States, Branches of Industry and Education Levels

Who will Benefit in Germany from a Transatlantic Trade and Investment Partnership (TTIP)?

Final Report, Part 2: Microeconomic Effects in Germany

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Global Economic Dynamics

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Who Will Benefit in Germany from a Transatlantic Trade and Investment Partnership (TTIP)?

Final Report, Part 2: Microeconomic Effects in Germany

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1. Introduction

In the first part of this study we examined the macroeconomic effects of a transatlantic trade and investment partnership (TTIP) between the European Union and the USA[1]. The main focus was on changes in trade structure, real income and employment provoked by the TTIP. Using a general equilibrium model, aggregated effects were examined for more than 120 countries. Adaptation of the aggregated price index in all these countries and the feedback effects on gross domestic products were considered in doing so, as was the full matrix of trade effects (even those between countries only indirectly affected) and thus all worldwide trade diversion effects. However, the broad geographic scale and the focus on macro-economic results made it impossible to draw more precise conclusions within individual countries. The second part of the study is intended to close that gap for Germany.

This study segment is devoted to the microeconomic effects of a transatlantic trade and investment partnership. It consists of zooming in on Germany, where we examine the disaggregated effects of an agreement on Germany's sectors and regions. This framework makes it possible to clarify which sectors and regions would be more impacted by a potential trade agreement than others. Furthermore, we can analyze the effects of a TTIP on different education levels and occupational categories. Unlike Part 1 of our study, we do not apply a general equilibrium model. Instead we base our analysis on a partial analytical approach of a gravitation equation. This means that the effects of the general equilibrium, such as trade diversion effects, are left out. This circumstance is important when interpreting the results and has obvious implications for any comparison with the results of the macro study.

Our analysis makes it possible to identify differences for Germany in how the impacts of a TTIP are felt in particular industries, occupations and education categories or regions. While our study makes use of quantitative methods, its partial analytic nature study strongly suggests that the results be interpreted mainly qualitatively. For a discussion of the effects on the whole economy, we refer the reader to the macro study cited above.

This micro study is organized as follows: In section 2 we explain our methodological approach and then, in section 3, we briefly present the data we used. In section 4, we identify the sector trade effects and discuss which industries we anticipate will experience greater economic vitality than others. Moreover, in this section we use a new approach to quantify the extent of non-tariff barriers (NTBs) at the industry level. Beyond that, we calculate the value creation and employment effects at the sector level. In section 5, we look at both the effects of a TTIP on Germany's job market as well as on Germany's regions. We explain which occupation and education categories and which regions would be most impacted by such an agreement. In section 6 we look at the effects of a TTIP on real income and the income risk. At the end of the study, we summarize our results.

1 See "The Transatlantic Trade and Investment Partnership (TTIP). Who Benefits from a Transatlantic Free Trade Agreement? Part 1: Macroeconomic Effects."

2. Comments on the investigational method

Our analysis is divided into three major steps. First we estimate the effect of a transatlantic agreement on trade between the USA and Germany in 16 different economic sectors on the basis of gravitational equations. For these economic areas, we have robust data and can readily estimate the projected induced trade effects.[2] This gives us indicators that reflect the impact on specific sectors of a TTIP. In the second step, we apply these sector impact levels to 88 different occupational groups, 3 education levels and 16 regions within Germany's federal states. In a third step, we use these results to estimate the effects of a TTIP on real wages in individual occupational groups and education levels. We also then calculate the effect of the TTIP on wage distribution.

2.1 Sector trade effects

The starting point for the first step is to estimate the expected trade effects at the sector level. As we did in the first part of the study, we assume that a transatlantic agreement will result in trade-creation effects that are similar to those for which data already exists. The main distinction from the first part of this study is the sector disaggregation: We estimate the extent to which the free trade agreement has led to trade creation within the affected country pairs for 16 different industries and then use the result as the most credible estimator for the effects of a transatlantic agreement.[3]

This approach has the major advantage of allowing a simple quantification of the potential effects of the agreement on non-tariff barriers. In that way, besides the elimination of import duties, which we can take for granted, we can include all important categories of trade costs whose decline would result in stimulating trade between the USA and the EU. Specifically, our approach considers all costs that limit international trade between two countries but do not fall in the category of import duties. Non-tariff barriers are regulatory measures with protectionist effects that disadvantage foreign suppliers compared to domestic ones. They can be politically induced or result from geographic and historical circumstances.

This economic analysis based on the gravitation model provides us with benchmarks for the increase in trade between Germany and the USA expected from eliminating customs barriers and non-tariff trade costs. In terms of methodology, we use a completely saturated fixed effect model on panel data for annual industry data from 1998 to 2007 and thereby exclude the recent crisis years.[4] We are especially interested in the average effects of free trade agreements on trade,[5] because

2 The 16 sectors consist of 14 in the manufacturing sector plus agriculture and mining. They are described below as manufacturing sectors. For the service sector, we calculate indirect effects through inter- and intra-sector links.

3 Another difference consists in the underlying model frameworks. Unlike Part 1, we do not use a general equilibrium model but a partial analytic model.

4 Such a saturated fixed effect model has been used by Felbermayr and Yalcin (2013), for example. See the references to the literature cited there. In Annex A.1 to this study, we explain the estimation method in greater detail.

5 There is a special challenge to empirical modelling in trying to provide coverage that is as complete as possible of all potential trade flow determinants. Only when that is assured can the effects of a free trade ageement be isolated and treated as causal.

they can be used to draw conclusions about changes in trade costs at the sector level. Moreover, because the average customs duties applied are known, the significance of non-tariff barriers (more exactly: the expected extent of their reduction) can be quantified.

Based on quantified trade potentials in the manufacturing industries and effects that can be interpolated from them for the service sector, we show where the largest value creation effects can be expected and in which industries employment will be most affected by a TTIP.

2.2 Trade effects for occupational groups, education levels and states

We begin by estimating the expected trade effects of a TTIP at the industry level. For that we use official trade statistics, as described in greater length below. We translate the trade shocks identified in this way, using data from the Institute for Employment Research (IAB) in Nuremberg, into shocks for individual occupational groups and education levels.

The approach is as follows: We know from the IAB dataset how various occupational groups are distributed among the individual segments of the economy, or what share of employment is held within specific industrial sectors by members of various occupational groups. The same applies to the different levels of education (university degrees, high school diplomas and/or vocational training or less). From the interaction of the trade shocks identified in step one with the employment distributions described, we can convert them into shocks specific to occupational groups and education levels. We have selected an appropriate ap-proach to quantify the shock at the state level using regional foreign trade statistics from the Federal Statistical Office, which provides information about export and trade activities in the individual sectors throughout every state in Germany. This enables us to draw conclusions about regional industry effects.

2.3 Effects on real wages and wage disparities

In the final step, we use the shocks for occupational groups and education levels described above in Mincer wage equations. Such equations model workers' wages as a function of their characteristics. To conduct our analysis, we have expanded the classic model to include employer characteristics. What interests us in particular is the extent to which the establishment in which a worker works is affected by international trade (exports, imports). The literature typically reports that companies with a more pronounced international presence pay higher wages than those that are less internationally oriented or are active only on the domestic market.[6]

6 Felbermayr, Hauptmann and Schmerer (2013) discuss methodological aspects of the estimates of such equations and the classification of the results in the literature on trade and labor market theory.

We can now use the shocks calculated by the estimated Mincer equations in the first and second steps of our analysis to project average changes in real wages resulting from a TTIP. This analysis can be executed on samples so that the real wage effects can be identified in individual segments of the German labor market (occupational groups and education levels).

Similarly, using the means described above, it is possible to forecast changes in wage disparities among individual segments of the German labor market. To do that, the individual data must be aggregated, however. This is done by calculating a wage disparity benchmark for the labor market segment under consideration. As usual in the literature, we use the standard deviation of the logarithm of wages. This benchmark does not depend on scaling the wage variables and is related monotonically to the well-known Gini Index of income inequality. Accordingly, a higher standard deviation indicates a higher degree of inequality.

3. Data and trends

3.1 Trade data

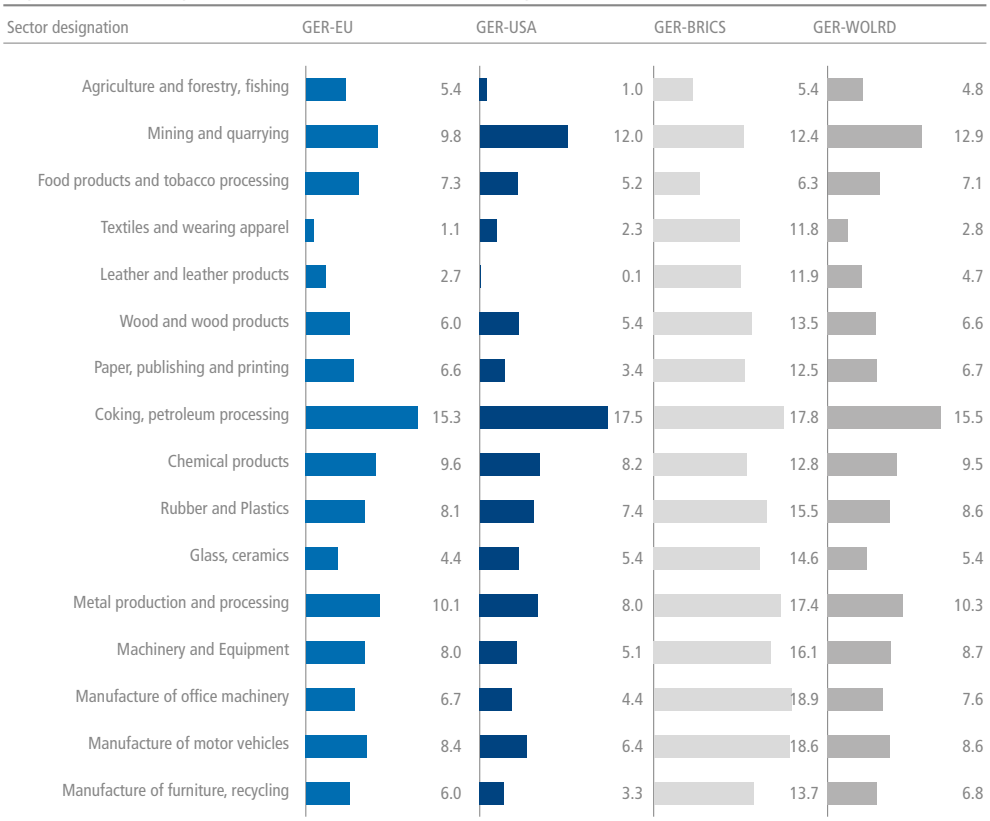
Our analysis is based on bilateral trade data at the industry level. We use the BACI dataset developed by CEPII with UN COMTRADE data and thus including trade information on all UN countries.[7] Unfortunately, there are narrow limits to disaggregation by sector. This is due on the one hand to the fact that we must ensure that our sectors are recognized in the system used for the input-output tables, and on the other, that our sector classification is compatible with the IAB datasets. Our sector classification is based on the standard classification of economic activities in the European Union (NACE Rev. 1.1) defined to two places. For our analysis of the trade effects induced by a TTIP, we examine 16 manufacturing sectors. These account for about 87 percent of German foreign trade, with only 13 percent included in the service sector.[8] The sectors we examine thus cover the greater majority of all of Germany's direct trade relationships. This fact, combined with the poor data situation for trade in services in general, justifies concentration on the 16 sectors in our analysis of the trade effects induced by a TTIP.

Figure 2 shows the average annual rate of change of trade between Germany and, respectively, the EU (defined as the EU 27), the USA, the BRICS countries (Brazil, Russia, India, China and South Africa) and the whole world for the sectors we examined. It becomes clear that in every sector except petroleum, there was less change in German trade with the USA than with the BRICS countries or with the whole world. This may be due to the fact that the level of trade with the USA is already substantially higher than with the emerging countries, where there is need to catch up with the USA. However, trade with the USA has increased in 12 of the 16 sectors less than it has with the EU, due to the number of new countries joining the customs union and the extension of the domestic market program. Nevertheless, this finding clearly shows that there is a potential for more trade between the EU and the USA from eliminating customs and regulatory barriers to market entry.

7 For more information, see: http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=1.

8 The basis for these calculations is data from the World Input Output Tables from 2007. This was the last year before the sharp decline in world trade as a result of the 2008 and 2009 financial market crisis.

Figure 1: Changes in trade in manufacturing



Source: Calculations by the ifo Institute based on the BACI dataset.

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3.2 Input-Output Dataset

The 16 manufacturing sectors we studied account for more than 80 percent of German foreign trade, but account for only some 20 percent of total value creation and about 20 percent of all employees.[9] In order to be able to estimate the effects of a transatlantic agreement for the whole economy, we additionally calculate the indirectly induced effects for the service sector. To do this, we use the inter- and intra-sector interconnections of the input-output analysis, based on the World Input-Output Tables (WIOD).[10]

In the text that follows, we therefore distinguish between the direct effects of a TTIP, which result in changes in the trade volume in the 16 manufacturing sectors, and the indirect effects of a TTIP, induced by interconnecting relationships.

9 These calculations are based on the data in the World Input-Output Tables form 2007. See also footnote 19. According to the most recent data from the German Federal Statistics Office from 2012, manufacturing generates 31.6 percent of all value creation and 26.6 percent of all employees.

10 For more information, see http://www.wiod.org/index.htm.

3.3 Regional Data

For the analysis at the regional level, we utilize data from the German Federal Statistical Office. Here we use each state's data segmented by economic sectors for exports to the United States from the year 2012[11], as well as employment figures from the manufacturing industry from the year 2008[12].

This data enables us to derive conclusions on sector-based trade and value creation effects in every state.

3.4 Company Data

The interconnection of trade effects and employment information necessary for our analysis is made through the Linked-Employer-Employee Dataset (LIAB) of the IAB. More specifically, we use the LIAB Cross-section Dataset 2, in which information on all employees registered for social security was added to a sample of establishments between 1993 and 2010.[13] This dataset thus includes not only detailed information about personal characteristics of individual employees, but also important information about the company. Of particular interest for our analysis is information on the level of a company's international activity. This linking of company and personnel data allows us to estimate the effects of a potential trade agreement on wages and the income risk facing employees. The LIAB data, however, are a stratified sample of companies. The use of weighting factors enables us to make representative statements about the distribution of companies in Germany.

3.5 Wage data

To be able to make representative statements about the distribution of education levels and occupational groups in the specific sectors, we use the SIAB dataset (sample of the integrated labor market biographies) of the IAB.[14] This dataset is a representative 2 percent sample of all employment subject to social security obligations in the Federal Republic of Germany. It contains the most important human capital characteristics of employees and makes it possible to calculate (daily) wages.[15] These wages, inflation-corrected by the Consumer Price Index, are the basis of our

11 Statitisches Bundesamt (https://www-gene-sis.destatis.de/genesis/online/data;jsessionid=83BF49DC2CDF812C2DE72CE8956C3355.tomcat_GO_1_2?operation=abruftabelleAbrufen&selectionname=51000-0036&levelindex=1&levelid=1379954988568&index=5)

12 Statitisches Bundesamt (https://www-gene-sis.destatis.de/genesis/online/data;jsessionid=83BF49DC2CDF812C2DE72CE8956C3355.tomcat_GO_1_2?operation=previous&levelindex=3&levelid=1379955209838&levelid=1379955194721&step=2)

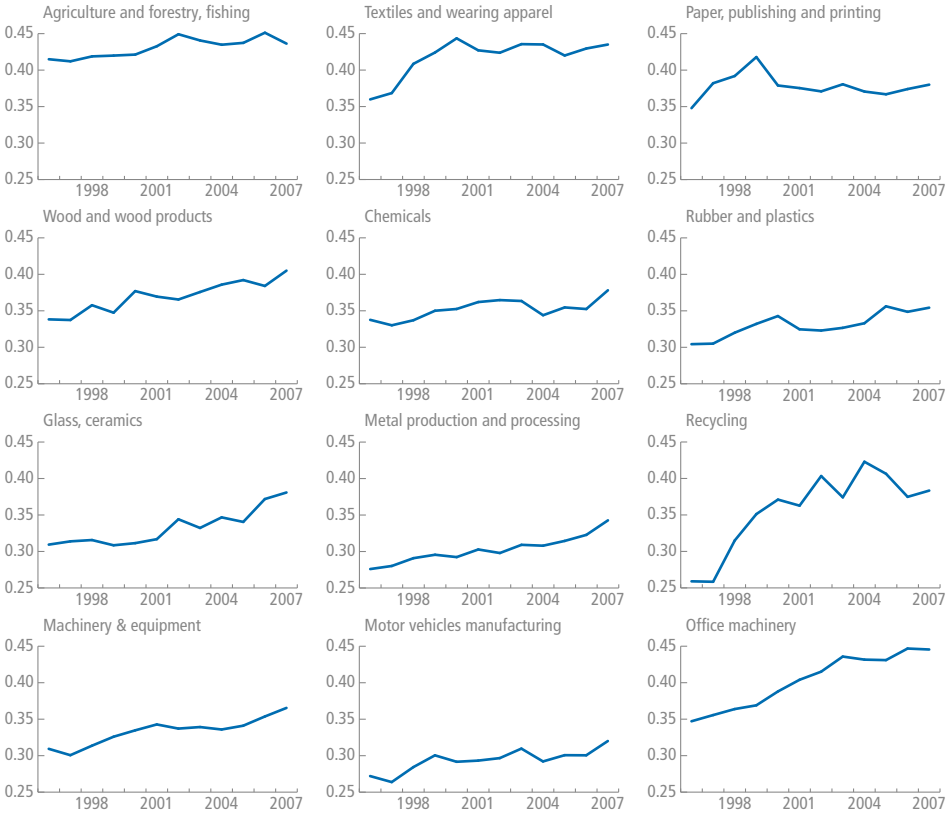
13 The data basis comes from the cross-section model (Version 2, 1993–2010) of the Linked-Employer-Employee data of the IAB. Access to the data was achieved during visits to the Research Data Center of the Federal Agency for Labor at the Institute for Labor Market and Occupational Research (FDZ). For more information, see Heining, Scholz, Seth (2013).

14 For more information, see Berge, König, Seth (2013).

15 The dataset has several well-known weaknesses. The most important is that the income variable is only filled if the person involved has an income from employment that is below the upper limit for social security contributions. For those employment relationships where this does not apply, there are algorithms for imputing it that have proven themselves in the literature.

calculations of the real wage effects of a TTIP. We also use wage data to draw conclusions about effects of a TTIP on income disparity. Figure 2 illustrates changes in wage disparity in Germany in selected segments of the economy, represented by the standard deviation of the logarithm of wages. As already explained above, this is an appropriate measure of the extent of the unequal distribution of wage income.

Figure 2: Wage disparity in Germany



Source: Calculations by the ifo Institute on the basis of the SIAB dataset of the IAB Nürnberg.

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The economic sectors shown offer only slight differences as to the extent of the measured disparity. The disparity is higher in the food industry than in machinery or automotive manufacturing, but in the period average of the sectors, the measurements generally scatter around 0.35, which also roughly applies for the German economy as a whole.[16] Across a large portion of the sectors, the trend is rising: inequality rose significantly from 1998 to 2007.

16 See for example Dustmann et al. (2009), Card et al. (2012) and Baumgarten (2012).

Figure 3 shows the extent of the wage disparity that cannot be explained by the characteristics of the employee, such as education, work experience, gender, immigrant status, etc. That is to say, this is a residual of a Mincer equation.[17] This residual can also be interpreted as the significance of factors that are not directly under the employee's influence. These include which company the employee works for, but there is also the simple influence of chance (e. g., that the personnel manager gives a salary bonus for reasons that an external user of the data cannot account for).

Figure 3: Residual wage disparity in Germany

Source: Calculations of the ifo Institute based on the SIAB dataset from IAB Nürnberg.

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Figure 3 makes it clear that most of the level of inequality and changes shown in Figure 2 are due to the residual portion of the wage inequality. In other words, it is not changing human capital characteristics that explain Figure 2. This makes it clear that changes in the implicit price of human capital or participation of employees in company success may lag behind development. The theoretical and empirical literature shows very clearly that international trade impacts income distribution specifically through these channels.[18]

17 Separate Mincer equations were calculated for each sector; within the sectors, the data was pooled across the years, however.

18 See Felbermayr et al. (2013) and Baumgarten (2012).

4. How are the trade effects distributed across industries?

4.1 Trade creation and NTB quantification

We are now ready to conduct the first step of the research approach sketched in section 2. We start by quantifying the expected trade effects in the 16 manufacturing industries. As already mentioned in Part 1 of our study, the trade effect anticipated from a TTIP is the one that can actually be observed in the data from existing trade agreements. This effect, as we will see in greater detail below, comes not from the elimination of customs duties but mainly from lowering non-tariff barriers (NTBs). We assume symmetry, i.e., that imports and exports are similarly affected in terms of how they change. The effects documented are, as already emphasized in the introduction, partially analytical in nature. They are related only to the expected change in trade between Germany and the USA and represent its lower limits because the endogenous adaptation of gross domestic products (which in turn has a trade-increasing effect) has not been taken into consideration.[19]

The third column in Table 1 shows the changes in bilateral trade expected from a possible transatlantic trade and investment partnership. It is evident that besides the food and tobacco processing industries, the metal industry would profit from such an agreement. There we expect trade growth of more than 50 percent. A similarly strong increase in the trade flow of just under 50 percent can also be seen for agriculture and forest products. Also evident is that for these sectors in particular, the reduction of non-tariff barriers will play a decisive role. Likewise, the manufacture of office machinery and data processing equipment will clearly benefit from a trade agreement between the EU and USA. There the expected increases are in the 40 percent range. For the chemical industry as well as for the furniture manufacturing sector, the expected trade growth is around 20–26 percent.

19 In particular, the reported effects do not necessarily add up to the effects occurring in the whole economic equilibrium; see Part 1 of the study.

Table 1: Sector trade effects of TTIP on EU-US trade, underlying decline in tariff and non-tariff barriers

NACE Rev.1.1	Sector designation	Trade creation (in percent)*	Trade elasticities according to Broda & Weinstein (QJE 2006)	Customs Importer USA from EU (in percent)**	Customs Importer USA from EU (in percent)**	NTB Importer USA from EU (in percent)**	NTB Importer USA from EU (in percent)**
A & B	Agriculture and forestry, fishing and fish farming	47.40	1.33	2.62	3.89	33.02	31.75
C	Mining and quarrying	.	5.32	0.96	0.77	.	.
DA	Food products and tobacco processing	65.86	3.65	2.31	5.60	15.74	12.45
DB	Textiles and wearing apparel	–19.35	1.89	7.00	8.19	.	.
DC	Leather and leather products	17.35	0.96	7.10	3.91	10.97	14.16
DD	Wood and wood products	.	0.83	0.19	0.96	.	.
DE	Paper, publishing and printing	14.68	1.55	0.02	0.02	9.45	9.45
DF	Coking, petroleum processing	.	3.36	6.63	1.50	0.00	0.00
DG	Chemical products	21.65	3.75	1.71	1.86	4.06	3.91
DH	Rubber and Plastics	14.80	1.34	1.71	1.86	9.33	9.18
DI	Non-metallic mineral products, ceramics	.	1.30	2.56	3.11	.	.
DJ	Basic metals and fabricated metals	52.65	2.77	1.67	1.66	17.34	17.35
DK	Machinery and Equipment	16.42	1.10	1.26	1.25	13.66	13.67
DL	Manufacture of office machinery, data processing equipment and installations	39.93	2.74	0.58	0.35	13.99	14.22
DM	Auto makers	16.88	2.27	1.19	4.67	6.25	2.77
DN	Furniture, jewelry, musical instruments, sports equipment, recycling Recycling	26.36	0.55	0.84	0.96	47.10	46.98

* „." means that econometrically, no effect could be identified that was significantly different from zero.
** Source of customs data: TRAINS Data from WITS. The customs are import-weighted average.

Source: Calculations by the ifo Institute on the basis of BACI data.

Moderate, but definitely positive trade creation effects are moreover to be expected in leather, paper and printing, glass and machinery. Even Germany's characteristic auto sector profits from a transatlantic agreement. Here we expect growth between 15 and 20 percent. Increases in auto production are relatively smaller than in other sectors because the trade relationships are already at a comparatively high level. We don't expect any positive growth in trade in the textile and clothing sector, on the other hand. For mining, forestry, coking and petroleum as well as glass, no statistically significant trade effects can be demonstrated in existing agreements. The other columns in Table 1 indicate the average customs duties that the USA or EU charge on their imports in the specific sectors. They are high for clothing in both regions; the EU charges significantly higher duties for food and autos than the USA; the USA charges higher duties than the EU in the coking/petroleum and leather sectors. Overall, the tariff rates are relatively low. To help in understanding the process, we would add here that the tariff rates indicated for all trading partners of the EU or the USA apply to the extent that they are members of the World Trade Organization (WTO). It is assumed that the TTIP would result in a complete elimination of these duties.

The table also presents the trade elasticities calculated by Broda and Weinstein (2006), which have been aggregated here at the sector level. The higher they are, the more strongly trade between the countries reacts to changes in trade costs. Based on this information, it is now possible to quantify at the sector level what drop in non-tariff barriers combined with the assumed elimination of tariffs would generate the calculated trade effects. Based on the different average duties applied, these differ only slightly between the EU and the USA.

The last two columns in Table 1 show the calculated NTB index as ad valorem equivalents. That means the values should be read as percentage surcharges on the manufacturing price and thus be interpreted similar to customs duties, but with one basic difference: They are not in fact customs duties. It turns out that the meaning of non-tariff barriers and the potential for lowering them through bilateral agreements like a TTIP in individual industries varies. Adjustable NTBs are especially high in furniture making or agriculture and forestry. The latter sectors especially include many protectionist measures that claim to be protecting consumers from harmful foodstuffs from abroad. But in machinery, metals and food, the non-tariff barriers are also substantial. Lower adjustable NTBs can be identified for the auto and chemicals industries.

The NTBs reported describe cost savings in the non-tariff area that have already been achieved on average by existing trade agreements. It can be assumed that a TTIP would be neither more nor less successful. Let us again be clear: The values should not be understood as levels, but as the likely changes in NTBs. In fact, the NTB potentials calculated can be regarded as lower limits, because in the existing trade agreements, there is typically no complete use of the tariff elimination potential made by the trading companies.[20]

4.2 Indirect effects on the service sectors

The preceding analysis has made it clear which manufacturing sectors can expect an increase in trade from a TTIP. Now we will consider how this economic revitalization, through inter and intra-industry links, affects Germany's whole economy but especially its service sector. We quantify these effects with the help of input-output analysis.[21] This provides us with information on how dependent the production of a sector is on intermediate products from its own and other sectors of the economy. In this way it is possible to quantify indirect effects of an increase in trade in sectors that are not themselves directly affected by a TTIP, for which, due to reasons of data availability and quality, no direct effects can be calculated. Table 2 shows the results. The third column shows the induced trade volumes we expect in the 16 manufacturing sectors from a transatlantic agreement. Column four shows the direct production effects. These represent how much production in Sector j is changed by the trade impact in Sector j. It should be noted that the induced trade volume is

20 This is due to the fact that the bureaucratic hurdles to making products duty-free are high (especially presentation of a certificate of origin).

21 The basis is the World Input Output Dataset (WIOD) from 2007. The WIOD is available for a period from 1995–2009. We base our calculations on 2007 in order to avoid distortions from the financial and economic crisis in 2009. To ensure a degree of consistency, we therefore refer throughout this report to 2007, when we are using the WIOD.

only slightly different than the direct production effects. This is due precisely to the prior work that Sector j requires from its own industry for manufacturing its final products. Since no direct trade effect can be calculated for the service sectors, there is no direct production effect in these sectors. The fifth column shows the total production effect that can be expected in Sector j. This total effect consists of the direct production effect and the indirect production effect. The indirect effect is the total of previous work in Sector j used to produce the final products in all other sectors (except j). In the service sector, this indirect effect is simultaneously the total effect. In order to be able to estimate the amplitude of the effects, column six shows the total production of the specific sector from 2007 and in the last column, the share of the total production effect in total production.

What can be seen is that the induced production effects are in the range of up to two percent of total production in 2007. The relatively largest production increases are to be expected in the industries that produce office equipment. The metal products and chemicals industries are also expected to realize significant production increases from TTIP.

The service sector most strongly affected by indirect effects is leasing movables without operators or the sector that provides services mainly to companies. Here it is evident that the indirectly induced effects alone add up to a share of 0.5 percent in total production of the sector.

Table 2 thus makes it very clear that although the direct trade effects occur exclusively in the 16 manufacturing sectors, the total economy would be noticeably affected by a transatlantic agreement. We find overall that the service sector experiences a comparable impact from indirect effects to the manufacturing sector.[22]

22 It is worth remembering that this is a partial analytical model, allowing abstraction from general equilibrium effects as well as from trade diversion effects. Such effects are explained in the first part of our study (Part 1: Macroeconomic Effects).

Table 2: Quantification of direct and indirect production effects of a TTIP in Germany by sector

NACE Rev.1.1	Sector designation	induced trade creation (in millions of Euros)	direct production effect (in millions of Euros)	total production effect (in millions of Euros)	total production (in millions of Euros)	total production effect / total production
A & B	Agriculture and forestry, fishing	102	106	230	51,950	0.004
C	Mining and quarrying	0	0	33	13,710	0.002
DA	Food products and tobacco processing	609	680	745	154,120	0.005
DB	Textiles and wearing apparel	–61	–61	–55	23,730	–0.002
DC	Leather and leather products	47	47	47	3,480	0.014
DD	Wood and wood products (without furniture production)	0	0	75	25,540	0.003
DE	Paper, publishing and printing	416	474	633	88,900	0.007
DF	Manufacture of coke, refined petroleum products and nuclear fuel	0	0	150	61,050	0.002
DG	Chemical products	2,863	2,937	3,040	156,970	0.019
DH	Rubber and Plastics	185	194	423	65,690	0.006
DI	Non-metallic mineral products, ceramics	0	0	122	41,090	0.003
DJ	Basic metals and fabricated metals	3,474	4,068	4,887	230,160	0.021
DK	Machinery and Equipment	2,158	2,401	2,677	224,800	0.012
DL	Manufacture of office machinery, data processing equipment and installations, manufacture of electrical and optical equipment	4,506	4,883	5,154	209,390	0.025
DM	Manufacture of motor vehicles	3,538	4,210	4,337	350,720	0.012
DN	Manufacture of furniture, jewelry, musical instruments, furniture, sports equipment, toys and other instruments Recycling	288	302	369	39,160	0.009
G-50	Retail trade (not including motor vehicles or service stations); Repairs of personal and household goods	0	0	182	54,360	0.003
G-51	Wholesale trade and commission trade (not including motor vehicles)	0	0	742	170,260	0.004
G-52	Sale; Maintenance and repair of motor vehicles and personal and household goods	0	0	659	146,230	0.005
H	Hotels and restaurants	0	0	13	66,500	0.000
I-60	Land transport services; Pipeline transport services	0	0	312	69,350	0.004
I-61	Water transport	0	0	23	25,080	0.001
I-62	Air transport	0	0	71	27,370	0.003
I-63	Other supporting and auxiliary transport activities; Activities of Travel Agencies	0	0	354	96,580	0.004
I-64	Post and telecommunications	0	0	186	81,100	0.002
J	Financial intermediation	0	0	468	219,710	0.002
K-70	Real estate activities	0	0	573	328,350	0.002
K-71-74	Renting of machinery and equipment without operator, data processing, research and development, provision of services predominantly for enterprises	0	0	2321	442,530	0.005
L	Public administration, defense, compulsory social security	0	0	94	182,560	0.001
M	Education	0	0	74	122,380	0.001
N	Health and social work	0	0	7	221,320	0.000
O	Other community, social and personal services	0	0	355	167,180	0.002
P	Households as employers	0	0	0	7,070	0.000

Source: Calculations by ifo Institute based on WIOD 2007.

4.3 Value creation and employment effects

We now show how much value creation can be expected from the induced trade effects and how many jobs in the specific sectors would be affected by it. Here again, we distinguish between direct and indirect effects.

Let us first examine the effects on value creation in manufacturing. The greatest total value creation effect is recorded in the office equipment and electronics manufacturing sector. As column five in Table 3 clearly shows, the relative growth in value creation (measured as a share of the total value creation effect of the sector in 2007) for this sector, at 2.5 percent, is the highest. Similarly strong value creation effects can be seen in metal production and chemicals. In the service sector, the value creation effects again come from indirectly induced effects. The greatest increase is posted by movables leasing, with a relative increase of 0.5 percent of value creation.

A similar picture can be obtained from examining the employment effects. Here too the sectors already mentioned show the greatest effects. The total for all sectors results in a total employment effect of nearly 160,000 employees. This value is only slightly different from the value of 181,000 jobs created reported by us in the macro study. The difference can be explained by the different model structure (partial analysis versus general equilibrium) and the different datasets used.

Table 3: Value creation and employment effects in Germany by sector

NACE Rev.1.1	Sector designation	Direct value creation effect (in millions of Euros)	Total value creation effect (in millions of Euros)	Total value creation effect /total value creation 2007	Direct effect workers	Total effect workers	Total worker effect/all workers 2007
A & B	Agriculture and forestry, fishing	43	93	0.004	911	1,967	0.002
C	Mining and quarrying	0	12	0.002	0	197	0.002
DA	Food products and tobacco processing	166	182	0.005	3,785	4,145	0.004
DB	Textiles and wearing apparel	–20	–17	–0.002	–393	–352	–0.002
DC	Leather and leather products	13	13	0.014	297	300	0.013
DD	Wood and wood products (without furniture production)	0	22	0.003	0	402	0.003
DE	Paper, publishing and printing	175	234	0.007	3,039	4,060	0.007
DF	Manufacture of coke, refined petroleum products and nuclear fuel	0	11	0.002	0	49	0.002
DG	Chemical products	986	1,021	0.019	8,494	8,794	0.019
DH	Rubber and Plastics	69	150	0.006	1,163	2,540	0.006
DI	Non-metallic mineral products, ceramics	0	46	0.003	0	692	0.003
DJ	Basic metals and fabricated metals	1,297	1,558	0.021	18,790	22,570	0.020
DK	Machinery and Equipment	882	983	0.012	11,597	12,932	0.012
DL	Manufacture of office machinery, data processing equipment and installations, manufacture of electrical and optical equipment	1,817	1,917	0.025	23,204	24,490	0.024
DM	Manufacture of motor vehicles	1,065	1,097	0.012	11,786	12,143	0.012
DN	Manufacture of furniture, jewelry, musical instruments, furniture, sports equipment, toys and other instruments, recycling	102	125	0.009	1,998	2,439	0.008
G-50	Retail trade (not including motor vehicles or service stations); repairs of personal and household goods	0	121	0.003	0	2,776	0.003
G-51	Wholesale trade and commission trade (not including motor vehicles)	0	433	0.004	0	6,207	0.004
G-52	Sale; Maintenance and repair of motor vehicles and personal and household goods	0	370	0.005	0	13,163	0.004
H	Hotels and restaurants	0	7	0.000	0	282	0.000
I-60	Land transport services; Pipeline transport services	0	145	0.004	0	3,932	0.004
I-61	Water transport	0	6	0.001	0	20	0.001
I-62	Air transport	0	19	0.003	0	165	0.003
I-63	Other supporting and auxiliary transport activities; Activities of Travel Agencies	0	142	0.004	0	2,129	0.003
I-64	Post and telecommunications	0	89	0.002	0	1,168	0.002
J	Financial intermediation	0	184	0.002	0	2,248	0.002
K-70	Real estate activities	0	458	0.002	0	679	0.001
K-71-74	Renting of machinery and equipment without operator, data processing, research and development, provision of services predominantly for enterprises	0	1,517	0.005	0	23,022	0.004
L	Public administration, defense, compulsory social security	0	64	0.001	0	1,363	0.001
M	Education	0	57	0.001	0	1,335	0.001
N	Health and social work	0	5	0.000	0	122	0.000
O	Other community, social and personal services	0	214	0.002	0	3,575	0.002
P	Households as employers	0	0	0.000	0	0	0.000

Source: Calculations by the ifo Institute based on WIOD 2007,

5. Impact of education and occupational groups and impact of regions

Now that we have quantified the projected trade affects and their indirect effects, we can turn to analysis step 2 and transform the trade shocks into shocks for the various education and occupational groups and regional shocks.

5.1 Descriptive analysis of the education groups

Within the framework of our analysis we distinguish three groups with different education levels: first, relatively unskilled workers, i. e., those who have no vocational training and nothing equivalent to a high school diploma. Workers with moderate qualifications have either a high school diploma or completed an apprenticeship, while highly qualified workers have completed a technical training college or a university degree.[23]

Table 4 shows the distribution of the education groups in manufacturing sectors. This shows the shares of the different education groups in total employment in the sectors and the trade creation potential calculated in the first part of our analysis. We examine the 16 manufacturing sectors for which we can calculate both direct and indirect effects. As discussed earlier, direct effects cannot be calculated for the service sector.

A more exact impression of how important the specific sectors are for each education group is provided by Tables 5 through 7, which list the individual groups for each of the five most important sectors. The first value in Table 5 should be understood as showing that 17 percent of all unskilled workers in the manufacturing sector are employed in the metal production and processing industry.

23 This classification is standard in the literature and follows such examples as Dustmann et al. (2009) and Baumgarten (2012). It should be noted here that the uncleaned education variable in the IAB dataset is of relatively poor quality. That means that many entries are missing or that individuals have inconsistent entries. Before our analysis, we clean the education variable using the imputation procedures that are recognized in the literature. See Fitzenberger et al. (2006) on this point.

Table 4: Distribution of education groups across manufacturing sectors

NACE Rev.1.1	Selected sectors	Unskilled (in %)	Moderately skilled (in %)	Highly skilled (in %)	Trade creation (in %)
A & B	Agriculture and forestry, fishing	19.43	75.52	5.05	47.40
C	Bergbau und Gewinnung von Steinen	15.81	76.18	8.01	.
DA	Food products and tobacco processing	18.96	76.98	4.06	65.86
DB	Textiles and wearing apparel	16.75	75.91	7.34	–19.35
DC	Leather and leather products	20.14	73.51	6.34	17.35
DD	Wood and wood products	16.75	75.91	7.34	.
DE	Paper, publishing and printing	20.14	73.51	6.34	14.68
DF	Coking, petroleum processing	16.11	78.68	5.21	.
DG	Chemical products	18.94	70.36	10.70	21.65
DH	Rubber and plastics	17.87	74.08	8.05	14.80
DI	Glass, ceramics	13.88	78.10	8.02	.
DJ	Metal production and processing	16.95	76.10	6.95	52.65
DK	Machinery and equipment	11.37	74.92	13.71	16.42
DL	Manufacture of office machinery	10.90	69.06	20.04	39.93
DM	Manufacture of motor vehicles	10.00	74.13	15.87	16.88
DN	Manufacture of furniture, recycling	13.88	78.51	7.61	26.36

Source: Calculations of the ifo Institute based on the IAB SIAB dataset.

Table 5: Significance of specific sectors for unskilled workers

Ranking	Sector designation	Relative significance for unskilled workers (in %)
1	Metal production and processing	17.08
2	Food products and tobacco processing	15.26
3	Machinery and equipment	10.36
4	Paper, publishing and printing	9.98
5	Manufacture of office machinery	9.47

Source: Calculations of the ifo Institute based on the IAB SIAB dataset.

Table 6: Significance of specific sectors for moderately skilled workers

Ranking	Sector designation	Relative significance for moderately skilled workers (in %)
1	Metal production and processing	15.05
2	Machinery and equipment	13.40
3	Food products and tobacco processing	12.16
4	Manufacture of office machinery	11.77
5	Manufacture of motor vehicles	9.30

Source: Calculations of the ifo Institute based on the IAB SIAB dataset.

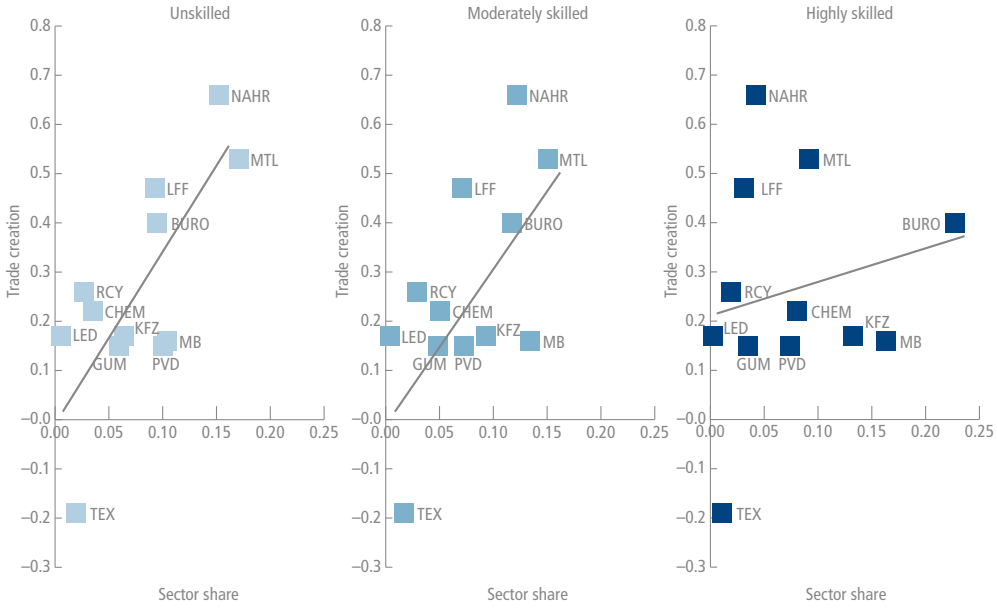
Table 7: Significance of specific sectors for highly skilled workers

Ranking	Sector designation	Relative significance for highly skilled workers (in %)
1	Manufacture of office machinery	22.75
2	Machinery and equipment	16.32
3	Manufacture of motor vehicles	13.25
4	Metal production and processing	9.16
5	Chemical products	8.04

Source: Calculations of the ifo Institute based on the IAB SIAB dataset.

Figure 4 shows in each case the correlation between the induced trade effects and the sector share of the individual education groups. It illustrates that for all education groups, there is a positive link between trade creation in a sector and the relative meaning of this sector for the specific group. It is striking, however, that the correlation for highly skilled workers at 0.17 is noticeably lower than for the other two groups. This is mainly due to the fact that highly skilled workers play a subordinate role in the sectors that show especially strong trade effects (such as food products, metal production and agriculture).

Figure 4: Correlation of trade creation in specific sectors



LFF = Agriculture and forestry, fishing
LED = Leather and leather products
CHEM = Chemicals
MB = Machinery and equipment
BERG = Mining and quarrying
HOLZ = Wood and wood products
GUM = Rubber
BURO = Office machinery
NAHR = Food products and tobacco processing
PVD = Paper, publishing and printing
GLAS = Glass, ceramics
KFZ = Motor vehicles
TEX = Textiles and wearing apparel
OEL = Coking, petroleum processing
MTL = Metal production and processing
RCY = Furniture production, recycling

Quelle: Berechnungen des ifo Institutes auf Basis des SIAB Datensatzes des IAB Nürnberg.

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5.2 Impact of education groups

The trade shock from analysis step 1 we now transform into impact measurements. While in the first part we identified the impact on specific sectors from a potential TTIP, we are now trying to quantify the impact on specific education groups. We are following the method proposed by Ebenstein et al. (2012) and calculate the index in two steps. First, we quantify a weighting factor α_{kj2010}:

$$(1)\ \alpha_{kj2010} = \frac{L_{kj2010}}{L_{k2010}},$$

Where L_{kj2010} is the number of employees in education group k in sector j in 2010, and L_{kj2010} the number of all employees in education group k in all sectors in 2010. Using the weighting factor, we then calculate the impact measurement. β_{k2010}:

$$(2)\ \beta_{k2010} = \sum_{J=1}^{J} \alpha_{kj2010}\Delta_j,$$

in which Δ_j represents the trade creation effect in sector j calculated in analysis step 1.

Table 8 shows the susceptibility index for the three education groups. This confirms again the impression that the correlation analysis has already provided: Unskilled workers are most significantly affected by the direct trade shock in the manufacturing sectors. Then come the moderately skilled workers and least affected are the highly skilled workers.

Table 8: Education impact measurement

	Impact measurement education
Unskilled	0.34
Moderately skilled	0.31
Highly skilled	0.27

Source: Calculations of the ifo Institute based on the IAB SIAB dataset.

5.3 Descriptive analysis of the occupational groups

The IAB dataset distinguishes more than 300 different occupations.[24] To obtain a degree of clarity, we have combined the individual listings into a total of 88 occupational groups.[25] Table 9 provides an initial impression of which occupational groups are in the sectors that show the greatest trade creation potential. A value of 34 % for sales personnel in the first part of the table thus means that 34 % of all employees in the food sector belong to this occupational group.

24 The occupational classification in the IAB dataset follows the one used by the Bundesagentur für Arbeit 1988 and includes some 330 characteristics.

25 We aggregate the employment categories (3 places), into employment groups (2 places).

Table 9: The most important occupational groups in certain sectors

Food products and tobacco processing	Metal production and processing	Agriculture and forestry, fishing	Manufacture of office machinery	Manufacture of furniture, recycling
Sales personnel (34 %)	Metalworkers (15 %)	Horticulturalists (36 %)	Office personnel and assistants (14 %)	Carpenters (26 %)
Producers of bakery and pastry products (11 %)	Assembly workers and metal-workers (12 %)	Agricultural workers (26 %)	Electricians (10 %)	Office personnel and assistants (14 %)
Meat and fish processors (9 %)	Office personnel and assistants (11 %)	Office personnel and assistants (5 %)	Assembly workers and metal-workers (9 %)	Laborers (6 %)
Other food occupations (6 %)	Metal workers (6 %)	Farmers (4 %)	Engineers (9 %)	Warehouse, transport workers (5 %)
Office personnel and assistants (6 %)	Laborers (5 %)	Forestry and hunting occupations (3 %)	Technicians (8 %)	Wood workers, makers of wood products (4 %)

Source: Calculations of the ifo Institute based on the IAB SIAB dataset.

5.4 Impact on occupational groups

Here we again calculate the impact, this time on individual occupational groups. Tables 9 i and 9 ii in the Appendix show the impact measurements of all 88 occupational groups in detail. What is clear is that those occupations that work almost exclusively in the food production industry are most likely to be affected. These include, for example, sales personnel. The metal industry is also affected more than average. At the lower end of this scale are occupational groups like printers, paper makers and construction materials suppliers and occupations in the clothing industry. However, it becomes clear that some of the service industries are affected rather more heavily. Here for example is where you find hospitality services workers (index of 0.50) or cleaners (index of 0.33). This shows once more that the total economy is affected by a TTIP, even if in this section, we only look at the direct trade effects on manufacturing employment.

5.5 Descriptive analysis of the regions

In this section, we analyze how much the individual states in Germany would be affected by possible transatlantic trade and investment partnership. Table 10 shows the two most important sectors per state with regard to their exports to the USA in the year 2012. We see, for example, that in Bavaria, auto manufacturing and the electronics sector generate the greatest percentage of exports. In Lower Saxony, it is machinery and auto manufacturing. An additional table (Table 10i) in the Annex shows which states have the greatest share of total German exports to the USA per sector. Here we see, for example, that for agriculture, Lower Saxony is the state with the highest export percentage in trade with the USA, followed by Bavaria and Schleswig-Holstein.

Table 10: The most important industrial sectors by state

State		
Baden-Württemberg	43.7 %	Automotive manufacturing
	22.8 %	Machinery
	15.1 %	Office machinery manufacturing
Bavaria	45.4 %	Automotive manufacturing
	19.0 %	Office machinery manufacturing
	15.9 %	Machinery
Berlin	31.1 %	Automotive manufacturing
	27.6 %	Office machinery manufacturing
	19.6 %	Machinery
Brandenburg	58.0 %	Chemicals
	32.1 %	Automotive manufacturing
	5.0 %	Office machinery manufacturing
Bremen	78.1 %	Automotive manufacturing
	10.3 %	Food and tobacco processing
	4.3 %	Metal production and processing
Hamburg	53.3 %	Automotive manufacturing
	14.6 %	Office machinery manufacturing
	8.6 %	Machinery
Hesse	43.8 %	Chemicals
	12.1 %	Office machinery manufacturing
	11.2 %	Machinery
Mecklenburg-Vorpommern	32.8 %	Machinery
	16. 5%	Office machinery manufacturing
	13.5 %	Metal production and processing
Lower Saxony	52.0 %	Automotive manufacturing
	9.8 %	Machinery
	9.8 %	Chemicals
North Rhine-Westphalia	25.5 %	Machinery
	23.1 %	Chemicals
	22.5 %	Metal production and processing
Rhineland-Palatinate	60.9 %	Chemicals
	12.9 %	Machinery
	6.2 %	Metal production and processing
Saarland	47.5 %	Automotive manufacturing
	24.2 %	Machinery
	16.4 %	Metal production and processing
Saxony	60.1 %	Automotive manufacturing
	14.7%	Machinery
	9.9 %	Office machinery manufacturing
Saxony-Anhalt	40.9%	Chemicals
	20.0 %	Metal production and processing
	14.0 %	Machinery
Schleswig-Holstein	29.8 %	Machinery
	27.7 %	Chemicals
	13.3 %	Office machinery manufacturing
Thuringia	36.4 %	Office machinery manufacturing
	26.3 %	Machinery
	10.4 %	Automotive manufacturing

Source: Calculations of the ifo Institute for Economic Research based on data from the German Federal Statistical Office

5.6 Impact on regions

Based on that data, how would the calculated trade effects from a TTIP be distributed among the states? If we assume that the trade effects on individual industries are distributed equally among the states, the following results emerge (see Table 11):

Table 11: Expected export increases by state

State	
Mecklenburg-Vorpommern	29 %
North Rhine-Westphalia	29 %
Thuringia	28 %
Berlin	27 %
Hesse	26 %
Saxony-Anhalt	26 %
Schleswig-Holstein	25 %
Saarland	25 %
Bremen	24 %
Rhineland-Palatinate	24 %
Lower Saxony	23 %
Bavaria	23 %
Baden-Württemberg	22 %
Hamburg	22 %
Brandenburg	21 %
Saxony	20 %

Source: Calculations of the ifo Institute on the basis of the LIAB dataset of the IAB.

Accordingly, we expect overall that import increases in bilateral trade with the USA could reach 20 to 30 percent per state. North Rhine-Westphalia could increase its exports to the United States by about 29 percent, due primarily to the strong position of metal production and processing in that state.

We expect the least impact in Saxony and Brandenburg, two regions whose exports to the USA are limited to a few sectors, such as the chemicals sector in Brandenburg. These sectors have a comparatively low forecast for trade creation.

The relatively strong values for Mecklenburg-Vorpommern, Thuringia and Bremen are mainly due to strong trade-creating effects in the food production industry and its importance in these states.

5.7 Value creation and employment effects in the regions

In addition to the bilateral export effects, we can also draw conclusions about the regional employment market and value creation effects. However, the calculation is limited to the direct trade effects on the manufacturing industry. In light of this, we expect that the actual extent of the effects will be substantially higher, since around 40 percent of the newly created jobs would fall under the non-exportable service sector.

Table 12: Regional impact on the manufacturing industry

State	Total employment growth	Total value creation effect (in millions of Euros)
North Rhine-Westphalia	21,080	1,433
Baden-Württemberg	20,163	1,566
Bavaria	19,471	1,597
Lower Saxony	7,647	555
Hesse	6,796	599
Rhineland-Palatinate	4,500	425
Saxony	4,014	207
Thuringia	2,477	101
Schleswig-Holstein	2,116	146
Saxony-Anhalt	1,986	72
Berlin	1,722	145
Saarland	1,460	100
Brandenburg	1,452	158
Hamburg	1,198	121
Mecklenburg-Vorpommern	735	25
Bremen	551	199

Source: Calculations of the ifo Institute on the basis of the LIAB dataset of the IAB.

Table 12 demonstrates that three states in particular would benefit from a free trade agreement: North Rhine-Westphalia, Baden-Württemberg and Bavaria. This is due primarily to their already high export levels. Approximately 60 percent of all manufacturing exports to the USA come from these states. In addition, a larger number of manufacturing industries that would see the greatest value creation effects from an agreement are located there, especially machinery manufacturing, metal production and processing, electronics industry (office machinery manufacturing, etc.), and auto manufacturing. And finally, Bavaria and Baden-Württemberg alone account for almost 20 percent of Germany's exports to the USA.

5.8 Employment and education in the regions

In this section, we take a look at how the calculated employment effects are distributed among the different education groups in each state. To do so, we combine the findings from section 5.1 with those from section 5.7 and derive the corresponding distribution for the individual states.

Table 13: Employment effects by state based on education level

State	Employment growth for relatively unskilled workers	Share of relatively unskilled workers in employment growth	Employment growth for workers with moderate qualifications	Share of workers with moderate qualifications in employment growth	Employment growth for highly qualified workers	Share of highly qualified workers in employment growth	Total employment growth
Baden-Württemberg	2,708	13.4 %	14,761	73.2 %	2,694	13.4 %	20,163
Bavaria	2,632	13.5 %	14,199	72.9 %	2,640	13.6 %	19,471
Berlin	243	14.1 %	1,234	71.6 %	246	14.3 %	1,722
Brandenburg	219	15.0 %	1,073	73.9 %	160	11.0 %	1,452
Bremen	67	12.2 %	408	74.0 %	76	13.8 %	551
Hamburg	153	12.8 %	871	72.7 %	174	14.5 %	1,198
Hesse	984	14.5 %	4,943	72.7 %	869	12.8 %	6,796
Mecklenburg-Vorpommern	104	14.2 %	542	73.7 %	89	12.1 %	735
Lower Saxony	1,087	14.2 %	5,635	73.7 %	925	12.1 %	7,647
North Rhine-Westphalia	3,159	15.0 %	15,567	73.8 %	2,354	11.2 %	21,080
Rhineland-Palatinate	709	15.8 %	3,305	73.4 %	486	10.8 %	4,500
Saarland	212	14.5 %	1,095	75.0 %	153	10.5 %	1,460
Saxony	570	14.2 %	2,951	73.5 %	493	12.3 %	4,014
Saxony-Anhalt	310	15.6 %	1,465	73.8 %	211	10.6 %	1,986
Schleswig-Holstein	309	14.6 %	1,548	73.2 %	258	12.2 %	2,116
Thuringia	362	14.6 %	1,813	73.2 %	301	12.2 %	2,477
∅ Manufacturing industry		∅ 16.6 %		∅ 75.1 %		∅ 8.8 %	
Total	13,827	14.2 %	71,411	73.3 %	12,129	12.5 %	97,368

Quelle: Berechnungen des ifo Institutes auf Basis der Daten des statistischen Bundesamtes.

Table 13 illustrates the corresponding results for all states and education groups. For Germany's 16 states, it shows essentially no major deviations from the expected average values.

However, a few noteworthy differences emerged between states in the areas of relatively unskilled and highly qualified workers.

For example, employment growth among relatively unskilled workers in Rhineland-Palatinate was highest in the national comparison.

The obvious reason for this effect is that the chemical sector, which employs a comparatively high percentage of relatively unskilled workers, is particularly important in this state.

Interestingly, the direct comparison of the total potential employment effects from an agreement with the current existing average distribution of the three education groups in the manufacturing industry shows that the relative increases for highly qualified workers are significantly greater than for the other two groups (see Table 13). At 12.5 percent, the growth here lies almost 4 percentage points higher than the current sectoral average of 8.8 percent for highly qualified workers. By contrast, the growth for moderately skilled and relatively unskilled workers came in at around 2 percent below the current sector ratio. This can be explained by the fact that in sectors such as machinery manufacturing and electronics in particular, where most jobs in the manufacturing industry are created, the percentage of highly qualified workers is especially high compared to the other sectors. In the electronics industry alone, it amounts to almost 20 percent. At this point we would like to remind readers again that the expected employment distribution calculated here only takes the manufacturing industry into account, and therefore does not include the service sector due to a lack of data.

6. Effects of a TTIP on income and the income risk

We are now turning to our third analysis step and use the calculated shock measurement to project changes in real income and in the income risk that we would expect as the result of a TTIP.

6.1 Effects on real income

For this we first examine Mincer wage equations. Such equations model the wages of dependent employees as a function of their characteristics. Typically for this type of analysis, individual wage data (in logarithmic form) are regressed on human capital indicators (education, work experience), socio-economic variables (age, gender, nationality), and a series of indicator variables (region, industry). In this way, information is obtained on the role of education in the wages paid, for example.

For our analysis, we expand the classic model by including characteristics of the employer. What interests us in particular is to what extent the establishment where the worker is employed is affected by international trade (exports and imports).

Concretely, we estimate the following Mincer regressions on individual wage data for 2010::

$$(3)\ \ln w_i = \beta X_i + \gamma \Omega_s + \varepsilon_i,$$

where $\ln w_i$ represents the logarithm of real wages, X_i is a vector of variables controlling for the characteristics of the worker, and β the related parameter vector.[26] Ω_s on the other hand, measures how strongly an establishment is involved in international trade; we view these variables as an openness measurement.[27] Accordingly, the estimated value of parameter γ provides information about the strength of the link between the openness of the establishment and the wages of the employees.

26 Since the wage information in the IAB dataset is available only to the upper earnings limit, we first use Tobit estimates, in order to establish the complete wage distribution from graded wage data. In doing this, we follow Dustmann et al. (2009) and Card et al. (2012). For our analysis we are using the imputed wage data. Moreover, we take into account the disproportionality of the LIAB calculation sample in that we additionally control for the industry, state and size of operation variables. For more information, see FDZ Method Report No. 01/2008.

27 Concretely, the openness measurement measures the extent of exports in the total sales of a company. Since the extent of exports at the company level correlates strongly with the extent of imports at the company level (see on this e. g. Baumgarten, 2012), this variable can be used as a proxy for the total openness of a company. We consider the average as the openness of a sector.

We conducted separate regressions for each group and thereby obtained group-specific γ values. They offer insight into how strongly openness influences the real wages in the specific sample.

Table 14 shows the results of the Mincer regressions for the individual education groups. The corresponding results for all occupational groups can be found in the Appendix as Tables 14 i.

Table 14: Regression results for education groups

Variables	Unskilled	Moderately skilled	Highly skilled
Individual characteristics	yes	yes	yes
Openness	0,004***	0,003***	0,003***
Number of observations	358.768	1.739.263	310.905
R^2	0,4964	0,2943	0,3377
*** indicates statistical significance at 1%.			
Source: Calculations by the ifo Institute based on the IAB LIAB dataset.			

The estimates shown in the Table should be interpreted as follows: A 10 % increase in openness in a sector (and accordingly, it is assumed, in an average establishment) leads to an average increase in real wages of 4 % for unskilled and 3 % for moderately and highly skilled workers. This finding is somewhat surprising. It means that the export success of individual companies also results in higher wages for unskilled workers and that the increase in wages in export-oriented companies is actually higher for less skilled persons than for workers with more training.

In further conducting our analysis, we use the shock measurements calculated previously in the estimated Mincer equations. In so doing, we take into account that the openness approximated is only with respect to trade by German firms with the USA. This means that openness, for example, in the food products sector rises by 66 % * 7 %, with 7 % representing the ratio of Germany's exports to the USA relative to Germany's total exports.[28] We thereby obtain a forecast of real wage change $\hat{\gamma}'$, which should result from a TTIP on average for the individual groups. Table 15 shows the forecast of real wage change for individual education groups.

Table 15: Forecasts of real wages

	Unskilled	Moderately skilled	Highly skilled
TTIP effect on real wages	0.0094	0.0065	0.0056
Source: Calculations of the ifo Institute on the basis of the IAB LIAB dataset.			

28 We are assuming this 7 % value for 2010 as an average value for all sectors.

Different aspects should be noted here. First, it is evident that all three values are positive. That means that in case of a TTIP, we expect real wage increases in all three education groups. For unskilled workers, we are forecasting an increase in real wages of about 0.9 percent, for moderately skilled an increase of 0.7 percent and for highly skilled workers we expect an increase in real wages of 0.6 percent.[29]

For the individual occupational groups, we are forecasting real wage changes that range between minus 5 percent (fishery jobs) and plus 5 percent (agricultural workers). For sales personnel, inspectors and dispatchers, builders of civil engineering structures and precision metal workers, we identify real wage increases of more than one percent. That also applies for meal preparers, social workers and personal care workers. This again makes clear that the whole economy would profit substantially from a transatlantic agreement. Because even though in this second segment we are looking only at the direct trade effects on manufacturing, it can be seen that for example cleaners or other service workers obtain real wage increases.

6.2 Effects on income risk

The effects of a TTIP on income risk are calculated in a similar way. As measure for this we use the residual wage disparity, i. e., the share of the wage inequality that cannot be ascribed to individual characteristics like age, education, gender or nationality. It thus represents a risk measurement, since it cannot be controlled for an individual.[30] If the scatter of these random wage components grows due to an increase in trade, then the income risk on the labor market increases: In other words, there is an increase in the share of workers paid substantially more or less than the wage their formal qualifications would entitle them to.

The procedure takes place in three steps. First, we conduct Mincer wage regressions and extract the residuals from them. The standard deviation of these residuals provides our analysis measurement, the income risk. In the second step, we estimate the extent the income risk is influenced by openness. To do that, we regress our income risk index on three constructed openness measurements, so that we can reach some conclusions about individual subsegments of the job market. In the last step, we again use the impact measurements that we had calculated to see how the income risk for various partial segments changes as the result of a possible agreement.[31]
First we look at the isolated results for the three education groups. Our analysis shows that for all

29 These results are compatible with the real wage effects for Germany that we calculated in the first part of the study (Part 1: Macro Economic Effects). There the real wage effects were between 0.5 and 2.2 percent, where we distinguish between a purely customs scanerio and a deep liberalization scenario. That distinction is not made here. Moreover, our analysis does not consider that the price level in the whole economy falls due to TTIP (as we know from the macro study), so that the real wage effects shown here represent lower limits. If the price level effect is assumed to be equal for all population groups (which is the usual practice), then the real wage effect can be readily compared across individual groups.

30 In econometric estimation equations, the unexplained residual is usually described as “shocks”. These scatter around zero in a linear estimation model. In our application, a lower residual means that the worker receives a higher wage, which would be due to him based on his calculated human capital profile. A positive residual means the opposite.

31 The construction of the openness index is again based on the plant information of the LIAB database. The first openness index varies across education groups, the second varies across occupational groups and the third openness index varies across states.

education groups, an increase in the income risk in the case of a transatlantic investment and trade partnership would be expected. In fact, the risk for unskilled workers rises most, with the standard deviation rising by 0.011. Workers with moderate skills can expect an increase in the income risk of 0.010, while for highly skilled workers, the income risk rises by 0.0089. These results should be interpreted against a background in which the average residual wage inequality has a value of 0.4.[32] We should thus see the average value as the status quo and then expect that a TTIP would increase the income risk of unskilled workers by nearly three percent. The corresponding income risk rise for the other two education groups is just below that.

A different picture emerges if we look at the isolated effects for individual occupational groups. Here it turns out that the occupations more frequently found in sectors that are distinguished for a high openness measurement, are subject to a smaller income risk. (That means that our openness factor in analysis step two described above is negative for the occupational groups). The result: For almost every occupational group, there is a decline in the income risk from a possible TTIP. The income risk will decline more, the more the occupational group is impacted by trade or openness. Table 16 i in the Annex provides the relevant overview. The effects from a TTIP on income risk on various occupational groups now lies between plus 0.0015 (textile processors) and minus 0.0058 (meat and fish processors). Again, the more open an occupational group is (i. e., the more important open sectors are for this occupational group), the more the income risk for this occupational group falls from a TTIP.

So far we have examined the effects on the income risk for education and occupational groups in isolation. To reach some conclusions about the overall effect, we must evaluate the total of the findings. Although there are opposite effects, the overall effect of a TTIP on the income risk is ambiguous. What we can say, however, is for example, that for an unskilled (= 0.011) concrete worker (= −0.0014), the income risk rises. For an unskilled salesperson (=0.0066), the income risk rises, but less than for the concrete worker. Thus it is possible to calculate for combinations of the education and occupation of a worker the expected change in his income risk.

32 This is a value that is also found in this amplitude in the literature. See Dustmann et al. (2009), Card et al. (2012) and Baumgarten (2012).

7. Summary

- Trade creation potential varies across industry sectors: The strongest trade effects are to be expected in the food and metal industries.

- There are also clear differences in the sectors with respect to the importance of non-tariff barriers. Politically adaptable NTBs are especially high in the recycling and agriculture sectors.

- The largest value creation effects in Germany are expected in the electrical sector. That is where the strongest employment effects are found.

- The transatlantic agreement also has affects in those industrial sectors and on those workers that are not directly affected by more trade. The reason for that are input-output interconnections.

- Real wage increases for all education groups (unskilled, moderately skilled and highly skilled) are to be expected from a TTIP, from 0.6 percent (highly qualified) to nearly one percent (unskilled).

- Occupations in the food sector, such as sales personnel, like occupations in the metal industry, show above average real wage increases of more than one percent.

- All states would benefit from an agreement, and increases in trade with the USA of 20–30 percent per state are expected. The size of the anticipated effects depends heavily on export levels at the outset.

- The income risk from a TTIP rises in all education groups and regions. However, the total effect remains ambiguous, since the income risk falls along the occupational dimension.

A. Annex

A.1 Gravitation models, estimation methods and results

The economic gravitation equation in its simplest form states that the trade flows between two economies depend proportionally on the product of their size and negatively on their distance from each other:

$$(A1)\ x_{ij} = \frac{BIP_i BIP_j}{BIP^W} d_{ij}^{-1},$$

where x_{ij} stands for the trade flows and BIP^W for world income, and BIP_i and BIP_j correspondingly for the GDP of countries i and j. d_{ij} measures the trade barriers between two countries. Although the simple gravitation equation in the empirical literature on trade is generally able to explain 60–80 % (depending on the dataset) of the variation in bilateral trade flows, the absence of a solid theoretical foundation for this conclusion was long considered a major criticism. Current research has however been able to show that the gravitation equation is consistent with many newer trade models.[33] A theoretically-based gravitation equation from Anderson and van Wincoop (2003) is very similar to the simple equation (A1):

$$(A2)\ x_{ij} = \frac{BIP_i BIP_j}{BIP^W} d_{ij}^{(1-\sigma)} \Pi_i^{(\sigma-1)} P_j^{(\sigma-1)},$$

where σ reflects substitutional elasticity, and Π_i and P_j represent the multilateral resistance terms. Trade policy is represented as a part of d_{ij}, in that we integrate an indicator variable for membership in a preferential trade agreement (PTA).[34] We assume the following connection:

$$(A3)\ d_{ij}^{1-\sigma} = \exp(\delta PHA_{ij} + \beta DIST_{ij} + \ldots),$$

where we consider, besides the indicator for membership in a preferential trade agreement, other geographic and historical variables that influence trade frictions between two countries. So, for example, $DIST_{ij}$ stands for the distance between the trading partners. By substitution of (A3) in (A2) and with a slight modification, we obtain our estimation equation:

$$(A4)\ \ln x_{ij} = \ln\left(Z_{ij}'\beta + \delta PHA_{ij} + \alpha_i + \gamma_j\right) + \ln \varepsilon_{ij},$$

where $Z_{ij} = (1, DIST, \ldots)'$ is a vector that contains a constant as well as all variables that make trade easier or more difficult except for PHA_{ij}. β is a vector of coefficients and $\alpha_i = BIP_i \Pi_i^{\sigma-1}$ and $\gamma_j = BIP_j P_j^{\sigma-1}$ apply.

33 This applies only under certain assumptions involving consumption, preferences, market structure and transport costs. Decisive contributions were made by Redding and Venabeles (2004), Baier and Bergstrand (2001), Anderson and van Wincoop (2003) and Anderson and van Wincoop (2004).

34 In this we again distinguish between “deep” and “all other” preferential trade agreements. We include among the “deep” agreements the North American Free Trade Agreement (NAFTA) and the EU Agreement.

For our analysis, we estimate the gravitation equation at the industry level and obtain for each sector a coefficient δ_s that indicates to us the average trade-creating effect of a deep agreement for that particular sector. Gravitation models can be estimated consistently with the help of fixed effects (Feenstra, 2004). In specification A) we estimate our industry-specific gravitation equations, in that we control for trade partner/sector-specific fixed effects, as well as for country/time-specific fixed effects and perform a linear estimate.

The fixed effects control for observed and unobserved heterogeneity in the data. In specification B) we conduct a non-linear, so-called *Poisson Pseudo Maximum Likelihood* (PPML) estimate, in order to take into account such factors as the relatively high number of zeros in the trade data (Santos Silva and Tenreyro, 2006). The PPML estimate has another decisive advantage, besides the consideration of the zeros in the trade matrix, compared to linear estimation methods: It generates consistent estimators even in the presence of measurement errors that cause heteroscedasticity. In B) time-consistent components are included through trade partner/sector-specific fixed effects. Instead of country/time-specific fixed effects that include the multilateral resistance terms in specification A), in specification B) we take into account time-specific fixed effects and linear multilateral resistance terms. In this we make use of the findings of Baier and Bergstrand (2009) and approximate the multilateral resistance terms with help of a Taylor approximation.

Table 1 i shows the results of both specifications. Together the results of both models – both in terms of the sign and the scale of the effects – are comparable. Since the trade effects at the sector level are the foundation for further calculations, Table 1 i also presents how they result from specification A and B.

Table 1 i: Estimation results

NACE Rev.1.1	Sector designation	Specification A	Specification B	Derived trade creation
A & B	Agriculture and forestry, fishing	0,728***	0,388***	0,388***
C	Mining and quarrying	–0,0249	0,0774	0,0774
DA	Food products and tobacco processing	0,714***	0,506***	0,506***
DB	Textiles and wearing apparel	–0,0106	–0,215**	–0,215**
DC	Leather and leather products	0,160*	–0,140	0,160*
DD	Wood and wood products	0,0448	–0,0675	–0,0675
DE	Paper, publishing and printing	0,221***	0,137*	0,137*
DF	Coking, petroleum processing	0,00668	0,133	0,133
DG	Chemical products	0,300***	0,196**	0,196**
DH	Rubber and Plastics	0,138**	0,105	0,138**
DI	Glass, ceramics	0,0337	0,0300	0,0300
DJ	Metal production and processing	0,423***	0,0325	0,423***
DK	Machinery and Equipment	0,0971	0,152**	0,152**
DL	Manufacture of office machinery	0,0734	0,336***	0,336***
DM	Manufacture of motor vehicles	0,159*	0,156*	0,156*
DN	Manufacture of furniture, recycling	–0,00709	0,234**	0,234**

*, **, *** refer to significance at the 1.5 or 10 percent level. Shortened representation: Since we estimate each sector separately, we will not provide references to additional information here.

Source: Calculations of the ifo Institute.

Note to Table 1 i:
The estimates shown also prove to be robust in alternative specifications.

Table 9 i: Degree of impact experienced by the occupational groups

Occupational group designation	Impact measurement
Farmers	0.43
Livestock breeders, fishing occupations	0.43
Administrators, farming and livestock consultants	0.39
Agricultural workers, animal keepers	0.47
Horticulturalists	0.47
Forestry, hunting occupations	0.46
Miners	.
Mineral, petroleum, natural gas extractors	.
Mineral processors	.
Stone workers	0.01
Construction materials producer	.
Ceramic workers	0.02
Glass makers	0.07
Chemical workers	0.21
Plastic processors	0.18
Paper makers, processors	0.14
Printers	0.15
Wood processors, wood product producers and related occupations	0.08
Metal processors, rollers	0.48
Form makers, casters	0.45
Metal formers (die casters)	0.39
Metal formers (under tension)	0.31
Metal surface processors, enhancers, coaters	0.42
Metal connectors	0.34
Blacksmiths	0.42
Sheet metal worker, fitters	0.24
Metal workers	0.31
Mechanics	0.27
Tool makers	0.30
Precision metal worker and associated occupations	0.37
Electrician	0.28
Installer and metal working occupations not named elsewhere	0.33
Spinning occupations	–0.12
Textile producers	–0.10
Textile processors	–0.10
Textile finishers	–0.17
Leather producers, leather and pelt processors	0.18
Producers of baked goods and pastries	0.65
Meat and fish processors	0.65
Meal preparers	0.55
Food and drink producers	0.62
Other food occupations	0.65
Masons, concrete installers	0.16
Carpenter, roofer, scaffolder	0.13
Road and foundation workers	0.29
Construction laborer	0.32

Table 9 i: Degree of impact experienced by the occupational groups

Occupational group designation	Impact measurement
Construction materials supplier	0.14
Interior designer, upholsterer	0.20
Cabinetmaker, model building	0.18
Painters, varnishers related occupations	0.26
Goods testers, dispatching packers	0.34
Laborers without more detailed designation	0.31
Machinists and related occupations	0.26
Engineers	0.26
Chemists, physicists, mathematicians	0.22
Technicians	0.26
Technical support personnel	0.27
Sales personnel	0.50
Bank, insurance sales personnel	0.05
Other service sales personnel and related occupations	0.22
Land transport occupations	0.37
Water and air transport occupations	0.21
Telecommunications occupations	0.21
Warehouse managers, warehouse, transport workers	0.23
Entrepreneurs, organizers, auditors	0.26
Elected officials, administrative decision-makers	0.25
Accountants, IT specialists	0.28
Office staff, clerical workers	0.26
Service, security occupations	0.30
Security personnel	0.07
Journalists, interpreters, librarians	0.15
Artists and associated occupations	0.21
Doctors, pharmacists	0.18
Other health service providers	0.18
Social work professions	0.24
Teachers	0.16
Intellectual and scientific occupations not mentioned elsewhere	0.22
Personal care	0.30
Hospitality service providers	0.51
Domestic services providers	0.33
Cleaning occupations	0.36
Workers with unidentified occupations	0.27
Workers without more detailed designation	0.29

Source: Calculations of the ifo Institute based on the IAB LIAB dataset.

Tabelle 10 i: The most important states by industrial sector

Sector designation		State
Agriculture and forestry, fishing	27.9%	Lower Saxony
	24.0%	Bavaria
	17.4%	Schleswig-Holstein
Mining and quarrying	30.2%	Bavaria
	26.9%	Saxony-Anhalt
	12.9%	Lower Saxony
Food products and tobacco processing	24.1%	Bremen
	20.9%	Lower Saxony
	11.1%	North Rhine-Westphalia
Textiles and wearing apparel	26.2%	Baden-Württemberg
	24.5%	Bavaria
	21.1%	North Rhine-Westphalia
Leather and leather products	28.8%	Rhineland-Palatinate
	25.9%	Bavaria
	20.5%	Schleswig-Holstein
Wood and wood products	21.1%	Rhineland-Palatinate
	19.4%	Bavaria
	13.8%	Lower Saxony
Paper, publishing and printing	30.9%	Baden-Württemberg
	29.0%	Lower Saxony
	13.3%	North Rhine-Westphalia
Coking, petroleum processing	59.9%	Hamburg
	17.0%	North Rhine-Westphalia
	9.3%	Baden-Württemberg
Chemical products	20.7%	Rhineland-Palatinate
	19.0%	North Rhine-Westphalia
	18.8%	Hesse
Rubber and Plastics	23.8%	North Rhine-Westphalia
	17.9%	Bavaria
	16.0%	Hesse
Glass, ceramics	36.4%	Bavaria
	10.7%	Baden-Württemberg
	10.6%	North Rhine-Westphalia
Metal production and processing	44.3%	North Rhine-Westphalia
	12.7%	Baden-Württemberg
	10.2%	Hesse
Manufacture of office machinery	33.8%	Bavaria
	26.9%	Baden-Württemberg
	10.0%	North Rhine-Westphalia
Machinery and Equipment	30.8%	Baden-Württemberg
	21.5%	Bavaria
	20.2%	North Rhine-Westphalia
Manufacture of motor vehicles	30.2%	Bavaria
	29.0%	Baden-Württemberg
	11.6%	Lower Saxony
Manufacture of furniture, recycling	25.1%	Baden-Württemberg
	22.4%	Bavaria
	15.4%	Hesse

Source: Calculations of the ifo Institute.

Table 14 i: Regression results, occupational groups, TTIP effect

Occupational group designation	Openness	TTIP effect
Farmers	0.005	0.0000
Livestock breeders, fishing occupations	–0.016**	–0.0479
Administrators, farming and livestock consultants	0.005*	0.0136
Agricultural workers, animal keepers	0.015***	0.0495
Horticulturalists	0.002	0.0000
Forestry, hunting occupations	0.005	0.0000
Miners	0.001	.
Mineral, petroleum, natural gas extractors	–0.007***	.
Mineral processors	0.001*	.
Stone workers	0.003*	0.0002
Construction materials producer	0.003***	.
Ceramicists	0.001*	0.0001
Glass makers	–0.002	0.0000
Chemical workers	0.002**	0.0030
Plastic processors	0.001**	0.0013
Paper makers, processors	0.001	0.0000
Printers	0.000	0.0000
Wood processors, wood product producers and related occupations	0.002	0.0000
Metal processors, rollers	0.002***	0.0068
Form makers, casters	0.001	0.0000
Metal formers (die casters)	0.001	0.0000
Metal formers (under tension)	0.003***	0.0065
Metal surface processors, enhancers, coaters	0.002**	0.0059
Metal connectors	0.002***	0.0048
Blacksmiths	0.002	0.0000
Sheet metal worker, fitters	0.003***	0.0050
Metal workers	0.003***	0.0065
Mechanics	0.002***	0.0038
Tool makers	0.002***	0.0043
Precision metal worker and associated occupations	0.004***	0.0104
Electrician	0.002***	0.0040
Installer and metal working occupations not named elsewhere	0.002***	0.0046
Spinning occupations	0.001	0.0000
Textile producers	0.002	0.0000
Textile processors	0.001	0.0000
Textile finishers	0.003***	–0.0035
Leather producers, leather and pelt processors	0.001	0.0000
Producers of baked goods and pastries	0.003	0.0000
Meat and fish processors	–0.000	0.0000
Meal preparers	0.004***	0.0155
Food and drink producers	0.002	0.0000
Other food occupations	0.000	0.0000
Masons, concrete installers	0.002**	0.0023

Table 14 i: Regression results, occupational groups, TTIP effect

Occupational group designation	Openness	TTIP effect
Carpenters, roofers, scaffolders	0.001	0.0000
Road and foundation workers	0.006**	0.0120
Construction laborer	0.002	0.0000
Construction materials supplier	0.003**	0.0029
Interior designer, upholsterer	–0.003	0.0000
Cabinetmaker, model building	0.004***	0.0050
Painters, varnishers related occupations	0.004***	0.0072
Goods testers, dispatching packers	0.005***	0.0117
Laborers without more detailed designation	0.007***	0.0154
Machinists and related occupations	0.002***	0.0036
Engineers	0.002***	0.0037
Chemists, physicists, mathematicians	0.001**	0.0015
Technicians	0.002***	0.0036
Technical support personnel	0.002***	0.0038
Sales personnel	0.009***	0.0317
Bank services, insurance sales personnel	0.003*	0.0011
Other service sales personnel and related occupations	0.004***	0.0061
Land transport occupations	0.001	0.0000
Water and air transport occupations	0.004**	0.0060
Telecommunications occupations	0.003***	0.0045
Warehouse managers, warehouse, transport workers	0.004***	0.0066
Entrepreneurs, organizers, auditors	0.001	0.0000
Elected officials, administrative decision-makers	0.003***	0.0052
Accountants, IT specialists	0.004***	0.0080
Office staff, clerical workers	0.003***	0.0055
Service, security occupations	0.004***	0.0084
Security personnel	0.001	0.0000
Journalists, interpreters, librarians	–0.001**	–0.0010
Artists and associated occupations	0.005***	0.0074
Doctors, pharmacists	0.005***	0.0063
Other health service providers	0.003*	0.0039
Social work professions	0.009***	0.0152
Teachers	0.006***	0.0066
Intellectual and scientific occupations not mentioned elsewhere	0.004***	0.0063
Personal care	0.020*	0.0424
Hospitality service providers	0.002*	0.0071
Domestic services providers	0.001	0.0000
Cleaning occupations	0.004***	0.0100

*, **, *** indicates significance level at 1.5 and 10 percent level.

Source: Calculations of the ifo Institute based on the IAB LIAB dataset.

Table 16 i: Effect on income risk by occupation

Occupational group designation	Impact measurement	TTIP effect on income risk
Farmers	0.43	–0.0038
Livestock breeders, fishing occupations	0.43	–0.0038
Administrators, farming and livestock consultants	0.39	–0.0034
Agricultural workers, animal keepers	0.47	–0.0042
Horticulturalists	0.47	–0.0041
Forestry, hunting occupations	0.46	–0.0041
Miners	.	.
Mineral, petroleum, natural gas extractors	.	.
Mineral processors	.	.
Stone workers	0.01	–0.0001
Construction materials producer	.	.
Ceramicists	0.02	–0.0002
Glass makers	0.07	–0.0006
Chemical workers	0.21	–0.0019
Plastic processors	0.18	–0.0016
Paper makers, processors	0.14	–0.0013
Printers	0.15	–0.0013
Wood processors, wood product producers and related occupations	0.08	–0.0007
Metal processors, rollers	0.48	–0.0043
Form makers, casters	0.45	–0.0039
Metal formers (die casters)	0.39	–0.0034
Metal formers (under tension)	0.31	–0.0027
Metal surface processors, enhancers, coaters	0.42	–0.0037
Metal connectors	0.34	–0.0030
Blacksmiths	0.42	–0.0037
Sheet metal worker, fitters	0.24	–0.0021
Metal workers	0.31	–0.0027
Mechanics	0.27	–0.0024
Tool makers	0.30	–0.0027
Precision metal worker and associated occupations	0.37	–0.0033
Electrician	0.28	–0.0025
Installer and metal working occupations not named elsewhere	0.33	–0.0029
Spinning occupations	–0.12	0.0011
Textile producers	–0.10	0.0009
Textile processors	–0.10	0.0009
Textile finishers	–0.17	0.0015
Leather producers, leather and pelt processors	0.18	–0.0016
Producers of baked goods and pastries	0.65	–0.0058
Meat and fish processors	0.65	–0.0058
Meal preparers	0.55	–0.0049
Food and drink producers	0.62	–0.0055
Other food occupations	0.65	–0.0057
Masons, concrete installers	0.16	–0.0014

Table 16 i: Effect on income risk by occupation

Occupational group designation	Impact measurement	TTIP effect on income risk
Carpenters, roofers, scaffolders	0.13	–0.0011
Road and foundation workers	0.29	–0.0025
Construction laborer	0.32	–0.0029
Construction materials supplier	0.14	–0.0012
Interior designer, upholsterer	0.20	–0.0018
Cabinetmaker, model building	0.18	–0.0016
Painters, varnishers, related occupations	0.26	–0.0023
Goods testers, dispatching packers	0.34	–0.0030
Laborers without more detailed designation	0.31	–0.0028
Machinists and related occupations	0.26	–0.0023
Engineers	0.26	–0.0023
Chemists, physicists, mathematicians	0.22	–0.0019
Technicians	0.26	–0.0023
Technical support personnel	0.27	–0.0024
Sales personnel	0.50	–0.0044
Bank, insurance sales personnel	0.05	–0.0005
Other service sales personnel and related occupations	0.22	–0.0019
Land transport occupations	0.37	–0.0032
Water and air transport occupations	0.21	–0.0019
Telecommunications occupations	0.21	–0.0019
Warehouse managers, warehouse, transport workers	0.23	–0.0021
Entrepreneurs, organizers, auditors	0.26	–0.0023
Elected officials, administrative decision-makers	0.25	–0.0022
Accountants, IT specialists	0.28	–0.0025
Office staff, clerical workers	0.26	–0.0023
Service, security occupations	0.30	–0.0027
Security personnel	0.07	–0.0006
Journalists, interpreters, librarians	0.15	–0.0013
Artists and associated occupations	0.21	–0.0019
Doctors, pharmacists	0.18	–0.0016
Other health service providers	0.18	–0.0016
Social work professions	0.24	–0.0021
Teachers	0.16	–0.0014
Intellectual and scientific occupations not mentioned elsewhere	0.22	–0.0020
Personal care	0.30	–0.0027
Hospitality service providers	0.51	–0.0045
Domestic services providers	0.33	–0.0029
Cleaning occupations	0.36	–0.0031
Workers with unidentified occupations	0.27	–0.0024
Workers without more detailed designation	0.29	–0.0026

Source: Calculations of the ifo Institute based on the IAB LIAB dataset.

Literature

Anderson, James, and Eric van Wincoop. “Gravity with Gravitas: A Solution to the Border Puzzle”. *American Economic Review* (93) 1 2003. 170–192.

Anderson, James, and Eric van Wincoop. “Trade Costs”. *Journal of Economic Literature* (42) 3 2004. 691–751.

Baumgarten, Daniel. “Exporters and the rise in wage inequality: Evidence from German linked employer-employee data”. *Journal of International Economics* (90) 1 2013. 201–217.

Baier, Scott and Jeffrey Bergstrand. “The Growth of World Trade: Tariffs, Transport Costs, and Income Similarity”. *Journal of International Economics* (53) 1 2001. 1–27.

Baier, Scott and Jeffrey Bergstrand. “Bonus vetus OLS: A Simple Method for Approximating International Trade-Cost Effects using the Gravity Equation”. *Journal of International Economics* (77) 1 2001. 77–85.

Vom Berge, Philipp, Marion König and Stefan Seth. “Stichprobe der Integrierten Arbeitsmarktbiografien (SIAB) 1975–2010”. *FDZ Datenreport* 1 2013.

Broda, Christian, and David Weinstein. “Globalization and the Gains from Variety”. *Quarterly Journal of Economics* (121) 2 2006. 541–585.

Card, David, Jörg Heining and Patrick Kline. “Workplace Heterogeneity and the Rise of West German Wage Inequality”. *The Quarterly Journal of Economics* (128) 3 2013. 967–1015.

Dustmann, Christian, Johannes Ludsteck and Uta Schönberg. “Revisting the German wage structure”. *Quarterly Journal of Economics* (124) 2 2009. 843–881.

Ebenstein, Avraham, Ann Harrison, Margret McMillan and Shannon Philipps. “Why are American Workers getting Poorer? Estimating the Impact of Trade and Offshoring Using the CPS” NBER Working Papers 15107, National Bureau of Economic Research, Inc 2009.

Feenstra, Robert. Advanced International Trade: Theory and Evidence. Princeton University Press, Princeton NJ 2004.

Felbermayr, Gabriel, and Erdal Yalcin. “Export Credit Guarantees and Export Performance: An Empirical Analysis for Germany.” *The World Economy*, forthcoming (doi: 10.1111/twec.12031).

Felbermayr, Gabriel, Andreas Hauptmann and Hand-Jörg Schmerer. “International Trade and Collective Bargaining Outcomes: Evidence from German Employer-Employee Data”. *Scandinavian Journal of Economics*, forthcoming.

Felbermayr, Gabriel, Mario Larch, Lisandra Flach, Erdal Yalcin and Sebastian Benz. *Dimensionen und Auswirkungen eines Freihandelsabkommens zwischen der EU und den USA*. ifo Studie. München 2013.

Fischer, Gabriele, Florian Janik, Dana Müller and Alexandra Schmucker. “Das IAB Betriebspanel – von der Stichprobe über die Erhebung bis zur Hochrechnung”. *FDZ Methodenreport* 1 2008.

Fitzenberger, Bernd, Aderonke Osikominu and Robert Völter. “Imputation rules to improve the education variable in the IAB employment subsample”. *Schmollers Jahrbuch: journal of Apllied Social Science Studies* (126) 3 2006. 405–436.

Heining, Jörg, Theresa Scholz and Stefan Seth. “Linked-Employer-Employee-Daten des IAB: LIAB-Querschnittsmodell 2 1993–2010”. *FDZ Datenreport* 2 2013.

Redding, Stephen and Anthony Venables. “Economic Geography and International Inequality”. *Journal of International Economics* (62) 1 2004. 53–82.

Santos Silva, Joao, and Silvana Tenreyro. “The Log of Gravity”. *Review of Economics and Statistics* (88) 4 2006. 641–658.

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The Bertelsmann Stiftung established the project "Global Economic Dynamics" (GED) to shed more light on the growing complexity of international economic relationships. By using state-of-the-art tools and methods for measuring, forecasting and displaying the dynamics of the world economy, the project aims at making globalization, its economic effects as well as its political consequences more transparent and tangible.

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