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Local Labour Market Effects of Manufacturing Import Competition: Evidence from the Netherlands

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Abstract

In my thesis I construct a region-specific measure of the increase in exposure to manufacturing import competition from China in the Netherlands over the period 1996-2007, based on start-of-period regional sector specializations and differences in national import growth across sectors. Unsurprisingly, I find a strongly negative effect of this measure on the contemporaneous change in local manufacturing employment. Next, I estimate the impact of import exposure on four potential channels of adjustment to adverse labour demand shocks. The most robust evidence is found in support of the conclusion that the China shock has been absorbed by a drop in the labour force participation rate, which highlights the adverse effects to some workers of opening up to trade. I also find some evidence of migration and inter-sectoral mobility playing a role. As an extension, I estimate the effect of import exposure on anti-EU sentiment and voting for populism, but I detect no statistically significant relationship.

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1 Introduction

Trade theory shows that free trade is good for the average worker, but that it can drastically change the income and wage distribution *across* workers. In the Western world, dissatisfaction among the 'losers of globalisation' has led to a moderate return to protectionism, after decades of increasing trade globalization (Evenett & Fritz, 2015). The UK have opted to leave the European Union, the US have elected a protectionist president and in most European countries, populist parties that oppose free trade have conquered a prominent role on the political stage (Van der Waal & De Koster, 2017). In my thesis, I attempt to make a contribution to the literature that tries to explain these patterns by examining the consequences of trade globalization for labour markets in developed countries. More specifically, I focus on the effects on the Dutch labour market of manufacturing import competition from low-wage countries.

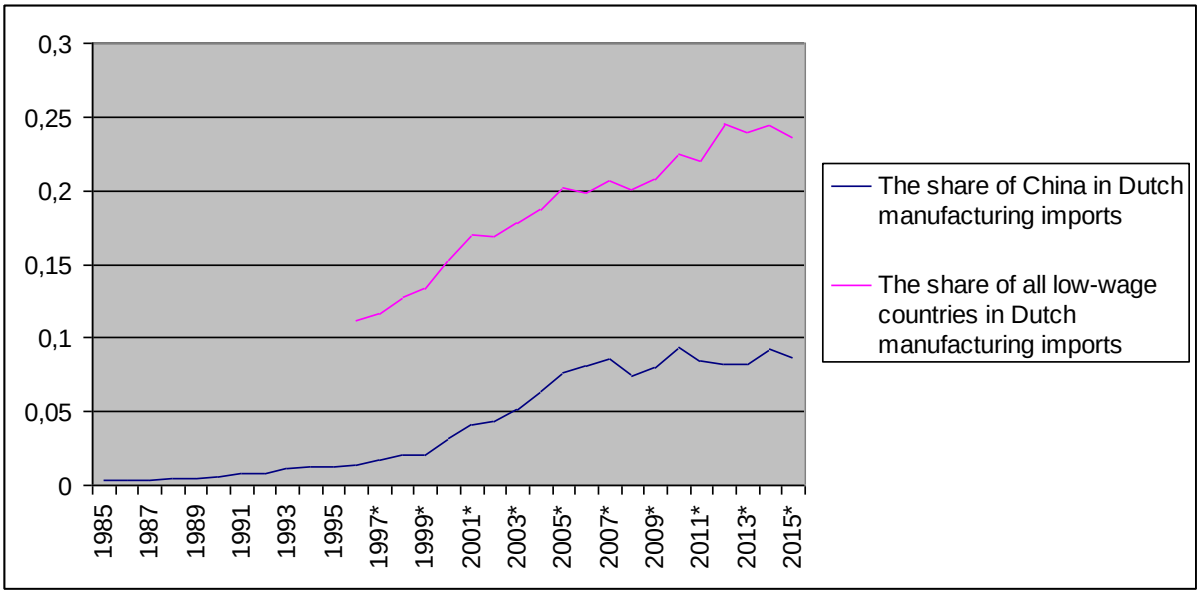
Trade theory predicts falling trade barriers to shift labour intensive production activities like manufacturing from capital-abundant countries to labour-abundant countries. This may explain why in the Netherlands, manufacturing employment has continuously declined over the past decades, from 16.8% of the working-age population in 1970 to just 7.2% in 2015, or from 25.4% of total employment to just 9.4%[1]. However, manufacturing employment may not only be declining due to trade globalization but also due to e.g. skill-biased technological change. In order to disentangle the import competition effect from other factors that influence Dutch manufacturing employment, I exploit the so-called 'China shock' that the Netherlands experienced over the period 1996-2007.

As shown in graph 1, China's share in Dutch manufacturing imports suddenly grew spectacularly in between 1996 and 2007, whilst being stable before and after this period. In 1996, China accounted for 1.4% (2.0 billion euros) of total Dutch manufacturing imports, by 2007 this figure had risen to 8.6% (26.3 billion euros). Over the same period, Dutch manufacturing exports to China grew by much less: from 0.4% (0.5 billion euros) in total Dutch manufacturing exports to 1.0% (3.6 billion euros)[2]. Graph 1 also shows that in between 1996 and 2007 China almost entirely explains the growth in the share of low-wage countries in Dutch manufacturing imports (11.2% in 1996 and 20.6% in 2007[3]). Similarly, China almost entirely explains the change in the Dutch manufacturing trade balance, which

[1] Source: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/82578NED/table?ts=1530539472597
[2] Source: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83929NED/table?ts=1530539532581
[3] Source: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/7137shih/table?ts=1526977443821

worsened by 26.4 billion euros over the 1996-2007 period[4]. Finally, virtually all other high-income countries have experienced similar Chinese manufacturing import penetration growth in between 1996 and 2007[5] and China's productivity growth in the 1990s and 2000s has been higher than in any other major economy (Autor et al., 2013).

Together, all these observations indicate that China's spectacular export surge was driven solely by Chinese developments, most likely falling trade barriers (Brandt et al., 2012) and improved supply conditions due to economic reforms (Hsieh & Klenow, 2009). Hence, Chinese manufacturing import growth over the 1996-2007 period arguably provides a source of Dutch exposure to import competition from low-wage countries that was fully exogenous to domestic conditions. One could be concerned that productivity or technology shocks in the Western world rather than those in China may be driving growth in imports, but all evidence points towards the conclusion that China's export surge is related to China-specific factors, as also documented by Autor et al. (2013).



Graph 1: China's share in Dutch manufacturing imports, low-wage countries' share in Dutch manufacturing imports, 1985-2015 (pre-1996 data unavailable for low-wage countries).

Given the exogeneity to the Dutch labour market of China's export surge, the China shock provides an ideal opportunity to estimate the effect of manufacturing import competition on Dutch labour market outcomes without having to worry about endogeneity issues like reverse causality. I do so by studying 40 different Dutch local labour markets. To the example of

[4] https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83929NED/table?ts=1530621323649
[5] Source: https://atlas.media.mit.edu/en/profile/country/chn/#Exports.

Autor et al. (2013), I compute a region-specific measure for exposure to Chinese imports, combining national-level data on the growth of imports in different manufacturing sectors over the period 1996-2007 with data on start-of-period regional manufacturing sector specialisations. The intuition behind this approach is that depending on their ex-ante sector specializations, each of the 40 Dutch regions has been hurt to a different degree by the China shock, as there are differences across sectors in China's productivity growth. For example, if China's export growth has been stronger in textiles than in machinery, a Dutch region that was specialized in textiles before the China shock should be affected more than a Dutch region in which most people were employed in machinery production.

I use the measure of regional exposure over the 1996-2007 period to estimate the effect of import competition on the contemporaneous change in local manufacturing employment. OLS estimates are likely to be biased due to positive demand shocks in some manufacturing sectors and due to labour market anticipation effects. Therefore I instrument for growth in Dutch imports from China using import growth in other rich nations, and for start-of-period regional sector specialisations using lagged regional sector specialisations. 2SLS analysis on the 1996-2007 period then yields a significantly negative effect of import exposure, indicating (just as expected) that in those regions for which import exposure was highest, manufacturing employment decreased most. Placebo tests provide little evidence that these regions already experienced the strongest job declines before the China shock, which mitigates the concern that the negative estimate simply captures pre-existing declining trends in manufacturing employment.

Next, I estimate the effect of regional import exposure on the local working-age population count, on the local number of long-term benefit receivers, on the local labour force participation rate and on the local average wage rate in non-manufacturing. In doing so, the channel(s) through which Dutch local labour markets adjust to adverse demand shocks can be identified. Moreover, by also estimating the effect of increased import exposure over the 1996-2007 period on the potential adjustment channels over the periods ranging from 1996 to 2003, 2004, ..., 2014, some insight can be gained into the *speed* of adjustment to labour demand shocks in the Netherlands.

2SLS estimates suggest that those that lost their job in the manufacturing sector either migrated out of the region, withdrew from the labour market, or joined the non-manufacturing labour force in the same region. The most exposed areas experienced the strongest decrease in working-age population count, the strongest decrease in the labour force participation rate and the strongest decrease in the average non-manufacturing wage rate. Estimates also highlight

sluggish adjustment: migration out of the most exposed areas did not stop until 2011, whilst China's share in Dutch manufacturing imports already stagnated around 2007. Also, the effect of exposure on non-manufacturing wages is only visible from 2010 onward.

In the final part of my thesis, I consider whether manufacturing import competition has translated into electoral outcomes at Dutch general elections in 2006 and 2010, and at the national referendum in 2005. The decreased participation rate in the most exposed areas indicates that the losers of globalisation may be concentrated there, and the adverse effects of the China shock may have induced them to turn to protectionist or anti-EU voting behaviour. Earlier research has shown that there is a strong effect of regional import exposure on local voting for e.g. Trump and Brexit. However, I find no evidence of such a relationship in the Netherlands.

The remainder of this thesis is organised as follows. Section 2 discusses some related studies. In section 3, I explain the construction of the local import exposure measure in more detail. Section 4 presents and discusses the results with regard to labour market outcomes. In section 5, the results with regard to electoral outcomes are presented. Section 6 concludes.

2 Related studies

2.1 The China shock and labour market outcomes

The identification strategy used in my thesis was first introduced by Autor et al. (2013), who show that those US areas that - based on ex-ante sector specializations - have been exposed most strongly to manufacturing import competition from China over the 1990-2007 period have experienced the biggest decline in manufacturing employment over that period. Results indicate that this adverse labour demand shock has been absorbed by higher unemployment, lower labour force participation and lower wages in non-manufacturing (indicating that those who lost their job in the exposed sector drive down wages in the non-exposed sector). The local working-age population count is not affected, suggesting that migration is not a channel of adjustment to regional labour demand shocks in the US.

Over the past few years, several other researchers have copied the empirical strategy of Autor et al. in order to consider the effect of the China shock on other countries' labour markets. Also they find a strongly negative impact of region-specific manufacturing import competition on local manufacturing employment. Also with regard to adjustment channels, results of studies using European data are largely similar to Autor et al.'s. Donoso et al. (2014) show that in Spain, import exposure is related to higher unemployment. Pessoa (2016) does the same for the UK and using Norwegian data, Balsvik et al. (2014) conclude that the China shock is associated with higher unemployment *and* a lower labour force participation rate. Importantly, European studies do not always find an effect on average wages in non-manufacturing, which could be explained by lower inter-sectoral mobility in Europe and/or by Europe's relatively high wage rigidity as compared to the US.

Some researchers have extended Autor's approach by considering wage effects *along* the wage distribution. Malgouyres (2016) finds that in France's manufacturing sector, the most strongly exposed areas experience a wage decrease for both the upper tail and the lower tail of the wage distribution, whereas in its non-manufacturing sector, the upper tail benefits and the lower tail loses from manufacturing import competition. Ashournia et al. (2014) reach a similar conclusion using Danish data. Due to data limitations, I will not consider effects on local wage inequality in my thesis.

2.2 Labour market adjustment in the Netherlands

Broersma & Van Dijk (2001) study Dutch adjustment to regional labour demand shocks in the 1990s. They conclude that shocks are absorbed through the labour force participation rate, whilst limited impact on migration and unemployment is observed. These findings are largely in line with the results of Decressin & Fatas (1995), who show that in European countries, adjustment to adverse labour demand shocks typically occurs through a drop in the local participation rate. A similar study by Blanchard & Katz (1992) indicates that in the US, local labour markets are more likely to adjust through migration out of the affected areas.

Speculating upon the reasons behind the participation rate being the main channel of adjustment, Broersma & Van Dijk stress that generous early retirement arrangements allow Dutch employers and redundant employees to negotiate a mutually beneficial move from employment to non-participation. Also, they note that many of those who move between non-participation and employment in the event of a labour demand shock are students and women.

Finally, Broersma & Van Dijk document that adjustment through participation in the Netherlands takes place at a rapid pace as compared to other European nations.

It should be stressed that all three mentioned studies use an identification strategy that may well suffer from endogeneity issues. The strategy defines a "shock" as simply being a change in the employment count. In contrast, the methodology used by Autor et al. relies on exogenous changes in employment: changes caused by the sudden Chinese productivity surge. Therefore, results with regard to adjustment channels may differ. Indeed, Autor et al.'s results indicate that migration is in fact the one channel that US local labour markets definitely do *not* adjust through, a finding that diametrically opposes the conclusions of Blanchard and Katz.

2.3 The China shock and electoral outcomes

In Autor et al. (2017), Autor and his team extend their earlier work by estimating the effect of regional import exposure on the local Republican vote share at the 2016 US general elections. During his campaign, the populist Republican candidate vowed to renegotiate free trade agreements and thereby he made himself appealing to the 'losers of globalisation'. Autor et al.'s results overwhelmingly demonstrate a positive relation between increased exposure to manufacturing import competition from China and the change in the Republican vote share from 2000 to 2016. The estimated effects imply that had the growth of manufacturing imports

from China been 50% lower, the Republican candidate would have lost several closely contested states, enabling the Democrat candidate to claim overall victory.

Colantone & Stanig (2016) link the China shock to the leave vote share at the 2016 UK national referendum on country's membership of the European Union. Their strategy is highly conservative: fixed effects for macro-regions are added, meaning that much variation in import exposure across micro-regions within the same macro-region is needed in order to find an effect on the leave vote share. Nevertheless, Colantone and Stanig find a strongly positive effect of regional import exposure on the local leave share. When comparing a micro-region at the 10th percentile with a micro-region at the 90th percentile within the same macro-region, a 4.5 percentage point difference in the leave vote share is predicted. Immigration, a frequently cited reason why people voted for Brexit, appears to be playing no role at all at the local level when import exposure is controlled for.

Finally, using a similar strategy as Colantone and Stanig, Malgouyres (2017) detects a small but significantly positive impact of regional exposure to import competition from low-wage countries on the local vote share of right-wing populist party Front National at presidential elections in France.

3 Regional import exposure

To construct a measure for regional exposure to manufacturing import competition from China, I use equation (1), to the example of Autor et al. (2013).

$$\Delta IPW_{nit} = \sum_j L_{ijt} / L_{njt} * \Delta M_{ncjt} / L_{it} \quad (1)$$

L_{ijt} is the number of hours worked in region i in manufacturing sector j in 1994. L_{njt} is the number of hours worked in the Netherlands in manufacturing sector j in 1994. ΔM_{ncjt} is the percentage change in Dutch imports from China related to manufacturing sector j in between 1996 and 2007. L_{it} is the total number of hours worked in region i in 1994.

This measure combines initial (1994[6]) differences in sector specializations between regions with differences in imports growth from China between those manufacturing sectors, in order to measure the change between 1996 and 2007 in Chinese import exposure per labour unit in each Dutch region. The intuition behind the measure is straightforward: Dutch regional labour markets have been exposed to a different degree to Chinese import competition, depending on their sector specialisation before the China shock.

I distinguish between 40 different commuting zones (COROP regions) and 10 different manufacturing sectors. These are the finest levels at which regional labour volumes are publicly available. COROP regions are ideal for this research, as this regional division of the Netherlands was specifically created to distinguish separate local labour markets.

Statistics Netherlands measures labour volumes according to the SBI index, whilst manufacturing imports are measured according to the SITC index. I match SITC categories to their corresponding SBI categories as shown below.

Labour units (SBI)	**Imports (SITC)**
Food, beverages and tobacco	1
Textiles	21, 26, 61, 65, 83, 84, 85
Paper	25, 64
Printing	892
Petroleum, chemicals, rubbers and plastics	23, 334, 335, 5, 62
Metals	67, 68
Metal products and machinery	69, 71, 72, 73, 74
Electronics	75, 76, 77, 87, 88, 898
Transport equipment	78, 79
Remaining manufacturing industries	24, 63, 664, 665, 666, 82

[6] Due to severe data limitations I use 1994 instead of 1996. If it makes any difference, it will only improve my proxy of import exposure as it mitigates anticipation effects (see also chapter 4).

Note that ΔIPW measures both the variation in import exposure arising from regional ex-ante differences in manufacturing versus non-manufacturing activities, and the variation arising from regional ex-ante differences in sector specializations *within* manufacturing. By adding the start-of-period manufacturing share in total employment as a control variable in the estimations, these two effects can be disentangled. An overview of each COROP region's import exposure value and start-of-period manufacturing share in total employment is shown in table 1 below.

	ΔIPW	**Start-of-period manuf share**
Achterhoek	4.32	0.25
Agglomeratie Haarlem	2.66	0.11
Agglomeratie Leiden en Bollenstreek	1.27	0.12
Agglomeratie 's-Gravenhage	0.97	0.05
Alkmaar en omgeving	1.72	0.12
Arnhem/Nijmegen	2.78	0.14
Delft en Westland	1.86	0.11
Delfzijl en omgeving	4.18	0.26
Flevoland	1.65	0.12
Groot-Amsterdam	2.22	0.07
Groot-Rijnmond	1.95	0.12
Het Gooi en Vechtstreek	4.34	0.15
IJmond	2.35	0.28
Kop van Noord-Holland	1.58	0.11
Midden-Limburg	5.19	0.26
Midden-Noord-Brabant	3.29	0.19
Noord-Drenthe	2.04	0.13
Noord-Friesland	2.17	0.15
Noord-Limburg	5.89	0.26
Noordoost-Noord-Brabant	2.36	0.2
Noord-Overijssel	3.36	0.18
Oost-Groningen	4.13	0.24
Oost-Zuid-Holland	1.57	0.13
Overig Groningen	2.44	0.13
Overig Zeeland	2.83	0.16
Twente	3.30	0.23
Utrecht	1.46	0.1
Veluwe	2.39	0.16
West-Noord-Brabant	3.31	0.21
Zaanstreek	2.84	0.21
Zeeuwsch-Vlaanderen	2.66	0.23
Zuid-Limburg	4.15	0.21
Zuidoost-Drenthe	3.01	0.26
Zuidoost-Friesland	3.49	0.19
Zuidoost-Noord-Brabant	7.01	0.26
Zuidoost-Zuid-Holland	4.55	0.19
Zuidwest-Drenthe	5.67	0.2
Zuidwest-Friesland	3.14	0.19
Zuidwest-Gelderland	2.48	0.2
Zuidwest-Overijssel	2.95	0.2

Table 1: The measure of increased exposure to manufacturing imports from China (ΔIPW) in between 1996 and 2007 and the 1996 manufacturing share in total employment.

Most data have been collected from Statistics Netherlands. The value of imports from China to Australia, Canada, Germany and South Korea in 1996 and 2007 for each sector has been collected from the online international trade database of the Observatory of Economic Complexity. URLs to all data sources can be found in the appendix.

4 Labour market outcomes

4.1 OLS estimates

The constructed measure for increased local labour market exposure to manufacturing import competition from China over the period 1996 to 2007 can be used in the following OLS estimation:

$$\Delta L_{it} = \alpha_0 + \alpha_1 * \Delta IPW_{nit} + X_{it}\gamma + e_{it} \quad (2)$$

Where ΔL_{it} is the percentage change from 1996 to 2007 in region i's manufacturing employment. The model is weighted by start-of-period population size. Robust standard errors are used.

$X_{it}\gamma$ is a vector of control variables. ΔIPW is arguably exogenously determined, however certain demographic and labour force characteristics may differentially determine the response of employment to import exposure. Therefore, the vector contains the start-of-period (1996) employed share of working-age women, the population share of immigrants and the high-educated share of the working population. Also, I include the start-of-period share of employment in routine occupations, in order to control for automation: China's productivity growth might have been strongest in those sectors that were most prone to automation in the Netherlands. Finally, and most importantly, the vector contains the start-of-period manufacturing share in total employment. As discussed in the introduction, the difficulty in estimating the causal impact of import exposure on employment lies in the fact that there are other reasons why manufacturing employment has declined over the years. By using the exogenous China shock, this problem is mitigated, however the ΔIPW measure may still in part be picking up the overall trend decline in manufacturing employment rather than the component that is due to import exposure. The addition of the start-of-period manufacturing share in total employment as a control variable should address this issue. It makes that the variation in ΔIPW stems no longer from both specialization in manufacturing versus non-manufacturing activities and sector specializations *within* manufacturing, but only from the latter. The causal estimate will then yield a comparison between regions that have the same initial specialization rate in manufacturing vs. non-manufacturing, but have a different initial industry mix within manufacturing.

OLS results are shown in table 2 below. In column 2, the start-of-period manufacturing share in total employment is included as a control variable. In column 3, the full set of controls is included.

	(1)	(2)	(3)
α_1	-2.56 (0.09)	-4.42 (0.04)	-2.42 (0.25)
Controls	None	Manuf share	Full controls
R^2	0.07	0.09	0.26
Observations	40	40	40

Table 2: The effect of increased import exposure over the period 1996-2007 on the change in local manufacturing employment over the period 1996-2007. OLS estimates. P-values in parentheses.

The coefficient of -2.56 in column 1 must be interpreted as saying that a 1 percentage point per labour unit higher manufacturing imports rise leads to a 2.56 percentage point larger predicted decrease in manufacturing employment.

Results are mixed. The estimates have the expected negative sign, indicating that exposure to manufacturing imports competition from China decreases Dutch manufacturing employment, but only the effects in columns 1 and 2 are statistically significant. When the full set of controls is included, the estimate is no longer significant.

One striking observation is that the start-of-period manufacturing share in total employment has a positive impact on the change in manufacturing employment (not shown). Apparently, in areas specialized in manufacturing before the China shock, the manufacturing sector as a whole experienced a more modest decline as compared to areas that were specialized in non-manufacturing activities. This suggests that in specifications without this control, any harmful effects of import competition from China may be disguised. Indeed, adding the start-of-period manufacturing share as a control variable lowers α_1 a lot (see column 2).

4.2 2SLS estimates

A potential threat to the unbiasedness of α_1 is that the differences in import growth across manufacturing sectors may not only be due to exogenous differences in productivity growth across Chinese manufacturing sectors, but also to endogenous Dutch demand shocks. If demand for goods produced in a certain sector has risen in between 1996 and 2007, this could

well result in both higher imports in that sector and in higher manufacturing employment in that sector, and hence in an overestimation of the true causal effect. A second threat to the internal validity is that at the beginning of the China shock, some adjustments may already have occurred to the Dutch labour market in anticipation of the upcoming wave of Chinese imports. Employment may have been cut in sectors in which producers anticipated a large Chinese productivity surge. This would again result in an overestimation of the true causal effect. In order to deal with these two issues, I construct the instrumental variable ΔIPW_{oit}:

$$\Delta IPW_{oit} = \sum_{(j)} L_{ijt-1} / L_{njt-1} * \Delta M_{ocjt} / L_{it-1} \quad (3)$$

ΔIPW_{oit} differs from ΔIPW_{nit} in two respects. First, instead of the Dutch import growth in each manufacturing sector, it uses the average of four other rich nations: Australia, Canada, Germany and South Korea. Even though import demand shocks may be correlated across rich nations, using this measure should at least mitigate the first endogeneity concern discussed above. Second, I use the 1987 division of labour hours across manufacturing sectors instead of the 1994 division. This should address the endogeneity issue related to anticipation effects.

The instrument can then be used in the following 2SLS estimation (weighted by start-of-period population size, robust standard errors):

$$\Delta L_{it} = \delta_0 + \delta_1 * \Delta IPW_{nit} + X_{it}\gamma + e_{it} \quad (4)$$

Where ΔIPW_{nit} is instrumented by $\Delta IPW_{oit:}$

$$\Delta IPW_{nit} = \beta_0 + \beta_1 * \Delta IPW_{oit} + e_{it} \quad (5)$$

First stage estimates are shown in table 3 and are very strong. P-values are significant (1% level), explained variation is high and the F-statistic exceeds 10 in all models.

	(1)	(2)	(3)
β_1	1.28 (0.00)	1.18 (0.00)	1.15 (0.00)
Controls	None	Manuf share	Full controls
R^2	0.80	0.81	0.83
Observations	40	40	40

Table 3: First stage estimates. P-values in parentheses.

2SLS estimates are shown in table 4. This time, all three estimates are significantly negative, indicating that in regions that were specialized in manufacturing sectors for which the rise in national imports from China has been most pronounced, the decrease in manufacturing employment has been stronger. The estimate of -8.49 in the preferred specification in column 3 implies that the COROP region at the 75th percentile (Oost-Groningen, 4.13 exposure) has a 16.64 percentage point[7] larger predicted decrease in manufacturing employment than the COROP region at the 25th percentile (Noord-Friesland, 2.17 exposure).

	(1)	(2)	(3)
δ_1	-3.26 (0.06)	-8.41 (0.01)	-8.49 (0.01)
Controls	None	Manuf share	Full controls
Observations	40	40	40

Table 4: The effect of increased import exposure over the period 1996-2007 on the change in manufacturing employment over the period 1996-2007. 2SLS estimates. P-values in parentheses.

Just as expected, 2SLS estimates are lower than OLS estimates. This suggests that my instrumental variable strategy has been successful at mitigating the biases arising from anticipation effects and demand shocks. If one believes demand shocks to be correlated across rich countries, there is still some upward bias remaining. Then, the estimates in table 4 should be regarded as upper bounds. This would not change the interpretation of the results, as the estimates are already significantly negative.

Also, note that the estimate of δ_1 again decreases when the start-of-period manufacturing share in total employment is added as a control variable. This confirms the earlier notion that this effect works in the opposite direction of the effect of exposure stemming purely from sector specializations within manufacturing.

A third threat to the internal validity is that there may be some unobserved factor causing both the employment decline in certain manufacturing sectors and the increase in Chinese exports to high income countries in those sectors. A way to gain insight into whether this is the case, is to check whether before the China shock, employment was already declining most strongly in the areas that would later experience the highest import exposure. Ideally, a placebo test should be performed using the change in manufacturing employment

[7] Somewhat less if one would filter out the demand-driven component of Chinese imports.

over an 11-year period before 1996 as a dependent variable and increased import exposure over the period 1996-2007 as an independent variable. Data limitations obstruct this. Manufacturing employment at the regional level is only available from 1993 onward. Therefore, I perform a quasi-placebo test using the 1993-1998 change in manufacturing employment as a dependent variable. The impact of the China shock was still small over this period, so estimates should be insignificant. Results are shown in columns 1 and 2 of table 5.

For robustness purposes, I perform a second placebo test. Manufacturing *labour hours* at the regional level are available from 1987 to 1994, just like the total number of jobs in manufacturing nationally. Combining these data gives the opportunity to compute the average number of labour hours per job, and hence the change in manufacturing employment per region from 1987 to 1994. The assumption that has to be made is that the evolution from 1987 to 1994 in labour hours per job does not differ between regions. Also, for the specification in column 4, note that I use the start-of-period manufacturing share of labour hours instead of the start-of-period share of manufacturing employment. As long as the ratio between labour hours per job in manufacturing and labour hours per job in non-manufacturing does not differ between regions, this does not form a problem for correct comparison between placebo and initial estimates. As in between 1987 and 1994, China's share in Dutch manufacturing imports only grew from 0.4% to 1.3%[8], exposure to Chinese manufacturing imports has been unimportant in this period. Hence, placebo tests should yield statistically insignificant results. Results are shown in columns 3 and 4 of table 5.

	Quasi-placebo (1)	Quasi-placebo (2)	Placebo (3)	Placebo (4)
δ_1	-0.80 (0.57)	-2.91 (0.18)	-0.56 (0.69)	0.02 (0.99)
Controls	None	Manuf share	None	Manuf share
Observations	40	40	40	40

Table 5: The effect of increased import exposure over the period 1996-2007 on the change in manufacturing employment in earlier periods. 2SLS estimates. P-values in parentheses.

The placebo tests are not ideal due to data limitations. Not only are regional employment data for the pre-China shock era scarce, I can also not perform a placebo test for the model with full controls as these are unavailable pre-1996. However, the tests that I do perform provide

[8] Source: https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83929NED/table?ts=1527375919258

no strong indication that δ_1 simply reflects a pre-existing declining employment trend in those regions that later experienced the largest import exposure from China. Estimates turn insignificant when the change in manufacturing employment in earlier periods is used as a dependent variable. This provides some reassurance that δ_1 captures the period-specific relation between increased Chinese imports and employment decline.

4.3 Adjustment channel and speed

In this section, I consider four potential channels through which Dutch regional labour markets may have adjusted to the large drop in manufacturing labour demand caused by the China shock: migration, labour force participation, dependence on benefits, and wages in non-manufacturing. I estimate the effect of import exposure on the change in each of the four channels over the period 1996-2007. In order to also gain some insight into the *speed* of adjustment, I also estimate the effect on changes over the periods 1996-2003, 1996-2004, 1996-2005, 1996-2006, 1996-2007, 1996-2008, 1996-2009, 1996-2010, 1996-2011, 1996-2012, 1996-2013 and 1996-2014.

First, I look at the change in the working-age population count, so as to consider whether the excess supply on the local labour market induced by the China shock has led people to move away from the most strongly exposed areas. An overview of the estimates and the corresponding p-values is shown in column 1 of table 6.

If people did not move away, the excess supply of labour caused by the labour demand drop in the exposed sector may have driven down wages in the non-exposed sector. Column 2 considers whether the most strongly exposed areas have experienced the largest drop in non-manufacturing wages following the China shock.

If people were reluctant to move to another area, and if wages were rigid, it may have been the case that the most strongly exposed areas have experienced a larger rise in the number of long-term unemployment ("bijstand") benefit receivers. Estimates and p-values are shown in column 3.

Instead of relying on unemployment benefits, those adversely affected by the China shock may have chosen to withdraw from the labour market. Therefore, I also estimate the effect of import exposure on the labour force participation rate. Results are shown in column 4.

	Working-age population count (1)	Non-manufacturing wages (2)	Long-term unemployment benefit receivers (3)	Labour force participation rate (4)
1996-2003	-3.42 (0.00)	-0.46 (0.54)	-0.09 (0.94)	-1.24 (0.05)
1996-2004	-3.52 (0.00)	-0.52 (0.43)	-0.78 (0.50)	-1.07 (0.06)
1996-2005	-3.24 (0.01)	-0.28 (0.70)	-0.79 (0.51)	-1.16 (0.04)
1996-2006	-3.35 (0.01)	-0.56 (0.50)	-0.60 (0.60)	-1.35 (0.02)
1996-2007	-3.77 (0.01)	-0.95 (0.22)	-0.31 (0.78)	-1.21 (0.06)
1996-2008	-3.87 (0.01)	-0.61 (0.32)	0.71 (0.56)	-1.31 (0.04)
1996-2009	-4.11 (0.00)	-1.00 (0.15)	0.71 (0.59)	-1.43 (0.03)
1996-2010	-4.24 (0.00)	-1.25 (0.04)	0.30 (0.87)	-1.16 (0.05)
1996-2011	-4.26 (0.00)	-1.39 (0.03)	0.24 (0.89)	-1.09 (0.09)
1996-2012	-4.16 (0.01)	-1.79 (0.02)	-0.91 (0.68)	-1.11 (0.04)
1996-2013	-4.20 (0.01)	-1.85 (0.03)	-1.36 (0.57)	-1.16 (0.05)
1996-2014	-4.03 (0.01)	-1.96 (0.02)	-1.70 (0.49)	-1.28 (0.04)

Table 6: The effect of increased import exposure over the 1996-2007 period on the change in four different labour market outcomes over twelve different periods. Overview of all 2SLS estimates. All models include the full set of controls. P-values in parentheses.

None of the estimates in column 3 are significant at the 10% level, suggesting that (long-term) unemployment is not the channel through which Dutch local labour markets have adjusted to the China shock. The evidence with regard to participation (column 4) is more convincing. Higher exposure is associated with a larger decrease in the labour force participation rate and estimates are often significant at the 5% level. However, the most important channel of adjustment seems to be migration. Estimates in column 1 are negative and often significant at the 1% level. Finally, the significantly negative estimates in column 2 suggest that some of those that lost their manufacturing job joined the non-manufacturing labour force in the same region, driving down wages there.

The estimates in table 6 also provide some insight into adjustment speed. As for the change in the working-age population, estimates indicate that migration out of the most exposed areas persisted until 2011. This suggests that this adjustment channel has been somewhat sluggish, as China's share in Dutch manufacturing imports already stagnated in 2008. As for the participation rate, no evidence of sluggish adjustment is detected. Estimates remain stable after 2003, suggesting a quick drop in participation at the beginning of the China shock, but no further withdrawals at later stages. Finally, the fact that the decline in non-manufacturing wages in the most exposed areas is only visible from 2010 onward suggests that inter-sectoral mobility is low and/or that wages are rigid.

Finally, in order to find out whether the negative estimates in columns 1 and 4 really reflect the consequences of the China shock or whether they simply capture pre-existing

declining trends, I perform some placebo tests in which I regress past changes in the working-age population count and past changes in the labour force participation rate on future changes in import exposure[9]. These tests should yield insignificant estimates. If some estimates are significant, this would indicate that the working-age population decrease and/or the labour force participation decrease in the most exposed areas had already started before the China shock, which would cast doubt on the conclusion that these declining trends are really related to manufacturing import competition from China.

As for the working-age population count, I perform placebo tests on the 1987-1994 period, just like I did in table 5 for manufacturing employment. Note that no test can be performed on the specification with full controls because pre-1996 data on most of the controls are not publicly available. Also, due to data limitations pre-1996, for the labour force participation rate I cannot perform a placebo test on the pre-China shock period. To still gain at least some insight into whether or not the decline is period-specific, I perform a quasi-placebo test on the 1996-2000 period, when the impact of the China shock was still small (see graph 1 in the introduction). Results are shown in tables 7 and 8.

	Placebo (1)	Placebo (2)
δ_1	-0.94 (0.06)	-1.00 (0.11)
Controls	None	Manuf share
Observations	40	40

Table 7: The effect of increased import exposure over the 1996-2007 period on the change in the working-age population count over the period 1987-1994. 2SLS estimates. P-values in parentheses.

	Quasi-placebo (1)	Quasi-placebo (2)	Quasi-placebo (3)
δ_1	-0.15 (0.65)	-0.61 (0.32)	-0.02 (0.98)
Controls	None	Manuf share	Full controls
Observations	40	40	40

Table 8: The effect of increased import exposure over the 1996-2007 period on the change in the labour force participation rate over the period 1996-2000. 2SLS estimates. P-values in parentheses.

[9] There is no need to perform a placebo test on the non-manufacturing wages channel. The non-significance of the estimates up to 2009 already demonstrates that the decline in the most strongly exposed areas only started after the China shock.

The insignificant estimates in table 8 provide some reassurance that the decrease in the labour force participation rate is actually related to the China shock. The decline had not started yet over the period 1996-2000, but it had over the period 1996-2003 and all subsequent years. As for the working-age population count, placebo estimates give more reason for concern. Even though the estimate in column 1 turns insignificant once the start-of-period manufacturing share is added as a control variable, the p-value of 0.11 is not fully reassuring. Based on these results, it would be ambitious to rule out the possibility that the significant estimates in column 1 of table 6 are capturing a pre-existing declining trend in the exposed areas, rather than the causal impact of impact exposure. As a defence, it must be stressed that the placebo estimate of -1.00 is much smaller in magnitude than the estimate of -2.30 (p-value 0.03) in the corresponding 1996-2003 model (not shown). So at least, the declining trend has strengthened in the China shock era.

All in all, my findings are largely in correspondence with those of Broersma & Van Dijk (2001), who also find that Dutch local labour markets adjust almost instantaneously to adverse labour demand shocks through a drop in the labour force participation rate. On the other hand, I detect some evidence of migration playing a role, which contradicts the conclusions of Broersma and Van Dijk and also the conclusions of the 'European' China shock studies mentioned in chapter 2. Finally, note that my finding of a *sluggish* drop in non-manufacturing wages fits well in the picture of the related studies, who show a clear effect in the US and more mixed results in Europe.

5 Electoral outcomes

In chapter 4, I have shown higher exposure to manufacturing import competition from China to be related to a drop in the local labour force participation rate. This suggests that Dutch local labour markets are not perfectly integrated with each other, and hence that the losers of globalisation are, at least to some extent, concentrated in certain areas. In turn, this implies that the effects of import exposure on electoral outcomes, if there are any, might be observable at the regional level. Dissatisfied voters may have turned to populist parties that oppose free trade (just like in the US, see chapter 2) and/or may have developed some anti-EU sentiment (just like in the UK, see chapter 2). I examine the link between increased import exposure and the vote share of left-wing populist party SP at the 2006 and 2010 general elections, the vote share of right-wing populist party PVV at the 2006 and 2010 general election, and the "no" vote share at the 2005 national referendum, when the Dutch voted on whether or not to agree to the introduction of an EU Constitution. The popularity of left-wing and right-wing populism in the Netherlands rose steeply in the 2000s, whereas it was virtually non-existent in the 1980s and 1990s[10].

On each of the five outcomes, I perform the following 2SLS estimation (weighted by start-of-period population size, robust standard errors):

$$V_{it} = \varepsilon_0 + \varepsilon_1 * \Delta IPW_{nit} + X_{it}\gamma + e_{it} \quad (6)$$

Where V_{it} is the relevant vote share in municipality i, and where ΔIPW_{nit} is increased import exposure (1996-2007) in the COROP region to which municipality i belongs, with ΔIPW_{nit} again being instrumented by ΔIPW_{oit} just like in equation 5. The control vector again consists of start-of-period (1996) demographic and labour force characteristics, measured at the COROP zone level: the population share of high-educated people, the share of working-age women that are employed, the share of employment in routine occupations (in order to control for automation) and the manufacturing share in total employment (so as to focus on variation in exposure stemming from sector specializations *within* manufacturing). In addition, the control vector now also contains a rich set of start-of-period demographic characteristics measured at the municipality level, that may differentially determine the voting response to import exposure: the population share of women, the population share of nine different age

[10] Source: https://www.verkiezingsuitslagen.nl/.

groups, the population share of unmarried, married, divorced and widowed people, the population share of seven different migration backgrounds and the share of households that consist of one person, multiple persons without children and multiple persons with children.

My database contains the 428 municipalities that the Netherlands existed of in 2010. In between 1996 and 2010, multiple municipality mergers took place. In order to deal with this issue, I manually calculated what would have been the values of dependent and independent variables in 1996, 2005 and 2006 if the municipality mergers would already have taken place at those times.

Results are shown in table 9. For all five electoral outcomes, estimates are insignificant from zero, suggesting that in the Netherlands, unlike in the UK, the US and France, manufacturing import competition has not translated into voting for populist parties or into anti-EU sentiment. One reason for this might be that in the Netherlands, the China shock has not been as large in magnitude as in other countries. As mentioned in the introduction, China's share in Dutch manufacturing imports had grown to 8.6% by 2007. In the US for example, this figure amounted to 13%. Also, as mentioned in section 2.2, in the Netherlands adjustment through the participation rate occurs remarkably smoothly, with mostly women, students and older workers leaving the labour market. Job losses of this nature may not have translated into as much bitter feelings towards free trade as job losses in other countries have. A third explanation may be that, contrary to other countries, in the Netherlands the China shock has diffused somewhat across regions through the migration channel, making it harder to observe electoral effects at the local level.

	NO 2005 (1)	PVV 2006 (2)	PVV 2010 (3)	SP 2006 (4)	SP 2010 (5)
ε_1	0.004 (0.25)	0.004 (0.14)	0.001 (0.77)	-0.004 (0.12)	-0.004 (0.19)
Controls	Full controls	Full controls	Full controls	Full controls	Full controls
Observations	428	428	428	428	428

Table 9: The effect of increased import exposure over the period 1996-2007 on vote shares. 2SLS estimates. P-values in parentheses.

6 Conclusion

In my thesis, I estimate the impact of manufacturing import competition from China on Dutch manufacturing employment and other labour market outcomes. I use data and economic literature to demonstrate that China's sudden export surge in between 1996 and 2007 was exogenous to the Dutch labour market, meaning that the China shock period provides an ideal opportunity to disentangle import competition effects on the Dutch labour market from other influencers. In order to do so, I study 40 different Dutch regional labour markets. By combining national-level data on import growth in different manufacturing sectors with ex-ante regional sector specializations, I construct a measure of region-specific exposure to manufacturing imports from China. The intuition behind this measure is straightforward: the higher the rise in Dutch imports from China in those sectors in which a region was specialized before the China shock, the more this region's labour market should have been affected by import competition.

By instrumenting for import exposure using lagged sector specializations and Chinese exports to other high-income countries, I mitigate biases that could arise due to labour market anticipation effects and (import) demand shocks. 2SLS estimates then indicate that increased import exposure over the period 1996-2007 had a statistically significant negative effect on the growth of manufacturing employment over that period. What's more, placebo tests show that those locations that had the strongest exposure and employment declines after 1996 did not already experience the largest employment declines before the China shock, indicating that the negative relation between import exposure and manufacturing employment over the 1996-2007 period reflects the period-specific effect of increased import exposure, and that it is not the case that it simply captures a pre-existing declining trend in manufacturing employment.

Next, by estimating the effect of import exposure on four other labour market related outcomes, I attempt to identify the channel(s) through which Dutch local labour markets have adjusted to the labour demand decrease generated by the China shock. Results indicate that the most strongly exposed areas experienced the largest decrease in the working-age population count and the largest decrease in the labour force participation rate. Minor evidence is found of non-manufacturing wages decreasing more in the most exposed areas. No evidence is found of an effect on the number of receivers of long-term unemployment benefits. What's more, placebo tests suggest that in the most exposed areas, the working-age

population count was already declining somewhat in the period preceding the China shock. Hence, the most convincing evidence is found in favour of the conclusion that the labour force participation rate has been the most important channel of adjustment to the China shock.

Even though free trade with low-income countries is believed to yield aggregate gains to the Dutch economy, my study thus highlights the adverse effects to some workers, proven by the decreased labour force participation rate in exposed areas. Also, sluggishness in adjustment - migration out of the most exposed areas persisted until 2011 and the drop in non-manufacturing wages is only significant from 2010 onward - highlights the transition costs associated with opening up to trade.

The decreased labour force participation rate in the most strongly exposed areas suggests that the 'losers of globalisation' are concentrated, and hence that electoral consequences of the China shock might be observable at the regional level. However, I find no significant impact of increased exposure to manufacturing import competition from China, neither on voting for populist parties, nor on voting against the EU Constitution at the 2005 national referendum.

7 Appendix

The value of exports from China to Australia, Canada, Germany and South Korea in 1996 and 2007 for each SITC sector has been collected from the online international trade database of the Observatory of Economic Complexity:
https://atlas.media.mit.edu/en/visualize/tree_map/sitc/export/chn/kor/show/1996/

The value of exports from China to the Netherlands in 1996 and 2007 for each SITC sectors has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/7137shih/table?ts=1527366425205

The division of labour hours (manufacturing versus non-manufacturing, and also between manufacturing sectors) in each COROP region in 1987 and 1994 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/70090NED/table?ts=1525037102836

Manufacturing employment in each COROP region in 1993, 1996 and 1998 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/7258BAAN/table?ts=1527368153371

Manufacturing employment in each COROP region in 2007 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/71813ned/table?ts=1527368135723

The working-age population count in each COROP region in each relevant year has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/03759ned/table?ts=1527367296722

The employed share of working-age women in each COROP region in 1996 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/70177ned/table?ts=1527368733785

The share of immigrants in the population in each COROP region in 1996 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/70072ned/table?ts=1527368968716

The share of employment in routine occupations in each COROP region in 1996 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/70177ned/table?ts=1527368733785

The population count in each COROP region in 1987, 1993 and 1996 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/37259ned/table?ts=1528240343384

The manufacturing share in total employment in each COROP region in 1993 and 1996 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/7258BAAN/table?ts=1527368153371

The labour force participation rate in each COROP region in 1996 and 2000 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/71887ned/table?ts=1528506467986

The labour force participation rate in each COROP region from 2003 to 2014 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83933NED/table?ts=1528506493034

The number of Bijstand benefit receivers in each COROP region from 2011 to 2014 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/82015NED/table?ts=1528587979517

The number of Bijstand benefit receivers in each COROP region from 2003 to 2010 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/37955ned/table?ts=1528587707550

The number of Bijstand benefit receivers in each COROP region in 1996 has been collected from Statistics Netherlands:

https://opendata.cbs.nl/statline/#/CBS/nl/dataset/7391UITK/table?ts=1528589956151

The high-educated share of the working population in each COROP region in 1996 has been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/70177ned/table?ts=1527368733785

The average hourly wage in non-manufacturing in each COROP region in each relevant year has been calculated using Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/82797NED/table?ts=1527372292125

Voting results for each municipality have been collected from the online Kiesraad database:
https://www.kiesraad.nl/verkiezingen/verkiezingsuitslagen

The additional demographic controls in equation 6 have been collected from Statistics Netherlands:
https://opendata.cbs.nl/statline/#/CBS/nl/dataset/70072ned/table?ts=1529789563895

Municipality mergers have been traced from Statistics Netherlands:
https://www.cbs.nl/nl-nl/onze-diensten/methoden/classificaties/overig/gemeentelijke-indelingen-per-jaar/

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