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D4.2. Impacts of import competition on labour market outcomes and well-being of workers

WP4 Globalisation: Impact on skills and inequality

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Summary

This report consists of two papers. Both papers deal with worker responses to import shocks in Western European countries, Germany and The Netherlands respectively. Both papers consider the effects of the sudden emergence of China as a major exporter and Eastern European countries becoming a member of the European Union. These two major changes in the world economy happened virtually simultaneously (in the first decade of the 21st century) and had profound impacts on the global division of labour. It is well-known that the overall welfare effects of increased trade are positive, mainly because it leads to lower prices. However, especially the "China shock" has strengthened the notion that the gains from trade are generally not equally distributed over the members of society. A by now large literature has found that the comparative advantages of China and Eastern Europe have had negative consequences for specific groups of workers in advanced countries, like the United States and Germany. In particular, low-skilled and medium-skilled workers with routine-intensive jobs in manufacturing industries suffered.

A question of major relevance for policy-makers is how to deal with this situation, in which the overall effects of increasing globalisation are positive, but substantial parts of society are hurt by it. Adopting protectionist policies might support those who are negatively affected, but at the expense of everyone else. Continuing to support initiatives for more trade liberalisation might have welfare-enhancing effects, but would increase inequality within countries.

One way to address this policy problem is to make the workers who have jobs that might be competed away more resilient, by adopting domestic policies. These policies should mitigate the effects of two sources of inflexibility, barriers to relocate to places with more favourable employment opportunities and barriers to switch to occupations that are less susceptible to the negative consequences of strong import competition. Policies in various domains (such as housing, pension systems and education) could be implemented to make it easier and more attractive for workers to adapt to problems associated with import shocks. Unfortunately, the literature has remained rather silent so far on studying how workers who adapted (despite the existing barriers) to import shocks by moving to different regions or switch into different occupations fared, after their adaptation decision. Did they earn higher wages than workers hit by import shocks who decided to stay put? Are they more satisfied with their jobs than otherwise comparable workers who did not adapt? Answers to questions like these are essential in gaining insights into the potential impacts of implementing policies that aim at reducing the barriers to adaptation that exist. The two papers in this report provide some first evidence.

The first paper, by Konietzny and Los, focuses on Germany. As opposed to the vast majority of the existing literature, exposure to import competition is not quantified based on the industry in which a worker is employed, but based on the type of business function (R&D, marketing, management or fabrication) he/she performs. The idea behind this choice is that production processes became organized as Global Value Chains (GVCs), in which countries specialize in functions *within* industries. An R&D worker in the German car manufacturing industry is much less exposed to imports of cars from Eastern Europe than a German fabrication worker in that industry, given that Eastern Europe (and also China) specialized in performing fabrication activities rather than R&D. We then determine regional exposure by function based on the employment composition of the region considered. The paper links these new import competition

indicators to worker-level data, which includes information on the region someone is working, their occupation, their labour earnings and their job satisfaction, next to many individual characteristics like age, gender, etc.

The paper finds that high degrees of import exposure made workers more likely to move to another region and switch function. Both effects are substantial, but the degree of switching functions only increased with a lag. The paper also finds that workers who chose to move to another German region following a trade shock could offset the negative impact on their earnings and job satisfaction. In fact, moving resulted in higher wages and greater job satisfaction compared to staying put. Workers who switched to a new function also increased their earnings, but did not improve their job satisfaction compared to those who remained in the same function.

The second paper, by Peijen, Kraan and Los, deals with workers in The Netherlands and is complementary to the first paper. It does not address the consequences of adaptation by workers by relocating to other regions, but contains much more detail about switching from one occupation to another, if compared to the first paper. The exposure to import competition indicator is similar to the one used in the first paper. The worker-level data come from the Dutch Labour Supply Panel. The paper identifies a group of workers that decided to switch occupations. The data does not allow us to be certain that they did this because they feared import competition, but the stated reasons for switching occupations are those that are relevant if import shocks occur (like switching because of job security concerns or closedown of the establishment). Propensity Score Matching techniques are then applied to identify a group of workers who are similar in background characteristics to these occupation switchers, but who chose to stay in their jobs instead. The findings show that (1) there is no significant short-term effect (up to two years later) of changing occupations on wages, but (2) there is a positive effect on job satisfaction. In the short run, import shocks themselves (independent of whether workers adapted or not) did not have an impact on wages and job satisfaction. However, in the long run (up to six years later), we observe no significant impact of moving occupations on either outcome variable. These findings might reflect the fact that The Netherlands (as opposed to Germany) is an economy that is mainly based on services industries. Consequently, import shocks have less of an impact on labour market outcomes.

The papers provide some first indications of how adaptation to import shocks affects labour market outcomes and well-being of workers in Western European countries. For The Netherlands, we do not find much evidence that adapting to import shocks in the decade of rapid globalisation (2000-2010) by switching occupations yields better outcomes. For Germany, we find that adapting buy either relocating to other regions or switching from performing one business function to performing another tended to have positive effects. It should be emphasized, however, that much more work needs to be done before really firm conclusions can be drawn. Especially for the study regarding Dutch workers, the sample sizes are small. The fact that the findings of the two papers are not always aligned could be due to differences in approach (imposed by differences in data availability), but might also be caused by structural differences between the German and the Dutch economy. Finally, analyses focusing on wage income and job security do not tell the full story. Ideally, one would also analyse the effects on life satisfaction and other measures of broad well-being. Especially moving into different regions can have negative effects in this respect, if it implies that one moves to places distant from where social networks were formed before moving. Lack of data prevented us from analysing important issues like these.

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Adapting to Import Shocks: The Labour Market Outcomes of Workers Moving into other Regions or Business Functions[1]

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Abstract

This report assesses whether and how import exposure affected German workers' regional mobility and job switching between 2000 and 2011. We also explore the wage and job satisfaction consequences of moving to another region and job switching following a trade shock. To this end, we develop a novel measure of regional-level trade exposure that also groups occupations with similar characteristics into business *functions* (management, marketing, R&D, and fabrication). We use trade data from the World Input-Output Database and regional employment data for 96 local labour markets from the German Federal Employment Agency, and combine them with worker-level data from the German Socioeconomic Panel to analyse trade exposure at the region-function level. Our findings show that more intense regional trade shocks made workers more likely to move to another region and switch their functions. In the most exposed regions, the probability that fabrication workers moved to another region more than doubled compared to the baseline probability. The probability of switching functions as a result of increased trade exposure increased by about 50% compared to the baseline. However, workers' probability of switching their functions following a trade shock increased only after a lag, likely because individuals need time to acquire new function-specific knowledge and skills. Moreover, the report reveals that workers who chose to move to another German region following a trade shock could offset the negative impact on their earnings and job satisfaction. In fact, moving resulted in higher wages and greater job satisfaction compared to staying behind. Workers who switched to a new function also increased their earnings but did not improve their job satisfaction compared to those who remained in the same function. These findings provide policymakers with new insights into the complex ways in which trade affects workers' lives and livelihoods, and how individuals adapt to the changing employment conditions it brings.

Keywords: Import shocks, business functions, worker-level adjustment, worker mobility, labour income, job satisfaction

JEL codes: F16, F66, J23, J31, J61.

1. Introduction

Global economic integration has had a sizable impact on the employment, livelihoods, and overall well-being of individual workers (Acemoglu et al. 2016; Autor et al. 2014; Colantone, Crinò, and Ogliari 2019). While there is abundant evidence that trade leads to overall welfare gains (Arkolakis, Costinot, and Rodríguez-Clare 2012; Feenstra 2018), these gains are unequally distributed among workers (Autor, Dorn, and Hanson 2016). In fact, some workers may even be worse off due to deeper integration (Autor, Dorn, and Hanson 2013a). Textbook models, in which the outcomes of trade liberalisation are driven by differences in comparative advantages of countries', predict such negative implications for some parts of society. Still, they tend to be neglected because workers (and capital) are assumed to adapt quickly. In these models, workers and capital can move immediately and without costs from one industry to another if trade patterns change. In reality, adaptation to trade shocks is much less straightforward, and consequently, substantial groups of workers face negative consequences, as the above-mentioned body of literature has found.

Explorations of how individuals make life choices regarding where they would live and work following trade shocks are rare. This is unfortunate because it limits our understanding of the complex ways in which trade affects the lives and livelihoods of workers, and how workers adapt to changing employment conditions. Workers are exposed to trade in various ways, depending on, inter alia, their industry, place of residence, and occupation. Their adaptation to changes in this exposure can take many forms, including changes in their working hours or work intensity, industry or occupation switches, spatial mobility, or temporary or permanent withdrawal from the labour market. Therefore, quantifying the worker-level adjustment mechanisms to trade shocks and their repercussions for wages and well-being is crucial for crafting policies that help harness the benefits of trade while mitigating the negative effects of economic integration and promoting equitable outcomes for all workers. In this report, we focus on two types of adaptation: finding a job in a different region and finding a different kind of job.

There is considerable heterogeneity in regional labour market conditions in Germany, the country of interest in this report (Figure 1). Workers can make significant gains by

moving to another region. Figure 1 details the large differences in regional labour market conditions. Specifically, there are large differences in unemployment rates in the different local labour markets (i.e., RORs)[3], ranging from 2.4% in Ingolstadt (in Bayern, in the Southeast), to 15% in the Mecklenburgische Seenplatte region (in the Northeast). Several regions in the former German Democratic Republic have unemployment rates above 10%. This suggests that individuals may choose to leave regions with unfavourable labour market conditions. Still, many workers stay in these regions.

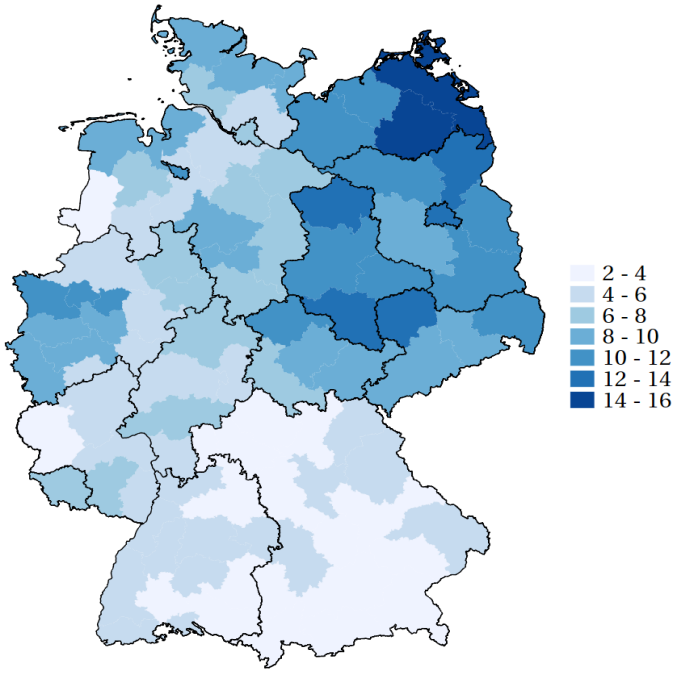

Figure 1: Unemployment rate at the ROR level in 2011.
Note: Authors' calculations based on data from INKAR (2020).

Furthermore, instead of solely examining aggregate-level responses at the regional level, as in Autor, Dorn, and Hanson (2013a, 2013b), we investigate how individual workers respond to trade exposure. Specifically, we first analyse the extent to which workers adapt to unfavourable changes in trade patterns. Do many of them find a job elsewhere in Germany?

[3] Raumordnungsregionen (RORs) is a German spatial reference framework situated between NUTS-2 and NUTS-3 levels in terms of granularity and roughly reflects the size of local labour markets. They constitute a framework that allows for the analysis of structural changes, the allocation of federal resources and identification of trends as well as the evaluation of infrastructure and employment structure in German regions.

Do they tend to switch to a different type of job? Next, we focus on differences between adapters and non-adapters regarding two types of labour market outcomes, wage income and job satisfaction. It is important to state from the outset that our data do not allow us to delve into the causes or determinants of adaptation decisions. However, by focusing on differences for individuals over time (controlling for differences in worker characteristics), we can quantify the differences that arise most probably due to decisions to adapt or not.

Our analysis focuses on the period from 2000 to 2011. This is a period in which not just the intensity of international trade increased rapidly, but also its nature. This has implications for the way in which import exposure of workers is most appropriately measured. Countries or regions do no longer compete for hosting entire industries, but the activities required for industry output can now be dispersed over countries or continents. Using occupational data, Timmer, Miroudot, and de Vries (2019) group such activities into four business functions (management, R&D, marketing, and fabrication) and find substantial differences across countries in their specialisation in functions. Consequently, German fabrication workers compete with Chinese fabrication workers, rather than with Chinese R&D workers. This type of competition is reflected in the import exposure measure that we use in this report. It is based on the trade-in-value-added and the input-output bodies of literature. By combining these measures with regional employment data, we can evaluate region-specific exposure levels for workers in each of the four business functions.

Our results show that workers who face a one percentage point higher exposure to imports in their initial function and region of employment are, on average, about 0.3 percentage points more likely to relocate to another region within Germany, which is sizeable given that the baseline probability of moving is just 1.1 percent. Moreover, our results suggest that workers switch functions in response to trade shocks. Nonetheless, this effect only occurs in the period following the shock, rather than immediately. We find that import exposure in the previous year increases the probability of switching functions by approximately 1 percentage point, on average, relative to the baseline probability of 6 percent. This is likely due to the fact that acquiring function-specific skills and knowledge takes time. Furthermore, when workers move to another region after a trade shock, they experience a rise in their labour earnings and job satisfaction compared with those who choose to stay behind. Meanwhile, while workers can offset the negative consequences of

trade for their wages by switching from one function to another, overall, their job satisfaction does not improve as a result. Suggestive evidence presented in Appendix B shows that the wage consequences of worker mobility may last for up to some years after the move. However, the positive association between prior import exposure and job satisfaction attenuates in the years following the move.

In summary, our findings suggest that import shocks induce individual mobility and job switching that seem to more than offset the negative repercussions of trade for individual wages and, in the case of relocations, job satisfaction. This report emphasises the need to thoroughly analyse the effects of trade exposure, going beyond just looking at its impact on wages and employment. It suggests that policymakers should examine the decisions to relocate (or switch functions) or stay put that individuals make following a trade shock. By conducting such detailed assessments and using advanced indicators based on import exposure, policymakers can better determine who benefits and who loses in a globalised economy. Despite the significant job satisfaction and wage gains associated with relocation, moving is not an option for everyone because of the difficulty of leaving behind friends and family, and the costs of starting over in a new location and profession. Since working in another labour market can offset the negative effects of trade on job satisfaction and wages, policymakers should consider alternatives to relocation, such as telecommuting or commuting.

Furthermore, although changing jobs, and more precisely, business functions, can help workers better adapt to trade exposure, acquiring function-specific skills and knowledge can be costly and time-consuming for many workers. Nevertheless, understanding how to best assist individuals in designing and implementing their adaptation strategies is a question of key policy importance. Policies that equip individuals with the tools and capabilities to weather the negative consequences of globalisation can help build a resilient workforce that is ready for the future of work.

The rest of this report is structured as follows. Section 2 reviews the literature on occupation-specific import exposure and the effect of trade integration on worker mobility within countries. Section 3 provides a brief discussion of data sources and measurement, while a more extensive discussion is available in the Appendix. Section 4 introduces the empirical strategy. In Section 5, we present our empirical results. We first consider the effect

of trade exposure on the propensity to move to another region or function and then analyse how workers moving to other regions fare at their destination region. Section 6 concludes.

2. Related literature

This report builds on and extends several strands of literature. First, recent research has explored the distributional effects of trade integration on the German economy. Two major trade integration processes have affected the labour market, with the rise of Eastern Europe in the 1990s and 2000s preceding the accession of China to the World Trade Organization (WTO) (i.e. the China shock) in 2001. According to Dauth, Findeisen, and Suedekum (2014, 2017), the effect of Eastern European integration on local labour markets was larger, and the net effect on the German economy was positive, mainly due to the country's positive net exports. However, import competition had a negative impact on relatively low-skilled workers who were unable to switch jobs, while higher-skilled workers with lower switching costs could transition to industries that benefited from rising export opportunities. This finding is supported by Dauth, Findeisen, and Suedekum (2020), who suggest that the negative effects of import exposure are concentrated on low-skilled workers, while high-skilled workers can benefit from export opportunities.

Second, a related strand of literature concerns studies focusing on occupation-level trade exposure. As an extension of the industry- and region-level studies of the China shock literature, occupation-level studies typically rely on a shift-share approach (Ebenstein et al. 2014; Traiberman 2019). To arrive at occupation-level exposure, Ebenstein et al. (2014) start with industry-level exposure, the dimension from which the shock will stem (shift). This industry-level exposure is then combined with industry-level employment shares in each occupation (share). The authors arrive at an occupation-level exposure indicator by summing the employment share over all industries. The main downside of this indicator is that it does not take functional specialisation within industries into account. It assumes that the functions performed by e.g. the Chinese electronics industry are identical to those in the German electronics industry. Applying their procedure for the U.S., Ebenstein et al. (2014) find that trade integration had a sizable effect on occupation wage differentials while industry wage differentials remain largely unaffected by trade. They suggest that these

findings underline the relevance of a worker's occupational tenure for wage determination. Using Danish data, Traiberman (2019) draws a similar conclusion and finds that a worker's occupation determines to a large degree whether a worker is better or worse off after experiencing a period of trade integration. The author shows that around 60% of the variation in labour earnings is accounted for by occupational tenure while the sector of employment only explains less than 20%.

Third, this paper directly builds on studies on trade adjustments at the regional level. These studies can be classified into two approaches: population-level studies (which examine aggregate outcomes like unemployment rates, industry or occupation shares, and average wages), and studies that look at the impacts of trade on individual workers. In the former category, Autor, Dorn, and Hanson (2013a, 2013b) examine the effects of Chinese import competition on employment in U.S. commuting zones between 1990 and 2007. They find that cross-regional variation in import competition explains up to 25% of the decline in manufacturing employment. Dauth, Findeisen, and Suedekum (2014) use a similar approach for Germany and find that the marginal effect of import exposure on the share of manufacturing employment is relatively small, amounting to only a quarter of the effect found in the U.S. However, they also find that the positive effect of export opportunities to China and Eastern Europe more than offsets this negative effect.

Instead of evaluating aggregate-level adjustments to and implications of trade shocks, we focus on individual responses to these shocks. Evidence on worker-level responses is scarce. This is unfortunate because it limits our understanding of the different ways in which trade affects the lives and livelihoods of workers and how they react to changing employment conditions in their regions and jobs that trade induces. Against this backdrop, this report provides novel evidence on the topic that can guide policy discussions.

The related literature on the topic has mainly been at more aggregate levels. For example, using U.S. administrative data, Autor et al. (2014) assess whether workers located in relatively more trade-exposed industries are more likely to relocate to another commuting zone (CZ). The period under consideration is 1994-2007 and the import penetration is measured as in Autor, Dorn, and Hanson (2013a). Autor et al. (2014) evaluate how import exposure affects labour market outcomes in the initial region of employment and in the region workers move to after being exposed. Using three different outcome variables

(cumulative earnings, cumulative employment and earnings per year), they do not find support for the hypothesis that U.S. workers respond to the negative repercussions of increased trade exposure by migrating to another CZ.

In a recent contribution, Autor, Dorn, and Hanson (2023) evaluate the role of immigrants in adjusting to regional trade shocks in the U.S. The authors build on previous research that provides evidence for greater spatial mobility of foreign workers compared to workers born in the U.S. The greater mobility of immigrants could have helped highly exposed regions adjust to the trade shock. However, in highly exposed commuting zones, Autor, Dorn, and Hanson (2023) only find a modest effect of immigrant workers on labour market adjustments, largely because immigrants found employment outside of highly exposed manufacturing industries. All in all, immigration seems to play only a minor role in local labour market adaptations following the China shock.

In another study, Dauth, Findeisen, and Suedekum (2014) evaluate the internal migration responses to trade exposure at the individual worker level, using the number of years a worker was consecutively employed in a specific region. The study examines changes in industry-specific import and export exposure from the East across 413 German (urban) districts. The regression model relates a worker's tenure to the changes in industry-specific import and export exposure, as well as to additional worker and industry-level control variables. The study finds a negative effect of import exposure and a positive effect of export exposure on regional tenure. On average, an import shock reduced region-specific tenure by 0.087 years, while an export shock increased region-specific tenure by 0.372 years. Overall, the positive effect of export exposure outweighs the negative effect of import exposure.

Furthermore, Dix-Carneiro and Kovak (2019) exploit Brazilian administrative data and observe individual workers over time. They capture trade exposure by regional tariff reduction (RTR) in the period 1990-1995 and argue that RTRs measure trade liberalisation and should result in a regional labour demand shock. The authors measure individual migration responses as the share of months away from the initial region. The empirical strategy compares workers with similar individual characteristics who lived in two different regions in 1989. The authors estimate the regression equation separately for each year and do not find a systematic migration response of individual Brazilian workers.

Lastly, Greenland et al. (2019) present an empirical framework closely related to the one used in this report. They use an indicator variable to measure migration from one U.S. CZ to another, with explanatory variables based on the work of Pierce and Schott (2016). Specifically, they capture trade exposure by exploiting the uncertainty in trade relations between the U.S. and China before China's WTO accession in 2001. By evaluating migration responses of individuals who were first observed in 10th grade and subsequently at age 26, the authors provide evidence for an out-migration effect of local import exposure in the U.S. Their results reveal that local labour markets that were most affected by this policy shift witnessed a decrease in population growth over the subsequent ten years. This impact was particularly evident in younger cohorts and groups with relatively low education.

This report builds on and extends these studies in two main ways: First, it is the first study to exploit function-level information that accurately reflects trade exposure in global value chains. Second, to our knowledge, it is the first paper to both explore relocations and job switching and as adjustment mechanisms and investigate how individual workers fare in a new region after leaving another region due to relatively high exposure to trade.

3. Data & variables

We use worker-level data with information on trade exposure constructed from several sources, combined using function and region identifiers. Our aim is to understand how import shocks in the function and region in which the individual works and lives affect their decision to move to another region or switch functions and what the labour market consequences of the relocation or job switching decision are.

3.1 German Socio-Economic Panel

We use worker-level data from the German Socioeconomic Panel (SOEP), which is a nationally representative survey that tracks the characteristics and circumstances of the same individuals and households living in Germany over time. One of the main advantages

of this dataset is that it contains a large sample size and detailed geographical data to identify individuals who experience a trade shock stemming from their function of employment and place of residence. The dataset also traces individuals who move within Germany and provides information on their occupation of employment, which allows us to identify both relocation and job switches.

The dataset also contains information on individual labour earnings and job satisfaction, alongside industry and occupation of employment, educational level, and standard individual-level characteristics that may affect labour earnings and moving decisions. Due to data availability of the employment and occupation information (detailed in Section 3.3 below), we restrict the analysis sample to the period 2000-2011, which is the period during which the intensity and nature of global trade changed most dramatically (see Timmer et al. (2021)). We focus on working-age individuals (15-64) observed in at least two subsequent surveys and for which the SOEP dataset provides information on the occupation of employment in at least one period.

Furthermore, we focus on the spatial location of the worker and utilise the most detailed geographic dimension in the publicly available SOEP data distribution, the ROR. The ROR is particularly relevant for our analysis as it reflects economic agglomeration and commuting flows and thus captures local labour markets at a specific level of aggregation. The 96 German RORs are nested within states, and larger states encompass a larger number of RORs. For instance, Hesse (Hessen) comprises five RORs, while Bavaria (Bayern) has 18.

Table 1: Number of individuals moving from one region to another between two survey waves, aggregated at the state level.

	2001	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	Total
Schleswig-Holstein	9	8	13	18	16	15	17	13	9	8	26	152
Hamburg	8	10	8	9	11	8	9	11	17	9	6	106
Niedersachsen	18	37	41	36	22	25	26	26	28	19	25	303
Bremen	5	0	7	4	1	5	4	0	2	1	3	32
Nordrhein-Westfalen	60	57	52	59	53	39	40	33	35	38	47	513
Hessen	17	23	26	22	11	14	26	18	17	17	31	222
Rheinland-Pfalz	13	9	28	19	8	10	12	5	7	12	15	138
Baden-Wuerttemberg	41	24	32	36	45	32	35	32	23	33	36	369
Bayern	36	46	46	45	44	32	47	35	27	32	47	437
Saarland	1	1	3	0	0	0	1	1	1	0	0	8
Berlin	17	19	9	17	8	6	20	16	10	13	11	146
Brandenburg	13	19	18	17	11	14	3	7	7	12	10	131
Mecklenburg-Vorpommern	1	2	2	6	3	6	4	2	7	4	14	51
Sachsen	9	9	15	12	5	13	13	22	16	10	10	134
Sachsen-Anhalt	5	7	5	8	7	13	8	7	5	7	7	79
Thueringen	5	13	5	2	6	8	4	6	8	7	7	71
Total	258	284	310	310	251	240	269	234	219	222	295	2892

Notes: Authors' calculations based on SOEP data. A cell of the table contains the number of observations of individuals changing the region of residence between two consecutive survey waves. Note that the number of changes is aggregated at the level of a state that may contain several regions.

Table 2: Number of individuals switching functions between two survey waves, aggregated at the state level

	2001	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	Total
Schleswig-Holstein	6	39	5	40	5	6	29	4	15	3	23	175
Hamburg	5	14	2	21	7	1	18	4	16	10	11	109
Niedersachsen	16	95	20	93	16	11	91	26	112	25	93	598
Bremen	2	5	2	2	0	1	6	2	8	0	9	37
Nordrhein-Westfalen	63	251	47	248	36	36	253	40	229	35	199	1437
Hessen	21	80	27	95	18	15	113	22	98	28	105	622
Rheinland-Pfalz	9	37	9	50	3	10	55	14	44	6	51	288
Baden-Wuerttemberg	45	132	35	144	31	23	141	36	133	31	150	901
Bayern	38	191	25	173	32	34	171	31	154	32	158	1039
Saarland	2	14	3	12	2	1	14	0	7	4	12	71
Berlin	11	37	6	42	7	3	45	15	52	17	50	285
Brandenburg	7	48	8	38	5	5	40	9	26	7	33	226
Mecklenburg-Vorpommern	6	22	6	20	3	8	17	5	19	6	21	133
Sachsen	16	88	18	82	15	5	70	13	73	11	70	461
Sachsen-Anhalt	12	49	7	27	7	5	34	9	45	6	42	243
Thueringen	11	46	10	42	6	8	46	8	45	12	43	277
Total	270	1148	230	1129	193	172	1143	238	1076	233	1070	6902

Notes: Authors' calculations based on SOEP data. A cell of the table contains the number of observations of individuals switching the business function between two consecutive survey waves. Note that the number of switches is aggregated at the level of a state that may contain several regions.

Tables 1 and 2 provide information about the numbers of individuals relocating and switching jobs in our analysis sample, respectively, aggregated at the German state level. Table 1 details the number of individuals moving from one of the 96 German local labour markets (RORs) to a different one, either within the same state (e.g. within Bavaria) or across a different German state (e.g., from Bavaria to North Rhine-Westfalia).

The first column in Table 1 denotes the state in which workers were living and working before they moved. In total, our analysis sample contains about 3,000 individuals who moved. The total number of moves fluctuated over years without a clear upward or downward tendency over time.

Moreover, Table 2 shows that the number of workers who initially worked in one function and switched to another function is considerably higher than the individuals who relocated. The number of observations in the sample varies considerably from year to year. We do not know what causes this variation but assume that it does not affect our results. Ideally, we would have wanted to study occupation rather than function switches, which would have resulted in a greater number of job switches. However, we are unable to do that as constructing an occupation-level switch indicator is not possible due to a severe structural break in the data for China and other countries that relates to the revision of the international occupational classification ISCO.

3.2 Constructing regional employment data at the function level

An import exposure measure for workers in a function in a region must consist of two building blocks. The first building block requires information on (i) the extent to which imports of this function penetrate into a region and (ii) the extent to which a given level of imports competes with this function in the region considered. The second building block relates to the occupational structure of each region. We obtain information on the number of employees subject to social insurance contribution in each occupation and each region from the German Federal Employment Agency (Bundesagentur für Arbeit). We classify these occupations using the 3-digit Klassifikation der Berufe (KldB) 88 occupational scheme for the period 2000-2011. WIOD and SOEP would allow for the inclusion of 2012-2014 but a change

in the occupational classification limits the years we consider in our analysis. There is no employment data available for 2012 and from 2013 onwards, the Federal Employment Agency uses the KldB2010 occupational classification, which differs significantly from KldB88 and cannot be unambiguously matched with the old classification scheme. For this reason, we rely on KldB88 and focus on the period from 2000 to 2011. We develop a correspondence table between KldB88 occupations and the four business functions detailed in Appendix A, Section A.2.[4]

We denote the functional employment structure within region r by the shares of the workers in each of the functions k in total regional employment as $s_{kr} = L_{kr}/L_r$. Figure 2 depicts the share of functional employment within regions in Germany. Fabrication shares are generally higher in the Southeast of Germany than elsewhere, while marketing shares are high in the regions around large cities, like Munich, Hamburg, and Berlin. Unsurprisingly, these city-regions also have relatively high shares of management employment, something that also holds for most regions in the former German Democratic Republic. We find the highest shares of R&D employment in regions such as Aachen (which is home to a Technical University) and Rheinpfalz (which hosts BASF), underlining the importance of educational institutions and research-intensive industries for this function. While our empirical strategy relies on the functional employment structure in 2000, we also depict the share of functional employment within regions for 2011 in Figure B1. The strong presence of the management function in the Eastern regions had disappeared in 2011 and seems to be due to relatively large numbers of workers who transitioned from being employed in state-owned enterprises to public sector organisations after the fall of the Iron Curtain at the end of the 1980s. The management, R&D and marketing shares in 2011 remain generally more concentrated in metropolitan areas surrounding Munich, Frankfurt and Hamburg. Outside of these metropolitan areas fabrication still makes up a large employment share.

[4] Table B5 details the correspondence between the 3-digit KldB88 occupations and the four business functions used in this report (management, marketing, R&D, and fabrication).

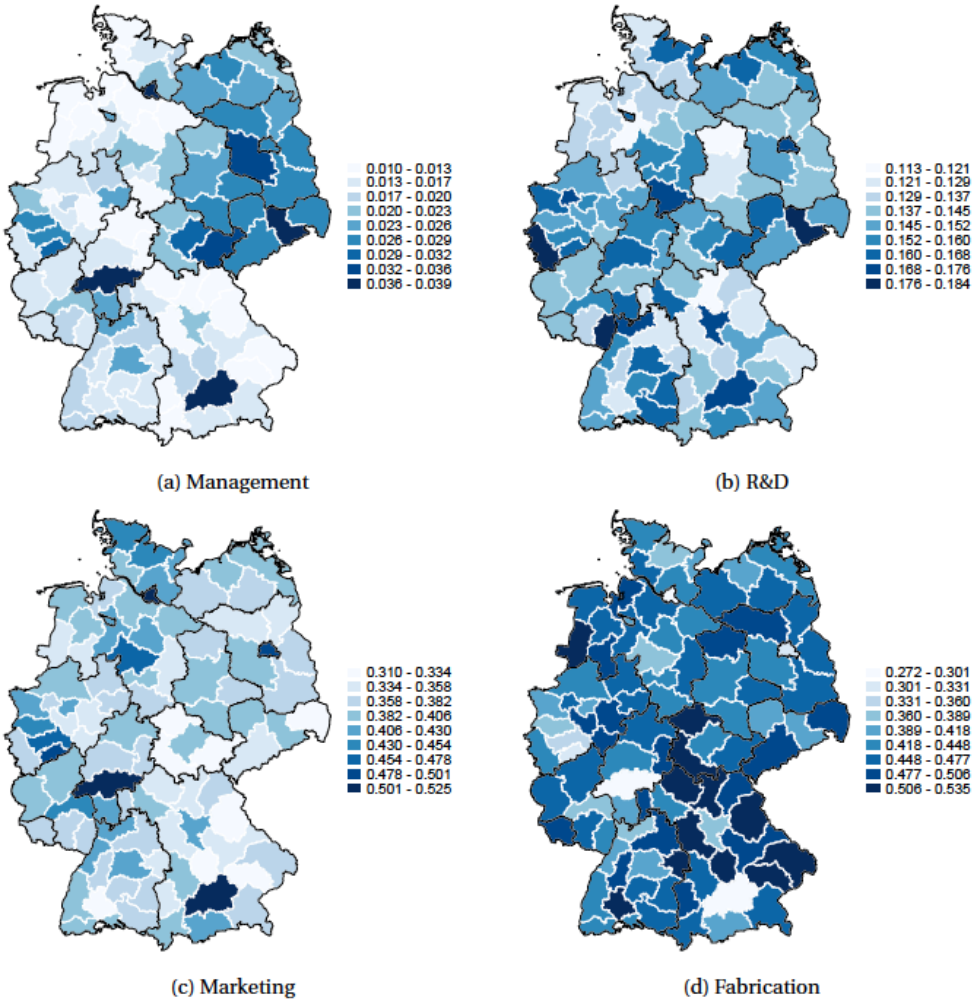

Figure 2: Functional employment share within regions in 2000.
Notes: Authors' calculations based on German Federal Employment Agency data.

3.3 Measuring German imports by function using the World Input-Output Database

As stated above, the first building block for the import exposure level used in this paper relates to function-level import exposure. In order to construct such a measure, we rely on intercountry input-output data. An intercountry input-output table contains information on the aggregate value of all bilateral transactions between all industries in all countries of the world in a given year. As such, it provides a quantitative description of the global production structure. Next to this, it also quantifies the values of the aggregate bilateral sales by each and every industry in each and every country to final users (e.g. households and firms purchasing capital goods) in each and every country. This implies that the linkages between the global production system and final users are also quantified. Using input-output

techniques proposed by Los and Timmer (2018), we can estimate the labour income earned in each and every industry in each and every country to produce e.g. the German imports from the Chinese automotive industry. This labour income not only includes labour income earned in, for example, the Chinese car manufacturing industry itself, but also earned in upstream industries, such as the steel manufacturing and business services industries. We then use information on the productive activities that generate value and differentiate the activities by function, based on industry-level splits of labour income by function.

Compiling and harmonising information on labour income by function within industries requires detailed survey and census data per industry. This is why only one multi-country input-output data initiative, the World Input-Output Database (WIOD) (Timmer et al. 2015) has thus far been linked to matched occupations databases. For this reason, we compute import exposure using input-output data from the 2016 release of WIOD, which covers 43 countries and includes a model for the rest of the world (see Table B3). The WIOD tables differentiate between 56 industries for each country (see Table B4). An advantage of the WIOD tables is that they have been carefully benchmarked to time series of national accounts statistics, enabling us to assess developments over time, which is necessary for the panel data approach in our study. The labour income shares data by function data were taken from Reijnders and de Vries (2018).

We match the worker-level occupational classification in SOEP with the function-level aggregation suggested by Reijnders and de Vries (2018) and Timmer, Miroudot and de Vries (2019) using the mapping in Table B5. Figure 3 depicts the embodied labour income Germany imports from China and Eastern Europe[5] for each function during the 2000-2011 period. In view of the comparative advantages in providing mainly manually-skilled workers of China and Eastern Europe, it is unsurprising to see that most of the labour income embodied in German imports stems from fabrication activities. Marketing workers in Eastern Europe and China contribute the second largest absolute amount to imports that enter the German economy. Relative to the amount of embodied labour income stemming from fabrication activities, the marketing functions in Eastern Europe provide more labour

[5] The group of Eastern European countries consists of Bulgaria, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Russia, Slovakia, and Slovenia.

income. In line with the findings from Dauth, Findeisen, and Suedekum (2014), we find that imports from Eastern Europe have had a higher magnitude than imports from China. Our data also shows that a sizeable amount of labour income from Eastern European countries was already entering the German economy prior to the surge in Chinese imports in the early 2000s. Embodied labour income from both the management and R&D functions remained at relatively low levels throughout the 2000s.

For all functions, we observe a temporary decline of imports into Germany in 2009. This is due to the global financial crisis. Facing uncertain demand levels, many firms decided to use inventories, rather than to purchase materials and components (including imported products) (Bems et al. 2013).

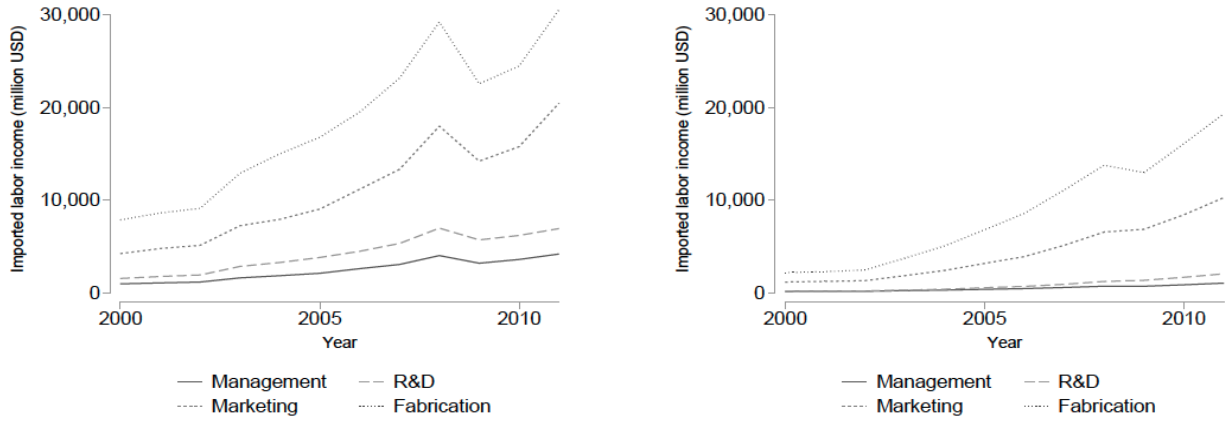

Figure 3: German imports in terms of embodied labour income (in million USD), 2000-2011.
Notes: Authors' calculations based on WIOD and Reijnders and de Vries (2018).

The value of imported embodied labour income itself does not tell much about the 'intensity' of exposure for workers in a specific function. If, for example, the imported embodied labour income of fabrication workers doubles in a given period, but amounts to only a marginal fraction of the labour income of German fabrication workers, the increase may not matter for German labour markets. To address this issue, we define the import exposure measure for function *k* as the ratio between imported labour income from China and Eastern Europe ($LIM_k^{EAST \rightarrow DEU}$) and the labour income of German workers in function *k*

(LI_k^{DEU}). This yields normalised, function-level trade flows $LIME_k$ that capture the embodied value added Germany imports from China and Eastern Europe:

$$LIME_k = \frac{LIM_k^{f,h}}{LI_k^h} \equiv \frac{LIM_k^{EAST \rightarrow DEU}}{LI_k^{DEU}}$$

The exposure of German workers (in each of the four business functions) to imports from China and Eastern Europe taken together as measured by this indicator is depicted in Figure 4. In 2011, the exposure to imports for fabrication workers was about twice as high as that of the second-exposed group of workers, in management. Throughout the period considered, R&D workers were least exposed.

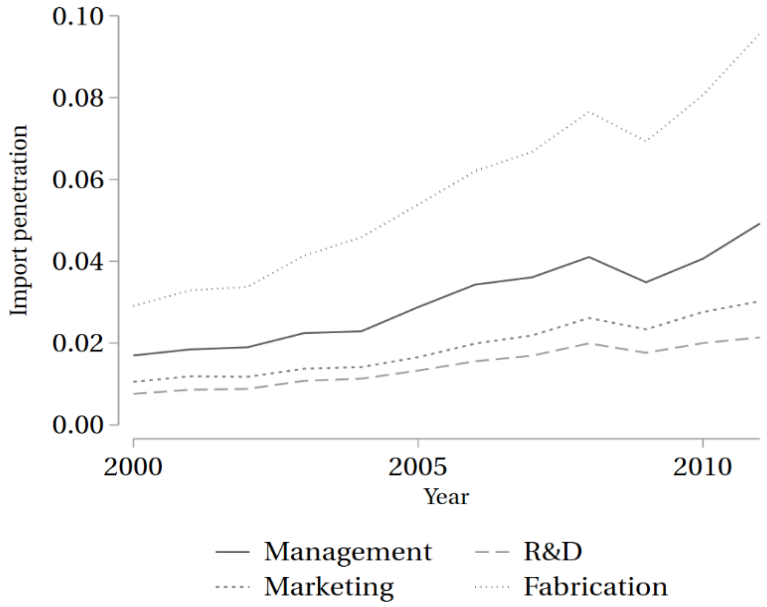

Figure 4: Import penetration ratio of German imports from China and Eastern Europe per function, 2000-2011.
Notes: Authors' calculations based on WIOD and Reijnders and de Vries (2018).

3.4 Measuring regional level trade exposure

We combine the regional employment shares and the WIOD-based national exposure to imports by function indicator to arrive at region-level import penetration *IP*, following Acemoglu et al. (2016). The employment shares are measured in 2000, so that only changes in function-level import flows contribute to the variation over time:

$$IP_{krt} = 100 \times s^{within}_{kr,2000} \times LIME_{kt} = 100 \times \frac{L_{kr,2000}}{L_{r,2000}} \times \frac{LIM^{EAST \rightarrow DEU}_{kt}}{LI^{DEU}_{kt}}$$

Table 3 contains information on the import exposure in 2000, exposure in 2011, and the change between 2000 and 2011 for the most and least exposed functions and regions in our data. Fabrication workers faced the largest increase over time, with the largest change of 3.57 percentage points in Landshut (a region to the Northeast of Munich, in which car manufacturer BMW has its largest part and components manufacturing plant). We find that the smallest exposure growth between 2000 and 2011 arose for managers. In several regions, the increases in exposure for these workers were smaller than 0.05 percentage points.

Table 3: Most and least exposed function-region cells between 2000 and 2011.

Function	Region	$IP_{kr,2000}$	$IP_{kr,2011}$	$IP_{kr,2011} - IP_{kr,2000}$
Highest increase				
Fabrication	Landshut	1.56	5.12	3.57
Fabrication	Oberpfalz-Nord	1.55	5.10	3.55
Fabrication	Schwarzwald-Baar-Heuberg	1.54	5.07	3.53
Fabrication	Südthüringen	1.53	5.03	3.50
Fabrication	Oberfranken-West	1.52	5.01	3.49
Lowest increase				
Management	Donau-Wald	0.02	0.05	0.03
Management	Westmittelfranken	0.02	0.05	0.03
Management	Main-Rhön	0.02	0.05	0.03
Management	Schleswig-Holstein Süd-West	0.02	0.05	0.03
Management	Emsland	0.02	0.05	0.03

Notes: Authors' calculations based on (4).

4. Empirical strategy

The empirical strategy comprises two steps. In the first step, we evaluate the effect of increased trade exposure on the individual decision to move into a different German region or to switch functions. In the second step, we assess how workers who adapt to a trade shock by moving to another region or switching their function fare in terms of labour earnings and job satisfaction.

4.1 The effect of trade exposure on regional mobility and function switching

We study two individual-level responses to increased exposure at the region-function level: i) moving to another region within Germany and ii) switching functions. We assess how trade shocks affect the probability of both responses by estimating the following specification for each individual *i* working in function *k* and living in region *r* at time *t*:

$$Y_{ikrt} = \beta_0 + \beta_1 IP_{krt} + \boldsymbol{X}_{ikrt}\boldsymbol{\Gamma} + \alpha_i + \alpha_k + \alpha_r + \alpha_t + \epsilon_{ikrt} \quad (5)$$

where the dependent variable Y_{ikrt} takes the values of 1 for individuals who relocate/switch functions between two consecutive survey periods (t and $t+1$) and 0 otherwise.[6] IP_{krt} measures the import exposure from China and Eastern Europe in function *k*, in region *r* in year *t,* X_{ikr} is a vector of individual-level control variables capturing years of schooling, marital status, household size, the number of children in the household, and asset income.[7] Furthermore, α_i and α_k capture individual and function fixed effects while α_r and α_t represent region and time fixed effects. The region, function, and individual fixed effects capture

[6] Figures B2 and B3 depict cross-regional variation in labour earnings and job satisfaction, respectively. These figures are based on the analysis sample and not on all workers in the German population.

[7] We use asset income (from dividends, savings, and rents), rather than household or individual labour income, to avoid endogeneity problems (see Nikolova and Ayhan 2019). While household income is potentially dependent on the move, asset income is not.

characteristics that do not change over time, such as geography and culture at the region level, the organisational culture at the function level, and individual traits, such as motivation or risk-taking at the individual level. The time fixed effects take into account shocks that affect all regions within Germany simultaneously, such as the global financial crisis. For simplicity, we estimate equation (5) using OLS and we cluster the standard errors at the initial region-function level.

4.2 Estimating the consequences of trade-induced regional mobility and function-switching

The second part of our analysis involves evaluating the labour market outcomes of workers who choose to relocate or switch functions compared to those who experience the same trade shock but do not make any changes. In other words, we compare workers who experience the same trade exposure but make the decision to change their work location and switch functions or not.

We estimate the following specification to explore how workers fare after relocating to another region or switching function compared to those who stay behind:

$$Y_{ikrt} = \beta_0 + \beta_1 \text{adapted}_{irt} + \beta_2 IP_{kr(t-1)} \times \text{adapted}_{irt} + \beta_3 IP_{kr(t-1)} + \boldsymbol{X}_{ikrt}\boldsymbol{\Gamma} + \alpha_i + \alpha_k + \alpha_r + \alpha_t + \epsilon_{ikrt} \quad (6)$$

The dependent variable captures individual wages (log real labour market earnings) or job satisfaction (measured on a scale of 0 “not at all satisfied” to 10 “very satisfied”).[8] Job

[8] Figure B4 captures cross-functional variation in job satisfaction over time. There is considerable variation across functions. Managers report the highest average job satisfaction, followed by R&D workers. Workers in the marketing function report mean job satisfaction that is around 0.2 points lower compared to managers and R&D workers throughout the entire analysis period. Throughout the years 2000-2011 fabrication workers report the lowest average job satisfaction. In addition, they seem to be the most negatively affected by the financial crisis in 2008.

satisfaction is a widely-used measure of subjective job quality (e.g. Clark 2015; Nikolova and Cnossen 2020).

The indicator variable $adapted_{irt}$ is coded as 1 for workers who relocated or switched functions between survey years *t-1* and *t,* and 0 for those who remain in the same region or function in both time periods. We interact the *adapted* indicator with the import exposure worker *i* experienced in region *r* and function *k* in the survey wave right before the choice to adjust to the trade shock at time *t*. The control variables and fixed effects are the same as those in Equation (5).

The coefficient estimate β_1 captures the differences in earnings or job satisfaction between similar workers who relocate (switch functions) compared with those who do not. Moreover, the coefficient estimate β_3 reflects the labour market consequences of trade. Importantly, the coefficient of interest β_2 captures the differential impact of trade for the wages and job satisfaction between those who relocate (switch functions) and allows assessing whether workers can offset the negative consequences of trade exposure by undertaking the specific actions we study. For ease of interpretation, all regressions, including the job satisfaction regressions, are based on an OLS estimator with fixed effects.

Readers should exercise caution when interpreting the results related to Equation (6) as they do not provide causal evidence. Specifically, since individuals do not randomly decide to relocate or switch their functions in response to a trade shock, there are potential endogeneity concerns. While we include a large number of fixed effects that capture the time-invariant peculiarities of professions, places, and individuals, some of these characteristics may change as a result of the trade shock. Furthermore, we do not know the exact reason for individual adaptation decisions, and therefore, we use the intensity of the trade shock as an indication for the moving/switching motivation.

Finally, we also track the earnings/job satisfaction of those who relocate to another region for up to five years following the trade shock and compared to those who do not relocate or switch functions (see Appendix B for a commentary and Table B1 and B2 for the econometric output).

5. Results

This section furnishes the empirical evidence regarding i) the effects of trade exposure on worker mobility and function-switching and ii) the consequences of trade-induced mobility and function-switching for earnings and job satisfaction. We first estimate how workers adjust to changes in the employment prospects of their region's labour market that arise due to economic integration, proxied by function-region-specific import exposure. Next, we compare the job satisfaction and wages of similar workers who experienced the same trade shock but make different decisions regarding staying and moving to another region.

5.1 Worker responses to import exposure

Table 4 summarises the results regarding individual mobility response to import exposure from China and Eastern Europe based on Equation (5). Model (1) contains the full set of control variables with the exception of region dummies. In Model (2), we add region dummies to account for time-invariant factors at the regional level, such as geography and persistent local labour market conditions. In Model (3), we lag the import exposure measure.

Table 4: Relocation response to import exposure from China and Eastern Europe.

	(1)	(2)	(3)
IP_{krt}	0.004***	0.003**	
	(0.001)	(0.001)	
$IP_{kr(t-1)}$			0.002*
			(0.001)
Years of education	-0.014***	-0.011***	-0.012***
	(0.003)	(0.003)	(0.003)
Married	-0.014***	-0.009***	-0.008**
	(0.003)	(0.003)	(0.003)
Persons in hh	0.005***	0.003**	0.000
	(0.001)	(0.001)	(0.001)
Children in hh	-0.007***	-0.006***	-0.003***
	(0.001)	(0.001)	(0.001)
Log asset income of hh	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
R&D	0.002	0.001	-0.002
	(0.003)	(0.003)	(0.003)
Marketing	-0.001	-0.001	-0.003
	(0.003)	(0.003)	(0.003)
Fabrication	-0.006	-0.005	-0.003
	(0.004)	(0.004)	(0.003)
Observations	115497	115497	87517
Adjusted R^2	0.006	0.046	0.056
Mean of DV	0.011	0.011	0.012
Individual FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Region dummies	No	Yes	Yes

Notes: Dependent variable: Indicator for switching regions between t and $t+1$. Standard errors clustered at the initial region-function-level and indicated in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The main message of Table 4 is that rising import exposure from China and Eastern Europe is associated with a higher probability of moving to another local labour market within Germany. This conclusion holds regardless of whether we measure the import shock contemporaneously (Models (1)-(2)) or consider last year's import shock (Model (3)). Similarly, accounting for local labour market heterogeneity (by including region fixed effects in Model (2)) does not alter the conclusions.

The effect sizes we estimate are statistically significant and meaningful in the economic sense. A one-unit increase in the import shock increases the probability of moving by 0.3 percentage points, which constitutes approximately one-third of the baseline probability of moving. To provide more context, for example, based on the coefficient

estimate on the import shock in Model (1), fabrication workers in Landshut who experienced an import penetration of 4.3 in 2010 had a $4.3 \times 0.003 = 0.013 \approx 1.3$ percentage points higher probability of moving to another ROR in 2011.

The coefficient estimates on the control variables are also in line with our expectations and the previous literature. Specifically, the low-skilled (as proxied by education levels), the unmarried, and those without children are more likely to move to another German region (independently of the import shock).

Next, we assess to what extent individuals engage in function switching in order to adapt to import exposure from China and Eastern Europe. Models (1) and (2) in Table 5 suggest that increases in imports from China and Eastern Europe in the current year are not associated with function switching in the subsequent period, but rather, two years after the shock (Model (3)). This delayed response is reasonable given that acquiring function-specific skills and human capital is not an instantaneous process. Individuals likely need time to learn the peculiarities of their new jobs and acquire function-specific skills. All in all, our results suggest that immediately after an import shock, individuals find it easier to move to another region rather than switch their function.[9]

[9] Models (1) & (2) of Tables 4 and 5 rely on an estimation sample that comprises the full set of available observations. The estimations in Model (3) have fewer observations. First, lagging the import exposure variable entails that observations from year 2000 are no longer included. Second, Model (3) also drops individuals with less than three consecutive observations because the specification requires information from (t −1), t and (t +1).

Table 5: Function switching response to import exposure from China and Eastern Europe.

	(1)	(2)	(3)
IP_{krt}	0.005	0.005	
	(0.004)	(0.004)	
$IP_{kr(t-1)}$			0.008**
			(0.003)
Years of education	-0.033***	-0.032***	-0.027***
	(0.004)	(0.004)	(0.005)
Married	-0.003	-0.004	-0.002
	(0.004)	(0.004)	(0.006)
Persons in hh	0.003	0.003*	-0.001
	(0.002)	(0.002)	(0.002)
Children in hh	-0.007***	-0.007***	-0.003
	(0.002)	(0.002)	(0.003)
Log asset income of hh	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
R&D	-0.044***	-0.043***	-0.037**
	(0.014)	(0.014)	(0.016)
Marketing	-0.071***	-0.070***	-0.063***
	(0.014)	(0.014)	(0.015)
Fabrication	-0.007	-0.006	0.003
	(0.019)	(0.019)	(0.018)
Observations	115497	115497	87517
Adjusted R^2	0.051	0.053	0.057
Mean of DV	0.059	0.059	0.063
Individual FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Region dummies	No	Yes	Yes

Notes: Dependent variable: Indicator for switching functions between t and $t+1$. Standard errors clustered at the initial region-function-level and indicated in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The size of the effect is also non-negligible: a one-unit increase in the severity of the import shock corresponds to a 0.8 percentage point increase in the probability of working in another function a year after the rise in import exposure. Evaluated at the mean probability of switching functions, this would entail an increase from 6.3 percent (baseline probability of function switching) to 7.1 percent. For example, for a highly exposed fabrication worker in

Landshut, this would amount to a $4.3 \times 0.008 = 0.034 \approx 3.4$ percentage points higher probability of switching to another function in 2011.[10]

5.2 The consequences of spatial mobility for labour earning and job satisfaction

Table 6 details the consequences of spatial mobility on labour earnings (Model (1)) and job satisfaction (Model (2)) of workers following a trade shock, based on estimating Equation (6). The main message of this table is that following an import shock, movers experience higher job satisfaction and wages compared with similar stayers.

Specifically, the interaction term $Mover_{irt} \times IP_{kr(t-1)}$ captures the differential impact of import shocks for movers and non-movers. In Model (1), the coefficient estimate on the interaction term is positive, while the coefficient estimates on having moved $Mover_{irt}$ and import exposure $IP_{kr(t-1)}$ in the prior region are negative. The total effect of trade shocks on earnings for those who stay is -0.10. For those who move to another region, the wage consequences of import shocks can be estimated by adding the coefficient estimate on the interaction term $Mover_{irt} \times IP_{kr(t-1)}$ combined with the coefficient estimate on the trade shock, 0.037-0.010=0.027. Those who move following the trade shock, therefore, benefit from higher earnings compared with those who stay behind in the original ROR.

[10] A third adaptation mechanism through which workers may adjust to trade exposure is relocating to another region *and* switching functions. The net effect of the adaptation to exposure would then hinge on the partial effects of both relocation and function switching. Such analyses would add further nuance to the paper but is unfeasible given the worker-level data at hand. The number of observations for individuals who both move to another region and switch function is very small and for many regions there is not a single observation in our data set that satisfies this condition.

Table 6: Labor earnings and job satisfaction after relocation.

	(1) ln(labor earnings)	(2) job satisfaction
$\text{Mover}_{irt} \times IP_{kr(t-1)}$	0.037**	0.149**
	(0.017)	(0.071)
$IP_{kr(t-1)}$	-0.010**	-0.029*
	(0.005)	(0.017)
Mover_{irt}	-0.066***	0.137*
	(0.023)	(0.075)
Years of education	0.296***	0.044*
	(0.011)	(0.026)
Married	-0.006	-0.008
	(0.012)	(0.038)
Persons in hh	-0.003	0.018
	(0.004)	(0.014)
Children in hh	-0.019***	-0.008
	(0.005)	(0.017)
R&D	-0.018	0.028
	(0.015)	(0.049)
Marketing	-0.052***	-0.008
	(0.013)	(0.043)
Fabrication	-0.052***	-0.138**
	(0.017)	(0.063)
Observations	97556	105371
Adjusted R^2	0.056	0.011
Mean of DV	10.185	7.032
Individual FE	Yes	Yes
Year FE	Yes	Yes
Region dummies	Yes	Yes

Notes: Dependent variable: (1) log real labor earnings, (2) job satisfaction. Standard errors clustered at the initial region-function-level and indicated in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

For ease of interpretation and additional nuance, Figure 5 plots the predicted labour earnings of import exposure at different percentiles of the import exposure distribution for movers and non-movers based on Model (1) of Table 6. This figure demonstrates that movers benefit from higher wages compared to stayers and that the effects are similar for different levels and intensities of the import shock.

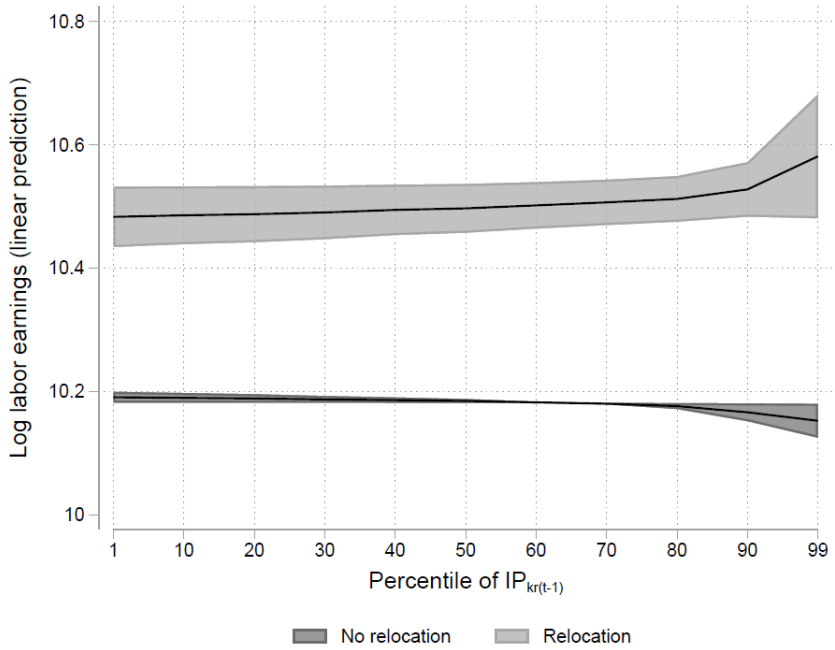

Figure 5: Predictive margins of the effect of import exposure on labour earnings differentiated for workers relocating to another region and those who stay.
Notes: Authors' calculations. The dependent variable is log labour earnings. We estimate Equation (6) and calculate predictive margins for individuals who move and individuals who stay in their regions at different percentiles of import exposure.

In addition, according to Model (2) of Table 6, relocating after experiencing trade exposure has a positive impact on job satisfaction. Our findings demonstrate that trade shocks have an adverse effect on the job satisfaction of individuals who choose not to move, as indicated by the negative coefficient estimate on the IP variable. However, this negative impact can be more than offset by relocating, as evidenced by the positive and sizeable magnitude of the interaction term. Figure 6 further illustrates that individuals who relocate tend to experience improved job satisfaction, regardless of the level of import shock they faced. Specifically, the benefits of relocating are larger or those who were hit by high levels of the trade shock (i.e., those above the 80th percentile).

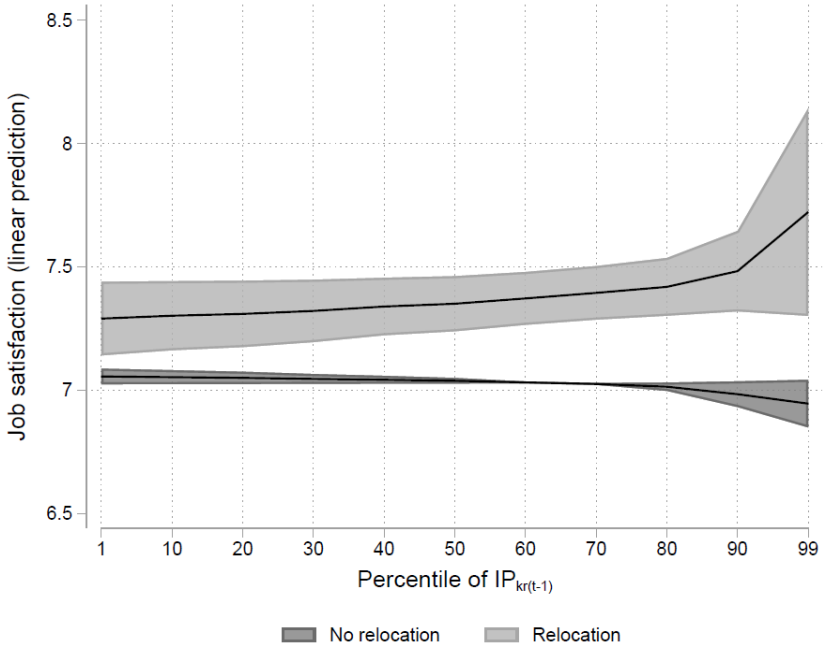

Figure 6: Predictive margins of the effect of import exposure on job satisfaction differentiated for workers relocating to another region and those who stay.
Notes: Authors' calculations. The dependent variable is job satisfaction. We estimate Equation (6) and calculate predictive margins for individuals who move and individuals who stay in their regions at different deciles of import exposure.

Next, we examine the labour market consequences associated with switching functions after experiencing an import shock (Table 7). Trade exposure has a negative impact on the labour earnings of those who do not switch functions, given by the coefficient estimate on the $IP_{kr(t-1)}$ variable. Yet, our findings suggest that individuals who decide to work in another function following a trade shock can fully counteract this adverse effect. This is evident from the negative coefficient estimate of -0.015 on the trade shock $IP_{kr(t-1)}$ and the positive coefficient of the interaction term $Mover_{irt} \times IP_{kr(t-1)}$ of 0.016. This implies that function switching can be a viable adaptation mechanism to trade shocks, although it should be noted that some workers find it easier to switch functions than others, for example due to differences in possessing the capabilities to acquire the relevant skills.[11]

[11] Based on the results in Table 7, workers who switch functions (for any reason) experience a decline in labour earnings, as evidenced by the negative coefficient estimate on the *Switcher* variable of -0.023. Nevertheless, changing functions as a result of a trade shock can partially offset this initial decline in labour earnings.

Figure 7 corroborates this conclusion by suggesting that function changes are beneficial for the wage earnings levels of individual workers at any level of the import shock and especially so at high levels of trade exposure (i.e., after the 80th percentile).

Table 7: Labor earnings and job satisfaction after function switching.

	(1) ln(labor earnings)	(2) job satisfaction
Switcher$_{irt} \times IP_{kr(t-1)}$	0.016*	0.054
	(0.008)	(0.033)
$IP_{kr(t-1)}$	-0.015***	-0.047**
	(0.006)	(0.023)
Switcher$_{irt}$	-0.023**	0.065*
	(0.010)	(0.036)
Years of education	0.299***	0.045*
	(0.012)	(0.027)
Married	-0.005	-0.000
	(0.012)	(0.039)
Persons in hh	-0.004	0.012
	(0.004)	(0.014)
Children in hh	-0.018***	-0.009
	(0.005)	(0.017)
R&D	-0.019	0.042
	(0.015)	(0.049)
Marketing	-0.051***	0.018
	(0.014)	(0.044)
Fabrication	-0.040**	-0.068
	(0.020)	(0.071)
Observations	97556	105371
Adjusted R^2	0.052	0.010
Mean of DV	10.185	7.032
Individual FE	Yes	Yes
Year FE	Yes	Yes
Region dummies	Yes	Yes

Notes: Dependent variable: (1) log real labor earnings, (2) job satisfaction. Standard errors clustered at the initial region-function-level and indicated in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The results related to job satisfaction are more nuanced (Model (2) of Table 7 and Figure 7). Specifically, rising trade exposure is associated with a decline in job satisfaction for both groups of workers, those who decided to switch functions as well as those who chose not to. This is evidenced by the negative and statistically significant coefficient estimate on the $IP_{kr(t-1)}$ variable and the non-statistically significant coefficient estimate on the interaction

term $Mover_{irt} \times IP_{kr(t-1)}$, respectively. Figure 8 details that workers who switch away from functions that are hit by moderate (but not low or high) levels of the import shock may experience some job satisfaction gains. Yet, the average worker who switches their job does not seem to experience such gains, as evidenced by column (2) of Table 7.

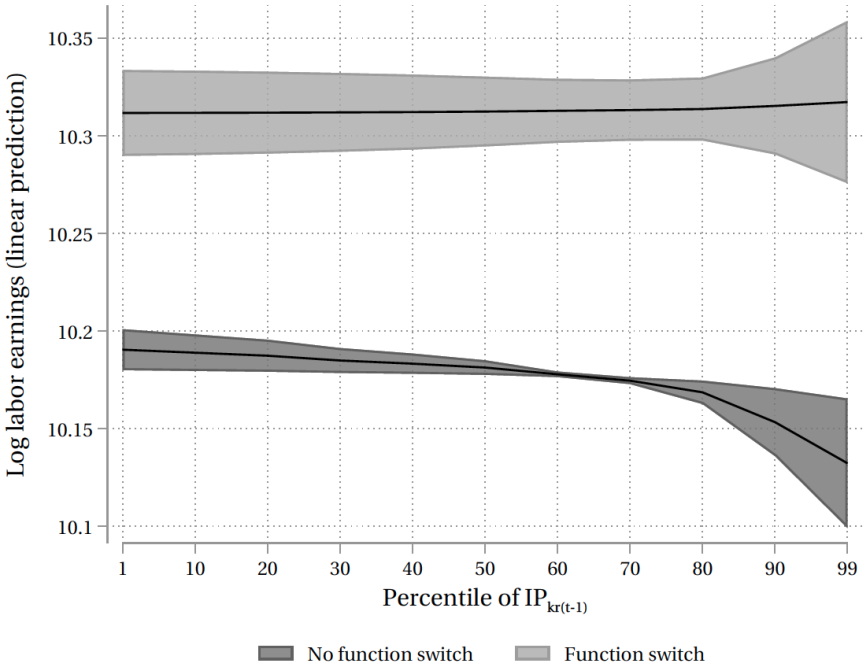

Figure 7: Predictive margins of the effect of import exposure on labour earnings differentiated for function switchers and non-switchers.
Notes: Authors' calculations. The dependent variable is log labour earnings. We estimate Equation (6) and calculate predictive margins for individuals who move and individuals who stay in their regions at different percentiles of import exposure.

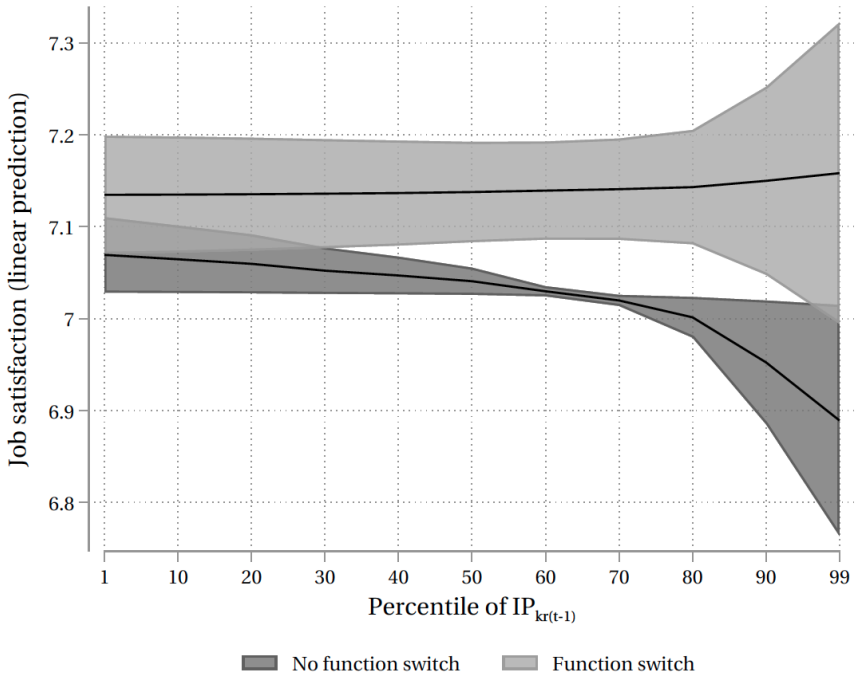

Figure 8: Predictive margins of the effect of import exposure on job satisfaction differentiated for function switchers and non-switchers.
Notes: Authors' calculations. The dependent variable is job satisfaction. We estimate Equation (6) and calculate predictive margins for individuals who move and individuals who stay in their regions at different deciles of import exposure.

6. Discussion and conclusion

While global economic integration has brought overall welfare gains, its impact on the labour market outcomes and well-being of individual workers has been unevenly distributed. Textbook models often neglect workers who have been made worse off as a result of trade liberalisation as they assume that these workers can quickly adapt to changing trade patterns and employment conditions. In reality, adaptation to trade shocks is not straightforward and understanding the mechanisms and patterns of individual adaptation to trade shocks is of utmost academic and policy importance.

This report contributes to the nascent literature that has begun examining individual adaptation mechanisms to trade exposure (e.g. Dix-Carneiro and Kovak 2019; Faber, Sarto,

and Tabellini 2022; Greenland et al. 2019; Traiberman 2019). Specifically, we examine the effect of Chinese and Eastern European import exposure on workers' relocation and job switching in Germany between 2000 and 2011. Moreover, we evaluate the labour market consequences of these decisions. To this end, we construct a novel indicator of import exposure that reflects the import exposure that workers face. Our focus lies on workers living in 96 local labour markets (RORs) and working in four business functions (management, marketing, R&D, and fabrication). The function-region import exposure indicator is based on linked trade data from the World Input-Output database and regional employment shares from the German Federal Employment Agency.

Our indicator takes advantage of recent advances in the measurement of trade shocks that take into account specialisation within industries and provides a more accurate view of the true implications of globalisation for workers. Specifically, it better reflects the fact that the production of goods in recent years exhibits an increasing degree of specialisation within industries (Timmer, Miroudot, and de Vries 2019). Traditional trade indicators based on gross trade typically do not capture these new trade patterns. In addition, much of the extant research on the worker-level effects of trade has focused on offshoring and import competition at the industry-level (Autor, Dorn, and Hanson 2016). While earlier contributions to the literature have provided insights on trade's implications on employment, wages, and working conditions, novel indicators at the business function level offer a more meaningful measurement of trade's effects in a highly fragmented global economy.

Statistical analyses based on worker-level outcomes from the German Socio-Economic Panel (SOEP) combined with the novel region-function trade exposure measure reveal that individuals who are highly exposed to imports in their initial function and region of employment are more likely to move to another region within Germany. The probability of switching functions also increases following a trade shock, but not immediately and only after a lag, likely because workers need time to learn the skills required for their new jobs and functions. Workers who move to another region as a result of trade exposure experience positive effects on their labour earnings and job satisfaction compared with those who decide to stay in the same region. Furthermore, while workers can mitigate the detrimental impacts of trade on their wages by changing their business function, their

overall job satisfaction typically does not improve as a consequence of working in these new types of jobs.

Our paper has several shortcomings, which are mainly due to data limitations. First, ideally, we would have wanted to study region-occupation-level trade shocks. Unfortunately, constructing such an indicator is not feasible because of a significant structural change in the data for China and other countries related to the revision of the ISCO occupational classification. Second, the results largely represent the short-run adaptation strategies of individuals. While we provide some additional analyses in Appendix B, studying long-term adaptation is challenging because individuals experience other life events above and beyond the trade shock. Furthermore, following individuals over time requires a large number of observations and little sample attrition. Third, our results could simply reflect that those who choose to switch jobs or functions after a trade shock are more motivated and talented, which determines their success in the new location or their new job. While we include individual fixed effects that proxy for motivation and personality traits, as well as control for socio-demographic characteristics, such as education, and family status, we cannot fully rule out this possibility. Nevertheless, relying on additional datasets and finding credible estimation strategy (e.g. a set of instrumental variables) is non-trivial in this setting.

Our paper leaves several opportune avenues for further extensions. Future work should prioritise extending our study in several ways. First, it is unclear whether the results for the German context hold in other settings and across time and space. Second, future analyses could focus on exploring additional labour market adjustment responses, including international migration, and switching to self-employment. Third, utilising larger datasets can provide more nuanced results related to particular heterogeneities depending on age, gender, and other socio-demographic characteristics, which we are unable to do due to the limited number of observations of movers and switchers in our data.

Overall, this report highlights the importance of carefully examining the consequences of trade exposure beyond the traditional wage and employment outcomes and investigating the choices that individuals make or do not make if faced with high exposure levels. Such nuanced examinations, combined with state-of-the-art indicators based on function-region trade exposure can help policymakers better identify the winners and losers of globalisation. Against the backdrop of the large job satisfaction and wage gains

that we find for those who move, a relevant policy question arises of why only a small fraction of individuals chooses to move. The extant body of literature has identified many factors that prevent mobility, such as migration costs, the pain of separation from social networks and family, and the costs of uprooting one's life and starting in a new place. Given that working in another labour market helps fully offset the negative consequences of trade for job satisfaction and wages but that individuals may be reluctant to move, policymakers may instead encourage other options, including telecommuting or commuting.

In addition, while job switching can help offset the negative consequences of trade exposure, switching jobs and functions may require costly individual adjustments related to re-skilling and re-training that workers may eschew. Understanding how to best support workers in acquiring these skills and knowledge and preparing them for the future of work are key actions that policymakers should prioritise. Such policies that help workers adapt to labour market shocks can create a more resilient and future-proof labour force and help reduce the inequalities that trade and globalisation induce.

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Appendix

A Text appendix

A.1 SOEP variables

Wage We measure annual wage by relying on SOEP's aggregate income variable *individual labor earnings*. It captures wages and salary from all employment including training, primary and secondary jobs, and self-employment, plus income from bonuses, overtime, and profit-sharing. The variable represents labor earnings in the previous year and we lead this variable by one year such that it indicates labor earnings in the current year. We deflate labor earnings to 2010 dollars using the consumer price index.

Years of education This variable captures the number of years of education completed at the time of the survey. Individuals have to be 16 years of older.

Married Indicates whether individuals are married or not.

Persons in household Captures the number of persons living in the household at the time of the survey.

Children in household Captures the number of persons in the household under the age of 18 at the time of the survey.

Asset income of household This variable represents the household asset income. The variable represents income in the previous year and we lead this variable by one year such that it indicates labor earnings in the current year. We deflate asset income to 2010 dollars using the consumer price index.

A.2 Occupation correspondence

We first use a correspondence between 3-digit KldB88 and 5-digit KldB2010. Next, we relate 5-digit KldB 2010 to 4-digit ISCO-08 codes. For both steps, we use correspondence tables published by the Bundesagentur für Arbeit (Bundesagentur für Arbeit, 2022). If the correspondence is ambiguous, the correspondence tables contain the number of alternatives as well as a main correspondence. We rely on the main correspondence. In the third step, we match 4-digit ISCO-08 codes to 4-digit ISCO-88 codes using correspondence tables published by the International Labour Organization (International Labour Organization, 2022). Based on the ISCO-88 codes, we group occupations into 4 aggregate business functions. Due to ambiguous mappings, we check the resulting KldB88-business functions mapping for plausibility and ensure that 3-digit KldB88 that are grouped in the same 2-digit KldB88 code fall into the same function. Only in a few cases, we deviate from this rule. For example, we allocate agricultural administrators (KldB88 31) to the fabrication function while we consider agricultural engineers (KldB88 32) in the R&D function.

A.3 Exposure measurement

Which function contributed value to imports that could have been contributed by workers in the Germany? To answer this question, we differentiate between three groups of countries. First, there is the home economy (Germany) for which we want to compute the import exposure indicators, henceforth indicated by the superscript h. Second, in a bilateral trade relationship, there is the foreign partner country from which the home economy imports, henceforth indicated by f. Third, there is the group of other countries in the world, indicated by r.

In the global input-output framework with C countries and J industries, all intermediate deliveries, be it domestically or cross-border, can be summarized in the $CJ \times CJ$ matrix $\boldsymbol{Z}$:

$$\boldsymbol{Z} = \begin{bmatrix} \boldsymbol{Z}^{h,h} & \boldsymbol{Z}^{h,f} & \boldsymbol{Z}^{h,r} \\ \boldsymbol{Z}^{f,h} & \boldsymbol{Z}^{f,f} & \boldsymbol{Z}^{f,r} \\ \boldsymbol{Z}^{r,h} & \boldsymbol{Z}^{r,f} & \boldsymbol{Z}^{r,r} \end{bmatrix} \tag{A1}$$

Deliveries for final consumption purposes are captured in the $CJ \times C$ matrix $\boldsymbol{F}$:[‡]

$$\boldsymbol{F} = \begin{bmatrix} \boldsymbol{f}^{h,h} & \boldsymbol{f}^{h,f} & \boldsymbol{F}^{h,r} \\ \boldsymbol{f}^{f,h} & \boldsymbol{f}^{f,f} & \boldsymbol{F}^{f,r} \\ \boldsymbol{f}^{r,h} & \boldsymbol{f}^{r,f} & \boldsymbol{F}^{r,r} \end{bmatrix} \tag{A2}$$

Gross value added is given in the $CJ \times 1$ vector $\boldsymbol{w}$:

$$\boldsymbol{w} = \begin{bmatrix} \boldsymbol{w}^{h} \\ \boldsymbol{w}^{f} \\ \boldsymbol{w}^{r} \end{bmatrix} \tag{A3}$$

The gross output level is contained in the $CJ \times 1$ vector $\boldsymbol{x}$:

$$\boldsymbol{x} = \begin{bmatrix} \boldsymbol{x}^{h} \\ \boldsymbol{x}^{f} \\ \boldsymbol{x}^{r} \end{bmatrix} \tag{A4}$$

I obtain the $CJ \times CJ$ input coefficient matrix $\boldsymbol{A}$ in which a typical element reflects the cost share of a

[‡]WIOD differentiates between the final demand categories final consumption expenditure by households, final consumption expenditure by non-profit organizations serving households, final consumption expenditure by government, gross fixed capital formation and change in inventories and valuables. We summarize the final demand by taking the row-sum for every country-industry.

specific (row) industry required to produce output in another (column) industry as follows:[§]

$$\boldsymbol{A} = \boldsymbol{Z}\hat{\boldsymbol{x}}^{-1} = \begin{bmatrix} \boldsymbol{A}^{h,h} & \boldsymbol{A}^{h,f} & \boldsymbol{A}^{h,r} \\ \boldsymbol{A}^{f,h} & \boldsymbol{A}^{f,f} & \boldsymbol{A}^{f,r} \\ \boldsymbol{A}^{r,h} & \boldsymbol{A}^{r,f} & \boldsymbol{A}^{r,r} \end{bmatrix} \tag{A5}$$

The value added per unit of output, we capture in the $CJ \times 1$ vector $\boldsymbol{u}$. We arrive at the labor compensation per unit of output by multiplying $\boldsymbol{u}$ with the diagonalized labor share vector s:

$$\boldsymbol{u} = \hat{\boldsymbol{x}}^{-1}\boldsymbol{w} = \begin{bmatrix} \boldsymbol{u}^h \\ \boldsymbol{u}^f \\ \boldsymbol{u}^r \end{bmatrix} \qquad \boldsymbol{v} = \hat{\boldsymbol{s}}\boldsymbol{u} = \begin{bmatrix} \boldsymbol{v}^h \\ \boldsymbol{v}^f \\ \boldsymbol{v}^r \end{bmatrix} \tag{A6}$$

A.3.1 Function-level labor income

In the next step, we outline how we measure embodied (imported) labor income per function. First, we compute domestic value added embodied in a certain output. This construct contains both the value added by the industry producing the output and the value added by other domestic industries that deliver intermediate inputs to the producing industry. Second, we characterize which function is involved in the production. Note that we first define a general approach that takes the perspective of the home economy (h) vis-à-vis a trade partner (f) and the remaining economies (r). At a later stage, we will specify how we use the indicators in the context of German trade with China and Eastern Europe.

Using a $CJ \times CJ$ identity matrix and the input coefficient matrix $\boldsymbol{A}$, we arrive at the Leontief inverse $(\boldsymbol{I} - \boldsymbol{A})^{-1}$. In contrast to the input coefficient matrix the Leontief inverse takes into account forward and backward linkages between industries. As such, a typical element of $(\boldsymbol{I} - \boldsymbol{A})^{-1}$ reflects the amount of production required in each industry to produce one unit of output, not only including the direct effect but also the indirect effects that run through other industries. We compute the $CJ \times 1$ vector $\boldsymbol{y}$ that captures the gross output needed in each industry to satisfy final demand $\boldsymbol{F}$, $\boldsymbol{i}$ is a summation vector of appropriate length:

$$\boldsymbol{y} = (\boldsymbol{I} - \boldsymbol{A})^{-1}\boldsymbol{F}\boldsymbol{i} \tag{A7}$$

Let $\boldsymbol{d}$ be the $CJ \times 1$ vector containing the domestic value added attributable to the productive activities of labor, i.e. the labor income embodied in the produces. Analogously, the $CJ \times 1$ diagonalized vector $\tilde{\boldsymbol{v}}^h$ captures the labor income relative to total gross output. The diagonal elements of $\tilde{\boldsymbol{v}}^h$ are identical to $\boldsymbol{v}$ defined in (A6) with regards to the vector $\boldsymbol{v}^h$ that captures domestic valued added but zero otherwise:[¶]

$$\tilde{\boldsymbol{v}}^h = \begin{bmatrix} \hat{\boldsymbol{v}}^h & \boldsymbol{0} & \boldsymbol{0} \\ \boldsymbol{0} & \boldsymbol{0} & \boldsymbol{0} \\ \boldsymbol{0} & \boldsymbol{0} & \boldsymbol{0} \end{bmatrix} \qquad \boldsymbol{d} = \tilde{\boldsymbol{v}}^h\boldsymbol{y} \tag{A8}$$

[§]The use of a hat symbol (e.g. $\hat{\boldsymbol{x}}$) indicates a diagonalized vector.

[¶]A bold 0 denotes a matrix of zeroes of appropriate size.

Let B be a $K \times CJ$ matrix that indicates the labor income of all individuals in function k working in industry j of country c as a share of labor income. A typical element of B reflects a function's labor income as a fraction of one unit of output:

$$l^h = Bd \tag{A9}$$

Substituting (A7) and (A8) in (A9) we obtain:

$$l^h = B\tilde{v}^h(I - A)^{-1}Fi \tag{A10}$$

The $K \times 1$ vector l^h captures the labor income by function, e.g. one element represents the income of all fabrication workers in final demand.

Next, we exploit that one can construct several measures of bilateral trade in value added. The regional exposure indicators in the tradition of Autor, Dorn, and Hanson (2013a) or occupation-level measures such as the one suggested by Ebenstein et al. (2014) evaluate trade in final goods. Clearly, the effect that stems from trade in final goods can lead to changes in domestic labor demand for a specific occupation. In the case of Chinese fabrication workers completing a good before it is imported by Germany it is apparent that the embodied labor compensation of Chinese fabrication workers has an effect on demand for German fabrication workers, as the good directly crosses the border. Yet, only focusing on this effect does not capture the entire effect of foreign labor contributions and domestic labor demand. Domestic labor demand may also change due trade in intermediate goods simply because intermediate production also gives rise to a demand for a certain type of labor. Value added trade measures allow for a tracing of labor compensation in both intermediate and final goods.

Since my research question closely relates to the research question of Autor et al. (2014), we suggest an indicator that captures embodied labor income that crosses the border and is directly used for final or intermediate demand purposes. As a consequence, the indicator we suggest is an extension of the VAX-D indicator (Los, Timmer, and de Vries, 2015). We use the idea that domestic value added in exports of one country is the foreign valued added in imports of the trading partner. Since we am interested in foreign value added in imports, we will from now on focus on foreign value added contributed in country f, evaluated from the perspective of the importing domestic economy h. Since we am interested in worker-level outcomes, we will not evaluate capital compensation because labor compensation directly relates to domestic labor demand. Importantly, the imports contain value contributions of other countries. We will only focus on the embodied labor country of specific trading partners in this paper.

In sum, we am interested in the labor income embodied in imported final and intermediate products (LIM-D). To this end, we first define foreign labor income, differentiated by function, e.g. the value added of Chinese fabrication workers. We accomplish this by modifying the diagonalized vector $\tilde{v}$. Instead of the domestic labor compensation and zeros otherwise the diagonalized vector now contains foreign

labor compensation ($\hat{v}^f$) and zeros otherwise:

$$\tilde{v}^f = \begin{bmatrix} 0 & 0 & 0 \\ 0 & \hat{v}^f & 0 \\ 0 & 0 & 0 \end{bmatrix} \qquad l^f = B\tilde{v}^f(I-A)^{-1}Fi \tag{A11}$$

A.3.2 Bilateral trade & the hypothetical extraction method

In this section, we explain in more detail how we compute the foreign value added in imports that one country faces vis-à-vis a trading partner. We use the hypothetical extraction method (HEM) that Paelinck, Caevel, and Degueldre (1965) and Strassert (1968) introduced and that Los and Timmer (2018) applied to measure bilateral exports of value added. Note that we can compute indicators such as VAX-C or VAX-P that rely on tracing parts of the final demand matrix both by a simple multiplication and by HEM. However, since VAX-D involves manipulations of the intermediate input matrix, we compute it using HEM.

Applying HEM, we set specific parts of the input-output matrices to zero which we then use to measure the importance of the extracted parts. Nullifying specific parts of the input-coefficient matrix $\boldsymbol{A}$ and the final demand matrix $\boldsymbol{F}$, we evaluate a hypothetical situation in which the partner country is no longer exporting to the domestic market, i.e. all intermediate and final goods the German imports from China, we set equal to zero. The input-output structure of the other economies remains the same.

I modify the imports of intermediates from the foreign to the domestic economy such that the modified input-coefficient matrix has a $J \times J$ block of zeros. Analogously, we nullify the respective $J \times 1$ final demand vector $\boldsymbol{f}^{f,h}$. The foreign value-added that h imports from f becomes:[‖]

$$\tilde{A}^{f,h} \equiv \begin{bmatrix} A^{h,h} & A^{h,f} & A^{h,r} \\ 0 & A^{f,f} & A^{f,r} \\ A^{r,h} & A^{r,f} & A^{r,r} \end{bmatrix} \qquad \tilde{F}^{f,h} \equiv \begin{bmatrix} f^{h,h} & f^{h,f} & F^{h,r} \\ 0 & f^{f,f} & F^{f,r} \\ f^{r,h} & f^{r,f} & F^{r,r} \end{bmatrix} \qquad \tilde{l}^{f,h} = B\tilde{v}^f(I-\tilde{A}^{f,h})^{-1}\tilde{F}^{f,h}i \tag{A12}$$

Using the actual foreign labor income and the labor income in a hypothetical situation with no imports from the partner country coming to the domestic economy, we compute the foreign value-added in imports as the difference between both levels. The resulting $K \times 1$ vector contains the labor income embodied in the imports from a partner country for K different functions, i.e. what we coin labor income in imports (LIM):

$$\text{LIM}^{f,h} = l^f - \tilde{l}^{f,h} \tag{A13}$$

[‖]Note that all matrices and vectors that relate to this hypothetical situation we indicate by adding a tilde or a bar above the variable. The superscript $f,h,$ indicates that the respective matrix or vector focuses on goods being exported by f and being imported by h

B Text appendix

The analysis in the main text focuses on the immediate consequences of moving in the first year after relocating. We also evaluate the persistent consequences that workers experience in the period up until four years after moving from one local labour market (ROR) to another (Tables B1 and B2).

Table B1 presents the estimates for labour earnings following a trade shock and moving (or staying) each year up until 4 years after the shock. Model (1) of Table B1 is equivalent to Model (1) of Table 6 in the main text and evaluates the effect of prior import exposure on labour earnings in the first year after the import shock.

The findings presented in Models (2)-(5) of Table B1 provide no clear pattern: movers have higher wages than non-movers two years and four years after the trade shock and the move, but not one or three years thereafter. These results should be interpreted with caution and as being suggestive only as the analysis sample in Models (2)-(5) differs from that in Model (1) due to the restriction that individuals need to be observed in our data for several consecutive years after the move.

Furthermore, Table B2 details the medium-term results related to trade shocks and relocations pertaining to job satisfaction. There is no strong evidence for a persistent job satisfaction effect of moving for workers experiencing a trade shock as evidenced by the largely non-statistically significant coefficient estimate on the interaction term across Models (2)-(5) with the exception of Model (4). All in all, the evidence from Tables B1 and B2 provides no clear pattern, but seem to suggest that earnings may be persistently higher a few years after the move. At the same time, workers experience job satisfaction increases only immediately after moving as a result of a trade shock.

Figure B2 depicts mean annual labour earnings in 2000 and 2011 across RORs. What stands out in 2000 are the relatively low labour earnings in the states of the former German Democratic Republic compared to the rest of Germany. The highest mean labour earnings in 2000 were registered in and around Munich. In 2011, the Munich region still ranked among the regions with the highest earnings but other regions such as the Frankfurt area had caught up.

Furthermore, Figure B3 displays mean job satisfaction in 2000 and 2011 across regions. Similarly to earnings, in 2000 the states of the former German Democratic Republic had relatively low mean job satisfaction. As opposed to mean labour earnings, workers in the metropolitan regions do not fare better in terms of job satisfaction, in either 2000 or 2011.

B Table appendix

Table B2: Labor earnings in the years after relocation.

	(1) (t)	(2) $(t+1)$	(3) $(t+2)$	(4) $(t+3)$	(5) $(t+4)$
$\text{Mover}_{irt} \times IP_{kr(t-1)}$	0.037**	-0.012	0.046*	0.027	0.092**
	(0.017)	(0.026)	(0.027)	(0.028)	(0.042)
$IP_{kr(t-1)}$	-0.010**	-0.008	-0.010	-0.015*	-0.021**
	(0.005)	(0.006)	(0.007)	(0.009)	(0.009)
Mover_{irt}	-0.066***	-0.003	-0.046*	-0.021	-0.024
	(0.023)	(0.025)	(0.028)	(0.028)	(0.031)
Years of education	0.296***	0.130***	0.073***	0.041**	0.036***
	(0.011)	(0.016)	(0.017)	(0.016)	(0.013)
Married	-0.006	-0.007	-0.003	-0.010	0.021
	(0.012)	(0.014)	(0.013)	(0.018)	(0.018)
Persons in hh	-0.003	0.013***	0.021***	0.024***	0.005
	(0.004)	(0.004)	(0.005)	(0.006)	(0.007)
Children in hh	-0.019***	-0.003	-0.004	-0.009	0.002
	(0.005)	(0.005)	(0.006)	(0.007)	(0.009)
R&D	-0.018	-0.028*	-0.051***	-0.021	-0.033
	(0.015)	(0.014)	(0.018)	(0.022)	(0.023)
Marketing	-0.052***	-0.028**	-0.013	-0.005	-0.010
	(0.013)	(0.014)	(0.018)	(0.019)	(0.021)
Fabrication	-0.052***	-0.037*	-0.034*	-0.011	-0.006
	(0.017)	(0.019)	(0.020)	(0.022)	(0.025)
Observations	97556	60667	49419	39370	31032
Adjusted R^2	0.056	0.016	0.011	0.005	0.005
Mean of DV	10.185	10.268	10.273	10.275	10.275
Individual FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes

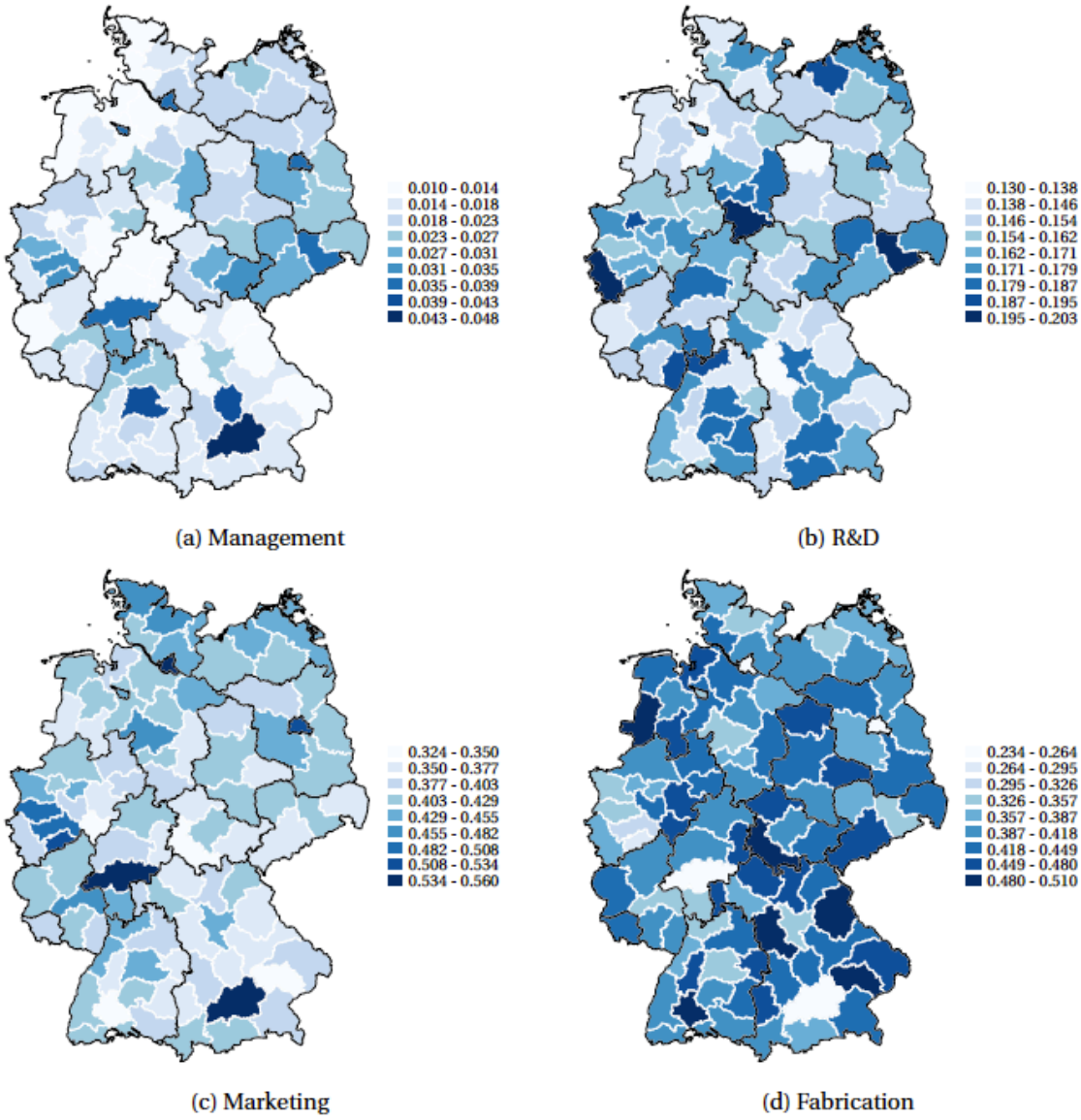
Notes: Dependent variable: Log real labor earnings. Standard errors clustered at the initial region-function-level and indicated in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table B3: Job satisfaction in the years after relocation.

	(1) (t)	(2) $(t+1)$	(3) $(t+2)$	(4) $(t+3)$	(5) $(t+4)$
$\text{Mover}_{irt} \times IP_{kr(t-1)}$	0.149**	0.025	-0.101	0.240*	-0.109
	(0.071)	(0.094)	(0.140)	(0.134)	(0.202)
$IP_{kr(t-1)}$	-0.029*	-0.030	-0.010	-0.009	-0.078*
	(0.017)	(0.022)	(0.026)	(0.033)	(0.041)
Mover_{irt}	0.137*	-0.050	0.116	-0.204	0.118
	(0.075)	(0.100)	(0.116)	(0.128)	(0.175)
Years of education	0.044*	-0.033	-0.053	-0.041	-0.048
	(0.026)	(0.032)	(0.036)	(0.044)	(0.051)
Married	-0.008	0.096**	0.056	-0.007	-0.056
	(0.038)	(0.047)	(0.048)	(0.057)	(0.066)
Persons in hh	0.018	-0.010	0.010	-0.013	0.025
	(0.014)	(0.017)	(0.021)	(0.020)	(0.024)
Children in hh	-0.008	0.013	0.021	0.036	-0.026
	(0.017)	(0.022)	(0.024)	(0.030)	(0.031)
R&D	0.028	0.014	-0.072	-0.049	0.089
	(0.049)	(0.058)	(0.060)	(0.070)	(0.089)
Marketing	-0.008	0.077	0.007	-0.020	0.083
	(0.043)	(0.052)	(0.052)	(0.065)	(0.076)
Fabrication	-0.138**	-0.023	-0.020	0.035	0.173*
	(0.063)	(0.065)	(0.078)	(0.079)	(0.104)
Observations	105371	64852	52921	42208	33276
Adjusted R^2	0.011	0.006	0.004	0.002	0.001
Mean of DV	7.032	7.086	7.108	7.119	7.130
Individual FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variable: Job satisfaction. Standard errors clustered at the initial region-function-level and indicated in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

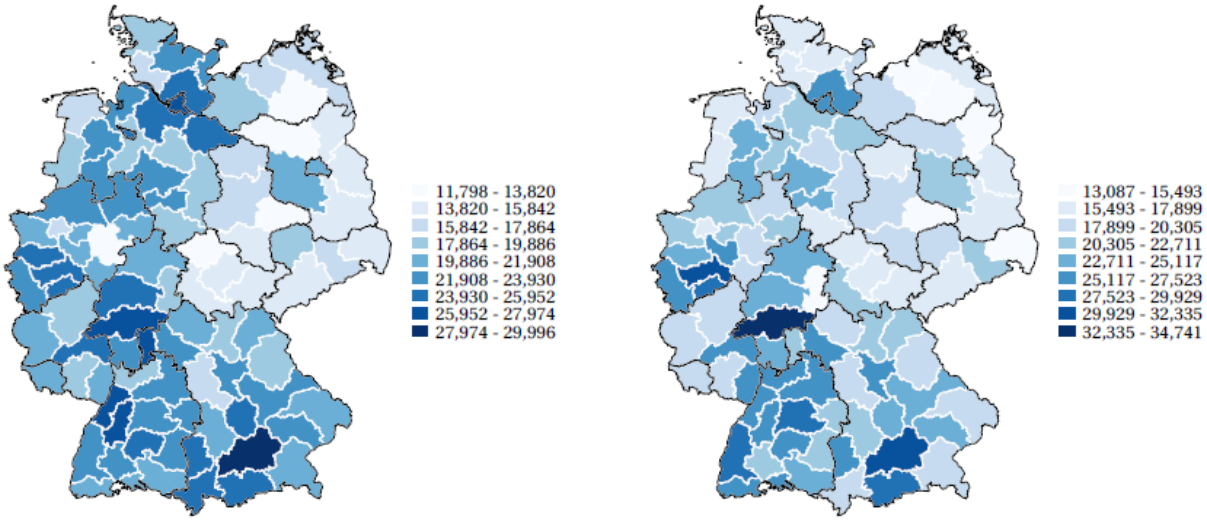
B Figure appendix



(a) Management (b) R&D

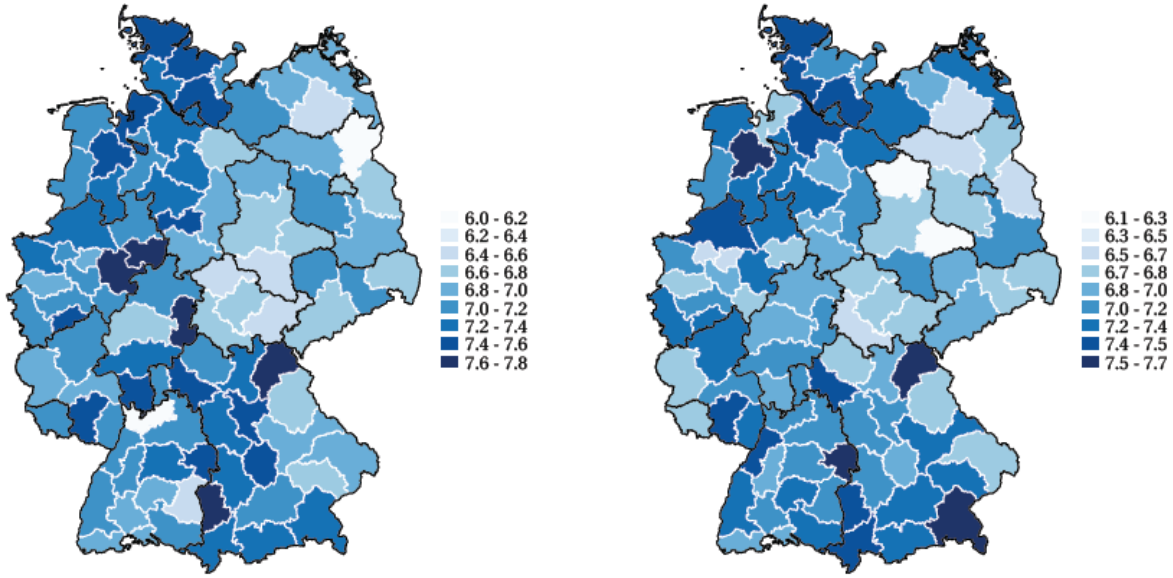
(c) Marketing (d) Fabrication

Figure B1: Functional employment share within regions in 2011.
Notes: Authors' calculation based on German Federal Employment Agency data.



(a) 2000 (b) 2011

Figure B2: Mean annual labor earnings per region, in 2010 EUR.
Notes: Authors' calculation based on SOEP data.



(a) 2000 (b) 2011

Figure B3: Mean job satisfaction per region, ranging from 0 (least satisfied) to 10 (most satisfied).
Notes: Authors' calculation based on SOEP data.

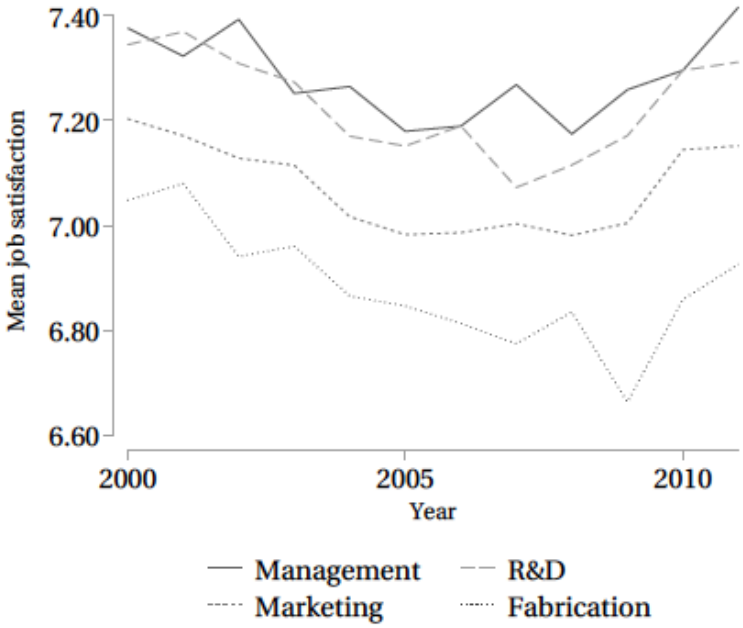


Figure B4: Mean job satisfaction per function, 2000-2011.
Notes: Authors' calculations based on SOEP data.

The Impact of Import Exposure on Occupational Changes of Dutch Workers: Effects on Wages and Job Satisfaction[12]

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Abstract

The current study assesses whether and how exposure to import shocks affected the occupational changes of Dutch workers between 2004 and 2008. We also explore the wage and job satisfaction consequences of occupational change following trade shocks. We combine trade data from the World Input-Output Database (WIOD) with worker-level data from the Dutch Labour Supply Panel (waves 2002-2008) to analyse trade exposure at occupation ISCO-08 1-digit level. We identify a group of workers that decided to switch occupations, likely due to import shocks. Propensity Score Matching (PSM) identifies a group of workers similar in characteristics to these switchers, but who chose to stay in their jobs. Our findings show that (1) there is no significant short-term effect (up to two years later) of changing occupations on wages, but (2) there is a positive effect on job satisfaction. In the short run, import shocks did not have an impact on wages and job satisfaction. However, in the long run (up to six years later), we observe no significant impact of moving occupations on either outcome variable. The effects that we find align with theoretical assumptions, suggesting the short longevity of increased satisfaction after a job change, but we did not see any substantial long-term impact.

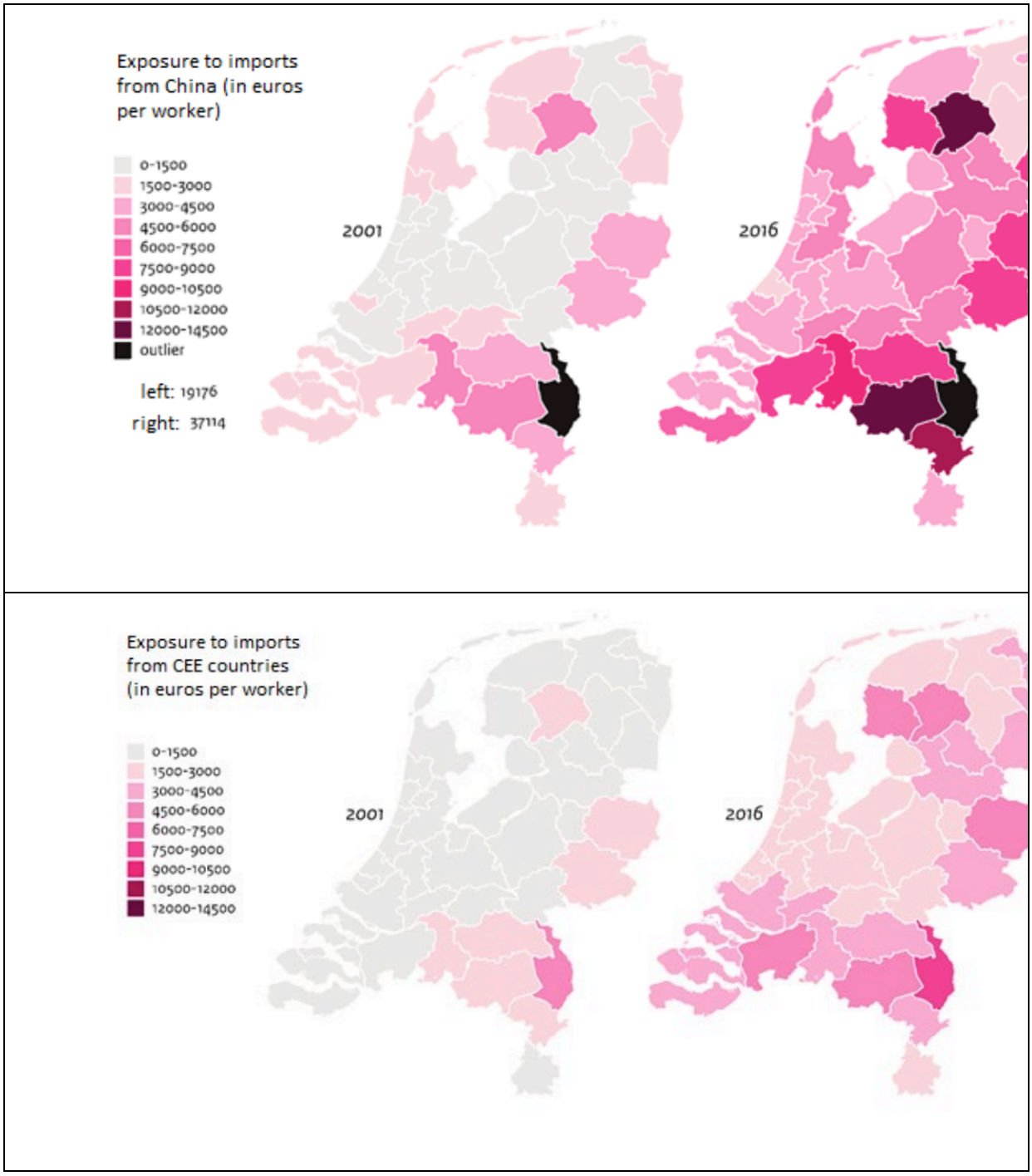
1. Introduction and context

The impact of imports from low-wage countries on employment and labour market inequality has been the subject of much discussion among scholars. Feenstra and Hanson's (2001, 1999) scholarly work aimed to understand the factors contributing to the growth of wage inequality in the United States. While technical change played a role, increasing trade with low-wage countries also affected domestic wages and employment. Trade was thought to have a minor impact during the 1990s and 2000s because of limited imports from low-wage countries. However, this changed after China became a WTO member. Autor et al. (2013) revealed that this rising competitiveness of China resulted in lower wages, increased unemployment, and reduced labour force participation in the United States.

Considering Western European labour markets, the China shock more or less coincided with the increases in imports from Central and Eastern European countries that had joined the European Union (Dauth et al., 2014; Malgouyres, 2017). Economic globalisation has impacted workers' employment, livelihoods, and well-being (Acemoglu & Restrepo, 2018; Autor, 2014; Colantone et al., 2019), with some workers being worse off due to deeper integration (Autor, 2013, Arkolakis et al., 2012; Feenstra & Sasahara, 2017). Trade benefits are thus unequally distributed among workers. In particular, low-skilled workers seem to have experienced higher risks of job loss in 2004 (Euwals et al., 2022). According to Euwals et al. (2022), the increasing and changing trade also led to shifts in employment between sectors and regions in the Netherlands (2001-2011), showing a heterogeneous picture of the relationship between imports and employment levels. The Northern, Eastern, and Southern regions of The Netherlands were highly exposed to imports. The densely-populated Western region, with a concentration of service and public administration employment, was less exposed to import competition.

In contrast, regions such as Eindhoven, Tilburg, Enschede, and the Heerenveen/Drachten area faced a rise in competition, resulting in job losses and wage declines, especially for workers in manufacturing industries more exposed to import competition. Import competition has negatively affected Dutch employment and wages, and export opportunities have had a positive impact. The export-oriented regions, such as the Rotterdam area, experienced job gains and higher wages.

Figure 1. Exposure to imports from China (upper) and CEE countries (lower) in euros per worker.



Note(s). CEE countries represent Bulgaria, Estonia, Lithuania, Latvia, Romania, and Slovenia.

Source. Euwals et al. (2022)

Changes in trade patterns may be harmful in the short run for some sectors and may open up opportunities for others (Euwals et al., 2022). The rise of 'new' jobs with relatively high productivity and the disappearance of 'old' jobs with relatively low productivity lead to higher production levels. However, this also creates uncertainty among employed persons, possibly leading to job loss and a lagging income. Due to the emerging flexibilisation of the labour market, this uncertainty is unevenly distributed among workers. The process of shifts in the Netherlands runs relatively smoothly because it happens partly naturally. Many older workers who retire do so in shrinking occupations (Bosch & ter Weel, 2013), while many younger workers start in emerging professions. While globalisation has increased, unemployment in the Netherlands has remained low compared to other countries.

Shifts in employment have consequences for groups that already face challenges in the labour market, with the adverse effects becoming more nuanced due to the combination of globalisation and automation. In part, but not exclusively, due to globalisation, factories close, companies engage in outsourcing, and sometimes entire industries disappear. The literature shows that specific groups of workers are relatively strongly affected (Scheele et al., 2009). The adjustments in the labour market happen naturally to some extent, as many workers quickly find new jobs. However, the studies also show that older workers, women with young children, and people with a non-Western migration background have relatively more difficulty finding work again and, if they do, receive a lower wage (Deelen et al., 2018). Global competition often affects a particular sector, making finding a job in a similar industry easier. Due to the combination of globalisation and automation, it has become less clear who the winners and losers are; the effects are less predictable and more nuanced (Baldwin, 2016).

The current study assesses how wages and job satisfaction levels were affected for workers who decided to change occupations – likely due to import shocks – compared to those who chose to remained in the occupation they had before the shocks. Using worker-level data from the Dutch Labour Supply Panel waves 2002-2008, we assess the short and long-term impacts by constructing two matched samples using Propensity Score Matching (PSM). First, we constructed matched samples for every survey wave between 2004 and 2008 to determine the short-term impact (one survey wave later, up to two years later). Differences-in-differences (DiD) estimation based on fixed-effects modelling looks at the change in wage and job satisfaction between two consecutive waves of the matched sample (see Allison, 2009). Second, we only used the 2004 matched sample to observe the long-term impact of occupational change on both outcomes up to three survey waves six years later. Again, differences-in-differences estimations are performed, but this time the DiD-estimator is split up into three post-survey waves, each indicating two years after an occupational change has

occurred. As such, we address the long-term net impact of changing occupations compared to those who decided not to do so. Third, using fixed-effect modelling, we attempt to net out the indirect effect of import shocks from the DiD-estimator (cf. Schuessler, 2017).

The theoretical contribution of the current study to the literature on trade shocks and worker outcomes is predominantly on the job satisfaction side. Many previous studies have examined the effect of import competition on employment outcomes such as job loss (Autor et al., 2013, 2014; Revenga, 1992). The current study extends the literature by examining how workers respond to import shocks by changing occupations in terms of wage development and job satisfaction. This addition is a significant contribution, as workers may change careers to avoid competition or seek better opportunities. Understanding wage and job satisfaction responses are crucial for predicting labour market outcomes in the face of trade shocks. In so doing, we contribute to the literature on the wage and job satisfaction consequences of occupational change following a trade shock, particularly the 2004 import shock, highlighting the importance of considering non-wage outcomes when assessing the impact of trade shocks on workers.

2. Data and methods

2.1. Data

This study uses data from the Dutch Labour Supply Panel waves 2002-2008 (the *OSA Arbeidsaanbodpanel*) from the Organisation for Labour Research (OSA) in the Netherlands. The OSA panel was set up to map several aspects of the Dutch labour supply (i.e., employees, job seekers, and non-participants) from 1986 to 2016, asking them about their labour mobility and job-search behaviour. A survey wave takes place every two years, and due to its panel structure, respondents (aged 16-66) are followed for as long as they keep filling out the questionnaires in subsequent years. Respondents are asked to either complete a questionnaire online or submit their answers on paper and return them to OSA. The sample is set up as a household sample, meaning that people are approached at the household level and can be analysed in this context. The panel data structure allows us to make differences-in-differences estimations. The modelling can capture both the short and long-term impact of occupational change likely due to import shocks – compared to those who remained in the same profession – on both log net monthly wage and job satisfaction. We used the

2002 wave only to get lagged information on, for instance, previous occupation, wages and job satisfaction, as the survey changed in its set-up as of 2004.

Method

Our method relies on comparisons between workers who switched from one occupation to another due to import competition (the 'treatment' group) and workers who share many characteristics of these workers but did not switch to a different occupation (the 'control' group). Regarding the treatment group, we focus on a group of respondents that changed occupations, which we identified by a change in the ISCO-08 4-digit code of a respondent between two survey waves. Of course, workers do not only switch occupations because of the threats of increased import competitions. It is impossible to identify workers who switched exactly because of this reason, but we can focus on stated motives for changes that are probably related to import shocks. Therefore, we only included respondents in the treatment group, if they stated one of the four referring reasons as their reason to change profession: (1) to have a more secure job; (2) reorganisation/business closure; (3) expiring/terminated fixed-term contract; and (4) dismissal for another reason. Thus, the treatment group variable gets the value of 1 if a respondent changed occupations and checked one of the aforesaid conditions related to redundancy, dismissal or perceived job insecurity. In contrast, all respondents who remained in the same occupation were assigned a value of 0 for the treatment group variable. Those respondents who switched occupation but did not check one of the additional requirements were excluded from the analysis.

Propensity Score Matching lends itself well to creating a matched sample for our differences-in-differences analysis. Every respondent in the treatment group is matched to another individual who remained in the same occupation in that very same survey wave ('control group'). We performed separate matching procedures for the survey waves 2004, 2006 and 2008 (R, package: MatchIt, method = nearest, distance = glm, k2k, without replacement, Mahalanobis: ISCO-2-digit, sector, sex). The 'nearest neighbour option' picks a control unit for every 'treated' unit with (almost) the same predicted propensity score, based on all covariates in the probit analysis. In contrast, the Mahalanobis option seeks the closest match on specific covariates ('greedy matching'). The covariates that we used for the matching are discussed below. This approach enables us to use the 2004 matched sample to measure the long-term impact of occupational change due to import shocks over the three survey waves (up to six years later). Thus, the *short-term* impact of occupational change is observed by comparing the wages and job satisfaction as stated in two consecutive survey waves. In contrast, the *long-term* impact of occupational change is observed by

comparing the wages and job satisfaction of only the 2004 matched sample up to three survey waves later, representing six years after matching.

The pre-matching covariates included in the matching refer to the previous wave ('survey year'): occupation (2-digit ISCO-08). Obviously, we would like to match respondents on the more detailed 4-digit ISCO-08 level here as well, but this proved infeasible due to a lack of potential control units in the survey data. To reduce the extent of heterogeneity, we matched respondents on several other covariates, like having one or multiple jobs: [1] 'No'; [2] 'Yes, paid employment'; [3] 'Yes, self-employment'; [4] 'Yes, as assisting spouse'. It can be argued that one is less vulnerable to import shocks and less willing to change occupations when another source of income is involved. For instance, having an additional job as an assisting spouse may disrupt the family, which impedes occupational change (see Ostroff & Clark, 2001). Another crucial pre-matching covariate is the sector or industry. As earlier noted, the import shocks have affected some sectors more severely than others (Euwals et al., 2022; Fouarge et al., 2017). Therefore, it is essential to match on sector [*Standaard Bedrijfsindeling (SBI)* in Dutch, comparable to the NACE classification]: [1] 'Agriculture'; [2] 'Industry'; [3] 'Construction'; [4] 'Trade'; [5] 'Transport'; [6] 'Business'; [7] 'Health'; [8] 'Other services'; [9] 'Government'; [10] 'Education'; [11] 'Missing sector'.

Furthermore, we also know that import shocks affected jobs differently across education level, age and position in the household (see Euwals et al., 2022). Therefore, we include the following levels in the procedure: educational attainment (ISCED2011 classification): [1] 'ISCED2011-Level 1'; [2] 'ISCED2011-Level 2'; [3] 'ISCED2011-Level 3-4-5'; [4] 'ISCED2011-Level 6'; [5] 'ISCED2011-Level 7'; [6] Missing education level. In the further text, we refer to the low skilled (ISCED levels 1-2), the intermediate skilled (ISCED Levels 3-5, and the high skilled (ISCED levels 6 or higher).

We also matched on sex [1] 'Male'; [2] 'Female' and age(-squared). The latter assumes that occupational change may be more common among middle-aged workers but may occur less among younger and older workers also because of the known relationships with regard to wage development and job satisfaction (Clark & Oswald, 2006; Clark, 2013). We also included the region of a respondent (Province/NUTS-2 level), because import shocks may have differential effects on career outcomes across regions: [1] 'Groningen'; [2] 'Friesland'; [3] 'Drenthe'; [4] 'Overrijsel'; [5] 'Gelderland'; [6] 'Utrecht'; [7] 'Noord-Holland (excl. Amsterdam)'; [8] 'Zuid-Holland (excl. Rotterdam, The Hague)'; [9] 'Zeeland'; [10] 'Noord-Brabant'; [11] 'Limburg'; [12] 'Flevoland'; and [13] 'Amsterdam, Rotterdam, The Hague', and also, civil status: [0] 'Single/Divorced/Widowed'; [1] 'Married/Cohabitated', and ethnicity: [1] 'Native Dutch'; [2] 'Ethnic minority background'. Lastly, we included the previous wave's ('lagged') log net monthly wage and job satisfaction to ensure that any

differences in the post-treatment outcomes between the occupation-switcher and his/her match could not be observed before the occupational switch already.

The total sample contains 9,942 individuals. We were able to match 462 workers who switched occupations and checked one of the selected reasons for this between 2004 and 2008 to an equally-numbered control group which can be considered similar in characteristics but without changes in professions (N_{2004} = 69, N_{2006} = 66, and N_{2008} = 96). Table A1 (in the appendix) provides information on the quality of the matching. It shows that there are no significant differences between the two groups.

2.2. Dependant variable

Our study considers labour market outcomes associated with import shocks focusing on two dependent variables. First, the *log net monthly wage* is calculated as the natural logarithm of the net monthly salary (in euros). We consider real wages by correcting for inflation using the annual Consumer Price Index (CPI) change. The second dependent variable is *job satisfaction*. Respondents were asked to indicate the extent to which they generally are satisfied with their current job on a 4-point scale: [1] 'Very unsatisfied'; [2] 'Unsatisfied'; [3] 'Satisfied'; and [4] 'Very satisfied'.

2.3. Empirical model

Our differences-in-differences estimations using fixed-effects panel regression models identify the impact of occupational change – presumably caused by import shocks - on either log net monthly wage or job satisfaction, denoted as Y_{it}, over that of remaining in the same profession. A binary independent variable, denoted as $\phi Treat_i$, indicates whether a respondent is in the treatment or in the control group. An interaction term with another binary independent variable that refers to the post-period ($\delta Post_{it}$), denoted as de DiD-estimator: $\delta Post_{it} Treat_i$, shows the differences between values of the dependent variables caused by occupational change. Equation (1) shows the mathematical representation of the abovementioned; please note that the time-invariant covariates and the intercept are dropped in the fixed-effects modelling:

$$Y_{it} = \beta_0 + \delta Post_{it} + \phi Treat_i + \delta Post_{it} Treat_i + \mu_i + \varepsilon_{it}$$

1)

Second, we observe whether import shocks explain the differences found in (1). Equation (2) shows how we estimate the extent to which import shocks can explain the found differences as a mediator: $\alpha Shock_{it}$. Therefore, we calculated for several 1-digit ISCO occupations the import shocks figures (in %, using the methods discussed in the appendix to the other paper in this deliverable, by Konietzny and Los) and added these to the data. We expect that for workers in occupations that experienced a strong increase in import competition, the wages and job satisfaction will be lower than for workers who did not face such competition from foreign workers. By including this mediator, we quantify the indirect effect of occupational change induced by import shocks.

$$Y_{it} = \beta_0 + \delta Post_{it} + \phi Treat_i + \delta Post_{it} Treat_i + \alpha Shock_{it} + \mu_i + \varepsilon_{it} \quad 2)$$

This mediating effect is shown mathematically in Equation (3), φ^1 is the *controlled direct effect* of $\delta Post_{it}$ while fixing the mediator: $\alpha Shock_{it}$. Since we assume constant effects here, this also equals the *natural direct effect*. Under these assumptions, if φ^1 is zero, any causal effect that $\delta Post_{it}$ has on Y_{it} must flow through the mediator, so it holds that:

$$ATE = \phi = \phi^1 + NIE \quad 3)$$

ATE stands for the average treatment effect and NIE stands for the natural indirect effect in the abovementioned equation, so we get to the NIE by identifying φ and φ^1. It is assumed that $\phi Treat_i$ is identified via difference-in-difference estimations. However, that does not automatically identify $\phi Treat_i^1$. We presume that ε^1_{it} is mean independent from $\delta Post_{it}$. In this context, this means considering no unobserved variables besides $\delta Post_{it}$ and the time-(in)variant fixed effects influencing both $\alpha Shock_{it}$ and Y_{it}. If this seems plausible, $\phi Treat_i^1$ is estimated by a regression technique of $\delta Post_{it}$ and $\alpha Shock_{it}$ on Y_{it} which controls for fixed effects (Peijen & Wilthagen, 2023; Schuessler, 2017). We expect that by adding this mediator, $\alpha Shock_{it}$, to the model that the main effect of $\delta Post_{it}$ and the interaction term between $\phi Treat_i^1$ and $\delta Post_{it}$, either turns out insignificant or weakens.

3. Empirical results

3.1. The short-term impacts of switching occupations

Table 2 shows the differences-in-differences outcomes assessing the short-term impact of occupational change induced by import shocks on log net monthly wage (left) and job satisfaction (right) using the 2004-2008 matched sample. Results of the first models indicate only a significant effect for the DiD estimator on job satisfaction (column 3), but not on the wage income (column 1). This finding suggests that people who changed occupations compare positively, with a view to job satisfaction but not to wages, with those who remained working in the same profession.

Table 1. Differences-in-differences estimation for the short-term impact of occupational change on log net monthly wage and job satisfaction using the 2004-2008 matched sample from fixed-effects panel regression models

	Log net monthly wage		Job satisfaction	
	(1)	(2)	(3)	(4)
	b	b	b	b
Post (reference= Pre)	-.022 (.076)	-.049 (.079)	-.038 (.056)	-.032 (.058)
Occupational change x Post (up to two years later) (reference= Stayers x Pre)	.199 (.108)	.197 (.108)	.245** (.079)	.245** (.079)
Import shock		1.225 (.899)		-.267 (.661)
Observations	836	836	836	836
R-squared	.013	.017	.033	.033

Notes. ***p < .001, **p < .01, *p < .05, standard errors in parentheses.

Source. Dutch Labour Supply Panel (2002-2008)

Second, we add the import shock figures to the previous model to net out the indirect effect of the DiD-estimator (columns 2 and 4 in Table 1). Somewhat surprisingly, we find no significant empirical support for a negative impact of import shocks on wages or job satisfaction. The estimates of the interaction effects do not change if the import shock mediator is added to the regressions. It

appears that people who decided to change professions, likely due to job insecurity, improved their job satisfaction in the short run, compared to those who remained working in the same occupation.

Since the analysis on which we report in Table 1 is based on the entire sample, the reported results could hide heterogeneity across subgroups in the population. Unfortunately, our sample is not large enough to investigate this in depth, but we analysed the effects for three subsamples of workers, splitting the sample based on educational attainment. The results are documented in Table A2. We only find some (weak) empirical support for short-term positive effects on wages for medium-skilled workers who switched occupation. For low-skilled workers and for high-skilled workers, we do not find such effects. The job satisfaction levels were affected positively by occupational switches for the subsamples of medium-skilled and high-skilled workers. For none of the subsamples, we find evidence of a negative impact on wages or job satisfactions of import shocks.

3.2. The long-term impacts of switching occupations

Table 2 shows the differences-in-differences outcomes assessing the long-term impact of occupational change likely on log net monthly wage (left) and job satisfaction (right) using the 2004 matched sample only. We do not find a significant increase in wages and job satisfaction over the years, nor is there a significant impact for those who changed professions in 2004, as shown by the insignificant DiD-estimators (the interaction effect) for both dependent variables (columns 1 and 3). There is no significant post-period effect on wages or job satisfaction, albeit the insignificant estimate for the third survey wave (up to six years later) after matching indicates a positive trend regarding wage income. Despite being insignificant again, the DiD estimator for the log net monthly wage may imply a negative wage development for those who changed occupations, relative to those who did not switch from one occupation to another.

Table 2. Differences-in-differences estimation for the long-term impact of occupational change on log net monthly wage and job satisfaction using the 2004 matched sample from fixed-effects panel regression models

	Log net monthly wage		Job satisfaction	
	(1)	(2)	(3)	(4)
	b	b	b	b
Post - Up to two years later (reference= Pre)	-.183	-.123	.014	.016
	(.114)	(.113)	(.100)	(.101)
Post - Up to four years later	-.138	-.022	-.032	-.029
	(.128)	(.130)	(.112)	(.116)
Post - Up to six years later	.228	.348*	-.040	-.037
	(.142)	(.143)	(.124)	(.128)
Occupational change x Post (reference= Stayers x Pre)				
Post - Up to two years later	-.010	.005	.072	.073
	(.161)	(.158)	(.141)	(.141)
Post - Up to four years later	-.034	-.047	.098	.097
	(.186)	(.183)	(.163)	(.163)
Post - Up to six years later	-.208	-.187	.115	.116
	(.199)	(.195)	(.174)	(.174)
Import shock		-4.268***		-.103
		(1.226)		(1.093)
Observations	452	452	452	452
R-squared	.046	.082	.004	.004

*Notes. ***p < .001, **p < .01, *p < .05,* standard errors in parentheses.*

Source. Dutch Labour Supply Panel (2002-2008)

The second model looks at the import shocks' annual impact on certain professions on wages and job satisfaction (columns 2 and 4). The negative estimate for the import shock variable if wage incomee is considered suggests that these shocks affected the wages of the sample as a whole in the longer run. Switching occupations did generally not have a distinct impact, since the estimates for the interaction effect are not significantly different from zero. The significantly positive estimate for the third survey wave in the post-period (b = .348, p < .05) suggests that the 2004 matched sample -

regardless of occupational change - recovered from the initial import shock in the third survey year of the post-period while controlling estimates for import shocks after occupational switches. Although the increasing positive estimates of the DiD-estimators on job satisfaction remain insignificant, it indicates that people who changed occupations in 2004 report higher levels of job satisfaction. In the appendix (Table A3), we consider heterogeneity in long-term effects along the educational attainment dimension again. For these subsamples, we do not find strong evidence for a long-term impact of changing occupations after an import shock either.

4. Conclusions, discussion and recommendations

4.1. Conclusions

Global economic integration has generally benefited people worldwide (Autor et al., 2013). The Dutch labour market has also been subject to various external shocks, yet this import competition seems to have affected labour markets in the Netherlands less than in other countries (Euwals et al., 2022), at least not in a macro-economic sense.

Some workers might have benefitted from these developments, whereas others have been negatively impacted by the changes it has brought about (cf. Traiberman, 2019). Unfortunately, this latter group of workers is often overlooked, implicitly assuming that they can easily adapt to changing labour markets. But in reality, adapting to these changes can be more problematic for some workers than initially thought and proposed in the literature (e.g., Autor, 2014; Harrison et al., 2011). We attempted to study and understand how workers respond to these shocks to develop policies to help them progress in their careers.

The current study's findings by performing differences-in-differences models on matched samples drawn from the Dutch Labour Supply Panel indicate that changes in occupations, potentially resulting from import shocks, have significantly impacted Dutch workers' short-term job satisfaction but not wages on short notice (one survey wave representing two years later). Our findings align with ample literature suggesting that changes in occupations resulting from import shocks can significantly impact short-term job satisfaction. Still, they may not immediately impact wages (Autor et al., 2016). Job satisfaction is affected by various factors beyond wages, such as work-life balance, job security and working conditions (Clark, 2001; Clark & Oswald, 1996, 2006). For instance, the evidence found in the organisational psychology literature shows us that anticipating job insecurity by showing proactive career behaviour can impact workers' well-being (Koen & van Bezouw, 2021; Langerak et al., 2022).

Some studies suggest that trade-related job displacement can significantly negatively impact job satisfaction, particularly in the short term (Bartel & Sicherman, 1993). In addition, occupational changes can be distinguished from job changes in general as they often indicate a less desirable employment situation, such as dismissal or perceived job security (cf. Chadi & Hetschko, 2018). However, either job or occupational change can lead to positive outcomes regarding wage changes and job satisfaction (Longhi & Brynin, 2010; Ong & Theseira, 2016). In the longer term, however, some evidence suggests that workers may adapt to changes in the labour market and that job satisfaction may return to pre-displacement levels (Daniel & Von Wachter, 2009). This finding may reflect a process of psychological adjustment or the acquisition of new skills and knowledge, as workers may eventually adapt to changes in the labour market and recover their levels of job satisfaction over time (Farber, 2015; Kletzer, 1996). This difference in observing the effect in both the short and long run is in line with Boswell et al.'s (2009) findings speaking of a 'honeymoon effect' (short term) and a 'hangover effect' (long term). However, we found no support for the latter effect. In conclusion, the current study's findings are consistent with existing literature suggesting that changes in occupations resulting from import shocks can significantly impact short-term job satisfaction but not necessarily wages in the short term.

We neither find support for the notion that these same occupational changes impact long-term wage development. Nonetheless, our results suggest that import shocks have affected wages generally. Still, we could not find any support for an indirect effect of import shocks affecting the relationship of occupational change on wage development. Parallels can be drawn with scarring theories, assuming that labour market mobility can be harmful when job-to-job transition is due to dismissal or perceived job insecurity (Gangl, 2006; Schmelzer, 2012). In situations as such, workers may be less critical with a view to the fit between their skills and those required for the position advertised, limiting their career growth opportunities (Fouarge et al., 2012). These scarring theories suggest that labour market mobility can have negative consequences, particularly when involuntary transitions are driven by perceived job insecurity. Workers in such situations may be less discerning about the fit between their skills and job requirements, ultimately limiting their opportunities for career growth. In addition, prospective employers may signal applicants' situation and adjust the salaries these employers are willing to pay (Fouarge et al., 2012; Gangl, 2006; Sattinger, 1993; Schmelzer, 2012). Finally, we attempted to net out the indirect effect of import shocks through the fixed-effects modelling, but no supporting results came to the fore. It could be that the comprehensive matching with quite many pre-matching covariates and a relatively low number of individuals controlled estimates too extensively to net out the indirect effect.

4.2. Limitations

One of the primary limitations of the current study is the inability to attribute occupational changes unequivocally to import shocks. Although we included additional criteria to identify workers potentially affected by import shocks, such as the reason for switching jobs being lack of job security, business closures, or contract termination, there is no precise metric to determine the extent of import shocks or external sectoral changes whatsoever. Herewith, we were only able to provide best-guess estimates. Despite our efforts to match workers based on many detailed observable characteristics in the data (e.g., ISCO-08 2-digit level, sector, educational attainment, et cetera), there remains a possibility of unobserved heterogeneity among workers affecting the estimates. Unobserved factors, unaccounted for during the matching process, may influence the estimates when we would have used ordinary least squares (OLS) regression models. The fixed-effects models were employed to account for potential selection bias and address the effects of unobserved heterogeneity not captured by the matching procedure. These models estimate the average within-individual change in wage and job satisfaction, at least controlling estimates for these remaining unobserved factors.

The impact of job loss was beyond the scope of the current study. Still, it is self-evident that job loss imposes apparent wage reductions on workers' careers and job satisfaction cannot be assessed once people indicate to be unemployed. The lack of panel data in the Dutch context, which could provide information on both occupations and indicators of wages and subjective well-being, is a further challenge due to the predominantly cross-sectional nature of available data sources. In addition, the data used in the current study had many observations but perhaps not enough observations to relate the occupational changes to import shocks fully. In particular, we lost many observations due to the additional conditions we applied in the current study to form the occupational changers ('treatment group'). To be clear, there was no loss of potential control units by including too many pre-matching covariates. Still, the treatment group became smaller due to additional requirements related to the job change. However, when we compromise on these conditions, we expect the group of occupational changers is made too broad. We further aimed to observe the impact on people who moved to another region to find employment elsewhere. Again, we had too few observations in the data available who actually did this and, therefore, could not construct a comprehensive control group. Evidence on the macro level (cf. Euwals et al., 2022) may differ from how regional mobility due to import shocks or any other macroeconomic development

affects workers' well-being. In addition, we cannot ignore the costs involved in moving to another region (Clark & Withers, 1999).

4.3. Future research and policy recommendations

Future research may take a closer look at the extent to which the previous and current occupations share more or less the same knowledge and skills and how this similarity in skills affects wages and job satisfaction. Occupational change is linked to an increase in wage inequality, particularly for low-skilled workers (Autor, 2014; Autor et al., 2014; Van den Berge & Ter Weel, 2015). As such, it can be argued that job satisfaction would be less affected or improved due to considerable similarity in working tasks and probably negligible income losses (Nawakitphaitoon & Ormiston, 2015). Future studies may also draw parallels with the consequences of technological advancements on the labour market. As routine tasks become automated, there has been a decreasing demand for low-skilled jobs (Frey & Osborne, 2017; Mihaylov & Tijdens, 2019). Unlike technological advancements, import shocks do not necessarily lead to long-term gains in productivity or economic growth, as they can shift economic activity from one country to another (Autor et al., 2016). Likewise, specific jobs may disappear or pay less, and individuals working in them will likely experience a wage reduction and may decide to switch occupations. Conversely, high-skilled jobs are in higher demand, increasing wages for those in these occupations. Even though we found no significant support for this skill-level differential in the current study – probably due to power issues of the sample – the directions of the effects point to this assumption.

Policymakers may consider measures to mitigate the impact of import shocks, such as supporting workers in affected industries to acquire new skills and facilitating the transition to other sectors. Euwals et al. (2022) suggested that enhancing export opportunities may increase the mobility of workers and might help buffer the adverse effects of import competition on the Dutch labour market. It is further suggested that employers could redirect their attention toward evaluating individuals' skills and potential to obtain the required skills. Adopting such skill-based approaches may create better prospects for marginalised workers with a distance from the labour market (Dekker et al., 2021), such as those affected by import shocks facing difficulties due to erroneous assumptions about their labour market productivity. Research has shown that import competition can lead to the displacement of workers and downward pressure on wages, particularly for low-skilled workers (Autor et al., 2013; Goldberg & Pavcnik, 2016). However, they might be suitable for

other jobs in the growing labour market sectors, perhaps with little training. Herewith, workers' income levels can also be retained –at least on a higher level – since these growing industries are craving for new employees. By adopting such skill-based approaches, employers may not only be able to provide better opportunities for these individuals affected by import shows but also fulfil their bottleneck vacancies as soon as they observe the ability to learn of workers in these affected sectors.

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Appendix

Table A1: Quality of the matching procedure, means and standard deviations (between parentheses) of the matching covariates of the treatment groups and the control groups.

	2004			2006			2008		
	Control N=69	Treat N=69	p	Control N=66	Treat N=66	p	Control N=96	Treat N=96	p
Previous wave occupation (2-digit ISCO-08)									
11 Chief executives, senior officials and legislators	.029 (.169)	.029 (.169)	1.000	.000 (.000)	.000 (.000)	1.000	.031 (.175)	.031 (.175)	1.000
12 Administrative and commercial managers	.000 (.000)	.000 (.000)	1.000	.015 (.123)	.015 (.123)	1.000	.010 (.102)	.010 (.102)	1.000
13 Production and specialised services managers	.087 (.284)	.087 (.284)	1.000	.061 (.240)	.061 (.240)	1.000	.021 (.144)	.021 (.144)	1.000
14 Hospitality, shop, and related services managers	.015 (.120)	.015 (.120)	1.000	.015 (.123)	.015 (.123)	1.000	.021 (.144)	.021 (.144)	1.000
21 Science and engineering professionals	.015 (.120)	.015 (.120)	1.000	.015 (.123)	.015 (.123)	1.000	.000 (.000)	.000 (.000)	1.000
22 Health professionals	.044 (.205)	.044 (.205)	1.000	.015 (.123)	.015 (.123)	1.000	.010 (.102)	.010 (.102)	1.000
23 Teaching professionals	.015 (.120)	.015 (.120)	1.000	.015 (.123)	.015 (.123)	1.000	.010 (.102)	.010 (.102)	1.000
24 Business and administration professionals	.087 (.284)	.101 (.304)	.959	.106 (.310)	.106 (.310)	1.000	.104 (.307)	.083 (.278)	.885
25 Information and communications technology (ICT) professionals	.058 (.235)	.058 (.235)	1.000	.046 (.210)	.046 (.210)	1.000	.010 (.102)	.010 (.102)	1.000
26 Legal, social and cultural professionals	.058 (.235)	.058 (.235)	1.000	.015 (.123)	.015 (.123)	1.000	.052 (.223)	.052 (.223)	1.000
31 Science and engineering associate professionals	.029 (.169)	.029 (.169)	1.000	.046 (.210)	.046 (.210)	1.000	.031 (.175)	.042 (.201)	.929
32 Health associate professionals	.000 (.000)	.000 (.000)	1.000	.030 (.173)	.030 (.173)	1.000	.052 (.223)	.052 (.223)	1.000
33 Business and administration associate professionals	.159 (.369)	.145 (.355)	.973	.121 (.329)	.121 (.329)	1.000	.010 (.102)	.010 (.102)	1.000
34 Policing, legal, social, cultural and related associate professionals	.015 (.120)	.015 (.120)	1.000	.015 (.123)	.015 (.123)	1.000	.031 (.175)	.031 (.175)	1.000
41 Office clerks	.058 (.235)	.058 (.235)	1.000	.061 (.240)	.061 (.240)	1.000	.052 (.223)	.052 (.223)	1.000

	2004			2006			2008		
	Control N=69	Treat N=69	p	Control N=66	Treat N=66	p	Control N=96	Treat N=96	p
42 Customer services clerks	.015 (.120)	.015 (.120)	1.000	.046 (.210)	.046 (.210)	1.000	.031 (.175)	.031 (.175)	1.000
43 Numerical and material recording clerks	.044 (.205)	.044 (.205)	1.000	.106 (.310)	.106 (.310)	1.000	.104 (.307)	.104 (.307)	1.000
44 Other clerical support workers	.015 (.120)	.015 (.120)	1.000	.030 (.173)	.030 (.173)	1.000	.052 (.223)	.052 (.223)	1.000
51 Personal service workers	.029 (.169)	.029 (.169)	1.000	.0152 (.123)	.015 (.123)	1.000	.042 (.201)	.042 (.201)	1.000
52 Sales workers	.058 (.235)	.058 (.235)	1.000	.106 (.310)	.106 (.310)	1.000	.135 (.344)	.146 (.355)	.979
53 Personal care workers	.015 (.120)	.015 (.120)	1.000	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000
54 Protective services workers	.000 (.000)	.000 (.000)	1.000	.015 (.123)	.015 (.123)	1.000	.010 (.102)	.010 (.102)	1.000
61 Market-oriented skilled agricultural workers	.015 (.120)	.015 (.120)	1.000	.000 (.000)	.000 (.000)	1.000	.021 (.144)	.021 (.144)	1.000
71 Building and related trades workers, excluding electricians	.029 (.169)	.029 (.169)	1.000	.015 (.123)	.015 (.123)	1.000	.021 (.144)	.021 (.144)	1.000
72 Metal machinery and related trades workers	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000	.010 (.102)	.010 (.102)	1.000
74 Other craft and related trade workers	.015 (.120)	.015 (.120)	1.000	.000 (.000)	.000 (.000)	1.000	.010 (.102)	.010 (.102)	1.000
75 Food processing woodworking garment and other craft and related trades workers	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000	.010 (.102)	.010 (.102)	1.000
81 Stationary plant and machine operators	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000	.010 (.102)	.010 (.102)	1.000
82 Machine operators and assemblers	.015 (.120)	.015 (.120)	1.000	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000
83 Drivers and mobile-plant operators	.044 (.205)	.044 (.205)	1.000	.0455 (.210)	.0455 (.210)	1.000	.010 (.102)	.010 (.102)	1.000
91 Cleaners and helpers	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000	.042 (.201)	.042 (.201)	1.000
93 Labourers in mining, construction, manufacturing and transport	.015 (.120)	.015 (.120)	1.000	.0303 (.173)	.0303 (.173)	1.000	.031 (.175)	.031 (.175)	1.000
94 Food preparation assistants	.000 (.000)	.000 (.000)	1.000	.0152 (.123)	.0152 (.123)	1.000	.010 (.102)	.010 (.102)	1.000
96 Refuse workers and other elementary service workers	.029 (.169)	.029 (.169)	1.000	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000
Sector									
Agriculture	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000	.010 (.102)	.010 (.102)	1.000
Industry	.232 (.425)	.174 (.382)	.701	.106 (.310)	.106 (.310)	1.000	.156 (.365)	.073 (.261)	.195

	2004			2006			2008		
	Control N=69	Treat N=69	p	Control N=66	Treat N=66	p	Control N=96	Treat N=96	p
Construction	.015 (.120)	.029 (.169)	.845	.0152 (.123)	.030 (.173)	.845	.052 (.223)	.083 (.278)	.692
Trade	.130 (.339)	.116 (.323)	.967	.182 (.389)	.136 (.346)	.777	.146 (.355)	.177 (.384)	.842
Transport	.058 (.235)	.072 (.261)	.943	.0758 (.267)	.0758 (.267)	1.000	.052 (.223)	.052 (.223)	1.000
Business	.217 (.415)	.203 (.405)	.979	.212 (.412)	.212 (.412)	1.000	.188 (.392)	.188 (.392)	1.000
Health	.174 (.382)	.217 (.415)	.815	.212 (.412)	.212 (.412)	1.000	.208 (.408)	.198 (.401)	.984
Other services	.044 (.205)	.044 (.205)	1.000	.0303 (.173)	.061 (.240)	.708	.063 (.243)	.063 (.243)	1.000
Government	.073 (.261)	.073 (.261)	1.000	.106 (.310)	.106 (.310)	1.000	.083 (.278)	.093 (.293)	.968
Education	.058 (.235)	.073 (.261)	.943	.0606 (.240)	.0606 (.240)	1.000	.031 (.175)	.0521 (.223)	.772
Missing sector	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000	.010 (.102)	.010 (.102)	1.000
Multiple jobs									
No	.928 (.261)	.928 (.261)	1.000	.955 (.210)	.879 (.329)	.292	.969 (.175)	.917 (.278)	.301
Yes, in paid employment	.029 (.169)	.044 (.205)	.902	.0303 (.173)	.030 (.173)	1.000	.0104 (.102)	.031 (.175)	.602
Yes, in self-employment	.015 (.120)	.029 (.169)	.845	.0152 (.123)	.0758 (.267)	.249	.010 (.102)	.052 (.223)	.254
Yes, as assisting spouse	.029 (.169)	.000 (.000)	.365	.000 (.000)	.015 (.123)	.607	.010 (.102)	.000 (.000)	.607
Province									
Groningen	.015 (.120)	.029 (.169)	.845	.015 (.123)	.030 (.173)	.845	.000 (.000)	.000 (.000)	1.000
Friesland	.044 (.205)	.029 (.169)	.902	.030 (.173)	.030 (.173)	1.000	.031 (.175)	.010 (.102)	.602
Drenthe	.044 (.205)	.044 (.205)	1.000	.030 (.173)	.015 (.123)	.845	.031 (.175)	.042 (.201)	.929
Overijssel	.044 (.205)	.073 (.261)	.769	.061 (.240)	.076 (.267)	.943	.094 (.293)	.063 (.243)	.724
Gelderland	.087 (.284)	.073 (.261)	.952	.076 (.267)	.030 (.173)	.51	.094 (.293)	.063 (.243)	.724
Utrecht	.058 (.235)	.044 (.205)	.928	.046 (.210)	.061 (.240)	.928	.083 (.278)	.063 (.243)	.858
Noord-Holland	.159 (.369)	.174 (.382)	.975	.197 (.401)	.152 (.361)	.791	.125 (.332)	.104 (.307)	.903
Zuid-Holland	.174 (.382)	.101 (.304)	.469	.197 (.401)	.197 (.401)	1.000	.208 (.408)	.167 (.375)	.762
Zeeland	.029 (.169)	.058 (.235)	.708	.030 (.173)	.015 (.123)	.845	.041 (.201)	.083 (.278)	.493
Noord-Brabant	.145 (.355)	.188 (.394)	.793	.167 (.376)	.167 (.376)	1.000	.146 (.355)	.135 (.344)	.979
	.101	.044	.425	.061	.091	.807	.094	.073	.873

	2004			2006			2008		
	Control N=69	Treat N=69	p	Control N=66	Treat N=66	p	Control N=96	Treat N=96	p
Limburg	(.304)	(.205)		(.240)	(.290)		(.293)	(.261)	
Flevoland	.029 (.169)	.044 (.205)	.902	.000 (.000)	.030 (.173)	.365	.031 (.175)	.073 (.261)	.432
Amsterdam, Rotterdam, The Hague	.073 (.261)	.101 (.304)	.835	.091 (.290)	.106 (.310)	.959	.021 (.144)	.125 (.332)	.021
Sex									
Male	.551 (.501)	.565 (.499)	.986	.545 (.502)	.561 (.500)	.985	.521 (.502)	.490 (.503)	.911
Female	.449 (.501)	.435 (.499)	.986	.455 (.502)	.439 (.500)	.985	.479 (.502)	.510 (.503)	.911
Educational attainment									
ISCED2011 level 1	.029 (.169)	.015 (.120)	.845	.030 (.173)	.015 (.123)	.845	.010 (.102)	.010 (.102)	1.000
level 2	.217 (.415)	.217 (.415)	1.00	.212 (.412)	.212 (.412)	1.000	.167 (.375)	.198 (.401)	.855
levels 3-5	.464 (.502)	.464 (.502)	1.000	.455 (.502)	.470 (.503)	.985	.563 (.499)	.510 (.503)	.771
level 6	.188 (.394)	.203 (.405)	.977	.212 (.412)	.227 (.422)	.978	.219 (.416)	.219 (.416)	1.000
level 7	.101 (.304)	.101 (.304)	1.000	.091 (.290)	.076 (.267)	.952	.042 (.201)	.063 (.243)	.811
Age category									
15-24	.015 (.120)	.044 (.205)	.600	.030 (.173)	.091 (.290)	.348	.115 (.320)	.240 (.429)	.077
25-34	.145 (.355)	.290 (.457)	.120	.015 (.123)	.197 (.401)	.003	.042 (.201)	.104 (.307)	.251
35-44	.304 (.464)	.348 (.480)	.863	.424 (.498)	.409 (.495)	.985	.208 (.408)	.292 (.457)	.413
45-54	.362 (.484)	.275 (.450)	.551	.333 (.475)	.227 (.422)	.401	.385 (.489)	.281 (.452)	.312
55-64	.174 (.382)	.044 (.205)	.048	.197 (.401)	.076 (.267)	.129	.250 (.435)	.073 (.261)	.004
65-75	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.000 (.000)	1.000	.000 (.000)	.010 (.102)	.607
Civil status									
No partner	.058 (.235)	.188 (.394)	.066	.227 (.422)	.182 (.389)	.813	.208 (.408)	.323 (.470)	.200
Married/Cohabitated	.942 (.235)	.812 (.394)	.066	.773 (.422)	.818 (.389)	.813	.792 (.408)	.677 (.470)	.200
Ethnicity									
Native Dutch	.986 (.120)	.928 (.261)	.250	.970 (.173)	.985 (.123)	.845	.990 (.102)	.948 (.223)	.254
Non-native	.015	.073	.250	.030	.015	.845	.010	.052	.254

	2004			2006			2008		
	Control N=69	Treat N=69	p	Control N=66	Treat N=66	p	Control N=96	Treat N=96	p
	(.120)	(.261)		(.173)	(.123)		(.102)	(.223)	
Previous wave									
Log monthly net wage	7.210 (1.19)	6.670 (1.75)	.114	6.550 (2.64)	6.640 (2.00)	.976	6.730 (1.82)	6.670 (1.67)	.974
Job satisfaction	3.320 (.606)	3.190 (.713)	.513	3.300 (.581)	3.170 (.622)	.431	3.230 (.533)	3.290 (.679)	.777

Notes. Because of some missing values for reported income and, to a lesser extent, reported job satisfaction in the previous wave, we had to perform multiple imputations to predict these values (package MICE, method = classification and regression trees, models = 50, iterations = 100). *Source. Dutch Labour Supply Panel (2002-2008)*

Table A2. Differences-in-differences estimation for the short-term impact of occupational change on log net monthly wage and job satisfaction using the 2004-2008 matched sample by education level from fixed-effects panel regression models

	Log net monthly wage						Job satisfaction					
	Low skilled		Intermediate skilled		High skilled		Low skilled		Intermediate skilled		High skilled	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	b	b	b	b	b	b	b	b	b	b	b	b
Post (reference= Pre)	.178 (.124)	.166 (.129)	-.028 (.115)	-.051 (.120)	-.090 (.165)	-.089 (.169)	.100 (.131)	.117 (.137)	-.140 (.092)	-.119 (.096)	-.074 (.095)	-.068 (.097)
Occupational change x Post (up to two years later) (reference= Stayers x Pre)	-.065 (.176)	-.067 (.178)	.295+ (.163)	.302+ (.164)	.075 (.231)	.076 (.234)	.054 (.186)	.058 (.187)	.306* (.131)	.300* (.131)	.355** (.133)	.362** (.135)
Import shock		.440 (1.354)		.920 (1.375)		-.100 (4.849)		-.668 (1.428)		-.802 (1.101)		-1.037 (2.786)
Observations	195	195	395	395	245	245	195	195	395	395	245	245
R-squared	.036	.037	.037	.037	.003	.003	.025	.027	.032	.035	.083	.084

*Notes. ***p < .001, **p < .01, *p < .05, +p < .10,* standard errors in parentheses.

Source. Dutch Labour Supply Panel (2002-2008)

Table A3. Differences-in-differences estimation for the long-term impact of occupational change on log net monthly wage and job satisfaction using the 2004-2008 matched sample by education level from fixed-effects panel regression models

	Log net monthly wage						Job satisfaction					
	Low skilled		Intermediate skilled		High skilled		Low skilled		Intermediate skilled		High skilled	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	b	b	b	b	b	b	b	b	b	b	b	b
Post-period (reference= Pre-period)												
Post-period - Up to two years later	.010	.032	-.153	-.118	-.271	-.265	.357	.383	-.202	-.198	-.071	-.070
	(.224)	(.231)	(.171)	(.175)	(.186)	(.176)	(.239)	(.246)	(.157)	(.161)	(.165)	(.166)
Post-period – Up to four years later	-.282	-.231	.073	.130	-.151	-.116	-.074	-.016	-.152	-.146	-.051	-.046
	(.249)	(.272)	(.192)	(.199)	(.222)	(.210)	(.265)	(.290)	(.176)	(.184)	(.197)	(.198)
Post-period - Up to six years later	-.294	-.234	.261	.316	.395	.434	.153	.222	-.227	-.221	.086	.092
	(.277)	(.305)	(.215)	(.221)	(.242)	(.229)	(.295)	(.325)	(.197)	(.204)	(.215)	(.216)
Occupational change x Post (reference= Stayers x Pre-period)												
Post-period - Up to two years later	-.233	-.227	-.144	-.137	.253	.372	-.401	-.406	.333	.333	.191	.208
	(.326)	(.328)	(.244)	(.244)	(.259)	(.246)	(.347)	(.349)	(.224)	(.225)	(.229)	(.232)
Post-period – Up to four years later	.381	.356	-.546	-.538	.294	.335	.240	.211	.109	.110	.234	.240
	(.394)	(.400)	(.273)	(.273)	(.303)	(.286)	(.419)	(.425)	(.250)	(.251)	(.269)	(.270)
Post-period - Up to six years later	.466	.448	-.379	-.363	-.219	.025	-.113	-.134	.424	.425	-.054	-.017
	(.444)	(.449)	(.296)	(.296)	(.332)	(.321)	(.473)	(.478)	(.272)	(.273)	(.294)	(.303)
Import shock		-.913		-2.206		-10.234***		-1.056		-.243		-1.536
		(1.907)		(2.114)		(3.081)		(2.030)		(1.949)		(2.907)
Observations	101	101	217	217	134	134	101	101	217	217	134	134
R-squared	.071	.071	.077	.084	.107	.216	.071	.076	.033	.023	.023	.027

*Notes. ***p < 0.001, **p < 0.01, *p < 0.05, +p < 0.10,* standard errors in parentheses.

Source. Dutch Labour Supply Panel (2002-2008)

GI-NI PROJECT IDENTITY

Project name

Growing Inequality: a novel integration of transformations research — GI-NI

Coordinator

Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek TNO, Netherlands

Consortium

CNAM – CEET, Centre d`études de l´emploi et du travail (France)
University of Groningen (Netherlands)
Centre for European Policy Studies (Belgium)
University of Adger (Norway)
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Growing Inequality:
A novel integration of
transformations research

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