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# The Rise of the East and the Far East: German Labor Markets and Trade Integration \*

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## **Abstract**

The unprecedented economic rise of Eastern Europe and China in the last two decades has triggered concerns in developed Western market economies about adverse effects for domestic labor markets through increased import competition. Simultaneously, exports from developed countries to these new destination markets have also surged. We analyze the effect of this enormous rise in trade integration on German labor markets between 1988 and 2008, using detailed administrative data. We exploit the variation in initial industry variation across German regions, before the onset of these trade shocks, and instrument for regional import and export exposure using trade flows from other highly-developed countries with East Europe and China. We find large effects of export and import exposure to East Europe; on average exports are estimated to have increased manufacturing employment by 3.99 percentage points, whereas imports increased manufacturing employment by 2.33 percentage points. We find no effects of trade integration with China on the employment margin. We complement our findings with results on regional wage growth, inequality, industry churning and population shifts. Using data at the worker level, we show that workers specialized in export (import) industries before the onset of trade shocks, have a higher (lower) probability of subsequently being employed and have more (less) stable employment outcomes, defined as working in the same firm or industry. These effects of trade on worker outcomes are larger and more robustly estimated for Eastern Europe.

**JEL-Classification:** F16, J31, R11

**Keywords:** International Trade Flows, Import Competition, Export Opportunities, Local Labour Markets, Employment, Earnings

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# 1 Introduction

Among the central forces that have spurred globalization in the last decades is certainly the rise of East Asian countries, especially China, in the world economy. The dramatic rise of international trade with these countries and their perceived competitiveness have led to major concerns in the traditional Western market economies about possible adverse effects for domestic labor markets. This “fear” is particularly high on the agenda in the US, which runs a huge trade deficit, and numerous studies have addressed the impact of trade integration with China and other East Asian countries on US wage inequality, offshoring, innovation activity, et cetera.<sup>1</sup>

From the perspective of Germany, which has been ranking consistently among the most open economies in the world and for a long time held the inofficial title of the export world champion, China’s rise also had a major impact. Starting from almost zero trade in the middle of the 1980s, the German import volume from China has risen dramatically to more than 50 billion Euro in 2008 (see Figure 1). This corresponds to a growth rate of 1608% that is far higher than for any other trading partner (see Table 1). However, although Germany also runs a trade deficit vis-a-vis China despite an overall trade surplus, the magnitude of this deficit is much smaller than in the US. This is because German exports to China have also risen substantially, by about 1000 % from almost zero in the mid-80s to some 30 billion Euro in 2008, which is much faster than the rise of US exports. The “rise of China” therefore led to two major impacts for the German economy: Increased import competition particularly in such sectors as textiles, toys or lower tier office and computer equipment, but at the same time a substantial rise in market opportunities for the classical German export sectors, most notably automobiles, specialized manufacturing and the electronic and medical industries.<sup>2</sup>

Another dimension along which Germany and the US differ, is that Western Europe was heavily affected by another major facet of globalization that at least economically had a much milder impact in North America, namely the fall of the iron curtain with the subsequent transformation of the former socialist countries in Eastern Europe into market economies. This has also led to major increases of both German import and export volumes. Overall, Germany has a trade surplus with Eastern Europe and the rise of exports even outpaced export growth to China. Yet, import growth from Eastern Europe also has been huge, exceeding 900 % over the time period from the mid 1980s until 2008.<sup>3</sup>

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<sup>1</sup>See, among others, Feenstra and Hanson (1999); Harrigan (2000); Feenstra and Wei (2010); Harrison, McLaren, and McMillan (2010); Ebenstein, Harrison, McMillan, and Phillips (2011).

<sup>2</sup>Also see Appendix Table A.1 for more information about the sectoral composition of overall Ger-

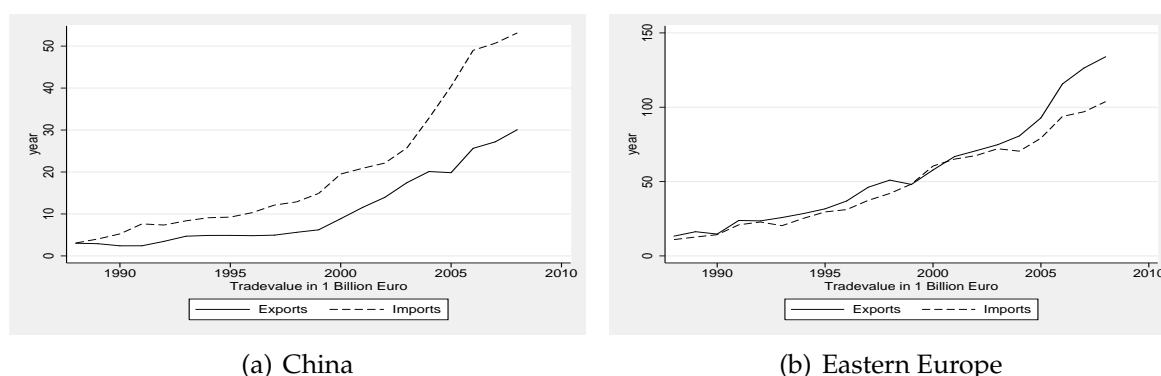


Figure 1: German Exports and Imports to/from China and Eastern Europe

Period	China IM	China EX	India IM	India EX	Asia Develop. IM	Asia Develop. EX
1988	3.1	3.0	1.3	1.9	4.1	3.5
1998	12.9	6.1	2.3	2.0	10.8	6.0
2008	53.2	30.9	4.8	7.3	15.9	9.6
Growth	1608 %	914 %	264%	274%	284%	174%

Period	Asia Ind. IM	Asia Ind. EX	E. Europe IM	E. Europe EX	ROW IM	ROW EX
1988	28.6	15.5	11.4	13.5	269.3	369.4
1998	32.1	19.0	42.3	53.2	356.9	441.2
2008	31.0	28.1	115.0	144.1	548.2	715.2
Growth	8%	81%	911%	970%	104%	94%

Table 1: Changes in the volume of German exports and imports, 1988 - 2008 in Billion Euros of 2005

For the German economy, import competition and export market opportunities therefore increased not only from the Far East, but also from the East much closer by. In this paper, we aim to analyze the impacts of these major trade shocks. Our analysis is conducted at the level of German local labor market areas. There is substantial variation in sectoral specialization patterns at this regional level, both in terms of manufacturing versus non-manufacturing but also within the manufacturing sector where goods trade occurs. Given these initial specializations, regions are thus differ-

man import and export flows.

<sup>3</sup>Eastern Europe comprises the countries Azerbaijan, Belarus, Bulgaria, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Poland, Moldova, Romania, Russian Federation, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. The corresponding figures for the change in trade volumes between the US and these countries are, in comparison to Germany, negligible. The sectoral structure of German trade with Eastern Europe is somewhat different that for China – see Appendix Table 1. Although the export sectors are basically the same, there is more intra-industry and vertical trade as the top imported items are automobile parts and electric apparatus.

ently exposed to import competition and export opportunities arising from Eastern European and Asian countries. We relate changes in key local labor market variables to measures of import and export exposure that reflect the local industry mix. Afterwards we complement this aggregate analysis with a disaggregate approach at the level of individual workers, analyzing how trade exposure affects employment stability within regions, local industries and plants.

In the literature, there are several approaches to identifying the impacts of trade shocks. One approach uses industries at the national level as the unit of observation, and analyzes how trade affects wages in general equilibrium taking into account that inter-sectoral labor mobility may also involve a loss of specific human capital (Feenstra and Hanson; 1999; Harrigan; 2000; Robertson; 2004; Poletaev and Robinson; 2008; Blum; 2008). This literature is based on the view that labor markets adjust instantaneously or very rapidly to a new equilibrium, even after major perturbations. Another prominent approach looks at finer levels of disaggregation and is based on the presumption that the adjustment to major trade shocks is sluggish and may require more time. In that case, the differential impacts on firms, occupations or regions may be informative about the short- to medium-run effects of trade liberalization. Within that string of literature, Bernard, Jensen, and Schott (2006), Verhoogen (2008), Amiti and Davis (2012), and Bloom, Draca, and Van Reenen (2011) have analyzed trade shocks at the level of plants and firms, whereas Artuc, Chaudhuri, and McLaren (2010), McLaren and Hakobyan (2010), and Ebenstein, Harrison, McMillan, and Phillips (2011) use the industry and occupation level.

Our work is most closely related to the literature that identifies the impact of trade shocks at the regional level, see Chiquiar (2008)), Kovak (2011), Topalova (2010), and in particular, Autor, Dorn, and Hanson (2011). The latter (henceforth labeled as *AHD*) separate the US into 722 commuting zones. *ADH* then analyze the differential performance of these regions along various dimensions as a function of their exposure to import competition from China. To account for unobserved shocks that simultaneously affect imports and regional performance, they use imports of other developed countries to construct an instrument for US regional import exposure. Their main finding is that commuting zones with an industry mix that strongly exposes them to competition from China have experienced severe negative impacts on their labor markets, such as rising unemployment, lower labor force participation, or increasing reliance on disability and other transfer benefits. At the same time they find that the Chinese trade shocks induced relatively small cross-regional population shifts. This low labor mobility, in turn, supports the view that commuting zones can be treated as “sub-economies” of the US across which the adjustment to trade shocks works far from instantaneously, so that the cross-regional variation in import exposure and labor market performance is a useful source of identification.

The analysis for German local labor market areas, which are comparable constructs to the US commuting zones, makes use of the empirical approach pioneered by ADH. Since regional labor mobility in Germany is traditionally much lower than in the US (Bertola; 2000), this approach seems especially well applicable in that context. Given the aforementioned substantial differences between Germany and the US in terms of their aggregate trade developments, however, we pay particular attention to two aspects that ADH did not focus on: exports and Eastern Europe. The “rise of China”, facilitated by substantial productivity gains and the Chinese WTO accession, and for that matter also the “rise of Eastern Europe” that was due to similar causes, not only imply an exogenous increase in import exposure from the point of view of a single German region. They also imply an increase in new export opportunities that regions specialized in the “right” type of industries can take advantage of. Our results in fact suggest that both aspects are crucial for understanding how German local labor markets were affected by, and adjusted to trade exposure in the past two decades.

In particular, consistent with ADH, we also find a negative *causal* effect of import exposure on manufacturing employment in German regions.<sup>4</sup> That is, regions specialized in import competing manufacturing sectors saw a decline in employment attributable to the impact of trade. That effect is significant only for import exposure from Eastern Europe, however, while the rising penetration from China does not seem to pose a major threat. Furthermore, we find that this negative impact is – on average – more than offset by a positive *causal* effect of export exposure. That is, regions specialized in export-oriented manufacturing sectors were able to build up employment as a result of the new trade opportunities. Again, this effect is more pervasive for Eastern Europe than for China. Our empirical analysis thus suggests that the overall impact of the rising trade with China and Eastern Europe was positive for manufacturing employment in Germany.<sup>5</sup> Quantitatively, the impact is large and economically highly important. We calculate that without these trade liberalizations, overall manufacturing employment in Germany would be 1.66 percentage points lower in 2008 than it actually is. In other words, the rising trade Eastern Europe did not cause the manufacturing sector in Germany to disappear; it rather strengthened it as a result of newly arising export opportunities.

Finally, the analysis at the individual level allows for a more detailed look how

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<sup>4</sup>To control for unobserved demand and supply shocks, we follow ADH and implement an IV strategy using trade flows from other high-developed countries with Eastern Europe and China. The main selection criterion for these countries is that demand and supply shocks should not be correlated with shocks in Germany in that time period. We go more into detail about our instruments in a later section.

<sup>5</sup>This result differs substantially from ADH’s main conclusion for the US case. First, they find a much stronger impact for import penetration from China. Second, they also “net out” import and export exposure but find that the impact of *net* import exposure from China remains negative. That is, manufacturing employment in US regions did not seem to benefit significantly from export opportunities in China.

this preserving of manufacturing employment came about. Here we use cumulative spell information from administrative social security data. We find that a higher export exposure of the own job raises the probability of staying employed within the same plant and/or local industry. Again this effect is stronger and more pervasive for export exposure to Eastern Europe than for China. On the import side, the effect is negative. That is, higher import exposure raises the probability that an employment relationship within a firm or local industry is terminated. Overall, however, we find that trade has led to a higher stability of employment relationships because of the stabilizing effect due to exports.

The rest of this paper is organized as follows. Section 2 describes the empirical approach. Section 3 introduces the data and presents the results for the analysis at the regional level, while Section 4 is devoted to the analysis at the individual level. Section 5 provides a discussion and concludes.

## 2 Theory and estimation strategy

### 2.1 The model

Similarly as in Autor, Dorn, and Hanson (2011) we use the model by Eaton and Kortum (2002) as the theoretical background for our estimation strategy. Consider an industry  $j$  in a German region  $i$ . The total output of that local industry is, in general equilibrium, equivalent to the total sales to all destination markets. Specifically, output  $Q_{ij}$  of a local industry in that Ricardian framework can be written as

$$Q_{ij} = A_{ij} \sum_n \frac{X_{nj} \tau_{nij}^{-\theta}}{\phi_{nj}},$$

where  $A_{ij}$  is the cost-adjusted productivity,  $X_{nj}$  is expenditure in the destination market  $n$  on industry  $j$ 's good,  $\tau_{nij}$  are bilateral trade costs between the origin region  $i$  and the destination market  $n$ , and  $\phi_{nj}$  is a measure for the *toughness of competition* in market  $n$  and industry  $j$ .

Our main aim is to identify the impact of the rise of China, or respectively, of Eastern Europe on the local markets in Germany.<sup>6</sup> Suppose China (indexed by  $c$ ) experiences growth in cost-adjusted productivity and/or declining bilateral trade costs, e.g. from joining the WTO. This will raise China's competitiveness and, from the point of view of a German local industry, displace sales in all relevant markets, including the own local market, the markets in the other German regions, and in the foreign export

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<sup>6</sup>For illustrative purposes we consider the rise of China in the theoretical model, i.e., changes in Chinese cost-adjusted productivity and trade costs. All arguments apply analogously to the rise of Eastern Europe.

destinations. Formally, the impact on the output of a German local industry is

$$\hat{Q}_{ij} = - \sum_n \frac{X_{nij}}{Q_{ij}} \frac{X_{ncj}}{X_{nj}} \left( \hat{A}_{cj} - \hat{\tau}_{ncj} \right), \quad (1)$$

where  $(\hat{A}_{cj} - \hat{\tau}_{ncj})$  represents the rise in Chinese productivity and the declining trade costs. In applying equation (1), we focus on the displacement effects that occur in the other German markets, neglecting the trade diversion in foreign countries at least in the benchmark specification. Limiting the summation across destinations  $n$  to the markets within Germany (indexed by  $g$ ), and summing across all industries  $j$  we obtain the following *direct* impact of China's rise on output in the German region  $i$ :

$$\hat{Q}_i = - \sum_j \frac{X_{gij}}{Q_i} \frac{X_{gcj}}{X_{gj}} \left( \hat{A}_{cj} - \hat{\tau}_{gcj} \right) \quad (2)$$

where  $X_{gij}/Q_{ij}$  captures the dependence of region  $i$ 's economy on sales in Germany, and where  $X_{gcj}/X_{gj}$  is the relative importance of China as a supplier of good  $j$  in Germany. The "rise of China" of course triggers numerous indirect effects in general equilibrium, such as adjustments in factor prices that in turn affect trade flows. However, similarly as Autor, Dorn, and Hanson (2011), our focus is on the identification of the *direct* impact of this exogenous trade shock, and on the analysis how German regions adjust to this shock along different margins.

To take equation (2) to the data, we proxy regional output by total regional employment in an initial time period  $t$ ,  $Q_i = E_{it}$ , and analogously we use region  $i$ 's initial share in total industry  $j$  employment to proxy for the region's share in total sales in that industry,  $X_{gij}/X_{gj} = E_{ijt}/E_{jt}$ . Finally, to proxy  $X_{gcj} (\hat{A}_{cj} - \hat{\tau}_{gcj})$  we use the total change in Chinese imports to Germany (in constant Euros) that was observed in industry  $j$  between time periods  $t$  and  $t + 1$ . Using equation (2), we can then compute the following measure:

$$\Delta(ImE)_{it}^c = \sum_j \frac{E_{ijt}}{E_{jt}} \frac{\Delta Im_{jt}^c}{E_{it}}. \quad (3)$$

This term captures the (potential) exposure of region  $i$  to imports from China, given the region's initial pattern of industry specialization. Figure 2 illustrates this import exposure across German regions, firstly with respect to Chinese imports and secondly with respect to imports from Eastern Europe for the period 1998-2008.

The median exposure to Chinese imports over that time period has been €838, while for Eastern Europe it was almost double with €1616. As can be seen from the maps, the industrial structure of Eastern Germany in 1998 was such that there has been little potential import competition, neither from China nor from Eastern



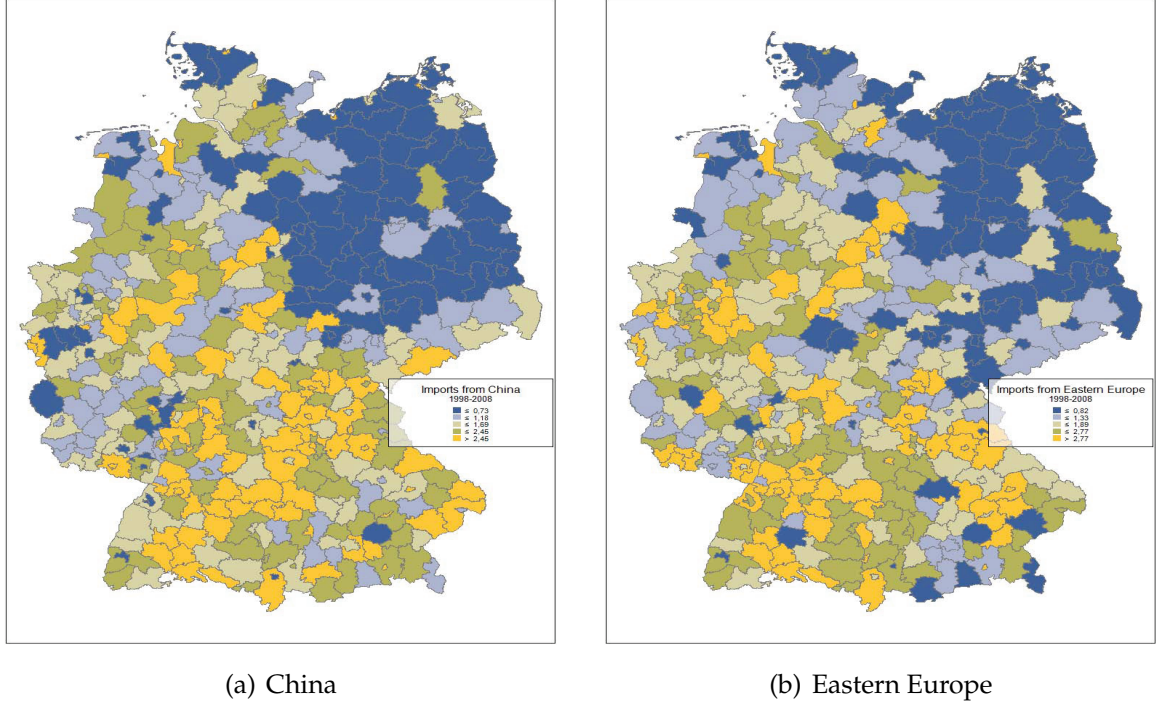


Figure 2: Import Exposure

Europe. The West was, by and large, exposed more strongly to imports although there is substantial regional variation within Western Germany. Notice also, that the correlation between Chinese and Eastern European import exposure across German regions is only about 0.3. That is, many regions had industry structures that exposed them quite strongly to the imports from one area, but not from the other.

Turning now to the export exposure, it is clear that the rise of China (respectively, of Eastern Europe) also creates different potentials for German regions to exploit those new market opportunities, depending on the initial industrial structures. In an analogous way as for imports, we show that the rise of China as an export destination for German goods has the following direct impact on output in a German region  $i$ :

$$\hat{Q}_i = \sum_j \frac{X_{cij}}{Q_i} (\hat{X}_{cj} - \hat{\tau}_{cgj})$$

Here,  $\frac{X_{cij}}{Q_i}$  is the dependence of local industry  $ij$  on sales in China, and  $\hat{X}_{cj} - \hat{\tau}_{cgj}$  represents the rise of the German industry  $j$ , e.g. driven by gains in Chinese demand for particular goods, and the decline in bilateral trade costs. Using  $Q_i = E_i$  and  $X_{cij} = \frac{E_{ij}}{E_j} X_{cgj}$ , the export exposure of a German region  $i$  is thus given by

$$\Delta(ExE)_{it}^c = \sum_j \frac{E_{ijt}}{E_{jt}} \frac{\Delta Ex_{jt}^c}{E_{it}} \quad (4)$$

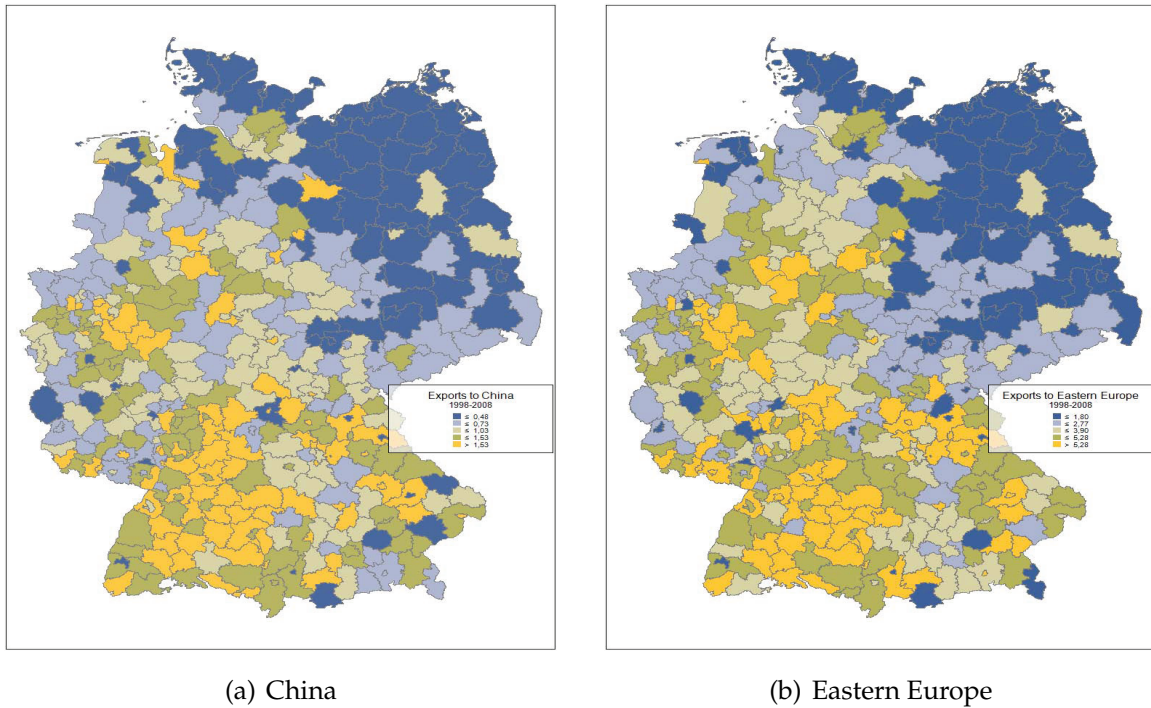


Figure 3: Export exposure

Figure 3 illustrates the potential export exposure of German regions, both with respect to China and Eastern Europe. The median export exposure was €372, while for Eastern Europe that number reached €2554. The map furthermore shows that, similar as for imports, the East seems to be relatively little affected. Within Western Germany there is substantial regional variation in the exposure to new export opportunities, yet with a clearly visible concentration in the south and southwest where the automobile and machinery sectors are highly prevalent.

## 2.2 Instrumental variable strategy

In the empirical analysis we aim to identify the causal effect of the rise of China and, respectively, of Eastern Europe on the economic performance of German regions. More specifically, we will regress the change of regional employment, wages, inequality, and others, between  $t$  and  $t + 1$  on the change of regional import and export exposure over the same time period. The main challenge for this exercise is the potential endogeneity of trade exposure: in particular, the presence of unobserved supply and demand shocks that simultaneously affect import/export exposure and regional economic performance.<sup>7</sup>

To address those concerns we employ an instrumental variable (IV) strategy that is

<sup>7</sup>Additionally, there may be measurement error, attenuating OLS estimates.

close in spirit to the approach by Autor, Dorn, and Hanson (2011). To instrument German regional import exposure from China, equation (3), we construct the following variable for every German region  $i$ :

$$\Delta(ImE_{Inst})_{it}^c = \sum_j \frac{E_{ijt-1}}{E_{jt-1}} \frac{\Delta Im_{jt}^{c-other}}{E_{it-1}}. \quad (5)$$

Here,  $\Delta Im_{jt}^{c-other}$  are changes in Chinese imports in industry  $j$  for other countries (see below). Similarly, as an instrument for regional export exposure we construct the following variable that uses changes in exports of other countries to China:<sup>8</sup>

$$\Delta(ExE_{Inst})_{it}^c = \sum_j \frac{E_{ijt-1}}{E_{jt-1}} \frac{\Delta Ex_{jt}^{c-other}}{E_{it-1}}. \quad (6)$$

The instrument (5) relies on the idea that China's rise in the world economy induces a supply shock and rising imports for *all* trading partners, not just for Germany. Constructing a regional import exposure measure by using those import flows from other countries therefore identifies the exogenous component of rising Chinese competitiveness, and purges the effects of possible other shocks that simultaneously affect German imports and regional performance variables. Notice further that the import values of the other trading countries are distributed across the German regions according to *lagged* sectoral employment shares from period  $t - 1$ . This is done in order to tackle potential issues of measurement error, or reverse causality, if employment reacted to anticipated trade. In practice using lagged or contemporaneous employment to construct the instrument turns out not to have any significant impact on the results.

The logic of the instrument (6) is similar. As China becomes more integrated into the world trading system, it becomes a more attractive export destination for *all* countries, not just for Germany. The instrument thus identifies the exogenous rise of China in terms of export opportunities, purging the impacts of other unobservable shocks.

The quality of the instruments hinges, in particular, on two important conditions. First, if supply and demand shocks are correlated across countries, the instruments do not purge the internal factors and the estimated coefficients are still biased. Second, in order for the exclusion restriction to be satisfied, there must not be an independent effect of the import/export flows of those other countries with China on the German regions, other than through the exogenous rise of China. To ensure that those conditions are not violated, it is important to consider which countries are included in the "instrument group" whose trade flows with China are used to construct the vari-

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<sup>8</sup>For Eastern Europe, the instruments for import and export exposure are constructed analogously using changes in trade flows of other countries with Eastern European economies.

ables (5) and (6). We exclude Germany's top five trading partners (e.g., France, US, Netherlands) from this group. First, supply and demand shocks may be too similar across those countries. Furthermore, internal shocks in those countries, which affect their trade flows with China, may also have direct effects on regional performance in Germany owing to their high significance for the German economy. Second, we only use non-neighboring countries, since direct neighbors of Germany are likely to violate the exclusion restriction because of correlated shocks. Our instrumental variables are therefore built from trade flows of relatively small and non-neighboring countries that do not belong to Germany's top trading partners, namely Australia, Canada, Japan, New Zealand, Norway, Spain and Sweden. We conduct several robustness checks where we change the countries that are included in the "instrument group".

## 3 Regional Level

### 3.1 Data

For the analysis at the regional level, we combine two main data sources. The German labor market data at the regional and local industry level come from the IAB-Establishment History Panel (BHP, cf. Spengler; 2008) which includes the universe of all German establishments. This data consists of an annual panel with approximately 2.7 million yearly observations on establishments aggregated from mandatory notifications to social security in the years of 1975 to 2008. Due to its administrative origin, the data restricted to information relevant for social security (structure of workforce with regard to age, sex, nationality, qualification, occupation, wage) but also very reliable and available on a highly disaggregated regional and sectoral level.

Information on international trade is taken from the United Nations Commodity Trade Statistics Database (Comtrade). This data contains annual international trade statistics of over 170 reporter countries detailed by commodities and partner countries. Trade flows are converted into 2005 Euros using exchange rates supplied by the German Federal Bank.

We merge these two data sources by harmonizing industry and product classifications. The correspondence between 1031 SITC rev. 2/3 product codes and the employment data (101 NACE 3-digit equivalent industry codes) are mostly provided by UN Statistics Division and allows unambiguously matching 92% of all commodities to industries. Trade values of ambiguous cases are partitioned into industries according to national employment shares in 1978.

Table 2: Means and Standard Deviations of Main Variables

	1988-1998		1998-2008	
	Outcome Variables			
10-year change manuf. Employment / working age pop in %-points	-2.51	( 2.71 )	-0.15	( 2.21 )
	Trade Exposure			
Change in Import Exposure				
Eastern Europe	1.84	( 1.06 )	1.89	( 1.30 )
China	0.59	( 0.52 )	1.91	( 1.88 )
Change in Export Exposure				
Eastern Europe	2.17	( 1.01 )	3.73	( 2.26 )
China	0.14	( 0.11 )	1.07	( 0.81 )
	Control Variables			
Initial shares in total labor force				
Manufacturing	39.35	( 12.34 )	30.77	( 12.69 )
Routine occupations	41.34	( 4.46 )	36.42	( 4.41 )
High skilled	4.30	( 2.43 )	7.09	( 3.76 )
Foreigners	6.46	( 3.71 )	5.86	( 4.26 )
Women	38.50	( 13.98 )	40.41	( 13.35 )

Trade exposure in €1000 per worker. Control variables in percent.

### 3.2 Benchmark Specification: Manufacturing Employment Growth

We estimate the effect of exposure to import competition and access to new export markets on local labor markets by running specifications of the form:

$$\Delta E_{it}^{M/WP} = \gamma_t + \beta_1 \Delta(ImE)_{it}^c + \beta_2 \Delta(ExE)_{it}^c + X'_{it} \beta_3 + e_{it}, \quad (7)$$

following Autor, Dorn, and Hanson (2011). In the baseline specification of this section, the dependent variable  $\Delta E_{it}^{M/WP}$  is the decadal change in the number of people employed in manufacturing as a fraction of the working age population in region  $i$ . Below we look at other outcomes as the level and the distribution of wages, total employment, industry turnover across regions (churning) and landprices.<sup>9</sup> The periods we consider span 1988-1998 and 1998-2008.<sup>10</sup> Eastern German regions are only included for the second decade 1998-2008, because sectoral employment data for these regions only became available in the mid 1990s. In the Online Appendix, we report robustness checks excluding all Eastern regions or only using the second period for identification. In the vector  $X'_{it}$  we include several region-decade specific controls, among them importantly the start-of-period manufacturing share and dummies for

<sup>9</sup>These extensions will be included in future drafts.

<sup>10</sup>Detailed data for regional sectoral employment is available starting in 1978. Since much of the rise of the East took place starting in the early 1990s, we use 1988 as our initial period. Additionally, this allows us to use lagged employment in the construction of our instruments as discussed above.

the 16 (federal) German states. We also allow for decade specific growth trends by a time dummy  $\gamma_t$ . In all specifications, we cluster standard errors at the region level.

### 3.2.1 Eastern Europe

#### OLS Estimates.

We begin by analyzing the effect of trade exposure to Eastern Europe. Table 3 shows various OLS specifications, in which we do not instrument for trade exposure. Throughout, we add federal state and decadal time dummies to control for unobserved heterogeneity at the state level and general time trends in manufacturing employment. Additionally, we include the initial start-of-decade share of manufacturing employment to account for initial specialization patterns, which might mean revert over time. Column one without additional controls shows a positive relationship with export and a negative relationship between import exposure and manufacturing employment growth. The magnitudes imply that a 1,000 Euro increase in East European export exposure is associated with an increase in manufacturing employment of 0.30 percentage points and 0.12 for import competition.

Next, we control for initial industry specialization patterns at a finer level, by adding the start-of-period regional employment share of consumption goods (among them textiles, shoes and furniture), production goods (among them chemicals or concrete) and capital goods (machinery and vehicles).<sup>11</sup> The coefficient for export exposure slightly increases and the one on import competition further attenuates towards zero.

For the next specification presented in column three, we add labor force composition effects as well as the share of routine occupation. The composition of the labor force is controlled for by the start-of-period share of high-skilled, foreigners and women of the workforce. Motivated by the literature on job off-shoring (reference), we include the percentage of occupations, which are routine intensive (represented by basic activities in the taxonomy of Blossfeld (1987)). Export exposure is still estimated to have a positive effect, whereas the relationship with import competition is still estimated around zero.

Finally, we add federal state and time interaction in columns four and five. The models are, hence, just identified from variation in trade exposure within states and decades. Using only the variation left in trade exposure within states and decades shows that the export coefficient is still estimated in the ballpark of 0.30, whereas the import coefficient is neither economically nor statically significant from zero. As we argued above, the OLS estimates are likely to be biased and we now turn to the IV

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<sup>11</sup>We exclude the category of food processing industries for they are distributed rather evenly across the country and only little affected by international trade.

Table 3: OLS: Trade Exposure with Eastern Europe and Manufacturing Employment

	Dependent Variable: 10-year change Manufacturing Employment				
	(1)	(2)	(3)	(4)	(5)
Import Exposure	-0.121 (0.174)	-0.029 (0.179)	-0.064 (0.167)	-0.073 (0.185)	-0.018 (0.188)
Export Exposure	0.303* (0.164)	0.361* (0.197)	.437*** (0.167)	0.248 (0.175)	0.326* (0.198)
Initial Share Manufacturing	-0.055*** (0.016)	0.233**** (0.045)	-0.079*** (0.017)	-0.052*** (0.017)	0.026 (0.039)
Initial Share Consumption Goods		-0.334**** (0.046)			-0.141*** (0.041)
Initial Share Production Goods		-0.286**** (0.051)			-0.110*** (0.040)
Initial Share Capital Goods		-0.301**** (0.042)			-0.081** (0.040)
% Routine Occupations of Labor Force			-0.048 (0.037)		-0.036 (0.036)
% High Skilled of Labor Force			-0.078 (0.053)		-0.084 (0.053)
% Foreigners of Labor Force			-0.166*** (0.029)		-0.175*** (0.028)
% Women of Labor Force			-0.063*** (0.010)		-0.059*** (0.010)
Federal State Dummies	Yes	Yes	Yes	-	-
Time Dummy	Yes	Yes	Yes	-	-
State and Time interaction	-	-	-	Yes	Yes

Observations: 739. Standard errors clustered by the 413 regions in parentheses. % High Skilled of Labor Force defined as the fraction of the workforce with a university degree. % Routine occupations defined as basic activities according to Blossfeld (1987). \*  $p \leq 0.10$ , \*\*  $p \leq 0.05$ , \*\*\*  $p \leq 0.01$

estimates for Eastern Europe.

#### IV Estimates.

To ease comparisons, we run the same models as above, with the only difference that we now instrument for trade exposure. The estimated effects of trade exposure from the IV models differ quite substantially from the OLS models. The coefficient for Eastern European import competition is now estimated between -0.552 and -0.787, taking on economically and statistically significant values. This indicates that the sources of potential bias for the OLS estimates, discussed above, seem to be quantitatively important and responsible for driving the OLS estimates towards zero. Similarly, the coefficient for exports rises in magnitude, estimated between 0.576 and 0.926 now. In our preferred specification from column five, which controls for labor force composition effects and initial specialization patterns and only uses within federal state and period variation, the estimates imply that increased import competition

Table 4: IV: Trade Exposure to Eastern Europe and Manufacturing Employment

	Dependent Variable: 10-year change Manufacturing Employment				
	(1)	(2)	(3)	(4)	(5)
Import Exposure	-0.552 (0.407)	-0.644 (0.406)	-0.787** (0.401)	-0.633* (0.365)	-0.718** (0.358)
Export Exposure	0.576* (0.343)	0.762* (0.407)	0.926*** (0.349)	0.585* (0.330)	0.780** (0.394)
Initial Share Manufacturing	-0.056*** (0.021)	0.219*** (0.046)	-0.089*** (0.024)	-0.051** (0.022)	0.007 (0.041)
Initial Share Consumption Goods		-0.315*** (0.049)			-0.124*** (0.044)
Initial Share Production Goods		-0.273*** (0.051)			-0.096** (0.040)
Initial Share Capital Goods		-0.292*** (0.042)			-0.071* (0.040)
% Routine Occupations of Labor Force			-0.020 (0.043)		-0.010 (0.039)
% High Skilled of Labor Force			-0.067 (0.055)		-0.073 (0.054)
% Foreigners of Labor Force			-0.180*** (0.030)		-0.185*** (0.028)
% Women of Labor Force			-0.062*** (0.010)		-0.057*** (0.010)
Federal State Dummies	Yes	Yes	Yes	-	-
Time Dummy	Yes	Yes	Yes	-	-
State and Time interaction	-	-	-	Yes	Yes
Kleibergen-Paap Wald rk F statistic	23.513	27.895	24.752	24.717	36.364

Observations: 739. Standard errors clustered by the 413 regions in parentheses. Eastern German regions only for the second period 1998-2008. % High Skilled of Labor Force defined as the fraction of the workforce with a university degree. % Routine occupations defined as basic activities according to Blossfeld (1987). Import and Export Exposure instrumented as described above. \*  $p \leq 0.10$ , \*\*  $p \leq 0.05$ , \*\*\*  $p \leq 0.01$

from Eastern European countries since 1988 decreased manufacturing employment in Germany by 2.33 percentage points for a region which saw its import exposure increase at the median value. Access to East European destination markets may have increased manufacturing employment growth by 3.99 percentage points against the average downward in manufacturing employment, holding all other factors constant. Table 4 also reports the Kleibergen-Paap Wald rk F statistic to diagnose a potential weak instrument problem.<sup>12</sup> With values above 23, the results suggest no such weak instrument bias- the values are above the critical values compiled by Stock and Yogo (2002) (for the i.i.d. case) and the well known rule-of-thumb value of 10 suggested by Staiger and Stock (1997).

<sup>12</sup>The Kleibergen-Papp statistic (Kleibergen and Paap; 2006) is appropriate to use in the presence of non-i.i.d. errors, as opposed to the Cragg-Donald F statistic for the i.i.d. case.



Table 5: OLS: Trade Exposure to China and Manufacturing Employment

	Dependent Variable: 10-year change Manufacturing Employment				
	(1)	(2)	(3)	(4)	(5)
Import Exposure	0.001 (0.060)	0.057 (0.057)	-0.015 (0.055)	-0.033 (0.063)	0.020 (0.057)
Export Exposure	1.248*** (0.332)	1.712*** (0.465)	1.740*** (0.354)	1.114*** (0.362)	1.638*** (0.497)
Initial Share Manufacturing	-0.061*** (0.014)	0.264**** (0.044)	-0.085*** (0.017)	-0.057*** (0.015)	0.048 (0.037)
Initial Share Consumption Goods		-0.348**** (0.048)			-0.150*** (0.042)
Initial Share Production Goods		-0.314**** (0.053)			-0.133*** (0.037)
Initial Share Capital Goods		-0.352**** (0.048)			-0.125** (0.049)
% Routine Occupations of Labor Force			-0.042 (0.033)		-0.026 (0.033)
% High Skilled of Labor Force			-0.124** (0.049)		-0.101** (0.049)
% Foreigners of Labor Force			-0.158*** (0.026)		-0.161*** (0.027)
% Women of Labor Force			-0.064*** (0.010)		-0.058*** (0.010)
Federal State Dummies	Yes	Yes	Yes	-	-
Time Dummy	Yes	Yes	Yes	-	-
State and Time interaction	-	-	-	Yes	Yes

Observations: 739. Standard errors clustered by the 413 regions in parentheses. % High Skilled of Labor Force defined as the fraction of the workforce with a university degree. % Routine occupations defined as basic activities according to Blossfeld (1987). \*  $p \leq 0.10$ , \*\*  $p \leq 0.05$ , \*\*\*  $p \leq 0.01$

### 3.2.2 China

#### OLS Estimates.

We now turn to the effect of China's rise on German labor markets via the trade channel. The OLS estimates reveal a high and significant correlation between export exposure and manufacturing employment growth, with coefficients estimated between 1.1. and 1.7; about double to triple times larger than the corresponding effects of Eastern European export exposure. In contrast, Chinese import competition does not correlate at all with changes in manufacturing employment; independent of the specification we find an estimate around zero, estimated with high precision. All other coefficients remain in the same ballpark as before; there is evidence for mean reversion across regions in the production of capital, production and consumption goods, indicated by the negative coefficients on the initial employments shares of these sectors, whereas, intuitively, a higher share of high skilled individuals and

Table 6: IV: Trade Exposure with China and Manufacturing Employment

	Dependent Variable: 10-year change Manufacturing Employment				
	(1)	(2)	(3)	(4)	(5)
Import Exposure	-0.105 (0.110)	-0.013 (0.084)	-0.137 (0.096)	-0.153 (0.104)	-0.092 (0.085)
Export Exposure	-0.339 (0.913)	-0.202 (0.922)	0.439 (0.920)	-0.572 (0.948)	0.253 (0.807)
Initial Share Manufacturing	-0.019 (0.021)	0.247*** (0.039)	-0.045** (0.023)	-0.011 (0.022)	0.035 (0.036)
Initial Share Consumption Goods		-0.320*** (0.044)			-0.117*** (0.042)
Initial Share Production Goods		-0.273*** (0.042)			-0.099*** (0.036)
Initial Share Capital Goods		-0.261*** (0.050)			-0.056 (0.050)
% Routine Occupations of Labor Force			-0.037 (0.035)		-0.028 (0.032)
% High Skilled of Labor Force			-0.073 (0.058)		-0.084* (0.049)
% Foreigners of Labor Force			-0.153*** (0.027)		-0.167*** (0.026)
% Women of Labor Force			-0.061*** (0.010)		-0.059*** (0.010)
Federal State Dummies	Yes	Yes	Yes	-	-
Time Dummy	Yes	Yes	Yes	-	-
State and Time interaction	-	-	-	Yes	Yes
Kleibergen-Paap Wald rk F statistic	19.747	19.844	17.105	19.057	18.783

Observations: 739. Standard errors clustered by the 413 regions in parentheses. Eastern German regions only for the second period 1998-2008. % High Skilled of Labor Force defined as the fraction of the workforce with a university degree. % Routine occupations defined as basic activities according to Blossfeld (1987). Import and Export Exposure instrumented as described above. \*  $p \leq 0.10$ , \*\*  $p \leq 0.05$ , \*\*\*  $p \leq 0.01$

women in the local labor force is negatively related to manufacturing employment growth.

#### IV Estimates.

After instrumenting for trade exposure, the estimates reject any economically or statically significant impact from Chinese trade integration on regional German manufacturing. Consistent with an upward bias of OLS for imports, the coefficient on import exposure is estimated larger in magnitude but clearly falls short of significance. The export coefficient changes in a even more drastic fashion compared to the OLS models, never being statistically significant and even switching signs for those specification which do not control for the initial regional labor force composition. This hints at a strong upward bias of the OLS estimates, driven by unobserved productivity and

supply shocks, which simultaneously have caused an increase in competitiveness in certain sectors and boosted exports and at the same time increased local employment.

## 4 Worker level

The results of the previous section show that trade with Eastern Europe has had strong effects on local labor markets, particularly on employment in the manufacturing sector. Our next step is to analyze how individual workers are affected by trade competition and opportunities. If labor markets were completely frictionless, we would not expect to find strong effects on individual workers. If their jobs were destroyed due to competition from abroad, they could just change to another employer with virtually zero costs or delay. However, an extensive literature on the long-term consequences of job displacement documents the opposite (Topel; 1990; von Wachter and Bender; 2006; Sullivan and von Wachter; 2009). In line with this strand of literature, one should expect that if jobs are displaced by import competition from abroad, workers have to find new jobs and acquire human capital specific to their new employers. Concretely, one would suspect to observe effects of trade competition on the biographies of workers in terms of reduced employment and earnings. On the other hand, trade opportunities could have a stabilizing effect on individual jobs. Workers who are involved in the production of goods that are increasingly in demand abroad might have a lower probability to quit their jobs (both voluntarily or involuntarily). Holding everything else constant, they have a better chance to accumulate human capital and could quit their jobs on their terms, presumably to find a better match. We thus expect to find the aggregate effects from the previous section be visible at the worker level as well. To analyze the effect of trade integration with the East and the Far East on individual labor market outcomes in Germany, we follow Autor, Dorn, Hanson, and Song (2011) and analyze the effects of increasing trade exposure on cumulative employment and earnings of workers over a long time horizon.

### 4.1 Data and variables

We use the Sample of Integrated Labour Market Biographies (SIAB, cf. Dorner, Heining, Jacobebbinghaus, and Seth; 2010). This data stems from all German social security notifications in the years of 1975 to 2008. A 2% random sample has been drawn from all persons who have either been employed or officially registered as job-seekers resulting in an individual-level spell dataset with information on age, sex, nationality, qualification, occupation, wage (right-censored at the upper earnings limit in the statutory pension fund - € 173.77 per day in 2008), unemployment benefits, spell durations etc. This data is highly accurate even on a daily

base due to its original purpose of calculating retirement pensions. Since the notifications of employees are passed by their employers, establishment level data from the Establishment History Panel (BHP) can be merged to this data set.

To match this data with the periods considered at the regional level, we analyze individuals who have been employed either in the year 1988 or 1998 and construct our dependent variables as cumulative days in employment and cumulative wage over the next ten years. We only consider persons who were of working age (22 – 64 years) in the respective period. We construct indices similar to the regional indices but on industry level to measure trade penetration at the worker level. This change from the regional to the industry perspective is to take into account that normally, manufacturing workers are often trained to work in occupations specific to a certain industry and accumulate human capital specific to this industry. If employment perspectives in this industry are altered by trade competition or opportunities, we expect this to have the largest impact on workers future employment outcomes. The change in import penetration from country  $c = \text{China, Eastern Europe}$  over the period  $t = 1998, 1998$  to  $T = 1998, 2008$  per worker in a German industry  $j$  is defined as

$$\Delta IP_{jt} = \frac{\Delta M_{jt}^c}{E_{jt}}, \quad (8)$$

where  $\Delta M_{jt}^c$  is the change in Imports from country  $c$  to Germany over the period and  $E_{jt}$  is total employment in industry  $j$  at the beginning of the period. Analogously, we define the change in export opportunities per worker in industry  $j$  as

$$\Delta EP_{jt} = \frac{\Delta X_{jt}^c}{E_{jt}}, \quad (9)$$

where  $\Delta X_{jt}^c$  is the change in exports of industry  $j$ 's goods from Germany to country  $c$ . It is important to keep in mind that there are basically two kinds of factors that influence these trade measures. First, huge increases in productivity and per-capita income of emerging countries as well as their increasing openness towards world markets in the past two decades should have increased their demand for German goods as well as their capability to act as competitors for German firms. Second, there could have been productivity shocks on German industries which influence both, German supply and demand on the world markets and domestic employment simultaneously. Since our interest is on the first kind, we again rely on instruments to identify the causal effects of the rise of the east on German labor markets. To this end, similarly to Autor, Dorn, Hanson, and Song (2011) we construct

$$\Delta IP_{ijt} = \frac{\Delta M_{j-3t}^{oc/c}}{E_{j-3t-3}} \quad \text{and} \quad \Delta EP_{ijt} = \frac{\Delta X_{j-3t}^{oc/c}}{E_{j-3t-3}} \quad (10)$$

as instruments for import and export exposure where we use the trade flows of the same set of developed countries as in the previous section. The relevant industries are not where worker  $i$  has worked at the beginning of the period but three years earlier to avoid a possible influence of sorting of workers due to anticipation of future trade exposure.

Since we consider all employees in manufacturing and service industries, we use a dummy variable to control for a person working in manufacturing at the start of the period. We also use dummies to control for year of birth and interaction terms for federal states and periods. Additionally, we use standard human capital variables of a Mincer-type wage regression. Since the main variables only vary between industries one could worry that they capture any industry-level effects that correlate with the change in trade exposure. To mitigate this multi-level problem, we also include further industry-level control variables (Herfindahl-Index, the Ellison and Glaeser (1997) Agglomeration-index, share of firms younger than two years, average establishment size, share of highly qualified employees, and share of employees older than 50).

Table 7: Means and Standard Deviations of Main Variables

	1988-1998		1998-2008	
	Outcome Variables			
100 x Cumulative Years of Employment	717.57	(314.35)	710.55	(318.68)
100 x Cumulative Years of Employment in original establishment	514.11	(375.81)	460.60	(381.11)
100 x Cumulative Years of Employment in original 3-digit industry	578.43	(369.88)	552.75	(378.07)
	Trade Exposure			
$\Delta$ Imports from Eastern Europe per worker $_{t=0}$	4.61	(7.57)	6.36	(9.47)
$\Delta$ Exports to Eastern Europe per worker $_{t=0}$	5.67	(5.56)	12.55	(10.98)
$\Delta$ Imports from China per worker $_{t=0}$	1.49	(3.78)	6.28	(19.83)
$\Delta$ Exports to China per worker $_{t=0}$	0.38	(0.99)	3.76	(4.84)

Trade exposure for workers in manufacturing industries in € 1000

## 4.2 Eastern Europe Results

The first two columns in Table 8 display the effects of an increase in Eastern European trade exposure on the number of days in employment over a 10 year period, when industry characteristics are not controlled for (models (1) and (2)). Interestingly, implementing the IV strategy does not lead to a big difference in the estimated

Table 8: Eastern European Trade Exposure and Individual Employment

	Dependent Variable:				
	100 x Cumulative Years of Employment over 10 year period				
	OLS (1)	IV (2)	IV (3)	IV (4)	IV (5)
	b/se	b/se	b/se	b/se	b/se
$\Delta$ Imports from Eastern Europe per worker $_{t=0}$	-0.05 (0.37)	-0.20 (0.81)	-0.63 (0.73)	-2.48* (1.32)	-1.94* (1.02)
$\Delta$ Exports to Eastern Europe per worker $_{t=0}$	1.04*** (0.32)	1.03 (0.98)	1.80** (0.90)	3.24*** (1.08)	2.26** (0.91)
Employment in manufacturing $_{t=0}$	26.17*** (5.72)	26.91*** (7.34)	19.28*** (7.18)	17.49* (10.46)	-12.07 (10.86)
Female	-170.54*** (6.48)	-170.57*** (6.48)	-173.38*** (6.00)	-98.25*** (6.32)	-120.26*** (6.97)
Foreign citizen	-71.38*** (6.21)	-71.35*** (6.19)	-68.99*** (5.70)	-33.56*** (3.90)	-42.33*** (4.48)
Low skilled	-43.64*** (2.98)	-43.62*** (3.00)	-43.25*** (3.00)	-32.00*** (3.27)	-45.87*** (3.38)
High skilled	9.11 (8.57)	9.11 (8.56)	2.97 (7.85)	-30.95*** (6.40)	-16.14** (6.90)
Industry characteristics	-	-	Yes	Yes	Yes
R-Square	0.149	0.149	0.150	0.140	0.124
Kleibergen-Paap Wald rk F statistic	-	10.062	7.896	7.896	7.896

Observations: 671022. Standard errors clustered by 397 industry x start of period cells in parentheses. Control variables include dummy variables for start of period tenure, firm size, year of birth and federal state x period fixed effects. Model (4) and (5) consider cumulative employment only within the original establishment or original 3-digit industry, respectively. \*  $p \leq 0.10$ , \*\*  $p \leq 0.05$ , \*\*\*  $p \leq 0.01$

coefficients. An explanation for this could be that industry level shocks driving both, productivity and trade, affect individual biographies to a lesser extent than local industries. Including industry-specific controls in model (3) substantially increases the estimated effects. The interpretation of the export exposure coefficient in Model (3) of 1.80 is that a € 1000 increase in industry exports per worker increases the expected time of employment over 10 years by 6.57 days ( $= 1.8 \cdot \frac{365}{100}$ ), ceteris paribus. Given that the average worker in manufacturing has faced an increase by more than € 1200 over a ten year period, this implies that employment has increased by 12 weeks due to increasing exports to Eastern Europe at the worker level. Interestingly, there is no comparable negative effect caused by imports from Eastern Europe. The Kleibergen-PaapWald rk F statistics are smaller than at the regional level. Nonetheless, the empirical statistics are larger than the critical values proposed by Stock and Yogo (2002) suggesting that a weak instrument problem does not arise in this framework either.

So far, we looked at the effects of trade on total time employed per worker. But even if there has been a negative effect on particular jobs, affected persons might have

found another job without a significant period of unemployment. Models (4) and (5) calculate the outcome variable only when employment took place in the original firm or the original industry, respectively. The absolute values of the coefficients of both trade variables increased significantly. This is evidence that trade with Eastern Europe indeed caused job turnover, at least between firms and industries, which is not observable at the aggregate level. Increased exposure to import competition by €1000 reduces the time spent with the original employer (the original industry) by 9.1 (7.1) days. On the other hand, export exposure seems to increase employment stability where an increase by the same amount increases employment by 11.8 (8.2) days. These findings are strongly in line with the results at the regional level, where trade exposure also had significant effects on manufacturing employment.

### 4.3 China Results

Table 9: China Trade Exposure and Individual Employment

	Dependent Variable:				
	100 x Cumulative Years of Employment over 10 year period				
	OLS	IV	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)
	b/se	b/se	b/se	b/se	b/se
Δ Imports from China per worker <sub>t=0</sub>	-0.03 (0.08)	-0.09 (0.14)	-0.07 (0.14)	-1.04*** (0.28)	-0.83** (0.33)
Δ Exports to China per worker <sub>t=0</sub>	3.02*** (0.79)	2.55** (1.10)	2.72** (1.13)	3.10 (1.98)	2.48 (1.79)
Employment in manufacturing <sub>t=0</sub>	29.05*** (5.47)	30.26*** (5.77)	26.18*** (5.69)	30.93*** (8.94)	-3.94 (9.19)
Female	-170.21*** (6.48)	-170.26*** (6.48)	-173.11*** (6.02)	-97.43*** (6.30)	-119.55*** (6.97)
Foreign citizen	-71.08*** (6.19)	-71.15*** (6.18)	-68.89*** (5.70)	-34.05*** (3.85)	-42.70*** (4.50)
Low skilled	-43.20*** (2.97)	-43.28*** (2.97)	-42.97*** (2.99)	-31.84*** (3.26)	-45.74*** (3.39)
High skilled	8.87 (8.54)	8.98 (8.54)	3.09 (7.86)	-30.67*** (6.38)	-15.89** (6.89)
Industry characteristics	-	-	Yes	Yes	Yes
R-Square	0.149	0.149	0.151	0.141	0.125
Kleibergen-Paap Wald rk F statistic	-	23.819	23.482	23.482	23.482

Observations: 671022. Standard errors clustered by 397 industry x start of period cells in parentheses. Control variables include dummy variables for start of period tenure, firm size, year of birth and federal state x period fixed effects. Model (4) and (5) consider cumulative employment only within the original establishment or original 3-digit industry, respectively. \* p ≤ 0.10, \*\* p ≤ 0.05, \*\*\* p ≤ 0.01

Turning to the results for trade with China, we find similar results. In our preferred

specification of model (3) presented in column three, an increase in export exposure again has a positive effect on overall days of employment, while there is virtually no effect of import competition. When the calculation of the outcome variables is restricted to the original firm or industry (columns four and five), we again observe an increase of the magnitudes of the coefficients. While the coefficients of import competition increased almost tenfold and are highly significant, the coefficient of export opportunities rose only slightly for employment in the original firm. However, the standard errors of export exposure increase strongly as well, leading the point estimates to become insignificant. Still, the conclusion from Eastern Europe trade holds also for China trade, albeit to a lesser degree: trade competition reduces employment stability in specific manufacturing firms and industries, while export have a positive effect. Considering overall employment, the results become less clear and only export opportunities have a positive effect on individual employment.

## 5 Discussion and Conclusion

- comparison to US case and autor et al paper
- other literature (developing countries; Kovak paper)
- consolidate regional and worker level

To be done.



## References

- AMITI, M., AND D. R. DAVIS (2012): "Trade, Firms, and Wages: Theory and Evidence," *Review of Economic Studies*, 79(1), 1–36.
- ARTUC, E., S. CHAUDHURI, AND J. MCLAREN (2010): "Trade Shocks and Labor Adjustments: A Structural Empirical Approach," *American Economic Review*, 100(3), 1008–1045.
- AUTOR, D. H., D. DORN, AND G. H. HANSON (2011): "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," Working Paper.
- AUTOR, D. H., D. DORN, G. H. HANSON, AND J. SONG (2011): "Trade Adjustment: Worker Level Evidence," mimeo.
- BERNARD, A. B., J. B. JENSEN, AND P. K. SCHOTT (2006): "Survival of the best fit: Exposure to low-wage countries and the (uneven) growth of U.S. manufacturing plants," *Journal of International Economics*, 68(1), 219–237.
- BERTOLA, G. (2000): "Labor Markets in the European Union," ifo Studien 1/2000, pp. 99–122.
- BLOOM, N., M. DRACA, AND J. VAN REENEN (2011): "Trade Induced Technical Change? The Impact of Chinese Imports on Innovation, IT and Productivity," NBER Working Paper No. 16717.
- BLOSSFELD, H.-P. (1987): "Labor Market Entry and the Sexual Segregation of Careers in the Federal Republic of Germany," *American Journal of Sociology*, 93(1), 89–118.
- BLUM, B. S. (2008): "Trade, technology, and the rise of the service sector: The effects on US wage inequality," *Journal of International Economics*, 74(2), 441–458.
- CHIQUIAR, D. (2008): "Globalization, Regional Wage Differentials, and the Stolper-Samuelson Theorem: Evidence from Mexico," *Journal of International Economics*, 74(1), 70–93.
- DORNER, M., J. HEINING, P. JACOBEBBINGHAUS, AND S. SETH (2010): "The Sample of Integrated Labour Market Biographies," *Schmollers Jahrbuch - Journal of Applied Social Science Studies*, 130(4), 599 – 608.
- EATON, J., AND S. KORTUM (2002): "Technology, Geography, and Trade," *Econometrica*, 70(5), 1741–1779.

- EBENSTEIN, A., A. HARRISON, M. MCMILLAN, AND S. PHILLIPS (2011): "Estimating the Impact of Trade and Offshoring on American Workers Using the Current Population Surveys," Working Paper.
- ELLISON, G., AND E. L. GLAESER (1997): "Geographic concentration in U.S. manufacturing industries: A dartboard approach," *The Journal of Political Economy*, 105(5), 889–927.
- FEENSTRA, R. C., AND G. H. HANSON (1999): "The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the U.S., 1979-1990," *Quarterly Journal of Economics*, 114(3), 907–940.
- FEENSTRA, R. C., AND S.-J. WEI (2010): *China's Growing Role in World Trade*. NBER and University of Chicago Press.
- HARRIGAN, J. (2000): "International Trade and American Wages in General Equilibrium, 1967-1995," in *The Impact of International Trade on Wages*, ed. by R. C. Feenstra, pp. 171 – 196. University of Chicago Press.
- HARRISON, A., J. MCLAREN, AND M. MCMILLAN (2010): "Recent Findings on Trade and Inequality," NBER Working Paper No. 16425.
- KLEIBERGEN, F., AND R. PAAP (2006): "Generalized reduced rank tests using the singular value decomposition," *Journal of Econometrics*, 133(1), 97–126.
- KOVAK, B. K. (2011): "Local Labor Market Effects of Trade Policy: Evidence from Brazilian Liberalization," mimeo, Carnegie Mellon University.
- MCLAREN, J., AND S. HAKOBYAN (2010): "Looking for Local Labor Market Effects of NAFTA," NBER Working Paper No. 16535.
- POLETAEV, M., AND C. ROBINSON (2008): "Human capital specificity: Evidence from the Dictionary of Occupational Titles and Displaced Worker Surveys, 1984-2000," *Journal of Labor Economics*, 26(3), 387–420.
- ROBERTSON, R. (2004): "Relative prices and wage inequality: evidence from Mexico," *Journal of International Economics*, 64(2), 387–409.
- SPENGLER, A. (2008): "The Establishment History Panel," *Schmollers Jahrbuch - Journal of Applied Social Science Studies*, 128(3), 501–509.
- STAIGER, D., AND J. H. STOCK (1997): "Instrumental Variables Regression with Weak Instruments," *Econometrica*, 65(3), 557–586.

- STOCK, J. H., AND M. YOGO (2002): "Testing for Weak Instruments in Linear IV Regression," NBER Technical Working Paper No. 284.
- SULLIVAN, D., AND T. VON WACHTER (2009): "Job Displacement and Mortality: An Analysis Using Administrative Data," *Quarterly Journal of Economics*, 124(3), 1265–1306.
- TOPALOVA, P. (2010): "Factor Immobility and Regional Impacts of Trade Liberalization: Evidence on Poverty from India," *American Economic Journal: Applied Economics*, (2), 1–41.
- TOPEL, R. (1990): "Specific Capital and Unemployment: Measuring the Costs and Consequences of Job Loss," *Carnegie-Rochester Conference Series on Public Policy*, 33(1), 181–214.
- VERHOOGEN, E. (2008): "Trade, Quality Upgrading, and Wage Inequality in the Mexican Manufacturing Sector," *Quarterly Journal of Economics*, 123(2), 489–530.
- VON WACHTER, T., AND S. BENDER (2006): "In the Right Place at the Wrong Time: The Role of Firms and Luck in Young Workers' Careers," *American Economic Review*, 96(5), 1679–1705.