy variable which is equal to one for the East German states, and we additionally interact this variable with time

fixed effects. [4] Additionally, time fixed effects are included. As regards the dependent variable, we distinguish FDI (the sum of inward and outward FDI relative to the state's GDP) from trade (the sum of imports and exports relative to the state's GDP), and the stocks of immigrants (relative to the state's population). In unreported regressions, we have also split up FDI into inward and outward FDI and trade into imports and exports. Results are qualitatively similar. Overall, our model explains more than 38% of the cross-sectional variation in the share of bilateral trade, 15% of the variation in the share of FDI, and 8% in the variation in immigration share across state-country pairs.

As regards the determinants of trade and FDI, we confirm earlier gravity regressions. Distance has a negative, and the state border dummy and foreign GDP have a positive impact. Foreign population has a positive impact on trade. German state population and the dummy for landlocked states have no statistically significant influence on the openness measures.

There are only a few variables which signs differ across specifications. State area has a negative impact on immigration but has no significant impact on trade and FDI. Migrants tend to move into densely populated states, which could be an indication that agglomeration forces are at work.

The regression results confirm our descriptive statistics in that East Germany is less integrated internationally than West German along all dimensions considered, even if we control for other factors affecting integration. Belonging to East Germany lowers openness to trade and FDI by $e^{0.8} = 2.23$ and openness to migration by $e^{0.08} = 1.08$. This effect can be interpreted as the influence of the former isolation of the East German states and thus of exogenous trade policy – the "long shadow of the Berlin wall".

---

[4] We do not include state fixed effects simultaneously since these complicate the interpretation of the dummy *East*. Unreported regressions show that out results are robust to including state fixed effects.

We use results of equation 3 to construct the predicted openness measures. Note that, in order to construct our instruments for trade, FDI, and migration, we use a specification in which the impact of the dummy variable for the East German states is allowed to vary over time. Looking at the correlation between the actual openness variable and the predicted openness variables as one measure for the quality of our instruments, we find correlation coefficients of about 0.5 to 0.9 (Table 4).

4.2 The Growth Equation

We present different specifications for our growth equations, using different estimation techniques, and different sets of dependent and explanatory variables. The first estimation technique that we use is a pooled panel. The second estimation technique is a state-fixed-effects panel estimation. In both specifications, the actual openness measures are instrumented with the predicted aggregated openness measures from the bilateral openness regressions. Moreover, the *F*-statistics of the joint significance of the excluded instruments on the first stage suggests that our instruments are valid and have a high explanatory power for actual openness.

In terms of the dependent and explanatory variables, we follow Frankel and Romer (1999), who use GDP per capita as the dependent variable, and a branch of the empirical growth literature, which uses GDP growth as the dependent variable (see, e.g., Barro and Sala-i-Martin 2004).

Results using GDP per capita as the dependent variable are presented in Table 5a. In a similar model, Frankel and Romer (1999) find a positive impact of trade openness on GDP per capita, a negative impact of country size (log area), and a positive impact of population size. Since we use GDP per capita as the dependent variable, we omit population size in the regression but add the log capital stock as a regressor. To capture the on-going nature of the integration

process in Eastern Germany, we additionally include a dummy for the East German states, an interaction term between this variable and a dummy which is set equal to one for the pre-1996 period, and a linear time trend. The interaction term between the East German dummy and the post 1996-period is included to capture the phasing out of investment subsidies in 1996. The expected sign is negative for the regressions using GDP per capita as the dependent variable and positive for the regressions using GDP growth as the dependent variable. The East German dummy and the interaction term are indeed negative and significant in most specifications for GDP per capita. The time trend is positive, as expected. Results reported in Table 5a show a negative impact of state size on GDP per capita and a positive impact of the capital stock.

Turning to the main variables of interest in this paper – the proxies for international integration – there is fairly robust evidence for a positive and significant impact of more trade and FDI on GDP per capita. The trade share has a positive and significant impact on GDP per capita in all specifications, including those where all openness measures are entered simultaneously. The FDI share is positive and significant only when entered in isolation and insignificant otherwise. This suggests that the trade and FDI openness variable might share some common information. The only openness measure which changes its sign moving from the OLS to the panel specification is the share of immigrants in total population. According to the OLS specification, the impact of this variable is positive while it is negative or insignificant in the fixed-effect regressions. The positive sign in the OLS equations might have been driven by the concentration of productive migrants in some states such as the smaller city states (Berlin, Bremen, or Hamburg). According to Boeri and Brücker (2005), immigrants in Germany are generally less skilled than natives. Controlling for unobserved heterogeneity among German states, they might also receive a lower average per capita GDP than natives.

4.3 Robustness

In addition to different specifications of the openness equation and the different panel estimators used for the growth equation, which have been mentioned above, we perform two main sets of robustness tests. First, we estimate the growth equation using GDP growth rather than GDP per capita as the dependent variable. This specification, as has been noted above, is not our preferred specification as it does not take into account the prediction of the neoclassical model that international integration should have a one-time level rather than a permanent growth effect (see, e.g., Henry 2006). Second, we split trade into imports and exports and FDI into inward and outward FDI.

Results using GDP growth as the dependent variable are presented in Table 5b. The set of explanatory variables now differs slightly as we include log GDP per capita for each German state and log gross investment as explanatory variables. Our results confirm earlier literature that finds a negative impact of GDP per capita and a positive impact of gross investment on growth. The negative impact of GDP per capita reflects a catching-up effect – low-income states grow faster. The interaction term between *East* and the pre-1996 period is now positive and highly significant, as expected. Results for the different openness measures confirm the earlier findings: the impact of trade and FDI on growth is positive for the different specifications. The impact of the immigrant share again switches from being positive to being negative, but it is only marginally significant in the panel specifications. Notice that the estimation strategy that use states fixed effects yields overidentification tests that reject the validity of our instruments at the 10% level of significance. Controlling for heterogeneity across states, the geographic component of international openness, and the interaction terms between the *East* dummy and the time fixed effects, trade thus influences GDP growth.

In unreported regressions, we have also looked into the effects of exports instead of trade and outward FDI instead of FDI. Presumably, the regional dimension of the data is more reliable on the outward than on the inward side. We largely confirm our earlier results. The impact of exports is positive and significant in the panel specifications. The impact of outward FDI is positive and significant in the OLS and in the panel specifications. Results for the remaining variables are hardly affected.

5 Conclusions

The Berlin wall has fallen more than 15 years ago, but it still casts a long shadow. In this paper, we have analyzed whether differences in GDP per capita in East and West Germany are due to differences in the degree of international openness. In contrast to earlier literature, we have used state-level data for one country only. Differences in institutions, regulations, and cultural factors are thus not an issue. We have considered trade, FDI, and migration as channels of international integration. In addition to exogenous geographic variables, we have used a time-varying East German dummy as a proxy for exogenously imposed barriers to international integration to create instruments for openness. Hence, we have identified the impact of openness on growth in a panel framework.

The empirical analysis in this paper has been based on a two-pillar strategy as in Frankel and Romer (1999). First, we have estimated openness equations. The openness equations perform quite well in terms of explaining trade, migration, and foreign direct investment. They show that geography and policy (i.e. the former isolation of East Germany from international markets) have a significant impact on openness. Moreover, these equations provide us with fairly reliable instruments of openness that we can use to explain differences in growth performance across regions.

Our model shows significant differences in the degree of openness between East and West Germany, even after controlling for the impact of geography on openness. East German states trade less with the rest of the world than their West German counterparts. The East German states with the closest trade links show a degree of trade integration comparable to those of the lesser-integrated West German states. Differences in the degree of integration are even more striking for foreign direct investment. There are not only few parents of multinational firms located in East Germany, the share of East Germany in inward FDI is also particularly low.

In a second step, we have used predicted values for bilateral openness and a trend term that is specific to the East German states to obtain an instrument for the overall openness of each state. Trade openness has a positive and significant impact on per capita GDP. This result is robust to different specifications and econometric methodologies. The impact of FDI openness is positive and significant only when taken in isolation. We do not find strong support for a positive impact of the share of immigrants on per capita GDP. Its impact is even negative when we control for the heterogeneity of German states.

6 References

Baldwin, R.E. (2003). Openness and Growth: What's the Empirical Relationship?. National Bureau of Economic Research. NBER Working Paper 9578. Cambridge MA.

Barro, R.J., and X. Sala-i-Martin (2004). *Economic Growth*. 2nd edition. MIT Press. Cambridge, MA.

Bound, J., Jaeger, D.A., and Baker, R.M. (1995). Problems with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogenous Explanatory Variables is Weak. *Journal of the American Statistical Association* 90(430): 443-450.

Burda, M.C. (2006). Factor Reallocation in Eastern Germany after Reunification. *The American Economic Review* 96(2): 368-374.

Boeri, T., and Brücker., H., (2005). Why Europeans Are So Tough on Migrants. *Economic Policy* October 2005: 629-703.

Dollar, D. and Kraay A. (2003). Institutions, Trade, and Growth. *Journal of Monetary Economics* (50): 133-162.

Frankel, J.A., and D. Romer (1999). Does Trade Cause Growth? *American Economic Review* 89(3): 379-399.

Helpman, E. (2004). *The Mystery of Economic Growth*. Harvard University Press, Cambridge MA.

Helpman, H., M.J. Melitz, and S.R. Yeaple (2004). Export versus FDI with Heterogeneous Firms. *American Economic Review* 94(1): 300-316.

Henry, P.B. (2006). Capital Account Liberalization: Theory, Evidence, and Speculation. NBER Working Paper No. 12698. Cambridge MA.

Lee H.Y, Ricci L.A and R. Rigobon (2004). Once Again, Is Openness Good for Growth? *Journal of Development Economics* 75(2): *451-472.*

Lipponer, A., (2006). Microdatabase Direct Investment – MiDi A brief guide, Economic Research Centre, Deutsche Bundesbank, mimeo.

Monopolkommission (2006). Sechzehntes Hauptgutachten der Monopolkommission 2004/2005. Bundestagsdrucksache 16/2460. 25.8.2006.

Nitsch, V. (2004). Border Effects and Border Regions: Lessons from the German Unification. *Jahrbuch für Regionalwissenschaft* 1: 23-28.

Redding, S. J, and Sturm, D. (2005). The Costs of Remoteness: Evidence from German Division and Reunification. CEPR Discussion Papers 5015. London.

Rodríguez, F. (2006). Openness and Growth: What Have We Learned? Wesleyan Economics Working Paper 2006-011. Middletown, CT.

Rodríguez, F. and Rodrik (2000). Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence. In: Ben Bernanke and Kenneth S. Rogoff (eds.). *Macroeconomics Annual 2000*. MIT Press for NBER, Cambridge, MA.

Schneider, L. (2005). Ost-West-Binnenwanderung: Gravierender Verlust an Humankapital. *Wirtschaft im Wandel* 10/2005. 309-314.

Sinn, G., und H.W. Sinn (1993). *Kaltstart*. Deutscher Taschenbuchverlag. Tübingen.

Sinn, H.-W. (2002). Germany’s Economic Unification: An Assessment After Ten Years. *Review of International Economics* 10(1): 113-128.

Staiger, D., and J.H. Stock (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica* 65(3): 557-586.

Uhlig, H. (2006). Regional Labor Markets, Network Externalities and Migration: The Case of German Reunification. *American Economic Review* 96(2): 375-382.

7 Appendix

Data Definitions and Sources

The following state-level data have, unless indicated otherwise, been obtained from the German Federal Statistical Office (Statistisches Bundesamt), Volkswirtschaftliche Gesamtrechnung (VGR) der Länder

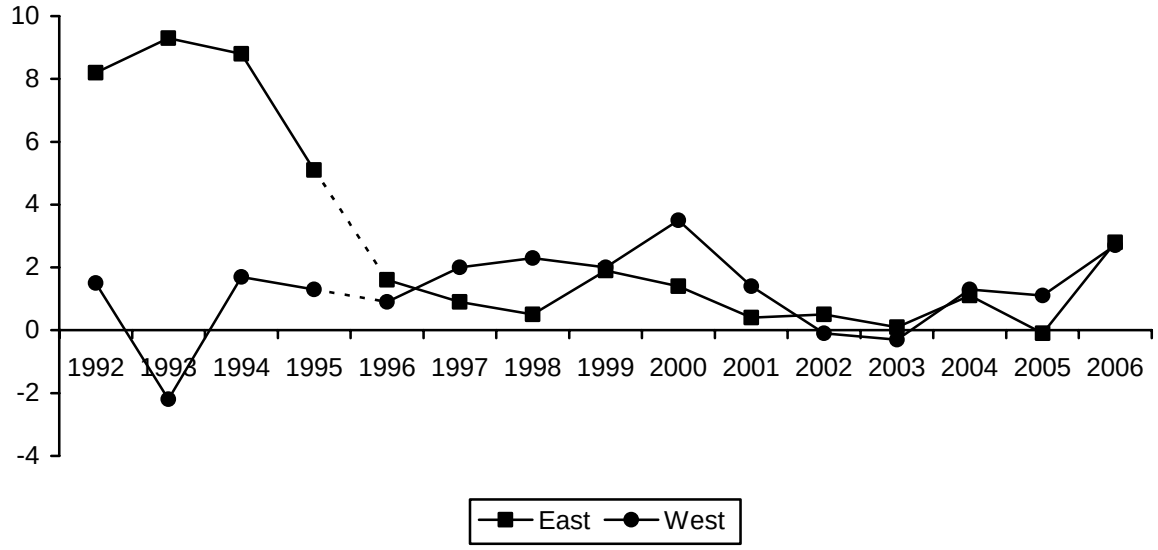
- Area: size of the German state in km²
- Capital stock: Capital stock of the German state in million Euro
- Distance: Geographic distance in 1,000 km, between German states and foreign countries.
- Foreign direct investment (FDI): Inward and outward foreign direct investment stocks. Semi-aggregated data by German state are taken from the firm-level database Micro-Database Foreign Direct Investment (*MiDi*) of the Deutsche Bundesbank. See Lipponer (2006) for details on the definition of these data.
- GDP per capita: State GDP per capita in prices of 1995 (in Euro)
- Landlocked German state: 0/1 dummy for German states not bordering the sea
- Population: State population (1,000)
- State border dummy: 0/1 dummy for border between a German state and a foreign country
- Stock of immigrants: stock of immigrants, end of period
- Trade: import and export value in million Euro.

The following country-level data have been obtained from the World Development Indicators on CD-Rom (World Bank):

- Area: country size in km²
- GDP: GDP in constant USD (Million)
- Population: Population in million

Figure 1: GDP Growth

Data for the East German states include Berlin. Data for the years before and after 1996 come from two different publications and may not be fully comparable.



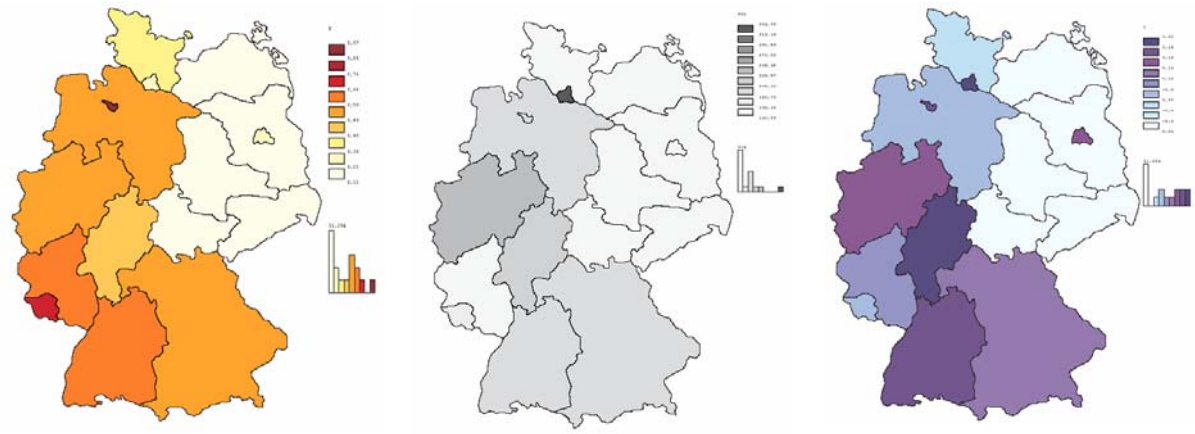
Source: German Statistical Office (VGR der Länder), http://www.destatis.de/themen/d/thm_regional.php (downloaded on May 6, 2007)

Figure 2: International Openness of East and West Germany

Trade share is defined as the share of exports and imports relative to GDP. *FDI share* is defined as the sum of inward and outward FDI stocks relative to GDP. *Migration share* is defined as the stock of immigrants relative to the total population.

(a) Trade Share (b) FDI Share (c) Immigrant Share

1992



2000

Source: German Statistics Office (VGR der Länder) (trade and migration), Micro Database Direct Investment (MiDi) (FDI); authors' calculations.

Table 1: Capital Intensity and GDP Per Capita

Data are averages for the East German states include Berlin.

a) Capital intensity (capital stock per employee in 1,000 euro)

	1991	1995	2000	2003
Baden-Württemberg	244	273	278	292
Bayern	250	280	298	317
Berlin	198	228	268	285
Brandenburg	n.a.	143	208	245
Bremen	209	229	239	250
Hamburg	208	230	240	260
Hessen	242	267	276	290
Mecklenburg-Vorpommern	n.a.	152	219	252
Niedersachsen	248	266	277	290
Nordrhein-Westfalen	226	248	248	261
Rheinland-Pfalz	269	294	303	318
Saarland	272	292	295	308
Sachsen	n.a.	136	193	212
Sachsen-Anhalt	n.a.	140	209	236
Schleswig-Holstein	251	273	290	307
Thüringen	n.a.	134	183	216
Mean West Germany	241	266	274	289
Mean East Germany	110	158	214	240

b) Nominal GDP per capita (euro)

	1991	1995	2000	2005
Baden-Württemberg	23,431	25,358	28,342	30,819
Bayern	22,725	25,523	29,486	32,408
Berlin	18,427	23,024	23,163	23,473
Brandenburg	7,660	15,035	17,295	18,756
Bremen	26,818	29,800	33,449	36,913
Deutschland	19,186	22,636	25,095	27,229
Hamburg	33,838	37,982	42,429	46,005
Hessen	24,418	27,145	30,225	32,453
Mecklenburg-Vorpommern	7,469	14,967	16,860	18,266
Niedersachsen	18,889	20,857	22,768	23,534
Nordrhein-Westfalen	21,185	23,443	25,236	27,080
Rheinland-Pfalz	19,299	20,942	22,590	24,004
Saarland	19,225	21,520	23,119	26,103
Sachsen	7,596	15,289	17,030	20,031
Sachsen-Anhalt	7,139	14,040	16,437	19,372
Schleswig-Holstein	19,303	21,800	23,312	24,381
Thüringen	6,626	13,932	16,640	19,048
Mean West Germany	22,030	24,372	26,956	29,045
Mean East Germany	9,442	16,350	18,108	20,117

Source: German Statistics Office (VGR der Länder)

Table 2: Descriptive Statistics of the Main Economic Variables

Variable	Observations	Mean	Standard deviation
	Openness equation		
Trade share	10,495	0.939	2.506
FDI share	4,266	0.608	1.917
Migration share	10,203	0.109	0.373
Ln Distance	12,950	8.052	0.996
Ln German state population	12,950	8.226	0.875
Ln foreign population	12,875	2.548	1.789
Ln foreign GDP in constant Euro	12,491	-2.802	1.874
East	12,830	0.284	0.451
	Growth equation		
Trade share	160	61.623	36.354
FDI share	160	16.211	17.598
Migration share	160	6.948	4.651
Predicted trade share	160	90.871	44.792
Predicted FDI share	160	-13.699	55.366
Predicted migration share	160	9.728	6.795
Ln GDP per capita German state	160	9.938	0.327
Ln gross investment	145	12.912	0.948

Table 3: The Openness Equation

FDI is the sum of inward and outward FDI stocks relative to GDP. *Trade* is the sum of exports and imports relative to GDP. *Stock of immigrants* is the stock of immigrants relative to total population. Robust t-statistics are reported in brackets. *** significant at the 1%, ** significant at the 5%, * significant at the 10% level of significance.

	FDI	Trade	Stock of immigrants
Ln Distance	–0.18***	–0.66***	–0.08***
	[2.91]	[6.45]	[6.48]
Ln German state population	0.12	–0.24	0.04
	[0.93]	[1.50]	[1.61]
Ln foreign population	–0.09	0.17***	0.05***
	[1.47]	[3.79]	[6.25]
Ln foreign GDP in constant Euro	0.49***	0.69***	0.00
	[4.62]	[10.85]	[0.25]
Ln German state area	–0.03	–0.02	–0.03**
	[0.56]	[0.30]	[2.02]
Ln foreign area	–0.02	–0.16***	–0.01
	[0.65]	[2.83]	[1.53]
Landlocked German state	0.19	–0.08	0.00
	[1.06]	[0.49]	[0.06]
State border dummy variable	0.62*	5.10***	0.02
	[1.85]	[2.72]	[0.26]
East German states dummy variable	–0.89***	–0.87***	–0.08***
	[3.20]	[5.01]	[3.35]
Constant	2.31***	12.08***	0.66***
	[2.90]	[7.84]	[3.86]
Year dummies	Yes	Yes	Yes
East * Year dummies	Yes	Yes	Yes
Observations	4,192	10,167	9,979
R-squared	0.15	0.38	0.08

Table 4: Correlation Between Openness Indicators and Their Predicted Values

This table gives the correlations between actual and predicted trade, FDI, and migration shares for the full sample. *** = significant at the 1*-level.

	Trade share	FDI share	Migration share	Predicted trade share	Predicted FDI share
Trade share	1.00				
FDI share	0.41***	1.00			
Migration share	0.64***	0.65***	1.00		
Predicted trade share	0.97***	0.52***	0.69***	1.00	
Predicted FDI share	0.51***	0.88***	0.79***	0.59***	1.00
Predicted migration share	0.60***	0.68***	0.98***	0.66***	0.81***

Table 5: The Growth Equation

This table reports the results of instrumental variable regressions, using predicted trade from Table 3 as an instrument of actual trade. The dependent variable in Table 5a is the log of real GDP per capita. The dependent variable in Table 5b is the growth rate in real GDP per capita. *Trend* is a linear time trend. *East* is a 0/1 dummy for the East German states. *East × 1996* is an interaction term between a 0/1-dummy for East German states and a 0/1 dummy for the pre-1996 period. ***, **, * significant at the 1%, significant at 5%, significant at 10% level of significance respectively. Observations are clustered at the state-level. Robust standard errors are reported in brackets.

a) GDP per capita as the dependent variable

	OLS estimates including state fixed effects				Fixed effects panel regressions			
	(S1)	(S2)	(S3)	(S4)	(S5)	(S6)	(S7)	(S8)
Trade share	0.0031***			0.0021***	0.0010***			0.0011**
	[0.0008]			[0.0006]	[0.0003]			[0.0005]
FDI share		0.0056**		0.0011		0.0008**		0.0005
		[0.0025]		[0.0017]		[0.0003]		[0.0004]
Migration share			0.0482***	0.0417***			-0.0121**	0.0115
			[0.0103]	[0.0119]			[0.0052]	[0.0080]
Ln German state area	-0.0604**	-0.0957***	-0.0029	0.0229				
	[0.0280]	[0.0283]	[0.0327]	[0.0283]				
Ln capital stock	0.1303**	0.0838*	-0.0371	-0.0462	0.0084	0.0484	0.0099	0.0482
	[0.0539]	[0.0432]	[0.0495]	[0.0456]	[0.0579]	[0.0604]	[0.0573]	[0.0656]
East	-0.1237	-0.1978***	-0.1525**	-0.0703				
	[0.1007]	[0.0588]	[0.0691]	[0.0939]				
East * 1996	-0.005	-0.0559***	-0.0349*	-0.0507***	-0.0242***	-0.0246***	-0.0227***	-0.0236***
	[0.0138]	[0.0212]	[0.0189]	[0.0131]	[0.0066]	[0.0073]	[0.0064]	[0.0071]
Trend	0.0099*	0.0055	0.0217***	0.0108*	0.0184***	0.0181***	0.0216***	0.0151***
	[0.0060]	[0.0052]	[0.0040]	[0.0056]	[0.0018]	[0.0019]	[0.0018]	[0.0026]
Constant	8.6096***	9.7240***	10.0462***	9.8598***				
	[0.5139]	[0.3960]	[0.3568]	[0.3890]				
Observations	145	145	145	145	145	145	145	145
R-squared	0.7989	0.794	0.8446	0.9045	0.9301	0.925	0.9112	0.9181
1st stage F-statistics: Trade	69.58***			69.58***	14.94***			14.94***
FDI		12.35***		12.35***		4.67***		4.67 ***
Migration			77.48***	77.48***			9.26***	9.26***
Hansen overidentification test	10.46	9.766	6.618	5.261	10.366	10.303	10.810	7.952
(*p-value)*	(0.164)	(0.202)	(0.470)	(0.385)	(0.169)	(0.172)	(0.147)	(0.159)

b) Real GDP growth as the dependent variable

	OLS estimates including state fixed effects				Fixed effects panel regressions			
	(S1)	(S2)	(S3)	(S4)	(S5)	(S6)	(S7)	(S8)
Trade share	0.0178***			0.0159**	0.0746***			0.0742*
	[0.0067]			[0.0068]	[0.0194]			[0.0382]
FDI share		0.0327**		0.0294**		0.0828*		0.0456
		[0.0132]		[0.0136]		[0.0429]		[0.0389]
Migration share			0.1241**	0.0091			-0.8253*	1.1233
			[0.0608]	[0.0716]			[0.4733]	[0.9600]
Ln GDP per capita German state	-1.9322*	-1.9295**	-2.4156*	-3.0338**	-4.8805	-12.3659***	-9.6532**	-9.0055**
	[1.0333]	[0.9731]	[1.3214]	[1.2819]	[4.0703]	[4.4007]	[4.3405]	[4.3168]
Ln gross investment	2.3046**	1.8832**	2.4960*	3.1566**	3.6006***	5.1866***	4.8642***	5.1260***
	[1.0487]	[0.9411]	[1.2863]	[1.3363]	[1.3541]	[1.8493]	[1.4772]	[1.7338]
East	-0.3716	-0.7256	-1.0643	-0.4671				
	[0.6741]	[0.7041]	[0.6600]	[0.6841]				
East * 1996	6.6450***	6.4947***	6.9642***	6.0041***	5.4086***	3.9672***	5.4733***	4.0262***
	[0.6154]	[0.6220]	[0.6039]	[0.6487]	[0.6319]	[0.6690]	[0.6465]	[0.7851]
Trend	0.0644	0.0502	0.1811***	-0.0057	-0.134	-0.0727	0.1868**	-0.2904
	[0.0607]	[0.0610]	[0.0547]	[0.0701]	[0.0830]	[0.1406]	[0.0808]	[0.1942]
Constant	-1.3481	3.6302	1.954	2.8419				
	[2.3913]	[2.6336]	[2.5049]	[2.5581]				
Observations	160	160	160	160	160	160	160	160
R-squared	0.57	0.5672	0.544	0.5822	0.4464	0.4532	0.4317	0.3889
1st stage F-statistics: Trade	42.00***			42.00***	7.33***			7.33***
FDI		7.13 ***		7.13***		3.48***		3.48***
Migration			85.17***	85.17***			5.80***	5.80***
Hansen overidentification test	10.715	12.194	10.182	10.833	16.206*	16.192*	17.600*	14.855*
p-value	(0.380)	(0.272)	(0.425)	(0.211)	(0.093)	(0.094)	(0.062)	(0.062)

IAW-Diskussionspapiere

Bisher erschienen:

Nr. 1
Das Einstiegsgeld – eine zielgruppenorientierte negative Einkommensteuer: Konzeption, Umsetzung und eine erste Zwischenbilanz nach 15 Monaten in Baden-Württemberg
Sabine Dann / Andrea Kirchmann / Alexander Spermann / Jürgen Volkert

Nr. 2
Die Einkommensteuerreform 1990 als natürliches Experiment. Methodische und konzeptionelle Aspekte zur Schätzung der Elastizität des zu versteuernden Einkommens
Peter Gottfried / Hannes Schellhorn

Nr. 3
Gut betreut in den Arbeitsmarkt? Eine mikroökonomische Evaluation der Mannheimer Arbeitsvermittlungsagentur
Jürgen Jerger / Christian Pohnke / Alexander Spermann

Nr. 4
Das IAW-Einkommenspanel und das Mikrosimulationsmodell SIMST
Peter Gottfried / Hannes Schellhorn

Nr. 5
A Microeconometric Characterisation of Household Consumption Using Quantile Regression
Niels Schulze / Gerd Ronning

Nr. 6
Determinanten des Überlebens von Neugründungen in der baden-württembergischen Industrie – eine empirische Survivalanalyse mit amtlichen Betriebsdaten
Harald Strotmann

Nr. 7
Die Baulandausweisungsumlage als ökonomisches Steuerungsinstrument einer nachhaltigkeitsorientierten Flächenpolitik
Raimund Krumm

Nr. 8
Making Work Pay: U.S. American Models for a German Context?
Laura Chadwick, Jürgen Volkert

IAW-Diskussionspapiere

Nr. 9
Erste Ergebnisse von vergleichenden Untersuchungen mit anonymisierten und nicht anonymisierten Einzeldaten am Beispiel der Kostenstrukturerhebung und der Umsatzsteuerstatistik
Martin Rosemann

Nr. 10
Randomized Response and the Binary Probit Model
Gerd Ronning

Nr. 11
Creating Firms for a New Century: Determinants of Firm Creation around 1900
Joerg Baten

Nr. 12
Das fiskalische BLAU-Konzept zur Begrenzung des Siedlungsflächenwachstums
Raimund Krumm

Nr. 13
Generelle Nichtdiskontierung als Bedingung für eine nachhaltige Entwicklung?
Stefan Bayer

Nr. 14
Die Elastizität des zu versteuernden Einkommens. Messung und erste Ergebnisse zur empirischen Evidenz für die Bundesrepublik Deutschland.
Peter Gottfried / Hannes Schellhorn

Nr. 15
Empirical Evidence on the Effects of Marginal Tax Rates on Income – The German Case
Peter Gottfried / Hannes Schellhorn

Nr. 16
Shadow Economies around the World: What do we really know?
Friedrich Schneider

Nr. 17
Firm Foundations in the Knowledge Intensive Business Service Sector. Results from a Comparative Empirical Study in Three German Regions
Andreas Koch / Thomas Stahlecker

Nr. 18
The impact of functional integration and spatial proximity on the post-entry performance of knowledge intensive business service firms
Andreas Koch / Harald Strotmann

Nr. 19
Legislative Malapportionment and the Politicization of Germany's Intergovernmental Transfer System
Hans Pitlik / Friedrich Schneider / Harald Strotmann

Nr. 20
Implementation ökonomischer Steuerungsansätze in die Raumplanung
Raimund Krumm

Nr. 21
Determinants of Innovative Activity in Newly Founded Knowledge Intensive Business Service Firms
Andreas Koch / Harald Strotmann

Nr. 22
Impact of Opening Clauses on Bargained Wages
Wolf Dieter Heinbach

Nr. 23
Hat die Einführung von Gewinnbeteiligungsmodellen kurzfristige positive Produktivitätswirkungen? – Ergebnisse eines Propensity-Score-Matching-Ansatzes
Harald Strotmann

Nr. 24
Who Goes East? The Impact of Enlargement on the Pattern of German FDI
Claudia M. Buch / Jörn Kleinert

Nr. 25
Estimation of the Probit Model from Anonymized Micro Data
Gerd Ronning / Martin Rosemann

Nr. 26
Bargained Wages in Decentralized Wage-Setting Regimes
Wolf Dieter Heinbach

IAW-Diskussionspapiere

Nr. 27
A Capability Approach for Official German Poverty and Wealth Reports: Conceptual Background and First Empirical Results
Christian Arndt / Jürgen Volkert

Nr. 28
Typisierung der Tarifvertragslandschaft – Eine Clusteranalyse der tarifvertraglichen Öffnungsklauseln
Wolf Dieter Heinbach / Stefanie Schröpfer

Nr. 29
International Bank Portfolios: Short- and Long-Run Responses to the Business Cycles
Sven Blank / Claudia M. Buch

Nr. 30
Stochastische Überlagerungen mit Hilfe der Mischungsverteilung
Gerd Ronning

Nr. 31
Openness and Growth: The Long Shadow of the Berlin Wall
Claudia M. Buch / Farid Toubal