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Worker and firm responses to trade shocks: The UK-China case☆

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ABSTRACT

We exploit the recent surge in Chinese export growth to study the effects of a trade shock on workers and firms in a foreign market, the UK, in the period 2000–2007. We find that individuals initially employed in sectors highly exposed to growth in imports from China experienced lower income growth and remained out of employment longer than workers in sectors that were less exposed to import competition. The effects are heterogeneous, with initially lower-paid workers suffering more in terms of employment and earnings than those initially better-paid, and female workers experiencing a greater relative fall in total earnings than males, mostly through reduced years of employment. Plants in industries more exposed to Chinese products displayed lower employment growth and higher probability of going out of business than plants in sectors more insulated from competition with China, with stronger effects for larger plants.

1. Introduction

One of the main consequences of trade openness is the reallocation of resources towards more productive regions, sectors and firms. This reallocation generally benefits the economies as a whole by raising productivity, reducing prices and ultimately increasing aggregate welfare (Melitz, 2003; Eaton and Kortum, 2002). However, this reallocation has important implications on labor markets, with not all groups of firms and workers benefiting from the process.

In recent decades, China has emerged as a dominant player in international trade. Its growth has been extremely rapid since its accession to the World Trade Organisation (WTO) in 2001, leading the country to surpass the United States in its share of world goods trade in 2011, as shown in Fig. 1. Meanwhile, in many developed countries, the share of employment in the manufacturing sector has fallen dramatically. For example, in the United Kingdom, manufacturing employment has

☆ Data from the Quarterly Labor Force Survey, Annual Survey of Hours and Earnings, Annual Respondents Database and Business Structure Database are collected by the Office for National Statistics and supplied by the Secure Data Service at the UK data service. The use of the data in this work does not imply the endorsement of ONS or the Secure Data Service in relation to the interpretation or the analysis of the data. This work uses research datasets which may not exactly reproduce National Statistics Aggregates.

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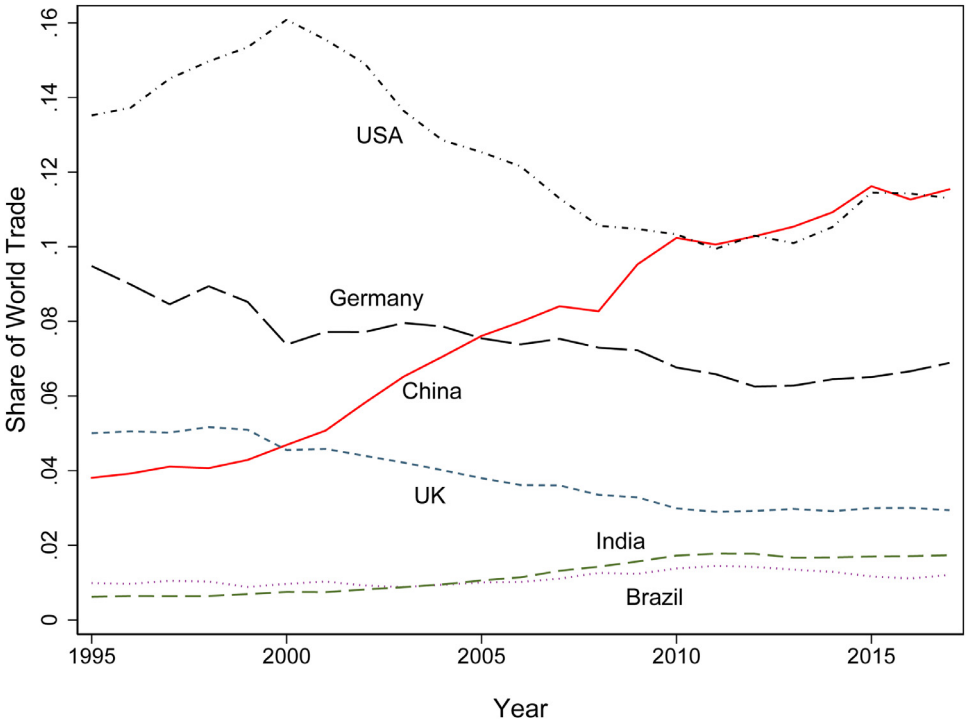

Fig. 1. Share of World Trade by Country Notes: The figure shows the yearly share of world trade in goods (value of imports and exports) by country between 1995 and 2017. Source: World Integrated Trade Solution (WITS) Database.

fallen from 16.7 percent at the beginning of 1997 to 9.1 percent in 2017. The remarkable integration of China into the global economy and the context of its growth has spurred renewed interest into the effects of international trade, especially on labor markets (Autor et al., 2016).

In this paper, we investigate how both workers and firms in a developed mid-sized economy, the UK, were affected by rising import competition from China. The UK provides an interesting environment for the study of trade shocks. There has been a sharp decline in employment in the manufacturing sector but the productive services sector has grown rapidly, with exports of services nearly doubling between 2001 and 2007 (Office for National Statistics, 2013). Furthermore, the country persistently ranks as one of the most flexible labor markets in the world (Scwab, 2018). These possibilities could potentially offset the frictional adjustments of workers affected by the China shock.

We investigate the effects of the growth of imports from China on both workers and firms, drawing on a rich set of UK administrative datasets. Exploiting the worker and firm panel datasets, we are able to analyze several margins of adjustment, including workers' cumulative earnings, employment status, average hourly and weekly wages (conditional on being employed), as well as firms' exits and employment growth. We also analyze numerous dimensions of heterogeneity for both workers and firms, and investigate how workers adjusted to the shock when switching their firm or industry.

To identify the effects of Chinese import competition on UK workers and firms between 2000 (the year before China entered the WTO) and 2007 (the year before the "Great Recession"), we rely on the fact that industries faced differential changes in exposure to Chinese import competition and exploit this variation across narrowly defined industries. A major concern in the identification of these effects is the potential endogeneity of the import exposure measure. For instance, the UK's imports from China may be correlated with contemporaneous labor demand shocks in the UK, which could lead to biased estimates. To identify the causal effect of Chinese export growth on the UK market, we adopt an instrumental variable strategy that isolates the part of trade flows that is driven by the China-specific effect, following Costa et al. (2016).[1]

We find strong and statistically significant evidence that workers initially employed in industries exposed to high levels of Chinese import growth experienced lower average weekly and hourly earnings growth compared to individuals in industries less exposed to imports from China. For example, the growth of average weekly earnings of workers in highly affected sectors was 3.9% lower than that of workers in industries facing low levels of Chinese import competition. Furthermore, we find some evidence of negative effects on workers' total earnings, defined as total cumulative earnings in the period 2001–2007 divided by the worker's pre-period average annual earnings, and on the number of years employed.

[1] We also show that our results are robust to using an instrument more closely related to that of Autor et al. (2014), which uses Chinese exports to a subset of developed countries excluding the UK.

The impact of the shock on the demand side of the UK labor market also entails important insights about how the country adjusted to the rise in import competition. Were firms in sectors hit harder by Chinese imports not able to survive the increased foreign competition? Did firms downsize? Or were firms simultaneously firing and hiring workers in response to the shock, leaving overall employment relatively unaffected at the sector level and implying that the results at the worker-level simply reflect firms reorganizing their employment composition? To better understand these issues, we study how Chinese import exposure affected firm outcomes over the same period.

We find evidence that plants in manufacturing industries more exposed to Chinese import competition displayed lower employment growth relative to plants in less exposed manufacturing sectors. In the period considered, plants in highly affected sectors experienced an employment growth rate that was approximately 13 percentage points smaller than that of plants in less affected industries. We find that the negative employment effects hold whether we include new entrant firms or not, or when restricting our sample only to firms that survived up to 2007. We also find more limited evidence that more exposed plants had a higher probability of going out of business. Therefore, there is evidence that firms in more exposed industries also suffered relatively more from the increase in import competition from China, both on the intensive and extensive margins.

We also study the reallocation margins by which workers adjust to the import competition shock. We do this by decomposing the employment and earnings effects into mutually exclusive channels of adjustment between 2001 and 2007 based on whether the worker remains at their initial employer and/or sector, as well as potentially counterbalancing movements across employers and distinct types of sectors. The results suggest that when workers did not move out of their original firm and/or sector, the effects of the China shock on total earnings growth were more severe. On the other hand, when workers moved into other tradable sectors and into the services sector, the negative impact of the China shock was somewhat mitigated. These offsetting effects occur primarily through relatively more years of employment when workers were outside their original two-digit sector.

We show that the effects are heterogeneous across distinct groups of workers and firms. We find that women suffered more from the shock than men in terms of their total earnings. This was driven by a significant relative fall in both working years and average earnings for women more exposed to the shock, while men experienced only a relative decline in average earnings. Younger workers suffered considerably more from the China shock than older workers in both earnings and employment. Individuals with lower initial pay experienced greater negative effects than individuals with higher initial pay in regards to employment, total earnings and average hours worked. In our firm heterogeneity analysis, we show that older and larger plants are more heavily affected by the China shock than younger and smaller ones, respectively, especially in terms of employment growth.[2]

Our paper mainly contributes to the literature analyzing the effects of import competition from China on labor markets.[3] This literature has developed quickly since the work of Autor et al. (2013), who showed that US regions more exposed to Chinese imports displayed lower employment and earnings growth when compared to less exposed regions. Our paper is closely related to those of Autor et al. (2014) and Utar (2018) who use worker-level data to study the impacts of the Chinese shock on individuals in the US and Denmark, respectively.[4] Similar to our results for the UK case, the papers show that Chinese import competition had negative (relative) effects on earnings and employment of American and Danish workers, with the earnings effects being more prominent than the employment effect. The magnitudes of the effects on UK workers' earnings are similar to those in the US, but smaller than the ones found in Denmark, although the latter comparison should be interpreted with caution due to differences with our empirical specification and sample.

Dauth et al. (2014) use worker-level data to study the impact of rising import exposure from the East (China and Eastern Europe) on employment outcomes in Germany between 1988 and 2008, finding that higher import competition diminishes workers' expected employment durations and job tenure (in their original employer or industry). However, they find that exports to the East helped to offset the negative employment effects and, interestingly, the rise of Eastern Europe affected German workers more heavily than trade with China.[5]

[2] One possible explanation for this effect is that age and firm size are positively correlated (Hsieh and Klenow, 2014) and, within industries, larger plants typically produce more standardized goods than smaller ones, therefore being more subject to competition with standardized imported products Holmes and Stevens (2014).

[3] More broadly, we contribute to the strand of the literature that investigates the effects of trade on labor markets. In particular, our worker-level analysis contributes to the literature on short-run worker adjustment to import competition. For example, Egger et al. (2007) use Austrian data to estimate how trade and outsourcing affected transition probabilities between sectors and/or being employed, finding that international factors are important for worker adjustment. For instance, increases in outsourcing negatively affect the probability of staying in or changing into the manufacturing sector. Other papers that analyze the impact of trade shocks on workers, firms and regions include Revenga (1992), Bernard et al. (2006), Topalova (2007), Menezes-Filho and Muendler (2007), Kovak (2013), Hakobyan and McLaren (2016), Dix-Carneiro and Kovak (2017), and Dix-Carneiro and Kovak (2019), to cite just a few.

[4] Ashournia et al. (2014) study the impact of the China shock on the wage gap between high and low skilled Danish workers, finding that the shock increased the gap as only low skilled workers' wage (and employment) growth were negatively affected by the shock. To better understand the mechanisms behind the changes in the wage gap, Ashournia et al. use firm-level regressions to analyze the impact of Chinese import competition on firms' sales by product type, finding that the China shock is biased towards low-skill intensive products. Our firm-level analysis looks at firms' employment and activity status, which are outcomes directly related to the impact of China on the labor market. Keller and Utar (2019) also study the impact of import competition from China on the Danish labor market, but focus on the effect on job polarization, showing that import competition from China has led to a rise in job polarization in Denmark.

[5] Dauth et al. (2014) also study the impact of the rise of the East on German regions, finding that more import competition lowered employment growth in regions specialized in import-competing industries, while regions focused on export-oriented sectors experienced stronger employment gains. In

Building on the existing literature, we are, to the best of our knowledge, the first paper to simultaneously study the impacts of Chinese import competition on labor market outcomes for both workers and firms, deriving useful insights on the process of adjustment to the shock. For instance, the firm-level analysis suggests that the China shock caused firms in more heavily-affected sectors to downsize and exit the market, and that this effect is present across different types of firms. In line with this, our worker-level decomposition shows that workers who remained at their initial firm and/or sector were hit the hardest, while those who switched across broadly-defined industries were able to partially offset those negative effects. Overall, by taking into account the possibility that new firms may enter the market and that firms may hire new employees (who may or may not be in our worker-level analysis sample), our results indicate that the impacts of China on employment and earnings reflect a contraction of some sectors and not simply labor market churn whereby firms adjusted their labor force by releasing their employees and hiring new ones.[6]

By studying the demand side of the labor market of a mid-size economy such as the UK, we additionally contribute to the strand of literature that analyzes the impact of trade shocks on firms' behavior, including those that focus on competition with China. Bernard et al. (2006) analyze the effects of import competition from low-wage countries, which is mainly due to China over the period considered (1977 to 1997). In line with our results, they find that industries facing greater import exposure experience higher rates of plant exit and, among surviving plants, those in more exposed sectors experience more sizeable reductions in employment. Iacovone et al. (2013) find that competition with China led to plant (and product) exit and sales contraction of Mexican producers, with stronger effects for smaller plants. Utar and Ruiz (2013) show that the inflow of Chinese goods had a significant negative (relative) impact on employment and plant growth in Mexico. Mion and Zhu (2013) find evidence that Chinese import competition reduces employment growth of Belgian firms. They find, however, that imports from China have no effect on firm survival. Bloom et al. (2016) focus the impact of Chinese imports on innovation in European countries, but also find evidence that competition with China had a negative effect on firms employment growth and survival probability.[7]

The paper is organized as follows. In Section 2, we describe the data used in the analysis and additional information about the China shock. In Section 3, we present our empirical strategy and show the results of the analysis using worker and firm panel data from the UK. We offer concluding comments in Section 4.

2. Data and the China Shock

We use a combination of rich administrative and survey data sources for the analysis. At the worker level, the main dataset is the Annual Survey of Hours and Earnings (ASHE) (Office for National Statistics, 2019a). It is an administrative dataset covering one percent of all workers, with the sample based on the last 2 digits of the National Insurance Number (equivalent to the social security number in the US).[8] The ASHE is a panel dataset with data collected annually, and provides information on individuals' earnings and employment history.[9]

The main firm-level dataset is the Business Structure Database (BSD) (Office for National Statistics, 2019b). It contains plant-level information on employment, activity status, and main industry for almost all business organizations in the UK, as well as some further information at the enterprise level such as sales and foreign ownership. The BSD is derived mainly from the Inter-Departmental Business Register (IDBR), which is a live register of plants collected by HM Revenue and Customs via VAT and Pay As You Earn (PAYE) records.[10] If a business is liable for VAT and/or has at least one member of staff registered for the PAYE tax collection system, then the business will appear in the IDBR (and hence in the BSD). Businesses listed in the IDBR account for almost 99 percent of economic activity in the UK. Only very small businesses (such as those of self-employed individuals) are not included in the register.

The main drawback of the BSD is that it provides limited information for each firm. We therefore supplement it with data from the Annual Respondent Database (ARD) (Office for National Statistics, 2012) in order to obtain some key technology-related control variables *at the sector-level* used in our analysis. The ARD is a survey distributed to all businesses with employment of 250 or more and a sample of smaller businesses drawn using stratified sampling from the IDBR sampling frame. The data is collected at the "reporting unit" level, which may be a plant, collection of plants or the enterprise level. In

a developing country regional level study, Costa et al. (2016) present evidence that the surge in imports from China negatively affected workers in terms of employment and earnings across Brazilian microregions, while the rise in Chinese commodity demand had the opposite effects.

[6] We also find mild evidence that more exposed firms experienced lower sales growth relative to less-exposed firms, suggesting that affected firms were not just offshoring jobs and maintaining the overall scale of their operations.

[7] Medina (2020) studies the effect of China's WTO accession on Peruvian firms' quality upgrade decisions following an increase in competition with Chinese products, finding that profitability losses due to competition in low quality segments induce firms to shift production toward high-quality varieties.

[8] The sample is broadly representative of the UK workforce, except for those on low pay (particularly those below the National Minimum Wage) and in self employment. Weights are provided to account for non-respondents and to match stratum in the Labour Force Survey (Office for National Statistics, Social Survey Division, Northern Ireland Statistics and Research Agency, Central Survey Unit, 2020) - a survey of employment in the UK. In our baseline analysis, we present unweighted results and show in the Online Appendix that the moments in the raw data as well as the baseline results are very similar when using the weights.

[9] The data are collected for a particular reference period in April, and include weekly and hourly earnings, hours worked, and the main industry of activity of the workplace. While the ASHE data has limited information on personal characteristics compared to some other data sources, the responses in the ASHE are considered to be highly accurate because they are provided by employers rather than employees themselves. The ASHE covers neither the self-employed nor individuals without payment in the reference period.

[10] PAYE is the system that HM Revenue and Customs uses to collect Income Tax and National Insurance contributions from employees.

each year, there are over 70,000 business contributors. The ARD provides detailed information and can be used to calculate, for example, R&D and capital intensity.[11] The ARD is representative at the industry level, which is the dimension on which we construct these controls for our regressions.

Data on exports and imports are obtained from the CEPII BACI database. This database contains information on all bilateral trade flows between any given pair of countries; such flows are described using the Harmonized System (HS) classification, at the 6-digit level.[12] To create a mapping between this trade classification and the industry classification in the ASHE, BSD and ARD that use the 5-digit UK standard industrial classification (UK SIC), we use a third intermediate classification: the 4-digit international Standard Industrial Classification revision 3 (ISIC3). Both HS and UK SIC can be easily aggregated to ISIC3, providing a consistent classification for our analysis.

Throughout our analysis, we use 2001 as the reference point for worker outcomes because China joined the WTO at the end of that year. China had begun to liberalize trade prior to 2001 but to gain access to the WTO it had to commit to several measures to further liberalize trade such as the reduction of import duties. China's entry into the WTO also meant that restrictive import quotas imposed by the European Union (mainly in textiles and apparel) would be lifted. Finally, the entry of China into the WTO also implied a considerable reduction in uncertainty for Chinese exporters. Handley and Limão (2017) show that this reduction in uncertainty in the US indeed contributed to a boom in China's exports to the US after its WTO accession.[13]

To measure the UK exposure to China, we use the import penetration measure matching that derived in Autor et al. (2014), i.e., the change in value of imports from China (the exporter) between 2000 and 2007 divided by the UK's (the importer) total expenditure on all goods (per sector) in the year 2000:

$$Chinese\ Import\ Exposure \equiv \frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}},$$

where expenditure equals the sum of total imports and the total UK sales (shipments), minus exports. We construct this measure by combining the Business Structure Database (sales per industry) and the BACI database (imports and exports). We consider only mainland China, i.e., we do not include Hong Kong and Macao in the import exposure measure.[14] Data on sales, exports and imports are at the 4-digit industry classification level (ISIC3) and are expressed in real terms (in thousands of GBP, using 2005 as the base year).

Table 1 shows the industries that were directly affected by China between 2000 and 2007 and the size of each industry as a share of employment in 2000.[15] The table presents 2-digit industries, while for our analysis we will use variation at the 4-digit level. The greatest increase in import penetration occurred in low-tech manufacturing sectors. Several industries that faced more Chinese competition had sizable shares of the labor force in tradable sectors in 2000. The heavily affected industries are generally linked to textiles, furniture and machinery production. The sectors that experienced lower increases in import penetration are within agriculture and mining.

Fig. 2 suggests that industries more exposed to Chinese products suffered greater employment declines. It shows a negative relationship between changes in log employment and changes in Chinese import exposure in tradable industries at the 4-digit level.

3. Empirical strategy and the effects of China

3.1. Worker-level evidence

Our model specification is motivated by Autor et al. (2014). We observe each worker's industry of business in 2000 and for each industry we compute the change in import exposure up to 2007. So long as worker mobility across sectors is not perfectly frictionless, import shocks to a worker's initial industry should affect his/her employment and earnings from 2001 onwards, as the import penetration shock represents a potential fall in domestic labor demand in that industry.

Our baseline estimating equation is:

$$y_{ik,01/07} = \beta_1 \frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}} + \beta_2 Z_{ik} + \varepsilon_{ik}$$

[11] There are some missing industries in ARD, restricting the sample of analysis. The missing industries are ISIC 2 digit: 1 (agriculture and hunting); 45 (construction); 65, 66 and 67 (financial intermediation); 75 (Public Administration and Defence); 8512 (Medical and dental practice activities) and 99 (Extra-territorial organization and bodies).

[12] Original data are provided by the United Nations Statistical Division (Comtrade database). BACI is constructed using an original procedure that reconciles the declarations of the exporter and the importer. This harmonization procedure enables the number of countries for which trade data are available to be extended considerably, as compared to the original Comtrade data.

[13] Even though tariffs were largely unchanged after 2001, China's joining the WTO led the US to implement the permanent most favored nation (MFN) status in the following year, which ended the annual threat of imposing high tariffs on Chinese goods. China was not subject to such annual reviews in Europe. On the other hand, China's negotiations with the EU were completed later than those with the US and much closer (in 2000–2001) to its accession.

[14] Our results in the next section do not change substantially if we include these two Special Administrative Regions.

[15] We carry out our analysis for samples considering only manufacturing industries, only tradable industries, and for both tradable and non-tradable industries, assuming a Chinese Import Exposure value of zero for the later.

Table 1
Industry Employment and Import Exposure.

Sector	$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	$(\frac{Imports_{chi}}{Expenditure})_{00}$	$(\text{Employment Share})_{00}$
Tanning and Dressing of Leather	0.130	0.142	0.55%
Wearing Apparel	0.101	0.079	2.93%
Furniture and Manufacturing n.e.c.	0.090	0.056	4.53%
Office, Accounting and Computing Machinery	0.054	0.061	1.01%
Radio, Television and Communication Equipment	0.050	0.031	2.77%
Textiles	0.048	0.029	3.45%
Machinery and Equipment	0.031	0.017	8.39%
Wood and Cork (except furniture)	0.029	0.010	1.69%
Other Non-Metallic Mineral Products	0.025	0.008	3.06%
Fabricated Metal Products $*^A$	0.022	0.012	8.27%
Electrical Machinery	0.022	0.038	4.2%
Basic Metals	0.016	0.003	2.89%
Rubber and Plastic	0.013	0.020	5.17%
Medical, Optical and Other Instruments $*^B$	0.008	0.021	3.29%
Paper	0.008	0.003	2.31%
Chemicals	0.007	0.006	5.99%
Forestry and Logging	0.005	0.006	0.23%
Publishing and Printing $*^C$	0.004	0.004	7.67%
Coke, Refined Petroleum and Nuclear Fuel	0.003	0.001	0.60%
Other Transport Equipment	0.003	0.005	3.47%
Motor Vehicles, Trailers and Semi-Trailers	0.003	0.000	4.72%
Fishing	0.002	0.001	0.26%
Other Mining and Quarrying	0.002	0.003	0.79%
Food and Beverages	0.002	0.001	10.58%
Mining of Coal and Lignite	0.001	0.003	0.30%
Agriculture and Hunting	0.000	0.003	10.07%
Tobacco	0.000	0.000	0.20%
Crude Petroleum and Natural Gas	0.000	0.000	0.63%
Total			*100%*

NOTES: The table considers only tradable goods industries (agriculture, manufacturing and mining). The table shows changes in Chinese import penetration from 2000 to 2007, the Chinese import penetration measure in 2000 and employment shares in 2000 by industry (ISIC3 2-digit). The denominator of this last measure considers only tradable goods industries. $*^A$ Excludes machinery and equipment. $*^B$ Includes watches and clocks. $*^C$ Includes reproduction of recorded media. Mining of ores are excluded from the table above due to the small number of observations.

The main outcomes we analyze are represented by $y_{ik,01/07}$, which will be one of five possible variables for employee i working in industry k (in 2000) in the period from 2001 to 2007: (i) Normalized total earnings, defined as total earnings between 2001 and 2007 - which accounts for both time worked and earnings conditional on working - divided by average annual earnings between 1997 and 2000; (ii) total working years is the total number of working years between 2001 and 2007[16]; (iii) normalized average weekly earnings is equal to average weekly earnings between 2001 and 2007, divided by average weekly earnings between 1997 and 2000; (iv) normalized average hourly earnings is equal to average hourly earnings between 2001 and 2007, divided by average hourly earnings between 1997 and 2000; and (v) normalized average hours worked is equal to the average numbers of hours worked per week between 2001 and 2007, divided by the average numbers of hours worked per week between 1997 and 2000.[17] All earnings measures are in real terms (using 2005 as the base year) and are winsorized at the top 99% and at the bottom 1%; all regressions consider only workers aged between 17 and 59 years in the initial period. Importantly, by normalizing variables by the worker's pre-period level, we are accounting for worker-specific, time-invariant unobservables that may affect outcomes.

As detailed previously, the change in import exposure from China between 2000 and 2007 in the worker's industry of activity in 2000 is defined as $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$. This is the change in Chinese imports between 2000 and 2007 divided by expenditure in a sector in the UK and is defined specifically for each industry.

The vector Z_{ik} contains individual and industry controls, which vary depending on each regression specification. All of the regressions include controls for pre-period levels of: log of average hourly earnings; log of average weekly earnings; average time employed between 1997 and 2000;[18] and average hours worked per week. Controlling for these lagged variables mitigates the concern that the results are only picking up worker-level heterogeneity associated with exposure to changes in

[16] For the robustness checks where we use the expanded sample of workers with low labor force attachment, we normalize total working years by dividing by the worker's average years employed between 1997 and 2000.

[17] For more details about the construction of all the dependent variables, see Online Appendix B. In particular, the annual earnings equal the Average Weekly Earnings multiplied by 52, the number of weeks in a year.

[18] The average time employed is constant in the baseline sample which is restricted to workers with high labor force attachment in the pre-period, defined as being employed in all four years from 1997 to 2000.

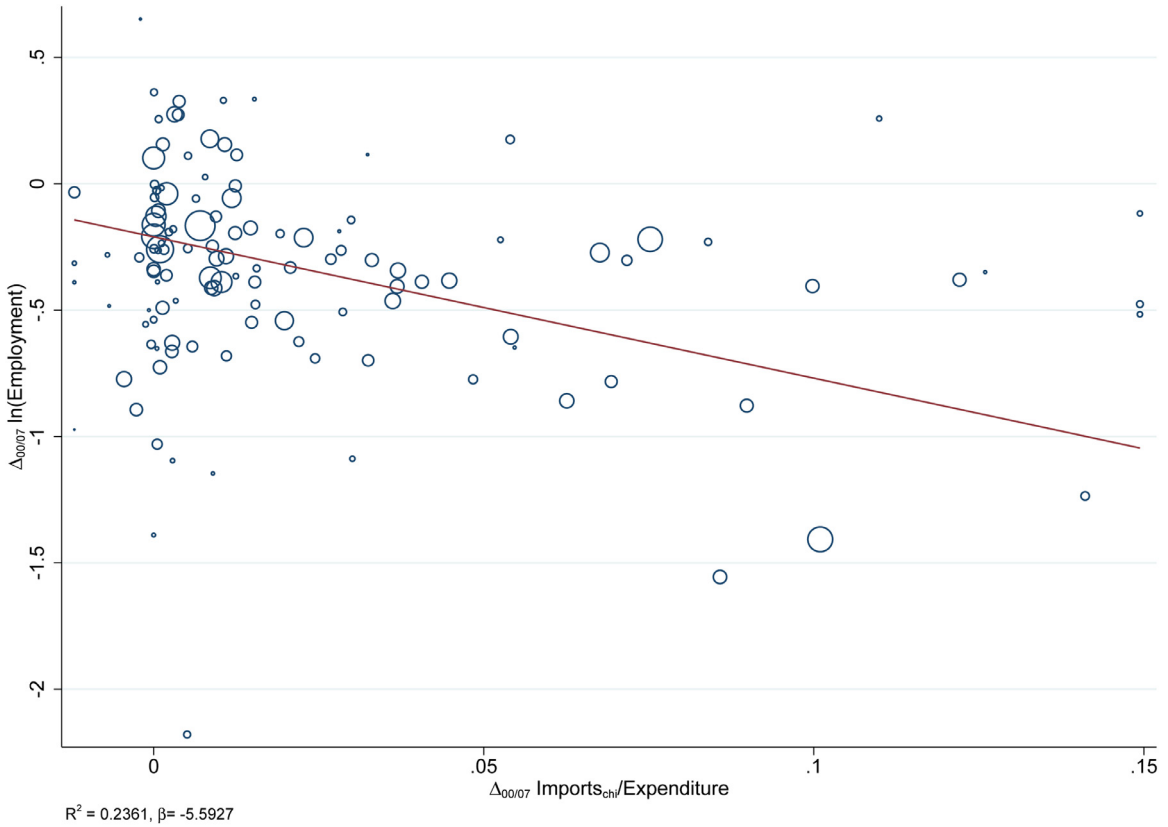

Fig. 2. Changes in the Logarithm of Industry Employment vs Chinese Import Exposure NOTES: The figure plots changes in employment between 2000 and 2007 against changes in exposure to Chinese imports in the UK at the 4-digit ISIC3 industry level. The size of the markers represent industry employment in 2000 and the fitted line uses these as weights. β represents the slope coefficient of the fitted line (the standard error is 0.9).

Chinese imports. By including these controls, we are estimating how the earnings and employment of individuals with comparable pre-period characteristics, including previous earnings and labor force attachment, were affected by the differential performance of China across industries in the period 2001 to 2007.

Additionally, we control for worker characteristics, in particular, age, age-squared, gender and an interaction between age and pre-period (log of) weekly earnings, (log of) hourly earnings and (levels of) years and hours worked. The ASHE data does not provide information on individuals' education. To compare individuals with similar educational backgrounds and similar jobs, we control for occupation fixed effects at the 4-digit classification level. We also control for whether the individual was working full-time or part-time in 2000.

The identifying variation comes from differences in Chinese import penetration across industries. It is therefore necessary to control for characteristics of each industry. We use (log of) real industry sales, (level of) industry employment, and (the log of) real industry exports to China in 2000 as controls. To rule out the possibility that Chinese imports simply capture a pre-existing general increase in the trend of UK imports, we also control for the change in import exposure to China and the rest of the world between 1997 and 1999 and for both industry import exposure to China and to the rest of the world in 2000, all at the 4-digit industry classification level. We include a very broad measure of outsourcing in 2000, given by the share of input costs in the output value at the 2-digit industry classification level. This value is obtained from the UK input-output tables supplied by the Office for National Statistics. We also control for previous trends in employment by including pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry classification) and from 1994 to 1996 (4-digit industry classification).[19] To compare industries with similar levels of technologies, we also include R&D intensity (investment in R&D normalized by the value added), real purchases of computer services and real investment in machinery at the 4-digit industry classification level in 2000. These variables are available at the firm level in the ARD, which we then aggregate into averages for each 4-digit industry classification using sample weights to ensure that they are representative at the industry level.

[19] These additional controls use data from the Labour Force Survey (LFS) from the ONS (Office for National Statistics, Social Survey Division, Northern Ireland Statistics and Research Agency, Central Survey Unit, 2020). The LFS is an individual level survey and, with sampling weights, is representative at the industry level.

The error term ε_{ik} represents unobserved components that affect workers' outcomes of interest. This term might be correlated with contemporaneous labor demand shocks in the UK. That is, imports from China in a given industry may be endogenously determined with respect to labor market conditions in that industry. To identify the causal impact of imports on labor market outcomes, we isolate the component of trade flows driven by Chinese productivity gains (or declining trade barriers). We do this by adopting an instrumental variable (IV) strategy similar to that of Costa et al. (2016).

To capture the supply-driven Chinese effect, we use the interaction between two components. The first component is the estimated China fixed effect obtained from an auxiliary regression of world trade flows. To obtain the fixed effect, we first define X_{ck} to be total exports of country c in sector k. We exclude the UK from the data and then run the following regression for all other countries in the BACI dataset:

$$\Delta X_{ck} = \gamma_k + \delta_{China,k} + \varepsilon_{ck}.$$

The left-hand side of the regression is the change in exports of a country in a given sector between years 2000 and 2007. The sector fixed effect, γ_k, is the mean change in exports for each sector k across countries (excluding the UK), capturing, for example, effects of shocks in world prices that are common to all countries.[20] This implies that the China fixed effect $\delta_{China,k}$ captures the deviation in export changes of China in sector k (excluding trade with the UK), relative to the weighted cross-country average. In other words, we are isolating the part of trade flows that is driven by the China-specific effect and not common to all countries. We normalize this measure by the total expenditure in a sector in the UK in 1997, $Expenditure_{k,97}$. The instrument is then given by

$$IV_{chi} = \frac{\hat{\delta}_{China,k}}{Expenditure_{k,97}},$$

where $\hat{\delta}_{China,k}$ is the estimate of $\delta_{China,k}$. The modelling assumption here is that changes in Chinese exports in each industry after 2000 to the world (excluding the UK) were not affected by UK industries. This instrument will suffer from reverse causality if the component $\hat{\delta}_{China,k}$ and/or the UK production in 1997 are affected by any type of anticipation of post-2000 labor demand shocks in the UK. To account for this, we add a series of additional controls in the regressions as discussed above. The advantage of our instrument is that it partials out industry shocks that are common to the world to isolate the China-specific component of trade. For robustness, we also construct an instrument more closely related to Autor et al. (2014), which uses Chinese exports in industry k to other developed economies, excluding the UK (in our case).

Table 2 shows the mean and standard deviation (in parentheses) for the main worker-level variables used in our analysis.[21] The top panel shows the outcome variables while the bottom panel shows variables that are used as controls. The columns present each of the four main samples used in the analysis. The main sample in column 1 includes all workers in all sectors with high labor force attachment - defined as being employed in all four years between 1997 and 2000 - while column 2 restricts this sample to manufacturing workers. Column 3 considers workers in all sectors with low and high labor force attachment, i.e. it includes workers who were employed and had positive earnings in at least one year between 1997 and 2000. The last column shows the summary statistics for the workers in manufacturing in the expanded sample.[22]

The first five rows show the main dependent variables. For the main sample in column 1, workers earned 6.41 times their initial annual earnings over the period 2001 to 2007 and had 5.13 years of employment (remembering that the working measure is normalized by the average number of years worked in the pre-period, i.e. it will be equal to the number of working years only in the first two columns where we restrict to workers with high labor force attachment in the pre period). Conditional on workers being employed, they earned 1.25 and 1.19 times their initial average earnings in terms of weekly and hourly payments, respectively, and worked 1.04 times their initial average hours worked.

We also analyze four other outcomes, shown in the next four rows. The probability of switching occupation at any point across the seven-year period is 0.45, while the probability of switching working area, defined at NUTS 3 level, equals 0.35.[23] The probability of switching industry is 0.46 while the probability of working in the services sector at any point between 2001 and 2007 is 0.81. To be clear, this last variable does not imply that the workers switched to the service sector. It simply considers if a worker worked in the service sector between 2001 and 2007, independently of their initial sector.

The table also shows the mean and standard deviations of the worker-level control variables. Workers in the main sample had, on average, log(average hourly earnings) and log(average weekly earnings) of 2.26 and 5.76, respectively (variables are in GBP in 2005 before the logs), and worked 35.8 hours per week in the pre period. The mean of (the level of) average hourly earnings is 10.9 and for average weekly earnings it is 380. A share of 0.28 of the workers were employed in manufacturing. Workers were 41.4 years old on average, and a share of 0.43 were younger than 40 years. The share of workers that were female was 0.47 and 0.19% were in part-time positions. The Earnings Capacity variables divide workers according to their tercile of hourly earnings within the distribution of their age cohort in the pre-period. As expected, workers are roughly evenly distributed into the three categories. In terms of occupational skill, a share of 0.40 and 0.36 of the individuals worked

[20] The regression is weighted by export volumes in 2000.

[21] The table shows unweighted values, as in our preferred specifications. Table C.2 in the Online Appendix presents the table with the ASHE calibration weights. The values are extremely similar.

[22] All samples include only workers who appear for at least one year in the period 2001–2007, as some variable are not well defined for individuals with zero years of employment and earnings.

[23] This is the nomenclature of territorial units for statistics (NUTS) level 3 for an individual working area.

Table 2
Descriptive statistics: workers.

	Main	Main: Manufacturing	Expanded	Expanded: Manufacturing
Normalized Total Earnings	6.413	5.907	6.900	5.834
	(4.015)	(2.868)	(44.632)	(4.994)
Normalized Average Weekly Earnings	1.250	1.173	1.452	1.207
	(0.973)	(0.358)	(11.096)	(0.762)
Normalized Average Hourly Earnings	1.187	1.132	1.246	1.167
	(0.349)	(0.265)	(0.923)	(0.687)
Total Working Years	5.128	5.003	5.189	5.108
	(1.812)	(1.815)	(2.179)	(2.127)
Normalized Average Hours Worked	1.035	0.996	1.109	1.004
	(0.451)	(0.193)	(0.902)	(0.283)
Occupation Switch	0.454	0.506	0.512	0.549
	(0.498)	(0.500)	(0.500)	(0.498)
Work Area Switch	0.350	0.323	0.390	0.353
	(0.477)	(0.468)	(0.488)	(0.478)
Industry Switch	0.456	0.501	0.504	0.544
	(0.498)	(0.500)	(0.500)	(0.498)
Worked in Services	0.806	0.328	0.837	0.370
	(0.395)	(0.469)	(0.369)	(0.483)
Log (Average Hourly Earnings) 97-00	2.264	2.273	2.182	2.218
	(0.482)	(0.425)	(0.508)	(0.449)
Average Hourly Earnings 97-00	10.888	10.705	10.170	10.242
	(6.101)	(5.588)	(6.118)	(5.615)
Log (Average Weekly Earnings) 97-00	5.764	5.897	5.638	5.842
	(0.628)	(0.467)	(0.720)	(0.504)
Average Weekly Earnings 97-00	379.5	405.4	350.3	389.5
	(226.8)	(207.0)	(233.5)	(210.1)
Average Working Years 97-00	1.000	1.000	0.954	0.958
	(0.000)	(0.000)	(0.115)	(0.109)
Average Hours Worked (per week) 97-00	35.793	39.968	34.693	39.684
	(9.665)	(7.141)	(10.632)	(7.539)
Manufacturing	0.280	1.000	0.248	1.000
	(0.449)	(0.000)	(0.432)	(0.000)
Age	41.444	40.962	38.878	39.190
	(9.749)	(9.833)	(10.785)	(10.544)
Young	0.431	0.459	0.520	0.521
	(0.495)	(0.498)	(0.500)	(0.500)
Female	0.471	0.240	0.493	0.264
	(0.499)	(0.427)	(0.500)	(0.441)
Part Time	0.188	0.048	0.230	0.058
	(0.391)	(0.213)	(0.421)	(0.235)
High Earnings Capacity	0.340	0.342	0.340	0.341
	(0.474)	(0.474)	(0.474)	(0.474)
Mid Earnings Capacity	0.330	0.330	0.330	0.330
	(0.470)	(0.470)	(0.470)	(0.470)
High Skilled Occupation	0.398	0.282	0.374	0.279
	(0.490)	(0.450)	(0.484)	(0.448)
Mid Skilled Occupation	0.363	0.602	0.346	0.589
	(0.481)	(0.490)	(0.476)	(0.492)
N	48,529	13,566	88,955	22,094

Notes: The table shows the mean and standard deviation (in parentheses) of the variables at the worker-level. The main sample includes only workers with high labor force attachment in the pre period. The expanded samples include any worker with at least one year of employment in the pre period.

in high and mid skilled occupations, where we rank occupations (at the one digit SOC 2000 code) according to average hourly earnings in the sample.[24]

Table A.1 in the Appendix shows the mean of the trade shocks in the sample for each of the four samples considered above. The table shows the mean and standard deviation (in parentheses) for the variables: Chinese Import Exposure; levels of imports from China in 2000 (adjusted by expenditure in the same year); and Chinese import exposure at the commuting zone (CZ) level. The last variable is the weighted average of the sector shocks in a commuting zone, again defined at the NUTS 3 classification level and using industry employment shares as weights. Following an approach similar to that of Costa et al. (2016), we divide the shock by the size of the labor force in the CZ from ASHE (in thousands of individuals and

[24] For more information, see Table C.1 in the Online Appendix and the surrounding discussion.

using the fact that ASHE is just a 1% sample). The table also shows different percentiles of Chinese Import Exposure (both at the sector and at the CZ level).[25]

3.1.1. Average impact on employment and earnings

We start by estimating the impact of greater Chinese imports on earnings and time spent in employment. Table 3 presents the main results. Column 1 shows results of a simple OLS regression, and the remaining columns are estimated by two stage least squares (2SLS) using the instrumental variables strategy outlined above. In all specifications, we control for lagged (log) earnings, employment and hours worked (excluding them does not qualitatively change the results). In columns 2–5 we introduce various sets of controls. The variables included in "Worker Controls" in columns 3 and 5 represent all the individual-level characteristics described previously, while the variables in "Industry Controls" in columns 4 and 5 encompass the industry-level characteristics.

Table 3 indicates that individuals initially working in industries more exposed to Chinese import growth experienced more negative effects on employment and earnings than those who were in industries with lower exposure, all else equal. Each of the five panels A, B, C, D and E represents a different dependent variable: normalized total earnings; normalized average weekly earnings; normalized average hourly earnings; normalized number of years worked; and normalized average of hours worked per week. In the first column, which presents the OLS results, the coefficients are negative and statistically significant, except in the last panel for normalized average hours worked. The 2SLS estimates in column 2 are larger in magnitude than those in the OLS regressions, indicating that the OLS estimates in column 1 are biased toward zero, possibly because labor demand shocks in the UK are positively correlated with imports from China in this simple specification without other controls. The first stages are strong, as indicated by the Kleibergen-Paap (KP) F statistics in the lower part of the table. When we control for worker characteristics in column 3, the coefficients generally decline in magnitude but remain significant, except for hours worked once more. This is mainly due to the addition of the 4-digit occupation fixed effects. Controlling for industry characteristics in column 4 also reduces the coefficients relative to column 2. In column 5, the most demanding specification that includes the full set of controls, the coefficients are all negative.

The effects on earnings growth are strong (Panels A, B and C). In column 5, our preferred specification, we can see a negative effect of imports from China on normalized total earnings, normalized Weekly Earnings, and normalized average hourly earnings, with the last two being statistically significant at the 5 percent level. With the help of column 2 of Table A.1 in the Appendix, which shows the percentiles of the import penetration variable for the manufacturing sector, the estimates imply that comparing a worker initially employed in a manufacturing sector at the 75th percentile of Chinese import exposure (0.03) with a worker initially employed in an industry at the 25th percentile of Chinese exposure (0.001) in the manufacturing sample, column 5 shows that an employee at the 75th percentile observed his or her normalized average weekly earnings decline by 3.87% = 100 * (-1.333) * (0.03 - 0.001) more than an employee at the 25th percentile of the shock. The effect on normalized average hourly earnings (Panel C) corresponds to a reduction of 3.45% at the 75th percentile of the shock relative to the 25^{th} percentile.

Table 3 also provides some tentative evidence that workers in more exposed sectors were more likely to be out of employment than those in less exposed sectors, although this result is not statistically significant in columns 4 and 5 when more stringent controls are added. There is no convincing evidence that hours of work was an active margin of adjustment for workers, as the coefficients switch sign and lose significance in specifications with more stringent controls.

In the Appendix, we show that the results are qualitatively robust to an alternative IV similar to the one used in Autor et al. (2014) (see Table A.2), to restricting the sample to workers employed in manufacturing in 2000 (see Table A.3) and to expanding the sample to include workers with lower labor force attachment (see Table A.4).[26]

We can also perform a back-of-the-envelope counterfactual exercise for the change in normalized average weekly earnings for workers initially in the manufacturing sector as a result of the China shock. Table 2 shows that the mean worker in the manufacturing sample experienced average weekly earnings growth of 17.3% relative to their pre-period average weekly earnings and the mean exposure to the shock across these same workers was 0.021, as shown in Table A.1 of the Appendix. The estimated coefficient for the marginal effect of the trade shock in the manufacturing sample is -0.982, as seen in column 5 of Table A.3. Therefore, the mean exposed worker experienced a 2% fall in average wages (-0.982 x 0.021 = -0.021) because of Chinese exports to the UK. Had China not increased its exports to the UK, their average weekly earnings growth would have been approximately 19% instead of 17% in the sample period. If we look at the worker at the 90th percentile of exposure among those initially in manufacturing (0.074), the estimated fall in average wages was 7.3%, an even more substantial drop relative to the mean value of the outcome variable.

We next conduct a falsification exercise by using the sample of workers employed in 1997, calculating the same earnings and employment measures from 1998 to 2000 and running a regression considering future Chinese import penetration on

[25] For confidentiality reasons, we are unable to present percentiles of the distribution. Therefore, to obtain percentile X we average the variable across individuals within percentiles X + 5 and X-5 of the variable. For example, "percentile 10 of $\frac{\Delta_{00,07} Imports_{chi}}{Expenditure_{00}}$" is the mean of Chinese Import Exposure between the percentiles 5 and 15 of the variable.

[26] In the Online Appendix, we also show that the results are robust to the use of ASHE weights (Table C.3) and dummyTXdummy-(to expanding the sample to include those who do not work at all between 2001 and 2007 (Table C.4). Note that panels B and C are not affected by the latter robustness check, as average earnings are calculated conditional on being employed. Results are also robust to removing the control for the variable which we use to normalize the outcome variable (Table C.5).

the right-hand side and the same controls for workers relative to the pre-period (1997) and for industries. Results are shown in Table A.5 of the Appendix, with no coefficient being statistically significant in the most stringent specification. Moreover, almost all the coefficients are relatively smaller in magnitude (the exception being panel B) and have smaller t-stats when compared to Table 3. We note that the results are not exactly zero, possibly because China's liberalization had already begun at a gradual rate in this pre period. This is why we control for pre-trends in wages and employment at the industry level.[27]

In summary, Table 3 indicates that greater import exposure to China in a sector significantly reduces real average earnings growth relative to less exposed sectors. We also find mild evidence that Chinese import competition affected years of employment and cumulative earnings.

We can also compare our results in Table 3 to those in Autor et al. (2014). In column 5, the coefficient of -7.525 (not statistically significant at usual levels) implies that comparing an individual initially employed in an industry at the 75^{th} percentile of the Chinese import exposure measure to one at the 25^{th} percentile, the implied differential in earnings is $21.82\% = 100 * (-7.525) * (0.03 - 0.001)$ of the worker's initial earnings. Comparing the same two groups of workers in the US, Autor et al. obtain the value of 45.8% for a 16-year period (between 1992 and 2007). When we divide both coefficients by the number of years used in each analysis (7 and 16), the effects in the UK and in the US are 3.11% and 2.86%, respectively. In contrast, Utar (2018) finds a more sizable effect in Denmark when examining the removal of textile quotas. Utar estimates an 89% fall of a pre-period year of annual earnings over a 9 year period, equating to 9.9% per year. Note though that our empirical specification and sample differs more compared with Utar (2018) than with Autor et al. (2014), so the comparison with the results of Utar (2018) should be interpreted with caution.

As in both Autor et al. (2014) and Utar (2018), we observe weak evidence of employment effects. In Panel B of Table 3, column 5, comparing the same two groups of workers (75^{th} vs. 25^{th} percentiles), the implied differential in the number of years without a job is $0.06 = (-2.290) * (0.03 - 0.001)$, i.e., 0.8 more months of unemployment (or out of the labor force).

Overall then, the comparisons between the UK and US are similar for both cumulative earnings and employment. The effect for the US is slightly less negative, which is likely to reflect that US labor markets are more flexible than those in the UK (Scwab, 2018).[28]

3.1.2. Movements across jobs

We next study workers' reallocation margins of adjustment to the rise in Chinese import exposure. We do this by decomposing the effects seen in the previous section into mutually exclusive channels.[29] The specification we use for each decomposition is that of column 5 of Table 3. We therefore show the baseline results of this column again in the first column of each decomposition table. The other columns show the mutually exclusive channels of adjustment. Given that the categories are mutually exclusive and the explanatory variables are consistent across specifications, the coefficients in all columns other than column (1) will sum to the coefficient in column (1) when we consider total earnings or total working years in our regressions, where the dependent variables are totals.[30] For the other dependent variables this property no longer holds, as they are averages computed conditionally on employment in a particular category, and hence, the sample differs across columns.

Our main decomposition is according to firm and sector mobility, with the results presented in Table 4.[31] Our analysis takes into account the direct impacts experienced by workers at their initial employer compared with the effects arising when workers move across firms and sectors. The mutually exclusive sector outcomes are: employment at the same firm in the same sector (column 2); employment at a different firm but within the same sector (column 3); employment at the same 2-digit sector but not the same 4-digit one (column 4); employment in tradable industries but not the same 2-digit sector (column 5); employment in non-tradable sectors outside their initial 2-digit sector (column 6); and a residual category (column 7).[32]

[27] We would ideally run the falsification exercise with another sample going further back in time, but we are limited by the data which starts in 1997. For the placebo exercise, the sample includes workers in some industries which do not appear in the main analysis. In Table C.6 of the Online Appendix, we repeat the placebo analysis without these additional sectors and show that the results all remain insignificant.

[28] The estimated effect for Denmark is much larger. We expect that part of the difference between Utar's results and ours to be due to distinct specifications. However, one possible economic reason for the larger effects observed in Denmark is that the country is economically smaller and more open (in terms of imports relative to GDP) than the UK so economic shocks would generate more output (and potentially employment) volatility in Denmark compared to the UK (di Giovanni and Levchenko, 2012).

[29] In the Online Appendix, we analyze four other outcomes linked to worker mobility across regions, occupations, and industries. We re-estimate our baseline model (without any decomposition) on dummy variables for whether the worker switched region, occupation, or industry between 2001 and 2007. The results are presented in Table C.7, along with more detailed discussion. There is some mild evidence to suggest that workers more exposed to the China shock were more likely to switch industry. There is no convincing evidence to suggest that workers more exposed to the shock were more likely to switch occupation or region. This finding, however, does not rule out the possibility that workers were affected differently by the China shock after moving across jobs, as we show in the present section.

[30] In the decompositions, total earnings in each column is the total earnings in that mutually exclusive category and is therefore equal to 0 if the worker never falls in that category. Total working years is defined accordingly.

[31] Throughout the decomposition analysis in this Section, we do not present first stage F statistics in the tables to save space but in almost all cases they are above 10. There are two cases where the F stat is 9.6 for the Residual Sector in Table 4.

[32] Note that columns 2 and 3 require that the worker is assigned to an enterprise code, a small number of which are not present in the data. Each of the other columns do not require this. So, in columns 4, 5 and 6 the individual could be at the initial firm or not (or have a missing enterprise code) as long as the individual is in a different sector. It is likely that the residual category will include mostly individuals that remained in the same sector but with a missing enterprise category, as well as individuals that moved to jobs that were not associated with a valid industry code.

A rich pattern of adjustment emerges from the analysis. Panel A shows that individuals who remained in their original employer (column 2) or in the same sector (either at the most disaggregated level, in column 3, or the two-digit level, in column 4) suffered considerably from the China shock in terms of normalized total earnings, with all the coefficients being negative and large in columns 2–4 (and statistically significant in columns 3 and 4). We observe that when workers switch to other tradable sectors or to the services sector (columns 5 and 6), the coefficients on normalized total earnings are positive, meaning that workers more affected by the China shock were able to offset their negative earnings effects when switching to these sectors. But this compensation occurs only through more years of employment in those other sectors, not through higher wages. To see this, note that we have negative coefficients in almost all columns of panels B and C (that show average earnings conditional on the individual being employed) and positive coefficients in columns 5 and 6 of Panel D. The first result shows that average earnings were generally negatively affected by imports from China regardless of the final industry of employment, while the second shows a positive effect on employment for workers who moved outside their initial 2-digit industry. Finally, we can see that working years were negatively affected for individuals who remained in their 2-digit initial industry (columns 2–4, panel D).[33]

We next analyze how workers were affected in terms of their adjustment within or across commuting zones. We run a decomposition analysis with two mutually exclusive categories: remaining in the initial commuting zone, and switching commuting zone. The results are shown in Table A.6, where column 1 is again the baseline results. The estimates suggest that jobs at workers' initial commuting zones and in new commuting zones are both affected by the China shock. It seems, however, that jobs in different commuting zones are more affected in terms of hourly earnings and employment, even though only the former effect is statistically significant.[34] Hence, we find no evidence that workers were able to mitigate their negative earnings effects through geographical mobility.[35]

3.1.3. Heterogeneous effects

We now study the effect of Chinese import penetration on distinct groups of workers defined in terms of age, gender, and relative earnings (within age cohort) in the pre-period (1997–2000).[36] A rise in import penetration may have differential impacts on distinct groups of workers. For example, workers' mobility across sectors, occupations and regions may vary with their age, gender and earnings capacity (Artuç et al., 2010; Brussevich, 2018; Keller and Utar, 2018).

Following Utar (2018) and Autor et al. (2014), our approach to estimating heterogeneous effects consists of splitting our previous analysis into different samples. More precisely, we split the sector decomposition analysis from Table 4 into different samples according to gender (male/female), age (below 40/above or equal to 40) and relative earnings capacity within age cohort (low, mid, high).[37]

The results are shown in Fig. 3.[38] Column (a) shows the results of our gender heterogeneity exercise. The first row shows the results for total earnings, the second row for average weekly earnings and the last row for total working years. Each bar corresponds to the coefficient of Chinese import penetration from a different regression, together with the respective 90% confidence interval. The horizontal axis corresponds to different categories based on our decomposition analysis. They consider our baseline model ("All" - equivalent of column 1 of Table 4). We also consider two other coefficients that entail important insights about workers movements across sectors. "Same Sector" corresponds to the case of employment at a different firm but within the same initial sector (equivalent of column 3 of Table 4), while "Tradable" corresponds to employment in tradable industries but not the same 2-digit sector (equivalent of column 5 of Table 4). The first row of column (a) shows that women suffered more than men in terms of their total earnings as a result of import penetration from China, a result also found in Keller and Utar (2018) for Denmark. This was driven by a sharp relative fall in working years and a significant relative fall in average earnings of women. Men experienced a relative decline in average earnings from the China shock, but did not have lower total working years. We can also see that men were able to gain in terms of their relative

[33] In the Online Appendix, we conduct the same decomposition analysis for the sample of manufacturing workers (Table C.8) and dummyTXdummy-(the expanded sample including low labor force attachment workers (Table C.9). The results are qualitatively similar, but the significance of the results varies across samples. The decomposition results are quantitatively very similar when using the ASHE sampling weights, and hence, we omit the results for the sake of space.

[34] The results of the commuting zone decomposition for the manufacturing and low labor force attachment samples are similar and are therefore not included in the paper.

[35] In the Online Appendix, we also decompose the baseline result by three mutually exclusive groups of occupational classifications: low, middle, and high skill. The results in Table C.10 suggest that earnings growth was lower for all categories of jobs. Average earnings growth fell most for workers employed in high skill occupations. On the other hand, total working years relatively fell most for workers in mid skill occupations, and actually relatively increased for workers in high skill positions, but these effects are not statistically significant. Hence, our results do not show clear evidence of import penetration from China leading to job or wage polarization at the worker level in the UK.

[36] We also run a heterogeneity analysis based on occupational skill levels and present the results in Tables C.12-C.14 of the Online Appendix.

[37] In the Online Appendix (Table C.15) we also study the heterogeneous effects by interacting the change in Chinese import exposure with age in 2000, with a female dummy variable, or with log average hourly earnings between 1997 and 2000 ($\hat{HE}_{97/00}$). The results are qualitatively similar to those presented in the main part of the paper.

[38] Throughout the heterogeneous effects section, we do not present the first stage F statistics for each regression to present the results in a more organized way (in the vast majority of cases they are above 10). For the same reason, we show only results for total earnings, average weekly earnings and total working years in the figure, and just a sub-set of the coefficients. All the plotted coefficients can be found in Tables C.16, C.17 and C.18 in the Online Appendix (all regressions are estimated by 2SLS with all controls at the worker- and industry-levels). The results for average hourly earnings and for average hours worked, which are not qualitatively different from the ones presented in the main part of the paper, can be seen in the Online Appendix, Tables C.19, C.20 and C.21.

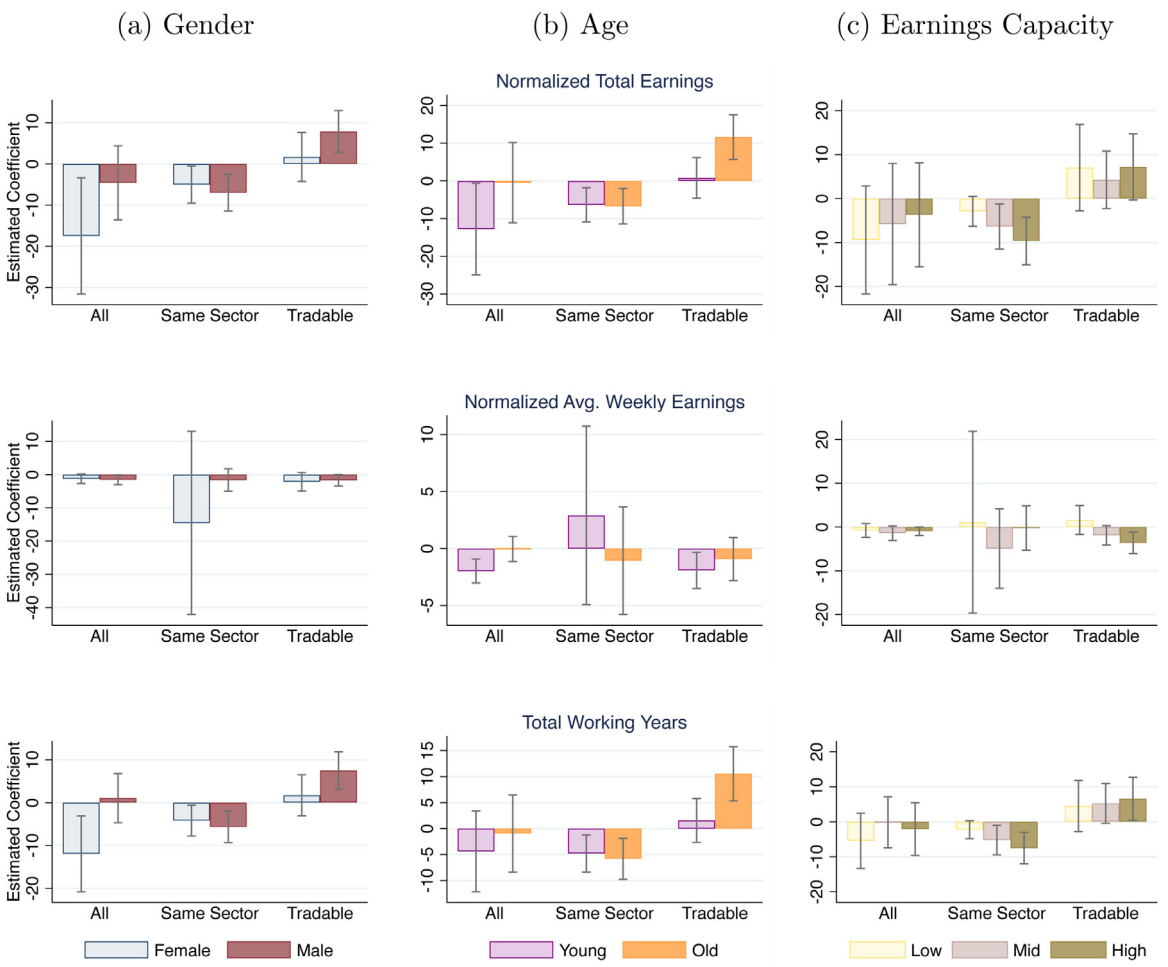

Fig. 3. Heterogeneous Effects NOTES: Each bar represents the coefficient of a different regression and their respective 90% confidence intervals. Rows 1, 2 and 3 represent different outcome variables - see the notes of Table 3 for their definitions. Each column presents a different heterogeneity analysis, which is conducted by splitting the sample based on different workers' characteristics. Each columns consider a different sample split: (a) male and female workers; (b) young and old workers; (c) workers with low, mid and high earnings capacity. The sample is restricted to workers with high labor force attachment in the period 1997–2000. The horizontal axis corresponds to different categories based on our decomposition analysis. "All" corresponds to the baseline model - equivalent of column 1 of Table 4. "Same Sector" corresponds to employment at a different firm but within the same initial sector - equivalent of column 3 of Table 4. "Tradable" corresponds to employment in tradable industries but not the same 2-digit sector - equivalent of column 5 of Table 4. The explanatory variable of interest is the change in import penetration (2000–2007) in the worker's initial industry of employment. All regressions are estimated by 2SLS and include all worker- and industry-level controls - see notes of Table 3 for a list of the controls and details on the IV. Standard errors clustered by industry (ISIC3 - 3-digit). All the plotted coefficients can be found in Tables C.16, C.17 and C.18 in the Online Appendix.

total earnings growth if they switched to other 2-digit sectors whereas the same effect for women is considerably smaller and not statistically significant.[39]

Column (b) of the figure shows the effects for workers below 40 in the initial period (labelled young) and those above or equal to 40 in the initial period (labelled old). Looking first at the "All" category coefficients, we see that younger workers were hit harder than older workers in terms of their total earnings. For young workers, there is a statistically significant negative coefficient for total and average earnings, while the corresponding coefficients for older workers are very close to 0 and not statistically significant. Analogously to the female/male case, it seems that older workers partially compensate their relative employment declines in their initial 2-digit industry with lower declines (or even increases) when they transition to other industries, while younger workers are not able to mitigate the losses from employment linked to their initial sectors.

We also investigate whether workers with different earnings capacity were affected differently by the shock. We split workers into terciles of average (hourly) earnings in the pre-period within their age cohort. By assigning earnings terciles within cohorts of workers with similar age, our sample division should capture differences in earnings capacity arising

[39] Note that the average exposure to the China shock of males is larger than that of females - see Table A.7 for the average China shock across different sub-samples.

Table 3
Employment and earnings.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
Panel A			**Normalized Total Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-7.839***	-10.680***	-9.544***	-5.194	-7.525
	(1.873)	(2.201)	(2.020)	(5.944)	(5.663)
Panel B			**Normalized Average Weekly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-0.659**	-0.709**	-1.305***	-0.721	-1.333**
	(0.264)	(0.271)	(0.303)	(0.631)	(0.634)
Panel C			**Normalized Average Hourly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.182***	-1.526***	-1.054***	-0.883	-1.188**
	(0.180)	(0.294)	(0.244)	(0.603)	(0.527)
Panel D			**Total Working Years**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-4.086***	-6.499***	-3.669**	-2.355	-2.290
	(1.093)	(1.622)	(1.469)	(3.788)	(3.467)
Panel E			**Normalized Average Hours Worked**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.363*	0.548**	-0.194	-0.276	-0.505
	(0.199)	(0.275)	(0.143)	(0.377)	(0.387)
1st Stage(s) Statistics					
IV_{chi}		.023***	.021***	.012***	.012***
		(.004)	(.003)	(.003)	(.003)
KP F Stat		35.662	36.273	13.160	14.485
N	48,529	48,529	48,529	48,529	48,529
Basic Controls	Yes	Yes	Yes	Yes	Yes
Worker Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: Panels A, B, C, D and E respectively represent the following dependent variables for employee i working in industry k (in 2000) in the period 2001 to 2007. Panel A) Normalized Total Earnings - total earnings between 2001 and 2007 divided by average annual earnings between 1997 and 2000. Panel B) Normalized Average Weekly Earnings - average weekly earnings between 2001 and 2007 divided by average weekly earnings between 1997 and 2000; Panel C) Normalized Average Hourly Earnings - average hourly earnings between 2001 and 2007 divided by average hourly earnings between 1997 and 2000; Panel D) Total Working Years - the number of years employed between 2001 and 2007 divided by the number of years employed between 1997 and 2000; Panel E) Normalized Average Hours Worked - the average number of hours worked per week between 2001 and 2007 divided by the average number of hours worked per week between 1997 and 2000. The sample is restricted to workers with high labor force attachment in the period 1997–2000. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable of interest is the change in import penetration (2000–2007) in the worker's initial industry of employment. All regressions include average years of employment and hours worked, and log of average hourly and weekly earnings between 1997 and 2000 as controls. "Worker Controls" include sex, age, age-squared, the interactions of age with average hourly and weekly earnings (1997–2000) and with average hours worked (1997–2000), occupation fixed effects (4-digit) and a part-time job dummy, all in 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW and China, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 110$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

from workers' characteristics other than experience, such as intrinsic ability and education. Our baseline results in column (c) of Fig. 3 show evidence that workers with low earnings capacity suffered the most from the shock in terms of total earnings, although the standard errors are large so the results are statistically insignificant. We can also see that workers of all earnings capacity levels that switched out of their two-digit sector were able to offset their relative total earnings losses (mostly not statistically significant results). The second row shows that conditional on being employed, the average wages of mid and high earnings capacity workers were more affected than those of low earnings capacity. This suggests that low earnings capacity workers were mostly affected in terms of employment, which is what we see in the last row of column

Table 4
Firm and sector decomposition.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
	All	Same Firm and Sector	Same Sector	Same 2-dig Sector	Tradable Sector	Non-Tradable Sector	Residual Sector
Panel A				**Normalized Total Earnings**			
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-7.525	-15.211	-6.383**	-6.036*	6.179**	5.227	8.700*
	(5.663)	(10.406)	(2.661)	(3.271)	(2.734)	(6.428)	(5.043)
N	48,529	48,529	48,529	48,529	48,529	48,529	48,529
Panel B				**Normalized Average Weekly Earnings**			
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.333**	0.205	-3.175	-2.568	-1.507*	-0.969	-3.971
	(0.634)	(0.449)	(2.211)	(1.658)	(0.866)	(1.183)	(3.687)
N	48,529	33,432	3,980	5,670	3,727	15,030	6,089
Panel C				**Normalized Average Hourly Earnings**			
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.188**	-0.192	-3.385	-1.880	-0.932	-1.160	-1.937
	(0.527)	(0.396)	(2.202)	(1.288)	(0.644)	(0.941)	(1.238)
N	48,529	33,417	3,979	5,664	3,725	15,024	6,084
Panel D				**Total Working Years**			
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-2.290	-13.405	-5.167**	-4.258	6.030**	7.139	7.371*
	(3.467)	(8.279)	(2.148)	(2.615)	(2.329)	(5.189)	(4.408)
N	48,529	48,529	48,529	48,529	48,529	48,529	48,529
Panel E				**Normalized Average Hours Worked**			
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-0.505	-0.246	-1.077	0.319	-0.731	0.349	-1.448
	(0.387)	(0.224)	(1.195)	(0.651)	(0.582)	(0.596)	(0.980)
N	48,529	33,465	3,995	5,679	3,733	15,067	6,097
Basic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Worker Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

NOTES: Panels A, B, C, D and E respectively represent the following dependent variables for employee *i* working in industry *k* (in 2000) in the period 2001 to 2007. Panel A) Normalized Total Earnings - total earnings between 2001 and 2007 divided by average annual earnings between 1997 and 2000). Panel B) Normalized Average Weekly Earnings - average weekly earnings between 2001 and 2007 divided by average weekly earnings between 1997 and 2000; Panel C) Normalized Average Hourly Earnings - average hourly earnings between 2001 and 2007 divided by average hourly earnings between 1997 and 2000; Panel D) Total Working Years - the number of years employed between 2001 and 2007 divided by the number of years employed between 1997 and 2000; Panel E) Normalized Average Hours Worked - the average number of hours worked per week between 2001 and 2007 divided by the average number of hours worked per week between 1997 and 2000. The sample is restricted to workers with high labor force attachment in the period 1997–2000. The first column corresponds to the baseline model. The other columns show mutually exclusive channels: employment at the same firm in the same sector (column 2); employment at a different firm but within the same sector (column 3); employment at the same 2-digit sector but not the same 4-digit one (column 4); employment in tradable industries but not the same 2-digit sector (column 5); employment in non-tradable sectors (column 6); and a residual category (column 7). The explanatory variable of interest is the change in import penetration (2000–2007) in the worker's initial industry of employment. All columns are estimated by 2SLS and include all worker- and industry-level controls - see notes of Table 3 for a list of the controls and details on the IV. Standard errors clustered by industry (ISIC3 - 3-digit) are in parentheses. ($N_{clusters}$ varies across samples). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

(c). As in the other heterogeneity exercises, moving out from their original industry seems to offset the negative effects from import competition on employment for all categories of workers.[40]

3.1.4. Local labor market analysis

So far, our analysis has measured workers' exposure to an import shock through their initial industry. This channel captures the *direct* impact of Chinese import penetration on worker outcomes but may miss important *indirect*, or general equilibrium, effects. First, the extent to which workers are affected by the import shock will depend on the their ability to relocate to other sectors. This, in turn, depends on employment opportunities within their local labor market, assuming that workers are relatively immobile across regions, and therefore on the extent to which the China shock impacted other important industries in their commuting zone. Second, there will be an aggregate demand effect of the shock, multiplying the positive and negative shocks through the economy. Part of this aggregate demand effect will be captured at the local level through expenditure on non-traded local goods and services (Acemoglu et al., 2016).

[40] We show how the results vary with the skill ranking of each worker's initial occupation, defined based on the relative hourly wage of the occupation in 2000. We present the results in the Online Appendix, Tables C.22 and C.23. Workers of all occupational types were negatively affected by the China shock but there is some heterogeneity driven by sharper falls in total working years for workers in low and mid skill occupations.

Table 5
Local labor market shock.

	(1)	(2)	(3)
	2SLS	2SLS	2SLS
	Normalized Total Earnings		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-7.525		-7.498
	(5.663)		(5.674)
CZ_{chi}		-1.075	-0.958
		(1.286)	(1.289)
	Normalized Average Weekly Earnings		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.333**		-1.308**
	(0.634)		(0.632)
CZ_{chi}		-0.925***	-0.904***
		(0.250)	(0.251)
	Normalized Average Hourly Earnings		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.188**		-1.163**
	(0.527)		(0.528)
CZ_{chi}		-0.890***	-0.872***
		(0.177)	(0.178)
	Total Working Years		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-2.290		-2.373
	(3.467)		(3.417)
CZ_{chi}		2.930***	2.967***
		(0.798)	(0.794)
	Normalized Average Hours Worked		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-0.505		-0.502
	(0.387)		(0.385)
CZ_{chi}		-0.132	-0.124
		(0.090)	(0.090)
1^{st} Stage(s) Statistics			
IV_{chi}	.012***		.012***
	(.003)		(.003)
F Stat IV_{chi}	14.485		7.737
$IVCZ_{chi}$		.017***	.017***
		(.001)	(.001)
F Stat $IVCZ_{chi}$		166.21	83.168
N	48,529	48,529	48,529
All Controls	Yes	Yes	Yes

NOTES: Panels A, B, C, D and E, respectively, represent different outcome variables - see notes of Table 3 for their definitions. The sample is restricted to workers with high labor force attachment in the period 1997–2000. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The commuting zone shock (Imports China in CZ) is a weighted (by the share of the labor force) average of the sector import shock in each CZ adjusted by total employment in the CZ from ASHE (in thousands of individuals). All columns are estimated by 2SLS and include all worker- and industry-level controls - see notes of Table 3 for a list of the controls. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. The instrument for change in imports in CZ, $IVCZ_{chi}$ is just a weighted (by the share of the labor force) average of the industry-level instrument. Standard errors clustered by industry (ISIC3 - 3-digit) are in parentheses. ($N_{clusters}$ =110). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

To encompass these general equilibrium effects, we redefine the Chinese import penetration shock at the local labor market level.[41] Specifically, the commuting zone shock is defined as the weighted average of the industry-level import shock in each commuting zone, where the weights are the initial share of the industry employment in the commuting zone labor force. Analogously, our commuting zone IV is constructed as a weighted average of the industry-level IV. The dependent variable is defined at the individual level as before, and for comparability we keep the same sample of workers.

We present the results in Table 5. Column 1 presents the baseline results from the industry level shock, column 2 shows results for the commuting zone shock, and column 3 includes both shocks as explanatory variables. All of the regressions

[41] One indirect channel that we do not consider here is exposure to the shock through upstream and downstream industry linkages, which may either positively or negatively affect labor demand at the industry level.

are estimated by 2SLS and include all of our previous controls. The results suggest that workers in commuting zones more affected by the shock suffer from significantly lower average earnings growth. Surprisingly, we find a positive coefficient for total years worked - a result that is also found in the US data by Autor et al. (2014) who propose that this phenomenon may be explained by an income effect.

In column 3, we see that the estimated coefficients for the industry and commuting zone shocks are very similar to the cases where they are estimated separately, implying that the two shocks are uncorrelated.[42] In particular, note that the industry effect is not capturing regional variation in exposure to the shock and that the main result holds conditional on the exposure of a worker's local labor market to the shock. Column 3 suggests that workers in both industries and local labor markets hit by the shock experienced lower total and average earnings growth, although the effects on total working years went in opposite directions. The fact that the negative coefficient on the commuting zone shock on average earnings remains when the direct industry shock is included suggests that the general equilibrium effects are important.[43]

3.2. Firm-level evidence

We now study how firms responded to the import shock in terms of employment and activity. More precisely, we turn to the analysis of plant-level responses to Chinese import penetration using data from the BSD described above. Our empirical approach is similar to that presented in Section 3.1. Our initial time period is still defined as the year 2000; however, in contrast to the worker analysis, we now include new entrants in some parts of the analysis. That is, we also consider plants that commenced operations in any year after (and including) 2001 in some specifications. We focus on ONS "local units", which are generally equivalent to plants. Groups of local units can be aggregated to the enterprise (firm) level. We observe the main industry of each plant, meaning that using plant-level data for our analysis is far more accurate than using data at the firm level, as firms may own many plants in different sectors. We use some additional firm-level information for our control variables.

We run a regression at the plant-level, where plants are indexed by j. The shock, which is still defined as the change in import penetration from China, is assigned at the industry level and therefore allocated to all plants in an ISIC3 4-digit industry. We cluster standard errors at the 3 digit industry level. Our main specification is:

$$y_{jk} = \beta_1 \frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}} + \beta_2 Z_{jk} + \varepsilon_{jk}$$

Our dependent variables are: (i) Employment Growth, defined as the change in log(employment) between 2000 and 2007; and (ii) Activity Status, a dummy variable equal to 1 if a plant was in business in 2007 and 0 otherwise.[44]

As in the worker level analysis, we are interested in comparing similar units so we control for a set of firm and industry level characteristics. The firm controls include an enterprise start-of-business-year fixed effect, a dummy for whether the enterprise is foreign owned and (log) employment at the enterprise level in the starting period. "Industry Controls" include the same variables as described in the worker-level analysis.

Table 6 shows the mean and standard deviation (in parentheses) for the main variables used in the analysis at the plant level (note that some variables are defined at the enterprise level as described above). We consider nine different sub-samples. Columns 1, 4 and 7 consider plants in tradable goods sectors (ISIC3 industry code lower than 3700), while columns 2, 5 and 8 consider only plants in manufacturing sectors (ISIC3 industry code lower than 3700 and greater than 1499). Columns 3, 6, and 9 include plants in all sectors. The samples then further restrict by activity status. For columns 1, 2 and 3, we include all plants in the sample, i.e. we include all plants that were alive in 2000, plants that enter after 2000 and survived up to 2007, and plants that died before 2007 that were active in 2000. In columns 4, 5 and 6 we exclude new entrants from this sample, i.e. plants that were not active in 2000. Columns 7–9 include only plants that were alive in 2000 and survived up to 2007. Similarly to previous studies that analyze the impact of Chinese imports on firms (Utar and Ruiz, 2013), in our main analysis we will focus on plants in the manufacturing sector.

The first two rows show the main dependent variables - employment growth and activity status. For our baseline sample in column 2, employment growth was on average -18.7% and a share of 0.52 of the plants were alive in 2007. Comparing plants in the manufacturing sector to all sectors of the economy (in column 3), the obvious difference is that employment at plants initially in manufacturing declined significantly over the period while for all plants mean employment growth was positive at 5.2%. Our analysis will shed light on the role of Chinese import penetration in explaining these trends.

The other rows show other plant and enterprise characteristics relevant for our analysis. A share of 0.10 of the plant are owned by foreign enterprises, the average number of workers at the local unit is approximately 22. The plant belongs to enterprises that have, on average, 193 workers and 6.7 plants.

[42] The correlation between the sector shock and the CZ shock in the data is relatively low (0.127 in the main sample and 0.114 in the expanded sample with low attachment labor force workers).

[43] In the Appendix (Tables C.24 and (C.25), we show that the results are qualitatively similar for workers initially in the manufacturing sector and for the sample of workers with low labor force attachment.

[44] For more details about the construction of the variables, see Online Appendix B. In particular, we assume that employment equals 1 for inactive plants (in the final period) and for young plants (in the initial period) that appear later than 2000 in the sample. Also note that all firms in our sample start active in 2000 (or in the year they enter). Hence, activity status equals 1 in 2007 if the firm did not changed its status throughout the period we analyze, while activity status equals zero otherwise.

Table 6
Descriptive statistics - firms.

	All Plants			No Entrants			Surviving Plants		
	Trad.	Manuf.	All	Trad.	Manuf.	All	Trad.	Manuf.	All
Employment Growth	-0.179	-0.187	0.052	-0.850	-0.857	0.078	0.031	0.032	0.078
	(1.547)	(1.560)	(1.490)	(1.319)	(1.331)	(0.620)	(0.651)	(0.653)	(0.620)
Activity Status	0.518	0.518	0.503	0.497	0.499	1.000	1.000	1.000	1.000
	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign Ownership	0.104	0.104	0.140	0.121	0.121	0.187	0.134	0.134	0.224
	(0.305)	(0.305)	(0.347)	(0.326)	(0.326)	(0.390)	(0.341)	(0.340)	(0.417)
Employment_{T_0} (enterprise)	362	193	5,552	255	191	3,635	184	178	1,884
	(5,125)	(1,679)	(26,080)	(3,354)	(1,772)	(17,639)	(1,180)	(1,189)	(8,602)
Local Units_{T_0} (enterprise)	10.1	6.8	186.4	6.6	5.1	145.9	4.5	3.8	86.1
	(103.5)	(64.4)	(654.3)	(64.3)	(48.8)	(521.6)	(24.0)	(20.6)	(333.6)
Employment_{T_0} (local unit)	21.455	22.143	13.963	27.334	28.190	16.475	35.722	36.852	21.331
	(93.432)	(95.559)	(77.196)	(110.418)	(112.708)	(84.165)	(140.155)	(142.942)	(108.827)
Small	0.424	0.416	0.478	0.437	0.493	0.414	0.489	0.481	0.440
	(0.494)	(0.493)	(0.499)	(0.496)	(0.500)	(0.493)	(0.500)	(0.500)	(0.496)
Young	0.499	0.499	0.444	0.333	0.331	0.434	0.226	0.223	0.324
	(0.500)	(0.500)	(0.497)	(0.471)	(0.471)	(0.496)	(0.418)	(0.416)	(0.468)
N	212,676	202,566	1,799,189	135,378	129,513	930,975	67,337	64,565	416,388

NOTES: The table shows mean and standard deviation (in parentheses) for different sub-samples of the firm-level data. Columns 1–3 include all plants, columns 4–6 restricts to the sample without new entrants, columns 7–9 restricts to firms alive at the start and end of the sample period. We consider plants in tradable (columns 1, 4 and 7), manufacturing (columns 2, 5 and 8) and all (columns 3, 6 and 9) sectors.

Similar to the worker-level case, Table A.8 in the Appendix shows the mean of the shocks in the sample by column, as well as the (pseudo) percentiles of Chinese import exposure at the plant level.

3.2.1. Average impact on employment and activity

Table 7 shows the regression results for the main sample of interest: plants initially in the manufacturing sector. The dependent variable is employment growth of the plant. Panel A includes all manufacturing plants, Panel B restricts to the sample without plants that enter after 2000, and panel C restricts to only firms that are observed in 2001 and survive up to 2007. Column (1) is estimated by OLS while columns (2) to (5) are estimated by 2SLS using the IV strategy outlined in Section 3.1. Column (2) does not include controls. Column (3) includes firm controls and column (4) includes industry controls. Column (5) includes both firm and industry controls.

The estimated coefficients are negative in all cases. Examining the 5th column of panels A, a 1-percentage-point increase in Chinese import penetration leads to a decrease of 2.57 percentage points in the employment growth rate in the period. The coefficient is marginally insignificant at the 10% level, with a p-value of 0.100 to 3 decimal places.

To investigate the possibility that the results in Panel A are driven by the entry of new plants - which may be more likely to enter into industries less affected by Chinese imports - we present results excluding new entrants from the sample in Panel B. The estimated coefficient is -2.76, which is very similar to the sample of all manufacturing firms, suggesting that it is not new entrants that are driving the results.

To investigate only the intensive margin of employment adjustment, in Panel C, we restrict the sample to only include plants that were alive in 2000 and survived up to 2007. The coefficient is smaller in magnitude because, as we show in the following analysis, plants more exposed to China were more likely to close. The estimated coefficient is -1.438 and is statistically significant at the 10% level. Therefore, there is adjustment in employment on the intensive margin for surviving plants.

In Table 8, we repeat the specifications above for a dummy dependent variable of the plant's activity status. Panel A shows that plants more exposed to China were more likely to be inactive by 2007 relative to less exposed plants, although in the most stringent specification in column 5, the coefficient is not statistically significant at the 10 percent level. The negative coefficient holds in Panel B when restricting the sample to exclude firms that entered after 2000. This provides evidence that adjustment occurred on the extensive margin, as well as on the intensive margin.

Tables A.9 to A.12 show the equivalent analysis but considering a sample of plants in tradable sectors and in all sectors. The sample of tradable plants presents similar but statistically stronger results, with some of the coefficients gaining significance. On the other hand, results appear weaker when we include plants in all sectors. In sum, it seems that plants have suffered from greater import competition from China, with stronger relative effects in the tradable and manufacturing sectors.

Overall, the analysis indicates that firms more exposed to import competition from China experienced relatively lower employment growth than those less exposed. The adjustment occurs at the intensive margin - with surviving firms having relatively lower employment growth - and at the extensive margin, with more exposed plants being more likely to cease

Table 7
Plant employment growth - manufacturing sectors.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
			Employment Growth		
Panel A			*Manufacturing - All Firms*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-1.210	-2.417**	-2.950***	-2.165	-2.571
	(1.104)	(1.105)	(1.035)	(1.787)	(1.536)
1st Stage(s) Statistics					
IV_{chi}		.023***	.023***	.018***	.018***
		(.006)	(.006)	(.006)	(.006)
KP F Stat		17.700	17.663	11.028	11.060
N	202,566	202,566	202,566	202,566	202,566
Panel B			*Manufacturing - No Entrants*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-1.667	-3.006**	-3.219***	-2.164	-2.763
	(1.186)	(1.180)	(1.185)	(1.758)	(1.833)
1st Stage(s) Statistics					
IV_{chi}		.024***	.023***	.018***	.018***
		(.006)	(.006)	(.006)	(.006)
KP F Stat		17.714	17.744	10.055	10.162
N	129,513	129,513	129,513	129,513	129,513
Panel C			*Manufacturing - Surviving*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-0.706*	-1.469***	-1.648***	-1.330*	-1.438*
	(0.419)	(0.529)	(0.595)	(0.747)	(0.804)
1st Stage(s) Statistics					
IV_{chi}		.023***	.023***	.017***	.017***
		(.005)	(.005)	(.006)	(.006)
KP F Stat		18.235	18.217	8.855	9.001
N	64,565	64,565	64,565	64,565	64,565
Firm Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: The regressions are estimated at the plant level. Panel A includes all manufacturing plants, Panel B restricts to the sample without new entrants, and Panel C restricts to firms alive at the start and end of the sample period. Employment Growth is defined as change in log(employment) between 2000 and 2007. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable is the change in import penetration relative to plants' industry in 2000 or plants' industry in its entry year if plant enters after 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. "Firm Controls" include enterprise birth date fixed effects, a dummy for enterprise foreign ownership in the starting period and enterprise employment in the starting period. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Robust standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 52$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

operation. The results are not driven by selection of new entrants into less exposed industries and, together, the regressions suggest that there was a decline in employment at both the industry and firm levels.[45]

This plant-level analysis complements the worker analysis, showing that both workers and firms suffered more if they were more exposed to the China shock. For example, the worker and firm analysis together suggest that it was not simply the case that firms readjusted their employment composition in response to the shock but instead they were negatively

[45] This plant-level analysis was not suitable to study the entry of new plants, a dimension that has an impact on employment. With this in mind, we aggregate the data and calculate entry at the sector-year level. In the Online Appendix, we run a similar analysis, but considering regressions at the sector-level for manufacturing, tradable and all sectors (Tables C.27, C.28 and C.29, respectively). We find evidence that Chinese import exposure negatively affected the change in the number of entrant plants and the change in the entry rate (number of entrant plants divided by the total number of active plants) between 2000 and 2007. It also negatively affected average entry and and average entry rate between 2000 and 2007 (across all years). The t-stats of the regressions, however, are low and the coefficients are generally not statistically significant at standard levels.

Table 8
Plant activity status - manufacturing sectors.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
			Activity Status		
Panel A			*Manufacturing - All Firms*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-0.830**	-0.947**	-0.854**	-0.649	-0.750
	(0.328)	(0.389)	(0.342)	(0.483)	(0.468)
1st Stage(s) Statistics					
IV_{chi}		.023***	.023***	.018***	.018***
		(.006)	(.006)	(.006)	(.006)
KP F Stat		17.700	17.663	11.028	11.060
N	202,566	202,566	202,566	202,566	202,566
Panel B			*Manufacturing - No Entrants*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-1.002***	-0.995**	-0.868**	-0.600	-0.819
	(0.353)	(0.416)	(0.365)	(0.581)	(0.551)
1st Stage(s) Statistics					
IV_{chi}		.024***	.023***	.018***	.018***
		(.006)	(.006)	(.006)	(.006)
KP F Stat		17.714	17.744	10.055	10.162
N	129,513	129,513	129,513	129,513	129,513
Firm Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: The regressions are estimated at the plant level. Panel A includes all manufacturing plants, Panel B restricts to the sample without new entrants. Activity Status is a dummy variable equals to 1 if a plant was alive in 2007 and 0 otherwise. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable is the change in import penetration relative to plants' industry in 2000 or plants' industry in its entry year if plant enters after 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. "Firm Controls" include enterprise birth date fixed effects, a dummy for enterprise foreign ownership in the starting period and enterprise employment in the starting period. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Robust standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 52$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

affected in terms of their total employment. Similarly, workers at more exposed plants also suffered more, as shown in the worker analysis above.[46]

3.2.2. Heterogeneous effects

We also examine whether Chinese imports affected plants in a heterogeneous way. To do this, we analyze different samples based on plants' characteristics. We decompose our main results based on plants' age and size in 2000.

Table 9 shows the employment growth (columns 1–4) and activity status (columns 5–8) results for plants in the manufacturing sector. Panel A considers the sample of all manufacturing plants, Panel B excludes plants that enter after 2000, and Panel C restricts to plants that survive between 2001 and 2007. Columns 1 and 5 show the results for old plants (all plants with birth date before the median birth date in *their respective sample*) and columns 2 and 6 present the results for young plants (all plants with birth date after or equal to the median birth date in *their respective sample*). Columns 3 and 7 focus on small plants (with employment in their initial year below the median in *their respective sample*), whereas columns 4 and 8 show results for large plants (with employment in their initial year equal or above the median *their respective sample*).[47]

[46] In Table C.26 of the Online Appendix, we present results with the growth of firm sales as the dependent variable. We only observe sales at the firm and not the plant level, so we compute plant level sales using the plant's share of total firm employment as weights, or by simply having firm-level sales as the outcome variable. The results are typically negative but insignificant. There is therefore no evidence to suggest that firms may have lost in terms of employment and gained in terms of total sales by offshoring in response to the shock. We include results for only the intensive margin of sales adjustment - the coefficients for the other samples are qualitatively similar and slightly larger in magnitude.

[47] The thresholds are calculated within each sample. This implies that the age and size thresholds in Panel A are different from those of Panel B and Panel C. We omit the first stage statistics. Most of the KP F stats are above 10.

Table 9
Plant heterogeneous effects - manufacturing.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Old	Young	Small	Large	Old	Young	Small	Large
	Employment Growth				**Activity Status**			
Panel A	*Manufacturing - All Firms*							
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-3.377	-2.111*	-0.498	-3.735	-0.785	-0.682*	-0.384	-0.971
	(2.344)	(1.127)	(0.499)	(2.456)	(0.658)	(0.380)	(0.391)	(0.664)
N	95,867	106,699	84,252	118,304	95,867	106,699	84,252	118,304
Panel B	*Manufacturing - No Entrants*							
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-5.047	-1.781	-0.261	-4.898	-0.829	-0.810*	-0.394	-1.218
	(3.694)	(1.176)	(0.490)	(3.086)	(0.840)	(0.463)	(0.419)	(0.861)
N	45,134	84,379	63,796	65,710	45,134	84,379	63,796	65,710
Panel C	*Manufacturing - Surviving*							
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-2.574*	-0.715	-0.209	-2.442				
	(1.422)	(0.544)	(0.454)	(1.461)				
N	25,810	38,755	31,041	33,517				
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

NOTES: The regressions are estimated at the plant level. Panel A includes the full sample of plants initially in manufacturing, Panel B excludes entrants from this sample, and Panel C restricts to plants that survive the full estimation period. The dependent variable is either employment growth (columns 1–4), defined as change in ln(employment) between 2000 and 2007, or activity status (columns 5–8), defined as a dummy variable equals to 1 if a plant was alive in 2007 and 0 otherwise. Each column represents a different sample: old and young plants (columns 1, 2, 5 and 6); Small and large plants in terms of employment (columns 3, 4, 7 and 8). All columns are estimated by 2SLS. The explanatory variable of interest is the change in import penetration relative to plants' industry in 2000 or plants' industry in its entry year if plant enters after 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. "Firm Controls" include enterprise birth date fixed effects, a dummy for enterprise foreign ownership in the starting period and enterprise employment in the starting period. All columns are estimated by 2SLS - see notes of Table 7 for details on the IV. Robust standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 52$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

There is some evidence to suggest that larger plants were more strongly affected by the shock than smaller ones in terms of employment growth and activity, with the estimated coefficients for small plants generally being close to zero in all cases and the coefficients for large plants being more sizeable, although generally they are marginally statistically insignificant. There is also some tentative evidence to suggest that older plants were more affected than younger ones in terms of employment, although the differences between the point estimates are smaller than those for large and small plants.[48] Similar results hold when we restrict the sample to plants that were alive in 2000 or to surviving firms (Panels B and C).

We also find similar results when we restrict the sample to plants initially in tradable industries and when we include plants in all industries. In the first case, many of the coefficients become statistically significant (see Tables C.30 and C.31 in the Online Appendix).

Hsieh and Klenow (2014) find that larger (US) firms are generally older, which may explain why the effects for the two groups of plants go in the same direction. The fact that the two groups of plants are more affected by Chinese competition (than young and small plants) is perhaps surprising and we offer three possible explanations for this result. First, Holmes and Stevens (2014) show that, within industries, larger plants typically produce more standardized goods than smaller plants. Therefore, larger plants may be more subject to international competition. Second, it is more costly for larger firms to innovate (Akcigit and Kerr, 2018) and therefore they may be less manoeuvrable in response to the China shock. Third, we measure plant size in terms of employment, so larger plants may be more labor intensive than smaller plants; given that China's comparative advantage is in labor-intensive sectors, larger plants may then be more heavily affected.

4. Conclusion

In this paper, we examine the effect of the recent rise of China as a trade shock on the labor market of a foreign market - the UK. We find evidence that an increase in Chinese import penetration significantly decreases individuals' earnings

[48] The size of the China shock is similar across the different samples: the average of Chinese import exposure is approximately equal to 0.03 in the four groups of plants.

growth and employment, with the effects being heterogeneous across different groups of workers. We also show that plants in industries more affected by Chinese import penetration exhibited lower employment growth and lower probability of survival, the effect being stronger for larger plants. Together, the analysis shows that the effects on employment and earnings were, at least in part, driven by a contraction of labor demand at both the firm and industry level.

Our paper corroborates the idea that trade integration creates both winners and losers around the globe. Our results, however, do not necessarily bolster the argument that the losses of workers and firms from competition with Chinese products outweighed the gains to others from the concurrent increase in exports to China and the decline in consumer and input prices. In fact, several studies have shown that the emergence of China in global trade generated positive welfare gains (di Giovanni et al., 2014; Caliendo et al., 2019) and increased innovation rates in developed economies (Bloom et al., 2016), while others have shown that the recent boom in commodities-for- manufactures trade between China and other developing countries benefited Brazilian local labor markets (Costa et al., 2016). Furthermore, the exit (or downsizing) of less productive firms due to trade tends to increase countries' average productivities (Melitz, 2003).

Our results also show that labor reallocation is costly in the short to medium term. This suggests that policies targeted to alleviate labor market frictions in general may help countries to cope better not only with trade competition shocks but, potentially, with other types of shocks that generate reshuffling of workers across firms, sectors and regions in the economy.

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Appendix A. - Additional analysis

Table A.1
Descriptive statistics: trade shocks at the worker-level.

	Main	Main: Manufacturing	Expanded	Expanded: Manufacturing
$\frac{\Delta_{00/07}Imports_{chi}}{Expenditure_{00}}$	0.006	0.021	0.006	0.022
	(0.019)	(0.030)	(0.018)	(0.031)
Percentile 10 of $\frac{\Delta_{00/07}Imports_{chi}}{Expenditure_{00}}$	0.000	0.000	0.000	0.000
Percentile 25 of $\frac{\Delta_{00/07}Imports_{chi}}{Expenditure_{00}}$	0.000	0.001	0.000	0.001
Percentile 50 of $\frac{\Delta_{00/07}Imports_{chi}}{Expenditure_{00}}$	0.000	0.010	0.000	0.010
Percentile 75 of $\frac{\Delta_{00/07}Imports_{chi}}{Expenditure_{00}}$	0.001	0.030	0.000	0.030
Percentile 90 of $\frac{\Delta_{00/07}Imports_{chi}}{Expenditure_{00}}$	0.019	0.074	0.017	0.074
$\frac{Imports_{chi,00}}{Expenditure_{00}}$	0.004	0.016	0.004	0.016
	(0.017)	(0.028)	(0.016)	(0.029)
CZ_{chi}	0.021	0.024	0.021	0.024
	(0.018)	(0.020)	(0.018)	(0.020)
Percentile 10 of CZ_{chi}	0.007	0.009	0.007	0.009
Percentile 25 of CZ_{chi}	0.011	0.013	0.011	0.013
Percentile 50 of CZ_{chi}	0.017	0.020	0.017	0.020
Percentile 75 of CZ_{chi}	0.025	0.030	0.025	0.030
Percentile 90 of CZ_{chi}	0.039	0.045	0.039	0.045

Notes: Each column of the table represents a different sample. The table shows the mean and standard deviation (in parentheses) for the variables $\Delta_{00/07}Imports_{chi}/Expenditure_{00}$. $Imports_{chi}/Expenditure_{00}$ and CZ_{chi}. The table also shows percentiles of $\Delta_{00/07}Imports_{chi}/Expenditure_{00}$ and of CZ_{chi}. The UK Data Secure Data Service does not release percentiles of the distribution. Hence, to obtain percentile X we average the variable across individuals within percentiles X + 5 and X-5 of the variable. For example, percentile 10 of "$\frac{\Delta_{00/07}Imports_{chi}}{Expenditure_{00}}$" is the mean of Chinese Import Exposure between the percentiles 5 and 15 of the variable.

Table A.2
Employment and earnings – alternative IV.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
Panel A			**Normalized Total Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-7.839***	-9.336***	-7.803***	-0.571	-2.551
	(1.873)	(2.092)	(1.821)	(4.733)	(4.408)
Panel B			**Normalized Average Weekly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-0.659**	-0.532**	-1.097***	-0.246	-0.703
	(0.264)	(0.263)	(0.253)	(0.457)	(0.474)
Panel C			**Normalized Average Hourly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.182***	-1.459***	-0.918***	-0.475	-0.732*
	(0.180)	(0.275)	(0.208)	(0.434)	(0.380)
Panel D			**Total Working Years**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-4.086***	-5.958***	-2.831*	-0.015	-0.028
	(1.093)	(1.563)	(1.445)	(3.136)	(2.807)
Panel E			**Normalized Average Hours Worked**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.363*	0.612**	-0.178	-0.169	-0.342
	(0.199)	(0.292)	(0.150)	(0.328)	(0.354)
1st Stage(s) Statistics					
IV_{chi}		.033***	.03***	.02***	.02***
		(.005)	(.005)	(.004)	(.004)
KP F Stat		39.749	39.137	19.624	21.344
N	48,529	48,529	48,529	48,529	48,529
Basic Controls	Yes	Yes	Yes	Yes	Yes
Worker Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: Panels A, B, C, D and E respectively represent the following dependent variables for employee *i* working in industry *k* (in 2000) in the period 2001 to 2007. Panel A) Normalized Total Earnings - total earnings between 2001 and 2007 divided by average annual earnings between 1997 and 2000. Panel B) Normalized Average Weekly Earnings - average weekly earnings between 2001 and 2007 divided by average weekly earnings between 1997 and 2000; Panel C) Normalized Average Hourly Earnings - average hourly earnings between 2001 and 2007 divided by average hourly earnings between 1997 and 2000; Panel D) Total Working Years - the number of years employed between 2001 and 2007 divided by the number of years employed between 1997 and 2000; Panel E) Normalized Average Hours Worked - the average number of hours worked per week between 2001 and 2007 divided by the average number of hours worked per week between 1997 and 2000. The sample is restricted to workers with high labor force attachment in the period 1997–2000. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable of interest is the change in import penetration (2000–2007) in the worker's initial industry of employment. All regressions include average years of employment and hours worked, and log of average hourly and weekly earnings between 1997 and 2000 as controls. "Worker Controls" include sex, age, age-squared, the interactions of age with average hourly and weekly earnings (1997–2000) and with average hours worked (1997–2000), occupation fixed effects (4-digit) and a part-time job dummy, all in 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW and China, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. The instrument for change in industry Chinese import penetration, IV_{chi} is equal to the change in exports from China to other developed economies (excluding the UK) divided by the level of expenditure in the industry in 1997 in the UK. Standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 110$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3
Employment and earnings – manufacturing.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
Panel A			**Normalized Total Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-3.826*	-6.640**	-7.784***	-6.386	-6.705
	(2.007)	(2.554)	(2.610)	(6.168)	(5.757)
Panel B			**Normalized Average Weekly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-0.471**	-0.612**	-0.765***	-0.753	-0.982**
	(0.234)	(0.265)	(0.248)	(0.525)	(0.468)
Panel C			**Normalized Average Hourly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-0.293	-0.326	-0.511**	-0.507	-0.689
	(0.178)	(0.300)	(0.238)	(0.559)	(0.440)
Panel D			**Total Working Years**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.403	-3.730**	-4.076**	-3.771	-3.405
	(0.976)	(1.653)	(1.832)	(3.799)	(3.718)
Panel E			**Normalized Average Hours Worked**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-0.165*	-0.337**	-0.256**	-0.325	-0.341
	(0.088)	(0.149)	(0.125)	(0.239)	(0.210)
$\frac{1^{st}\ Stage(s)\ Statistics}{IV_{chi}}$		.019***	.018***	.012***	.012***
		(.004)	(.003)	(.004)	(.004)
KP F Stat		25.516	26.904	9.643	9.537
N	13,566	13,566	13,532	13,566	13,532
Basic Controls	Yes	Yes	Yes	Yes	Yes
Worker Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: Panels A, B, C, D and E respectively represent the following dependent variables for employee i working in industry k (in 2000) in the period 2001 to 2007. Panel A) Normalized Total Earnings - total earnings between 2001 and 2007 divided by average annual earnings between 1997 and 2000. Panel B) Normalized Average Weekly Earnings - average weekly earnings between 2001 and 2007 divided by average weekly earnings between 1997 and 2000; Panel C) Normalized Average Hourly Earnings - average hourly earnings between 2001 and 2007 divided by average hourly earnings between 1997 and 2000; Panel D) Total Working Years - the number of years employed between 2001 and 2007 divided by the number of years employed between 1997 and 2000; Panel E) Normalized Average Hours Worked - the average number of hours worked per week between 2001 and 2007 divided by the average number of hours worked per week between 1997 and 2000. The sample is restricted to workers initially employed in the manufacturing sector with high labor force attachment in the period 1997–2000. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable of interest is the change in import penetration (2000–2007) in the worker's initial industry of employment. All regressions include average years of employment and hours worked, and log of average hourly and weekly earnings between 1997 and 2000 as controls. "Worker Controls" include sex, age, age-squared, the interactions of age with average hourly and weekly earnings (1997–2000) and with average hours worked (1997–2000), occupation fixed effects (4-digit) and a part-time job dummy, all in 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW and China, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 52$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.4
Employment and earnings – low labor force attachment.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
Panel A			**Normalized Total Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-13.949**	-10.382	-14.636	-5.342	-17.799
	(6.685)	(7.185)	(9.831)	(10.314)	(17.323)
Panel B			**Normalized Average Weekly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-2.416	-1.355	-2.921	-1.474	-4.808
	(1.623)	(1.579)	(2.257)	(2.121)	(4.105)
Panel C			**Normalized Average Hourly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.517***	-1.442*	-0.579	0.157	-0.451
	(0.318)	(0.731)	(0.830)	(1.036)	(0.869)
Panel D			**Total Working Years**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-3.397***	-5.041***	-4.001***	-3.117	-2.722
	(1.128)	(1.627)	(1.241)	(3.356)	(2.924)
Panel E			**Normalized Average Hours Worked**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.515**	0.821***	-0.193	-0.391	-0.717
	(0.224)	(0.296)	(0.214)	(0.570)	(0.593)
1st Stage(s) Statistics					
IV_{chi}		.023***	.021***	.012***	.012***
		(.004)	(.004)	(.003)	(.003)
KP F Stat		33.351	34.724	13.297	14.749
N	88,955	88,955	88,955	88,955	88,955
Basic Controls	Yes	Yes	Yes	Yes	Yes
Worker Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: Panels A, B, C, D and E, respectively represent the following dependent variables for employee i working in industry k (in 2000) in the period 2001 to 2007. Panel A) Normalized Total Earnings - total earnings between 2001 and 2007 divided by average annual earnings between 1997 and 2000. Panel B) Normalized Average Weekly Earnings - average weekly earnings between 2001 and 2007 divided by average weekly earnings between 1997 and 2000; Panel C) Normalized Average Hourly Earnings - average hourly earnings between 2001 and 2007 divided by average hourly earnings between 1997 and 2000; Panel D) Total Working Years - the number of years employed between 2001 and 2007 divided by the number of years employed between 1997 and 2000; Panel E) Normalized Average Hours Worked - the average number of hours worked per week between 2001 and 2007 divided by the average number of hours worked per week between 1997 and 2000. The sample is extended to workers with low labor force attachment in the period 1997–2000. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable of interest is the change in import penetration (2000–2007) in the worker's initial industry of employment. All regressions include average years of employment and hours worked, and log of average hourly and weekly earnings between 1997 and 2000 as controls. "Worker Controls" include sex, age, age-squared, the interactions of age with average hourly and weekly earnings (1997–2000) and with average hours worked (1997–2000), occupation fixed effects (4-digit) and a part-time job dummy, all in 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW and China, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 110$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5
Placebo exercise.

	(1)
	2SLS
Panel A	**Normalized Total Earnings**
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-6.183
	(5.711)
Panel B	**Normalized Average Weekly Earnings**
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-2.167
	(1.987)
Panel C	**Normalized Average Hourly Earnings**
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-0.278
	(0.369)
Panel D	**Total Working Years**
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.379
	(0.889)
Panel E	**Normalized Average Hours Worked**
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.011
	(0.374)
1st Stage(s) Statistics	
IV_{chi}	.012***
	(.002)
KP F Stat	22.009
N	17,474
Basic Controls	Yes
Worker Controls	Yes
Industry Controls	Yes

NOTES: Panels A, B, C, D and E respectively represent the following dependent variables for employee i working in industry k (in 1997) in the period that goes from 1998 to 2000. Panel A) Normalized Total Earnings - total earnings between 1998 and 2000 divided by average annual earnings in 1997). Panel B) Normalized Average Weekly Earnings - average weekly earnings between 1998 and 2000 divided by average weekly earnings in 1997; Panel C) Normalized Average Hourly Earnings - average hourly earnings between 1998 and 2000 divided by average hourly earnings in 1997; Panel D) Total Working Years - the number of years employed between 1998 and 2000 divided by the number of years employed in 1997; Panel E) Normalized Average Hours Worked - the average number of hours worked per week between 1998 and 2000 divided by the average number of hours worked per week in 1997. The sample excludes individuals that are not in employment in 1997. Column 1 estimated by 2SLS. Change in import penetration (2000–2007) relative to workers' industry of employment in 1997. All regressions include average years of employment and hours worked, and log of average hourly and weekly earnings in 1997. "Worker Controls" include sex, age, age-squared, interaction of age with average hourly and weekly earnings, and with average hours worked (1997), occupation fixed effects (4-digit) and a part-time job dummy, all in 1997. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW and China, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 126$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6
Commuting zone decomposition.

	(1)	(2)	(3)
	2SLS	2SLS	2SLS
	All	Same CZ	Switch CZ
Panel A	**Normalized Total Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-7.525	-2.567	-4.949
	(5.663)	(5.974)	(4.682)
N	48,529	48,529	48,529
Panel B	**Normalized Average Weekly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.333**	-0.930*	-0.816
	(0.634)	(0.555)	(1.153)
N	48,529	40,991	16,957
Panel C	**Normalized Average Hourly Earnings**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-1.188**	-0.649	-1.568*
	(0.527)	(0.411)	(0.805)
N	48,529	40,982	16,941
Panel D	**Total Working Years**		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-2.290	-0.010	-2.269
	(3.467)	(4.416)	(3.302)
N	48,529	48,529	48,529
	Normalized Average Hours Worked		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	-0.505	-0.600*	-0.461
	(0.387)	(0.352)	(0.746)
N	48,529	41,023	16,978
Basic Controls	Yes	Yes	Yes
Worker Controls	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes

NOTES: Panels A, B, C, D and E respectively represent the following dependent variables for employee i working in industry k (in 2000) in the period 2001 to 2007. Panel A) Normalized Total Earnings - total earnings between 2001 and 2007 divided by average annual earnings between 1997 and 2000). Panel B) Normalized Average Weekly Earnings - average weekly earnings between 2001 and 2007 divided by average weekly earnings between 1997 and 2000; Panel C) Normalized Average Hourly Earnings - average hourly earnings between 2001 and 2007 divided by average hourly earnings between 1997 and 2000; Panel D) Total Working Years - the number of years employed between 2001 and 2007 divided by the number of years employed between 1997 and 2000; Panel E) Normalized Average Hours Worked - the average number of hours worked per week between 2001 and 2007 divided by the average number of hours worked per week between 1997 and 2000. The sample is restricted to workers with high labor force attachment in the period 1997–2000. The first column corresponds to the baseline model. The other columns show mutually exclusive channels: worker remains in the initial commuting zone (column 2) and worker switches to a different commuting zone (column 3). The explanatory variable of interest is the change in import penetration (2000–2007) in the worker's initial industry of employment. All columns are estimated by 2SLS and include all worker- and industry-level controls - see notes of Table 3 for a list of the controls and details on the IV. Standard errors clustered by industry (ISIC3 - 3-digit) are in parentheses ($N_{clusters} = 110$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.7
Descriptive statistics: trade shocks by age, gender and earnings capacity.

	Male	Female	Old	Young	Low Earnings Capacity	Mid Earnings Capacity	High Earnings Capacity	Low Skill Occupation	Mid Skill Occupation	High Skill Occupation
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.008	0.004	0.007	0.006	0.007	0.007	0.004	0.003	0.011	0.004
	(0.020)	(0.017)	(0.020)	(0.018)	(0.022)	(0.019)	(0.014)	(0.014)	(0.024)	(0.014)
$\frac{Imports_{chi,00}}{Expenditure_{00}}$	0.006	0.003	0.005	0.004	0.005	0.005	0.003	0.002	0.008	0.003
	(0.018)	(0.015)	(0.018)	(0.016)	(0.021)	(0.017)	(0.012)	(0.012)	(0.021)	(0.013)
Percentile 10 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Percentile 25 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Percentile 50 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Percentile 75 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.006	0.000	0.001	0.000	0.000	0.003	0.000	0.000	0.010	0.000
Percentile 90 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.028	0.006	0.021	0.017	0.024	0.023	0.013	0.004	0.047	0.009

Notes: Each column o the table represents different samples of the high labor force data: males, females, old (above 39), young (below 40), high, mid and low skilled (based on earnings percentiles by cohort in 2000) and high, mid and low skilled occupations. Table shows mean (row with the name of the variable) and standard deviation (row immediately below the name of the variable) for the variables $\Delta_{00/07} Imports_{chi}/Expenditure_{00}$, $Imports_{chi}/Expenditure_{00}$ and CZ_{chi}. The table also shows percentiles of $\Delta_{00/07} Imports_{chi}/Expenditure_{00}$ and of CZ_{chi}. The UK Data Secure Data Service does not release results with simple percentiles of the distribution. Hence, to obtain percentile X we average the variable across individuals within percentiles X + 5 and X-5 of the variable. For example, percentile 10 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$" is the mean of Chinese Import Exposure between the percentiles 5 and 15 of the variable.

Table A.8
Descriptive statistics: trade shocks at the firm-level.

	All Firms			No Entrants			Surviving		
	Trad.	Manuf.	All	Trad.	Manuf.	All.	Trad.	Manuf.	All
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.029	0.031	0.003	0.029	0.030	0.004	0.026	0.027	0.004
	(0.036)	(0.036)	(0.015)	(0.035)	(0.036)	(0.017)	(0.034)	(0.034)	(0.017)
Percentile 10 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.000
Percentile 25 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.003	0.005	0.000	0.003	0.003	0.000	0.003	0.003	0.000
Percentile 50 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.012	0.013	0.000	0.012	0.013	0.000	0.011	0.012	0.000
Percentile 75 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.053	0.055	0.000	0.046	0.052	0.000	0.038	0.040	0.000
Percentile 90 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$	0.096	0.096	0.006	0.096	0.096	0.008	0.084	0.084	0.008
$\frac{Imports_{chi,00}}{Expenditure_{00}}$	0.024	0.025	0.003	0.023	0.024	0.003	0.021	0.022	0.003
	(0.040)	(0.040)	(0.016)	(0.039)	(0.040)	(0.017)	(0.037)	(0.037)	(0.017)

Notes: Each column of the table represents different samples, described in the text. The Table shows the mean and standard deviation (in parentheses) for the variables $\Delta_{00/07} Imports_{chi}/Expenditure_{00}$ and $Imports_{chi}/Expenditure_{00}$. The table also shows percentiles of $\Delta_{00/07} Imports_{chi}/Expenditure_{00}$. The UK Data Secure Data Service does not release results with simple percentiles of the distribution. Hence, to obtain percentile X we average the variable across individuals within percentiles X+5 and X-5 of the variable. For example, percentile 10 of $\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{00}}$" is the mean of Chinese Import Exposure between the percentiles 5 and 15 of the variable.

Table A.9
Plant employment growth - tradable sectors.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
			Employment Growth		
Panel A			*Tradable - All Firms*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-1.324	-2.590**	-3.019***	-3.684*	-3.452*
	(1.096)	(1.106)	(1.006)	(2.098)	(1.758)
1st Stage(s) Statistics					
IV_{chi}		.024***	.024***	.018***	.018***
		(.005)	(.005)	(.005)	(.005)
KP F Stat		18.952	18.927	10.766	10.831
N	212,676	212,676	212,676	212,676	212,676
Panel B			*Tradable - No Entrants*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-1.785	-3.183***	-3.450***	-2.834	-3.588*
	(1.175)	(1.171)	(1.199)	(1.782)	(1.934)
1st Stage(s) Statistics					
IV_{chi}		.024***	.024***	.017***	.017***
		(.006)	(.005)	(.005)	(.005)
KP F Stat		18.825	18.888	10.264	10.412
N	135,378	135,378	135,378	135,378	135,378
Panel C			*Tradable - Surviving*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-0.664	-1.368***	-1.554***	-1.779**	-1.854**
	(0.413)	(0.492)	(0.552)	(0.866)	(0.912)
1st Stage(s) Statistics					
IV_{chi}		.023***	.023***	.016***	.016***
		(.005)	(.005)	(.005)	(.005)
KP F Stat		19.290	19.294	9.293	9.506
N	67,337	67,337	67,337	67,337	67,337
Firm Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: The regressions are estimated at the plant level. Panel A includes all plants in tradable goods sectors, Panel B restricts to the sample without new entrants, and Panel C restricts to firms alive at the start and end of the sample period. Employment Growth is defined as change in log(employment) between 2000 and 2007. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable is the change in import penetration relative to plants' industry in 2000 or plants' industry in its entry year if plant enters after 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. "Firm Controls" include enterprise birth date fixed effects, a dummy for enterprise foreign ownership in the starting period and enterprise employment in the starting period. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Robust standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 52$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.10
Plant activity status - tradable sectors.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
			Activity Status		
Panel A			*Tradable - All Firms*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-0.808**	-0.899**	-0.840**	-0.791	-0.996*
	(0.322)	(0.364)	(0.323)	(0.554)	(0.541)
1st Stage(s) Statistics					
IV_{chi}		.024***	.024***	.018***	.018***
		(.005)	(.005)	(.005)	(.005)
KP F Stat		18.952	18.927	10.766	10.831
N	212,676	212,676	212,676	212,676	212,676
Panel B			*Tradable - No Entrants*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-0.956***	-0.899**	-0.833**	-0.639	-1.022*
	(0.346)	(0.388)	(0.342)	(0.615)	(0.586)
1st Stage(s) Statistics					
IV_{chi}		.024***	.024***	.017***	.017***
		(.006)	(.005)	(.005)	(.005)
KP F Stat		18.825	18.888	10.264	10.412
N	135,378	135,378	135,378	135,378	135,378
Firm Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: The regressions are estimated at the plant level. Panel A includes all plants in tradable goods sectors, Panel B restricts to the sample without new entrants. Activity Status is a dummy variable equals to 1 if a plants was alive in 2007 and 0 otherwise. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable is the change in import penetration relative to plants' industry in 2000 or plants' industry in its entry year if plant enters after 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. "Firm Controls" include enterprise birth date fixed effects, a dummy for enterprise foreign ownership in the starting period and enterprise employment in the starting period. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Robust standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 52$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.11
Plant employment growth - all sectors.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
			Employment Growth		
Panel A			*All Sectors - All Firms*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-4.177***	-5.580***	-3.290***	-3.278	-2.381
	(0.924)	(1.106)	(1.011)	(2.015)	(1.764)
1st Stage(s) Statistics					
IV_{chi}		.031***	.031***	.017***	.017***
		(.005)	(.005)	(.005)	(.005)
KP F Stat		31.002	30.902	11.125	11.129
N	1,799,189	1,799,189	1,799,189	1,799,189	1,799,189
Panel B			*All Sectors - No Entrants*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-1.522	-2.197	-3.579***	-2.199	-2.133
	(1.362)	(1.431)	(1.240)	(1.960)	(1.690)
1st Stage(s) Statistics					
IV_{chi}		.031***	.03***	.016***	.016***
		(.006)	(.006)	(.005)	(.005)
KP F Stat		30.494	30.361	10.610	10.638
N	930,975	930,975	930,975	930,975	930,975
Panel C			*All Sectors - Surviving*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-1.157***	-1.702***	-1.236**	-1.572**	-1.388*
	(0.438)	(0.508)	(0.482)	(0.761)	(0.743)
1st Stage(s) Statistics					
IV_{chi}		.029***	.029***	.016***	.016***
		(.005)	(.005)	(.005)	(.005)
KP F Stat		32.393	32.135	10.046	10.099
N	416,388	416,388	416,388	416,388	416,388
Firm Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: The regressions are estimated at the plant level. Panel A includes all plants in any sector, Panel B restricts to the sample without new entrants, and Panel C restricts to firms alive at the start and end of the sample period. Employment Growth is defined as change in log(employment) between 2000 and 2007. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable is the change in import penetration relative to plants' industry in 2000 or plants' industry in its entry year if plant enters after 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. "Firm Controls" include enterprise birth date fixed effects, a dummy for enterprise foreign ownership in the starting period and enterprise employment in the starting period. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Robust standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 52$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.12
Plant activity status - all sectors.

	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS	2SLS
			Activity Status		
Panel A			*All Sectors - All Firms*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	-0.278	-0.189	-0.320	-0.231	-0.383
	(0.419)	(0.465)	(0.410)	(0.664)	(0.533)
1st Stage(s) Statistics					
IV_{chi}		.031***	.031***	.017***	.017***
		(.005)	(.005)	(.005)	(.005)
KP F Stat		31.002	30.902	11.125	11.129
N	1,799,189	1,799,189	1,799,189	1,799,189	1,799,189
Panel B			*All Sectors - No Entrants*		
$\frac{\Delta_{00/07} Imports_{chi}}{Expenditure_{97}}$	0.129	0.468	0.002	0.088	-0.326
	(0.499)	(0.586)	(0.388)	(0.772)	(0.565)
1st Stage(s) Statistics					
IV_{chi}		.031***	.03***	.016***	.016***
		(.006)	(.006)	(.005)	(.005)
KP F Stat		30.494	30.361	10.610	10.638
N	930,975	930,975	930,975	930,975	930,975
Firm Controls			Yes		Yes
Industry Controls				Yes	Yes

NOTES: The regressions are estimated at the plant level. Panel A includes all plants in any sector, Panel B restricts to the sample without new entrants. Activity Status is a dummy variable equals to 1 if a plants was alive in 2007 and 0 otherwise. Column 1 is estimated by OLS and columns 2–5 by 2SLS. The explanatory variable is the change in import penetration relative to plants' industry in 2000 or plants' industry in its entry year if plant enters after 2000. "Industry Controls" include pre-period employment growth and pre-period employment changes for two different periods, from 1986 to 1991 (2-digit industry) and from 1994 to 1996 (4-digit industry) and a broad outsourcing measure (share of input costs in value added at the 2-digit industry level); and other 4-digit industry measures such as pre-period change (1997–1999) in import penetration from China and the rest of the world (RoW); levels of import penetration from the RoW, real (log) sales, employment level, real (log) exports to China, R&D intensity, real purchase of computer services and real investment in machinery, all in 2000. "Firm Controls" include enterprise birth date fixed effects, a dummy for enterprise foreign ownership in the starting period and enterprise employment in the starting period. The instrument for change in industry Chinese import penetration, IV_{chi}, is the China fixed effect estimated for the 2000–2007 difference from an auxiliary regression of exports on sector dummies considering all countries of the world but the UK, divided by the level of expenditure in the industry in 1997 in the UK. Robust standard errors clustered by industry (ISIC3 - 3-digit) in parentheses ($N_{clusters} = 52$). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at 10.1016/j.euroecorev.2021.103678

References

Acemoglu, D., Autor, D., Dorn, D., Hanson, G.H., Price, B., 2016. Import competition and the great us employment sag of the 2000s. J. Labor Econ. 34 (S1), S141–S198. doi:10.1086/682384.

Akcigit, U., Kerr, W.R., 2018. Growth through heterogeneous innovations. J. Polit. Econ. 126 (4), 1374–1443. doi:10.1086/697901.

Artuç, E., Chaudhuri, S., McLaren, J., 2010. Trade shocks and labor adjustment: a structural empirical approach. Am. Econ. Rev. 100 (3), 1008–1045.

Ashournia, D., Munch, J., Nguyen, D., 2014. The impact of chinese import penetration on danish firms and workers. Economics Series Working Papers 703. University of Oxford, Department of Economics.

Autor, D.H., Dorn, D., Hanson, G.H., 2013. The china syndrome: local labor market effects of import competition in the united states. Am. Econ. Rev. 103 (6), 2121–2168.

Autor, D.H., Dorn, D., Hanson, G.H., 2016. The china shock: learning from labor-market adjustment to large changes in trade. Annu. Rev. Econ. 8 (1), 205–240. doi:10.1146/annurev-economics-080315-015041.

Autor, D.H., Dorn, D., Hanson, G.H., Song, J., 2014. Trade adjustment: worker-level evidence. Q. J. Econ. 129 (4), 1799–1860.

Bernard, A.B., Jensen, J.B., Schott, P.K., 2006. Survival of the best fit: exposure to low-wage countries and the (uneven) growth of u.s. manufacturing plants. J. Int. Econ. 68 (1), 219–237.

Bloom, N., Draca, M., Van Reenen, J., 2016. Trade induced technical change? the impact of chinese imports on innovation, it and productivity. Rev. Econ. Stud. 83 (1), 87–117. doi:10.1093/restud/rdv039.

Brussevich, M., 2018. Does trade liberalization narrow the gender wage gap? the role of sectoral mobility. Eur. Econ. Rev. 109, 305–333. doi:10.1016/j.euroecorev.2018.02.007. Gender Differences in the Labor Market.

Caliendo, L., Dvorkin, M., Parro, F., 2019. Trade and labor market dynamics: general equilibrium analysis of the china trade shock. Econometrica 87 (3), 741–835. doi:10.3982/ECTA13758.

Costa, F., Garred, J., Pessoa, J.P., 2016. Winners and losers from a commodities-for-manufactures trade boom. J. Int. Econ. 102 (C), 50–69.

Dauth, W., Findeisen, S., Suedekum, J., 2014. The rise of the east and the far east: German labor markets and trade integration. J. Eur. Econ. Assoc. 12 (6), 1643–1675.

Dix-Carneiro, R., Kovak, B., 2019. Margins of labor market adjustment to trade. J. Int. Econ.. Forthcoming.

Dix-Carneiro, R., Kovak, B.K., 2017. Trade liberalization and regional dynamics. Am. Econ. Rev. 107 (10), 2908–2946. doi:10.1257/aer.20161214.

Eaton, J., Kortum, S., 2002. Technology, geography, and trade. Econometrica 70 (5), 1741–1779.

Egger, P., Pfaffermayr, M., Weber, A., 2007. Sectoral adjustment of employment to shifts in outsourcing and trade: evidence from a dynamic fixed effects multinomial logit model. J. Appl. Economet. 22 (3), 559–580.

di Giovanni, J., Levchenko, A.A., 2012. Country size, international trade, and aggregate fluctuations in granular economies. J. Polit. Econ. 120 (6), 1083–1132. doi:10.1086/669161.

di Giovanni, J., Levchenko, A.A., Zhang, J., 2014. The global welfare impact of china: trade integration and technological change. Am. Econ. J. Macroecon. 6 (3), 153–183.

Hakobyan, S., McLaren, J., 2016. Looking for local labor market effects of nafta. Rev. Econ. Stat. 98 (4), 728–741. doi:10.1162/REST_a_00587.

Handley, K., Limão, N., 2017. Policy uncertainty, trade, and welfare: theory and evidence for china and the united states. Am. Econ. Rev. 107 (9), 2731–2783. doi:10.1257/aer.20141419.

Holmes, T.J., Stevens, J.J., 2014. An alternative theory of the plant size distribution, with geography and intra- and international trade. J. Polit. Econ. 122 (2), 369–421. doi:10.1086/674633.

Hsieh, C.-T., Klenow, P.J., 2014. The life cycle of plants in india and mexico *. Q. J. Econ. 129 (3), 1035–1084. doi:10.1093/qje/qju014.

Iacovone, L., Rauch, F., Winters, L.A., 2013. Trade as an engine of creative destruction: mexican experience with chinese competition. J. Int. Econ. 89 (2), 379–392. doi:10.1016/j.jinteco.2012.06.

Keller, W., Utar, H., 2018. Globalization, Gender, and the Family. Working Paper 25247. National Bureau of Economic Research doi:10.3386/w25247.

Keller, W., Utar, H., 2019. International trade and job polarization: evidence at the worker level. NBER Working Paper Series. 10.3386/w22315

Kovak, B.K., 2013. Regional effects of trade reform: what is the correct measure of liberalization? Am. Econ. Rev. 103 (5), 1960–1976.

Medina, P., 2020. Import Competition, Quality Upgrading and Exporting: Evidence from the Peruvian Apparel Industry. Mimeo. University of Toronto.

Melitz, M.J., 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica 71 (6), 1695–1725.

Menezes-Filho, N.A., Muendler, M.-A., 2007. Labor Reallocation in Response to Trade Reform. CESifo Working Paper Series 1936. CESifo Group Munich.

Mion, G., Zhu, L., 2013. Import competition from and offshoring to china: a curse or blessing for firms? J. Int. Econ. 89 (1), 202–215.

Office for National Statistics, 2012. Annual respondents database, 1973–2008: Secure access. [data collection], 2nd Ed. UK Data Service. SN:6644 doi:10.5255/UKDA-SN-6644-2.

Office for National Statistics, 2013. International Trade in Services: 2011. Technical Report doi:10.4324/9780429043130-7.

Office for National Statistics, 2019a. Annual survey of hours and earning, 1997–2019: secure access. [data collection], 15th ed. UK Data Service. SN: 6689 doi:10.5255/UKDA-SN-6689-14.

Office for National Statistics, 2019b. Business structure database, 1997–2018: Secure access. [data collection]., 10th ed.UK Data Service. SN: 6697. 10.5255/UKDA-SN-6697-10.

Office for National Statistics, Social Survey Division, Northern Ireland Statistics and Research Agency, Central Survey Unit, 2020. Quarterly labour force survey, 1992–2019: Secure access. [data collection]. 18th ed.. UK Data Service. SN: 6727. 10.5255/UKDA-SN-6727-19.

Revenga, A.L., 1992. Exporting jobs? the impact of import competition on employment and wages in u.s. manufacturing. Q. J. Econ. 107 (1), 255–284.

Scwab, K., 2018. The Global Competitiveness Index Report 2017-2018 No. 31. World Economic Forum.

Topalova, P., 2007. Trade liberalization, poverty and inequality: Evidence from Indian districts. In: Globalization and Poverty. National Bureau of Economic Research, Inc, pp. 291–336. NBER Chapters

Utar, H., 2018. Workers beneath the floodgates: low-wage import competition and workers' adjustment. Rev. Econ. Stat. 100 (4), 631–647. doi:10.1162/rest_a_00727.

Utar, H., Ruiz, L.B.T., 2013. International competition and industrial evolution: evidence from the impact of chinese competition on mexican maquiladoras. J. Dev. Econ. 105 (C), 267–287.