Growing apart: The comparative political economy of income inequality and social policy development in affluent countries

Thewissen, S.H.

Author: Thewissen, Stefan Hubert
Title: Growing apart : the comparative political economy of income inequality and social policy development in affluent countries
Issue Date: 2015-09-29

3 Competing with the dragon

Employment and wage effects of Chinese trade competition in 17 sectors across 18 OECD countries[1]

ABSTRACT

The rapid rise of China on the global economic stage could have substantial and unequal employment and wage effects in advanced industrialised democracies given China's large volume of low-wage labour. Thus far, these effects have not been analysed in the comparative political economy literature. Building on new pooled time-series data, we analyse the effects of Chinese trade competition across 17 sectors in 18 countries between 1990 and 2007. Our empirical findings reveal overall employment declines and higher earnings inequality in sectors more exposed to Chinese imports. We devote particular attention to a new channel, increased competition from China in 59 foreign export markets, which positively affects the high-skilled whilst the low-skilled bear the brunt. Hence, this study shows that neglecting the competition in foreign countries leads to underestimation of the distributive effects of trade. More generally, our findings provide new insights into how international trade, technological change, and labour market institutions contribute to the widely observed trend of rising inequality.

3.1 INTRODUCTION

During the past two decades China's manufacturing exports to advanced industrialised democracies have grown enormously. As a result of its liberalisation of product and financial markets, its growth in productivity, and its World Trade Organisation (WTO) accession in 2001, China became the world's largest exporter of goods in the span of two decades between early 1990s and 2010 (OECD, 2012c).

---

1 This chapter appeared as Thewissen, S., Van Vliet, O. (2014) Competing with the dragon: Employment and wage effects of Chinese trade competition in 17 sectors across 18 OECD countries, *LIS Working Paper Series no. 623*. Earlier versions of this study were presented at the 7th ECPR-SGEU Conference, 5-7 June 2014 The Hague, the 2014 LIS Summer Workshop, 29 June-5 July, Luxembourg and the 26th SASE Annual Conference, July 10-12 2014 Chicago. We thank all the participants, Michael Blauberger, Koen Caminada, Kees Goudswaard, John Peters, David Rueda, and Vera Troeger for their helpful comments and suggestions. All errors remain ours.

Given China's large volume of low-wage labour, its growing exports can potentially have substantial consequences for the wages and employment possibilities of employees in OECD countries. Globalisation as such has a long history of being examined as a cause of rising earnings inequality in the comparative political economy literature. Studies tend to use imports and exports with less developed countries summed together as a percentage of GDP as indicator; most studies report insignificant associations between this measure and wage inequality (Pontusson *et al.*, 2002; Rueda and Pontusson, 2000; Oliver, 2008). Huber and Stephens (2014) do not find significant effects of total imports and exports as a percentage of GDP on wage inequality. Yet, these studies do not devote specific attention to China's rise on the global economic stage. In addition, trade is measured at the country level even though there are substantial differences in the degree to which sectors within countries are exposed to trade. Furthermore, an important theoretical channel through which trade has an impact on employment and wages is neglected. Traditional measures of trade only capture direct linkages between trading partners. These approaches disregard that exporting sectors are also affected by the rise of China when foreign export markets switch to Chinese imports instead.

Recent studies in international economics and labour economics reveal strong distributive effects of the rise of China on the global economy in single-country studies. Autor *et al.* (2013) and Autor *et al.* (forthcoming) find that rising Chinese import competition on US labour markets has reduced employment and wages in manufacturing sectors. For Norway, Balsvik *et al.* (forthcoming) find negative employment effects, but no indications of wage effects. These authors attribute these dissimilarities in results to the lower flexibility of Norwegian labour market institutions compared to the US Although these case studies insightfully depict country-specific developments, they do not allow for a general assessment of employment and wage effects of Chinese trade competition across a broader group of OECD countries with diverse political-economic institutions.

We aim to complement our existing knowledge of determinants of earnings inequality by analysing the developments in employment and wages in 17 sectors across 18 OECD countries between 1990 and 2007. This approach allows us to examine the distributive effects of Chinese trade competition, while we can account for institutions found to be relevant in the comparative political economy literature on wage inequality (e.g. Rueda and Pontusson, 2000; Mahler, 2004; Martin and Swank, 2012). With respect to this literature, we seek to make three contributions.

First, existing research pertains to distributive effects of international trade in general, but does not devote attention to effects of Chinese trade in particular. We empirically test whether increased Chinese trade competition provides an explanation for rising levels of inequality in Western countries (Bradley *et al.*, 2003; OECD, 2011a; Huber and Stephens, 2014). Second, we extend our analysis of trade effects on the distribution of earnings by taking into account Chinese competition on foreign export markets. This route has been neglected thus far in the existing inequality literature. Third, we take the sector as the unit of analysis. Exposure to international trade and therefore its labour market effects vary substantially across sectors (Scheve and Slaughter, 2004; Hays *et al.*, 2005; Walter, 2010; Oesch, 2013). Our central hypothesis is that sectors with greater exposure to Chinese trade competition experience stronger labour market effects. Building on Mahler *et al.* (1999) and Thewissen *et al.* (2013b), we examine the sectoral variation in employment, wages, and earnings inequality using a new sectoral dataset based on LIS micro data (Wang *et al.*, 2014a). Furthermore, our study is complementary to recent research on de-industrialisation. We inspect the evolution of the manufacturing sectors in detail, whilst recent accounts mainly focus on developments in the services sectors (Rehm, 2009; Ansell and Gingrich, 2013; Wren, 2013; Dancygier and Walter, forthcoming).

The chapter is organised as follows. We begin by reviewing the literature and formulating hypotheses on the effects of Chinese trade competition, skill-biased technological change and labour market institutions on employment and earnings inequality. In Section 3.3, we discuss the data and methods and specify the measure for Chinese export competition in foreign markets. Subsequently, Section 3.4 presents the results of the analysis. Section 3.5 summarises the main findings and concludes.

3.2 LITERATURE AND HYPOTHESES

Our theoretical understanding of the distributive effects of Chinese exports is based on two standard trade models from international economics. In the Ricardo-Viner model, sectors are the central unit of analysis as it is assumed that factor mobility is limited. Employees in sectors with higher exports as a result of the reduction of trade restrictions benefit, whereas employees in sectors with increased imports loose (Samuelson, 1971; Hays, 2009). In contrast, the Stolper-Samuelson model (1941), in which factor mobility is assumed to be perfect, hinges on factor endowments. Owners of abundant production factors profit from trade.

Increased trade competition stemming from China may affect workers in OECD countries in two ways. First, Chinese imports in OECD countries can substitute the domestic production of goods, resulting in a reduced labour demand. Hence, it can be expected that sectors with more Chinese exports experience negative employment and wage effects. The findings of Autor *et al.* (2013) and Balsvik *et al.* (forthcoming) for respectively the US and Norway support this hypothesis. Second, Chinese exports may also affect sectors by generating increased competition in the foreign markets where sectors sell their products. As an example, it could be that a German manufacturer has a large market share in France, but that France substitutes German imports for Chinese products (Balsvik *et al.*, forthcoming). Thus, we hypothesise that the employment size of sectors more exposed to Chinese trade competition will shrink.

Furthermore, we predict that employment and wage effects of Chinese trade competition are not equally shared across all workers. Given the relative abundance of low-skilled labour in China, mainly the low-skilled employees in exposed manufacturing sectors in OECD countries will be affected by Chinese exports. Therefore, we hypothesise that sectoral exposure to Chinese trade competition is associated with negative employment and wage effects for low-skilled employees. For high-skilled workers, however, expectations are less clear-cut. Based on an empirical analysis for the UK, Bloom *et al.* (2012) find positive wage effects of Chinese trade competition for high-skilled workers. As more competition from China does not imply more exports to China, on the contrary, these positive effects are not an indication of the typical winners from the Stolper-Samuelson model. Instead, according to recent insights from international economics (e.g. Melitz, 2003), increased competition triggers firms to increase their productivity in order to survive. Indeed, Bloom *et al.* (2012) find that Chinese trade competition has a positive impact on innovation and productivity. In order to achieve this, firms hire more high-skilled workers, leading to positive labour market effects in sectors that are more exposed to Chinese competition. Thus, we expect positive employment and wage effects for high-skilled workers in sectors more exposed to Chinese export competition. Last, as we predict that the high-skilled gain from Chinese trade competition whilst this negatively affects the low-skilled, we expect that sectors more exposed to Chinese trade competition have higher levels of intrasectoral earnings inequality.

Another explanation for rising levels of labour market inequality is the effect of so-called skill-biased technological change (Goldin and Katz, 2008; Oesch, 2013; Wren, 2013). According to this argument, technological innovation complements the high-skilled, whilst it substitutes routine labour by capital. The demand for high-skilled labour increases, leading to more employment opportunities and higher wages for highly educated workers. In contrast, the demand for low-skilled labour decreases, resulting in fewer jobs and lower wages for lowly educated workers. These effects of technological change are supported by various empirical studies on the US (Autor *et al.*, 2003; Goldin and Katz, 2008). Focusing on the labour market effects of information and communication technologies (ICT), Michaels *et al.* (2014) extend this empirical evidence to sectors in Japan and nine European countries.

Prompted by the fact that the theoretically predicted labour market effects of trade and technological change are rather similar, there has been a debate which of the two is most responsible for growing levels of inequality. A recent study on the US by Autor *et al.* (forthcoming) pushes this debate forward by showing that the effects of trade and technological change actually differ. The authors find that sectors with a greater exposure to trade competition experience overall declines in employment. In contrast, technological change yields neutral effects on overall employment, but substantial compositional effects within sectors, as low-skilled employment declines and high-skilled employment grows. Hence, we expect that technological change has positive employment and wage effects for highly educated workers and negative employment and wage effects for lowly educated workers, without affecting the overall employment size of the exposed sector.

A third line of explanations for the variation in employment and wages, and one that is central in the current comparative political economy literature, emphasises the importance of labour market institutions. As employers and employees bargain over wages and other working conditions, the outcomes of these negotiations are a function of a country's system of labour relations and political power distributions (Kenworthy, 2001; Martin and Swank, 2012; Huber and Stephens, 2014). A first factor is the share of employees covered by wage bargaining agreements (Wallerstein, 1999). When more employees are covered by bargaining agreements, there is less variation in wages between workers. Hence, we expect bargaining coverage to be negatively associated with wage inequality.

In addition to the coverage, also the level of coordination of wage bargaining may affect labour market outcomes. In the wage inequality literature, the main hypothesis on this score is that countries with centralised systems of wage bargaining have a more compressed wage distribution. Centralised wage bargaining creates fewer and smaller wage differentials as more firms and industries are covered by the same wage settlements (Wallerstein, 1999; Rueda and Pontusson, 2000; Mahler, 2004). As the existing empirical evidence is based on country-level studies, it is an empirical question whether and how coordination affects wage inequality within sectors.

Moreover, the coordination of bargaining may also have employment effects. High wage settlements may have adverse effects on employment if wages are not in line with productivity. Hence, as multiple sectors are involved in the bargaining, the resulting wage settlement may harm employment in low-productivity sectors (Iversen and Wren, 1998). On the other hand, it could also be expected that in highly coordinated bargaining systems, the employment implications of wage determination are taken into account more explicitly by unions and employment organisations as norms of fairness and solidarity become more dominant (Soskice, 1991; Wallerstein, 1999).

Furthermore, labour market outcomes may be influenced by employment protection legislation (EPL). EPL increases the gap between employees with a permanent contract (insiders) and employees without a permanent contract (outsiders). The costs of dismissal increase with the strictness of EPL, which gives insiders bargaining power in wage setting (Lindbeck and Snower, 2001; Rueda, 2007). Hence, we expect that the strictness of EPL is positively related to earnings inequality. Moreover, EPL might also yield distributive effects between skill groups. Because of a substantial component of fixed costs, EPL protects low-skilled workers more than high-skilled workers (Koeniger *et al.*, 2007).

Finally, the political ideology of governments might also have an impact on the wage dispersion. In the wage inequality literature, two effects are highlighted. First, since governments are extensively involved in private-sector wage setting in many advanced industrial countries, the ideology of governments might have a direct effect on wage inequality. Hence, left-wing governments can be expected to pursue greater wage inequality than liberal or conservative governments (Wallerstein, 1999). A second and more indirect argument is that governments might influence wages and employment through minimum wage legislation, taxes, and other forms of income policies. Again, it may be expected that left-wing governments adopt policies that lead to less inequality (Rueda and Pontusson, 2000; Pontusson *et al.*, 2002; Oliver, 2008).

3.3 DATA, MEASURES AND METHOD

3.3.1 Dependent variable

To examine the labour market effects of import and export competition at the sectoral level across countries and over time, we use multiple data sources. First, we analyse sectoral employment effects, using the relative employment size. This measure is defined as the number of employees in a sector divided by the number of employees in the national economy. Data are taken from the EU-KLEMS database (2011) that consists of harmonised data from national statistical institutes (Timmer *et al.*, 2010; O'Mahony and Timmer, 2009).[2] The effects of trade with China may vary across skill groups, but the EU-KLEMS data do not contain information on the skill levels of the employees. Yet, sectoral information on the share of hours worked per skill group is available. Following other studies (OECD, 2011a; Michaels *et al.*, 2014), we use this measure, relying on data from the EU-KLEMS March 2008 release.

In addition to the employment effects, we examine sectoral wage effects across different skill groups. We use the wage bill share per skill group, based on EU-KLEMS data. A second measure that we use to examine the wage effects is the level of earnings inequality within a sector, measured by the Gini index. Data come from the Leiden LIS Sectoral Income Inequality Dataset (Wang *et al.*, 2014a). This database is constructed on the basis of LIS micro data (LIS, 2014). It includes income from wages and self-employment for individuals aged between 25 and 54 across sectors. The analysis focuses on 17 sectors at

2 For Canada we have to use the EU-KLEMS March 2008 dataset.

the 2-digit International Standard Industrial Classification (ISIC) 3.1 level[3] across 18 capitalist countries[4] and utilises annual data for the years 1990-2007.[5]

3.3.2 Measuring Chinese trade competition

For our measure of exposure to Chinese import competition, we follow existing sectoral studies (Mahler *et al.*, 1999; Michaels *et al.*, 2013) and measure this as the value of the total imported goods as a share of the value added for sector *i* in country *j* in year *t*. This measure is the sectoral equivalent of imports as a share of GDP at the country level.[6] Data on imports come from the OECD STAN Bilateral Trade Database (2011b) and value added is taken from EU-KLEMS (2011).

To capture the Chinese competition in foreign markets *p* to which sectors export their goods, export competition for sector *i* in country *j* at time *t* is measured as follows:

$$\sum_{p}\left(\frac{\text{exports}_{ijpt}}{\text{exports}_{ijt}} \times \frac{(\text{Chinese exports}_{ipt} - \text{exports}_{ijpt})}{\text{total exports}_{ipt}}\right) \tag{3.1}$$

The second part of equation 3.1 measures the difference in exports from the sector type *i* of China and country *j* to country *p*, relative to the total exports – from all countries – of sector type *i* to country *p*.[7] Hence, this measure

3 See Table A3.1 in the appendix for the ISIC codes. We leave out total manufacturing; and manufacturing of chemical, rubber, plastics, and fuel products (23t25) in our descriptives and regressions to avoid having sectoral overlap, as we include all constituent sectors separately.

4 Australia, Austria, Belgium, Canada, Czech Republic, Germany, Denmark, Spain, Finland, France, the UK, Ireland, Italy, Japan, the Netherlands, Portugal, Sweden, and the US.

5 The beginning is set by data availability on imports from China and the end is due to data availability from EU-KLEMS. Information on shares of hours worked per skill group is only available up to and including 2004.

6 As a simple test we calculate the correlation between total imports in value added at the country level from our database and imports of goods and services in percentages of GDP from World Bank National Accounts. The correlation is 0.93, with a comparable mean (32.0 versus 35.2 from the World Bank) and standard deviation (both 17.5).

7 We restrict our analysis to 59 partner countries as data for other countries contain too many missings. We calculate Chinese exports to each of the 59 partner countries at the sectoral level for our sample of countries individually as follows. We collect both export data reported by China at the sectoral level, and import data reported by each of the 59 partner countries at the sectoral level. The correlation between the two is 0.99. To maximise data availability, we first interpolate both time series. Next, we extrapolate the export data from China using the trend in import data from the separate partner countries. As a final check we calculate the percentage of (unweighted) values at the country partner sector year level larger than +1 and smaller than -1. These numbers would be the result of data differences in the combination of bilateral trade from multiple reporting countries, as it is substantively

indicates the difference between the export market shares of the sectors *i* from China and country *j* in country *p*. Subsequently, the pressure from the Chinese competition in the foreign market *p* depends on the relative importance of foreign market *p* for sector *i* in country *j*. Therefore, the competition in foreign market *p* is weighted by the first term of equation 3.1, which is the value of the exported goods from sector *i* in country *j* to country *p* divided by the total exports of sector *i* in country *j*.[8] An advantage of the export competition measure used in this study over the measures used by Autor *et al.* (2013) and Balsvik *et al.* (forthcoming), is that our measure accounts for the temporal variation in the exports from sector *i* in country *j*, whereas the other measures only include the initial market share of this sector. For the export competition measure, sectoral data from the OECD STAN Bilateral Trade Database are collected for 59 partner countries *p*, including all OECD countries, all European countries, the BRIICS, Malaysia, Pakistan, the Philippines, and Thailand, which amounts to little over half a million observations, covering around 85 per cent of all imports for our sample of countries.

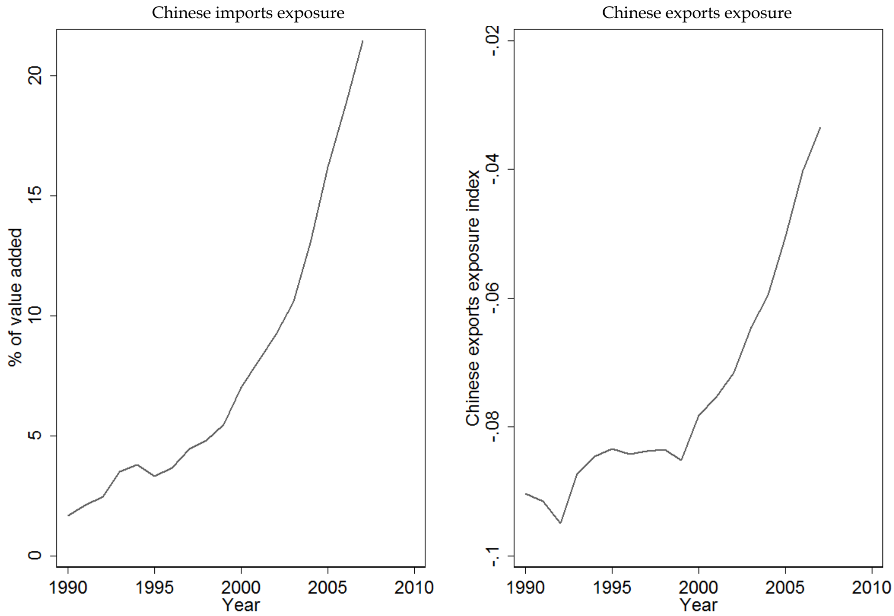
Figure 3.1 and Table 3.1 show that China is becoming an increasingly important trade partner for developed countries. Figure 3.1 presents averages for all sectors, whereas Table 3.2 presents trade exposure per sector averaged across countries. Between 1990 and 2007, the imports from China as a percentage of value added increased in all sectors but the mining industry. The export competition measure shows negative values for all sectors in 1990. This indicates that in the foreign markets, the value of the exports from the OECD countries is on average larger than the value of the Chinese exports. Over time, the exposure to Chinese competition has rapidly increased for exporting firms, as indicated by less negative values.

Interestingly, the exposure to import and export competition from China varies considerably across sectors. This is also reflected by a low correlation between the two measures (0.25). For instance, exposure to Chinese export competition in the electrical manufacturing sector increased between 1990 and 2007, whereas it hardly changed in the paper industry. However, exposure to Chinese imports in the home markets did increase substantially in the paper industry.

impossible that the difference between Chinese and home country's exports to a partner's sector divided by total exports to this partner's sector is larger than 1. The 0.2 per cent of all observations for which this is the case are changed to missings.

8 We make two amendments to this weighting factor to make sure it adds to 1 at the sector country year level. First, we multiply the weighting factor by the difference between total country exports and the sum of country exports to each individual country, since we 'only' collect data for 59 countries rather than to all countries. Second, for each indicator separately we correct for missing trade information from a partner country, which is only a minor adjustment (the correlation between the corrected and uncorrected series is above 0.97).

Figure 3.1 Evolution of Chinese imports and exports competition



Note Unweighted averages across all countries and sectors in our sample

Table 3.1 Imports and exports exposure

Sector	Exposure to imports from China (% value added)			Chinese exports exposure (index)		
	1990	2007	Change	1990	2007	Change
Agriculture	0.4	0.7	0.3	-0.08	-0.08	0.00
Mining	3.4	3.0	-0.4	-0.03	-0.05	-0.01
Total manufacturing	1.1	16.2	15.1	-0.09	0.00	0.09
Man. food	0.6	1.7	1.1	-0.08	-0.07	0.00
Man. textiles	10.4	128.6	118.2	-0.04	0.11	0.15
Man. wood	1.1	9.1	8.0	-0.10	-0.05	0.05
Man. paper	0.1	1.9	1.8	-0.13	-0.12	0.01
Man. coke, chemicals, rubber	0.7	6.2	5.5	-0.09	-0.06	0.03
Man. coke	0.5	2.0	1.5	-0.10	-0.12	-0.03
Man. chemicals	0.8	6.2	5.4	-0.08	-0.05	0.03
Man. rubber	0.8	12.0	11.3	-0.12	-0.05	0.08
Man. other non-metal	0.5	7.2	6.7	-0.11	-0.02	0.09
Man. basic metals	0.4	9.3	8.9	-0.10	-0.03	0.07
Man. machinery	0.6	17.3	16.7	-0.10	-0.01	0.09
Man. electrical	1.3	75.7	74.4	-0.08	0.08	0.16
Man. transport equip	0.1	5.4	5.3	-0.13	-0.08	0.05
Man. n.e.c	4.3	41.9	37.7	-0.07	0.04	0.11
Average (unweighted)	1.7	21.5	19.8	-0.09	-0.03	0.06

Source Trade data from OECD STAN Bilateral Database, value added from EU-KLEMS

3.3.3 Other independent variables

To account for effects of skill-biased technological change on employment and wages, we follow Michaels *et al.* (2014), Massari *et al.* (2013), and Wren (2013) and include ICT capital compensation as a share of sectoral value added from the EU-KLEMS dataset (2011).[9] We include two measures to account for wage-setting institutions, namely the bargaining coverage, which is defined as the proportion of employees covered by wage bargaining agreements, and the level of wage coordination.[10] Both measures are taken from the ICTWSS database (Visser *et al.*, 2013).[11] As a measure for the strictness of employment

9 As Michaels *et al.* (2014) also note, since capital compensation is calculated as a residual, it could be negative. We replace values by zeros if negative (3 per cent of total observations). We calculate the indicator by multiplying ICT capital compensation as a share of total capital compensation by capital compensation, and divide this by value added, where we have placed capital compensation and value added in real dollars using OECD information on exchange rates. We have to use the EU-KLEMS March 2008 version for Portugal.

10 We linearly interpolate the bargaining coverage rate.

11 For Ireland there are only 3 observations available for bargaining coverage in the fourth version of ICTWSS; the first observation is for 2000. We use the third ICTWSS version for this country and we interpolated the data. The correlation between the linearly interpolated series from the third and fourth version for the 9 overlapping observations is 0.89.

protection legislation, the EPL index from the OECD (2014a) is included. To analyse the impact of left-wing governments, we use the percentage of total cabinet posts held by left-wing parties from the Comparative Political Data Set (Armingeon *et al.*, 2012). Furthermore, employment and wages may be affected by cyclical dynamics. To control for these dynamics, we include a number of variables. At the sectoral level, we include the volume of gross value added. Data are taken from the EU-KLEMS dataset (2011). For more general economic conditions at the country level, we include the unemployment rate. As low-skilled workers are more substitutable than high-skilled workers, the bargaining position of low-skilled workers is more directly and more disadvantageously affected by unemployment (Pontusson *et al.*, 2002). Hence, unemployment can be expected to be positively associated with earnings inequality. Unemployment rates are taken from the OECD (2014b) Labour Force Statistics. Finally, we include real GDP per capita from the OECD (2014c) National Accounts.

Last, we include a measure of total excluding Chinese imports as a share of sectoral value added to account for the effect of other imports. Chinese imports and total excluding Chinese imports are substantively and empirically distinct, as indicated by a low correlation (0.14) and a much more rapid average rise of Chinese imports (15.2 instead of 2.0 per cent on average per year for our sample).

3.3.4 Method

An important issue in the analysis of time-series cross-section data is non-stationarity. Indeed, we find evidence for non-stationarity of our main variables.[12] The study relies on an error correction model, in which changes of the dependent variable are regressed on the lagged levels and the changes of the independent variables. Such a model is better able to cope with non-stationarity than specifications in levels only (Beck, 1991; De Boef and Keele, 2008). Given the nature of the data in many studies in comparative political economy, it is a conventional estimator in the field (Iversen and Cusack, 2000; Ansell and Gingrich, 2013; Wren *et al.*, 2013). In an error correction model, the lagged levels capture the long-term structural effects, whereas the changes capture the short-term transitory effects (Podestà, 2006). Hence, the estimated equation is:

12 We conduct Im-Pesaran-Shin tests for each of our time series individually, where the time trend and a lag structure are allowed to differ across time series. The lion's share of our time series suffers from stationarity. Further tests show that first differencing our variables removes the persistence in the majority of the time series for our variables.

$$\Delta y_{ijt} = \alpha_0 + \alpha_1 y_{ijt-1} + \beta_0 \Delta x_{ijt} + \beta_1 x_{ijt-1} + \beta_2 z_{it-1} + \varepsilon_{ijt} \quad (3.2)$$

Here, Δy_{ijt} denotes the first difference in the dependent variable in sector *i* in country *j* and year *t*; α_0 is the intercept and ε_{ijt} is the error term. For the vector of independent variables x_{ijt} the short-term effects are indicated by β_0. The long-term effects are indicated by $\beta_1/-\alpha_1$.

To analyse the data, the study relies on OLS regression analyses. The main model does not include sector or country fixed effects, since the inclusion of both a lagged dependent variable and unit dummies renders the estimator inconsistent (Nickell, 1991). Nevertheless, estimating the model with sector or country dummies generally replicates the main results. Despite the fact that the lagged dependent variable absorbs autocorrelation in the error term, Breusch-Godfrey tests indicate that there is still autocorrelation left. Therefore, the error term is specified to follow a panel-specific AR(1) process. In addition, we use panel-corrected standard errors to correct for panel-heteroskedasticity and contemporaneous spatial correlation (Beck and Katz, 2011).

3.4 Empirical analysis

3.4.1 Employment effects

The results of estimation of employment effects are presented in Table 3.2. Model 1 starts with the analysis of the relative employment size of a sector, defined as the number of people working in a sector divided by people working in the national economy. As this ratio sums to one for each country-year observation, we leave out country-level variables as they lose their interpretation.[13] Our findings indicate that Chinese imports are negatively associated with the employment size.[14] This result provides empirical support for the hypothesis that imported Chinese goods substitute domestically produced goods leading to negative employment effects. The employment effects of total imports excluding Chinese imports are comparable but smaller. Models 2 and 3 show that the negative employment effects from Chinese imports mainly impinge on low-skilled workers. Exposure to Chinese export competition seems to have a negative effect on overall employment, but only in the short run as the coefficient for the lagged level is not significant. For low-skilled workers, there is a negative effect of Chinese export competition on their hours worked. In sectors that are exposed to strong competition from

13 Our results hardly change when we include the labour market institutions: import competition becomes insignificant whilst export competition becomes significant.

14 Our main results do not change when we restrict our analysis to the 3777 observations for which we also have information on share of hours worked per skill group. Total excluding Chinese imports become insignificant.

China in their foreign export markets, there is less work for lowly educated workers. Interestingly, there is more work for highly educated workers in these sectors. In response to the increased competition, firms seek to increase their productivity and highly educated workers benefit from this.

With respect to technological change, the results indicate that there is no significant association between technological change and the employment size of sectors. Nevertheless, technological change is negatively related to the share of hours worked by lowly educated workers and it is positively related to the share of hours worked by highly educated workers. Taken together, these results lend support to the argument that technological change alters the composition of employment within sectors rather than the overall employment size of sectors. In sectors with greater skill-biased technological change, the number of low-skilled jobs declined whilst the number of high-skilled job increased.

Among the institutional variables, EPL is positively associated with the share of hours worked by lowly educated workers, whereas it is negatively associated with the share of working hours of the highly educated workers. In line with our expectation, these results indicate that EPL provides more protection for low-skilled workers than for high-skilled workers. For the coordination of wage bargaining, we find a negative association with the share of working hours of low-skilled workers. The coverage of wage bargaining and the political ideology of governments do not yield significant employment effects.

Turning to the economic control variables, the unemployment rate is negatively associated with the share of hours worked by low-skilled workers, whereas it is not significantly associated with the share of hours worked by high-skilled workers. These results are in line with the theoretical argument that unemployment affects the labour market position of low-skilled workers more adversely than the position of high-skilled workers. Furthermore, the results provide some evidence for positive employment effects of the value added and GDP per capita.

Table 3.2 Chinese import and export competition and employment

	Δ Relative employment size	Δ Share of hours worked low-skilled	Δ Share of hours worked high-skilled
	(1)	(2)	(3)
Δ Chinese imports (x 10^{-1})	-0.177	7.317	2.513
	(0.535)	(0.286)	(0.432)
Chinese imports (t-1) (x 10^{-1})	-0.259**	-4.612*	-0.631
	(0.039)	(0.061)	(0.588)
Δ Chinese exports comp	-0.141**	0.060	0.111
	(0.015)	(0.964)	(0.924)
Chinese exports comp (t-1)	0.001	-0.782**	0.596***
	(0.787)	(0.018)	(0.000)
Δ Total excluding Chinese imports (x 10^{-1})	0.001	0.167**	0.054
	(0.489)	(0.014)	(0.671)
Total excluding Chinese imports (t-1) (x 10^{-1})	-0.003**	0.008	0.018
	(0.019)	(0.782)	(0.797)
Δ Technology	-0.048	2.605	-0.091
	(0.699)	(0.328)	(0.971)
Technology (t-1)	-0.012	-3.114***	3.073***
	(0.875)	(0.000)	(0.004)
Δ Value added	0.028***	0.070	0.101
	(0.005)	(0.495)	(0.265)
Value added (t-1)	0.004	0.009	0.194***
	(0.655)	(0.910)	(0.005)
Bargaining coverage (t-1)		-0.007	0.001
		(0.148)	(0.394)
Bargaining coordination (t-1)		-0.136**	0.022
		(0.032)	(0.435)
Left government (t-1)		0.001	-0.000
		(0.593)	(0.408)
EPL (t-1)		0.436***	-0.103*
		(0.009)	(0.081)
Unemployment rate (t-1)		-0.028**	0.002
		(0.037)	(0.784)
GDP per capita (x 10^{-3}) (t-1)		0.023***	-0.005
		(0.004)	(0.494)
Lagged dependent variable	-0.026***	-0.012**	0.009
	(0.000)	(0.014)	(0.208)
Constant	0.007	-1.014***	0.262
	(0.525)	(0.001)	(0.373)
N	4270	3777	3777
Adjusted R^2	0.12	0.18	0.08

Note Error correction model with panel-corrected standard errors and panel-specific AR(1) structure. 1990-2007 for the relative employment size, 1990-2004 for the shares of hours worked low- and high-skilled. P-values in parentheses, *p<0.1, **p<0.05, ***p<0.01

3.4.2 Wage effects

Table 3.3 presents the results of the regression analyses of wage bill shares. Exposure to Chinese export competition is negatively associated with the wages of low skilled workers, whereas it is positively associated with the wages of high skilled workers. In line with the results for the employment effects, these results indicate that sectors with great exposure to Chinese export competition face substantial distributive effects. Furthermore, Chinese imports do not reach significance in these analyses. This suggests that the distributive effects of Chinese imports run via employment rather than via wages, as we predicted from our theoretical section for our set of countries with more rigid labour market institutions (Balsvik *et al.*, forthcoming).

Table 3.3 Chinese import and export competition and wage bill shares

	Δ Wage bill share low-skilled	Δ Wage bill share high-skilled
	(1)	(2)
Δ Chinese imports (x 10^{-1})	3.130	6.414
	(0.557)	(0.137)
Chinese imports (t-1) (x 10^{-1})	-2.592	-0.908
	(0.129)	(0.670)
Δ Chinese exports comp	1.647	-0.673
	(0.182)	(0.754)
Chinese exports comp (t-1)	-0.773***	0.537*
	(0.007)	(0.056)
Δ Total excluding Chinese imports	0.183***	0.023
(x 10^{-1})	(0.009)	(0.907)
Total excluding Chinese imports (t-1)	0.026	0.022
(x 10^{-1})	(0.512)	(0.865)
Δ Technology	2.990	0.025
	(0.232)	(0.995)
Technology (t-1)	-2.472***	3.540**
	(0.000)	(0.015)
Δ Value added	0.124	0.050
	(0.122)	(0.637)
Value added (t-1)	0.025	0.168*
	(0.620)	(0.071)
Bargaining coverage (t-1)	-0.005	0.000
	(0.313)	(0.973)
Bargaining coordination (t-1)	-0.147***	0.026
	(0.000)	(0.569)
Left government (t-1)	0.001	-0.001
	(0.529)	(0.418)
EPL (t-1)	0.461***	-0.110
	(0.001)	(0.357)
Unemployment rate (t-1)	-0.025**	0.008
	(0.016)	(0.618)
GDP per capita (x 10^{-3}) (t-1)	0.024***	-0.002
	(0.000)	(0.859)
Lagged dependent variable	-0.019***	0.004
	(0.000)	(0.627)
Constant	-1.195***	0.439
	(0.000)	(0.444)
N	3777	3777
Adjusted R^2	0.21	0.06

Note Error correction model with panel-corrected standard errors and panel-specific AR(1) structure, 1990-2004. P-values in parentheses, *p<0.1, **p<0.05, ***p<0.01

For technological change, the results indicate a negative effect for low-skilled workers and a positive effect for high-skilled workers. As expected, skill-biased technological change increases the differences in wages between lowly and highly educated workers. As to EPL, the results suggest that it is mainly the low-skilled workers who benefit from the increased bargaining power. The results for the unemployment rate correspond to the estimations of the employment effects. Low-skilled workers are more severely affected by high levels of unemployment and this culminates in negative wage effects.

Subsequently, we analyse Gini coefficients to examine the distributive consequences of Chinese trade competition. This allows us to tap into levels of inequality at the sectoral level. Yet, as these estimations rely on LIS instead of EU-KLEMS data for this measure, the set of sectors and countries is different and the number of observations is substantially smaller.[15] Even though this alters some of our results since we lose power and as outliers become more influential, our main results remain visible.

The results in Table 3.4 show that sectors that are more exposed to imports from China are characterised by more dispersed earnings. This corresponds to our previous findings presented in Table 3.2 and 3.3. Furthermore, we see that exposure to total imports excluding those from China are negatively rather than positively related to intrasectoral inequality, suggesting that the labour market effects of Chinese imports differ from those of imports in general. The coefficient is very small. In model 1, the long-run effect of Chinese export competition – the coefficient of the lagged level – does not reach significance. The coefficient of the first difference suggests even a negative effect in the short run. However, a jack-knife analysis presented in Table A3.2 (appendix) indicates that these results are driven by a single country, the US[16] Model 2 shows that when the US are not included, the long-run effect of Chinese export competition is positive and strongly significant. This indicates that export competing sectors are characterised by greater earnings inequality. The US has a disproportional effect on the coefficients with 20 per cent of the observations. The country combines high levels of inequality with a large domestic market with relatively low overall levels of exports.

15 For the LIS data we have to lump together the manufacturing of coke (23), manufacturing of chemicals (24), and manufacturing of rubber (25). The same holds for the manufacturing of machinery and equipment not elsewhere classified (29) and electrical and optical equipment (30t33). The included country-waves are: Czech Republic (1996 and 2004), Finland (1991, 1995, 2000, 2004, 2007), Germany (1994, 2000, 2004, 2007), Denmark (1992, 1995, 2000, 2004), the UK (1999, 2004, 2007), Ireland (1994-1996 which is combined to one wave, with earnings corrected for inflation, 2004, 2007), Sweden (1992, 2000, 2005), and the US (1991, 1994, 2000, 2004, 2007). We move away from an annual model to one in which available waves are directly linked over time (so for Czech Republic the dependent variable is the difference in first order corrected Gini between 1996 and 2004, and lagged levels refer to 1996).

16 Our other main findings hardly change when we conduct a jack-knife analysis.

Interestingly, we do not find robust evidence for inequality-enhancing effects of skill-biased technological change, as the coefficient for technological change does not reach significance. The difference between these and our previous estimations of employment and wages could be due to the lower number of observations here. In line with our hypothesis, the results indicate that higher degrees of bargaining coverage are associated with lower levels of earnings inequality. When more employees are included in the wage settlements, there are smaller and fewer wage differentials between employees. The fact that we do not find significant effects for bargaining coverage in the estimations presented above indicates that bargaining coverage can explain the variation in earnings inequality better than the variation in employment or wage shares. The positive effects for EPL suggest that stricter EPL contributes to segmented labour markets with greater earnings inequality between insiders and outsiders. The positive effect of the coordination of wage bargaining contradicts our expectation and the findings in earlier studies. This is probably a reflection of the mechanism that coordination tends to link wages across sectors and therefore reduces inequality at the country level rather than within sectors. Unemployment increases earnings inequality, which corresponds with the results that unemployment is mainly detrimental to low-skilled workers.

Table 3.4 Chinese import and export competition and intrasectoral earnings inequality

	Full sample	Without US
	(1)	(2)
Δ Chinese imports (x 10^{-1})	-0.022	-0.071
	(0.951)	(0.876)
Chinese imports (t-1) (x 10^{-1})	0.787***	0.774**
	(0.007)	(0.045)
Δ Chinese export comp	-0.152***	-0.136
	(0.000)	(0.155)
Chinese export comp (t-1)	0.014	0.096***
	(0.444)	(0.006)
Δ Total excluding Chinese imports	0.011	0.004
(x 10^{-1})	(0.616)	(0.879)
Total excluding Chinese imports (t-1) (x 10^{-1})	-0.056***	-0.066***
	(0.000)	(0.000)
Δ Technology	-0.081	-0.038
	(0.862)	(0.943)
Technology (t-1)	-0.215	-0.146
	(0.220)	(0.464)
Δ Value added	0.001	0.000
	(0.880)	(0.968)
Value added (t-1)	-0.002	-0.005
	(0.692)	(0.410)
Bargaining coverage (t-1)	-0.002***	-0.002***
	(0.000)	(0.000)
Bargaining coordination (t-1)	0.011***	0.009**
	(0.004)	(0.029)
Left government (t-1)	0.000	0.000
	(0.140)	(0.173)
EPL (t-1)	0.014**	0.028***
	(0.021)	(0.000)
Unemployment rate (t-1)	0.003***	0.003***
	(0.005)	(0.000)
GDP per capita (x 10^{-3}) (t-1)	0.001***	0.002***
	(0.001)	(0.000)
Lagged dependent variable	-0.432***	-0.462***
	(0.000)	(0.000)
Constant	0.132***	0.111***
	(0.000)	(0.000)
N	250	202
Adjusted R^2	0.42	0.45

Note Error correction model with panel-corrected standard errors and panel-specific AR(1) structure, 1990-2007. P-values in parentheses, *p<0.1, **p<0.05, ***p<0.01

3.4.3 Sensitivity analysis

We perform a number of additional tests to examine the robustness of our results. First, we account for other emerging economies to examine the uniqueness of the Chinese trade competition. The sum of imports from India, Malaysia, Mexico, the Philippines, and Thailand – which is lower and grew less than the imports from China – is never significant in the regressions and it does not affect our main results. In the regressions on earnings inequality, the coefficient for the lagged level of Chinese export competition becomes also significant when the US is included.

Furthermore, the rise of the Chinese economy may not only increase the competition for sectors in OECD countries, it may also increase the exports of these sectors to China, which could have positive employment effects. To account for these effects, we use two measures, namely the exports to China and the net imports from China, defined as imports from China minus exports to China. The coefficients for exports to China are never significant, whilst employing net imports leads to fully comparable findings as presented above.

Another aspect of globalisation that might have distributive consequences is the increased international flows of capital, although the economic theory on such effects is developed less (Mahler, 2004; but see Burgoon and Raess, 2014). As in other recent inequality studies (e.g. Michaels *et al.*, 2014), capital flows are not included in our main analyses, because there is only limited bilateral data on capital at the sectoral level. Utilising the limited data available (OECD, 2014d), we run regressions with the total foreign direct (FDI) investment positions, inflows, and outflows. None of these variables reaches significance, nor does including these variables affect the main results for the other variables.

3.5 Conclusions

With the rapid expansion of the Chinese economy, the international trade arena has changed substantially for manufacturing sectors in Western countries in the last two decades. Yet, to date this surge of China has not received much attention in comparative political economy on inequality. We contribute to our understanding of the effects of Chinese trade competition by analysing employment and wage effects for a broad set of advanced industrialised democracies. We use sectoral measures of Chinese trade competition between 1990 and 2007 for 18 countries. Moreover, we include a measure that taps into export competition stemming from China.

Accounting for institutional variation across countries, our analysis shows employment declines in sectors that are more exposed to imports from China. Furthermore, effects on wages and employment are not equally shared across skill levels, as we hypothesised. The lowly educated workers bear the brunt of the substitution of domestic production by Chinese imports. This translates into higher levels of earnings inequality in sectors that compete more strongly with Chinese imports.

Existing studies report distributive effects of Chinese imports on employment levels in the US and Norway, whilst wage effects are only found in the US (Autor *et al.*, 2013; Balsvik *et al.*, forthcoming). Our study generalises these findings to a set of 18 OECD countries with diverse labour market institutions. The distributive effects of Chinese import competition are channelled through employment rather than wages.

With respect to the increased competition from China in foreign export markets, our results show distributive effects. This implies that current accounts where competition for exporting sectors is neglected leads to underestimation of the distributional effects of trade competition. Sectors with greater exposure to export competition experience declines in employment and wages for low-skilled workers and rises in employment and wages for high-skilled workers. The production work of low-skilled workers is substituted by Chinese exports, resulting in a lower demand for low-skilled labour. For the high-skilled workers, our results tend to support earlier findings for the United Kingdom indicating that stronger competition triggers innovation and productivity increasing activities in exporting sectors, which increases the demand and so employment and wages for high-skilled workers (Bloom *et al.*, 2012).

Skill-biased technological change is often put forward as an additional determinant of rising earnings dispersion. We find neutral effects of technological change on the overall employment size of sectors. However, in sectors with greater technological innovation, we find negative employment and wage effects for low-skilled workers and positive employment and wage effects for high-skilled workers. Interestingly, these findings suggest that the effects of Chinese trade competition in the US which have recently been found by Autor *et al.* (forthcoming) also apply to other OECD countries. Technological change has merely distributive consequences, whereas international trade is also related to overall declines in employment.

More generally, our study stresses the importance of considering the substantial differences in Chinese imports and overall globalisation, and the large variation in exposure across sectors. Theoretically, we would expect trade competition from China to have particularly strong distributive effects given its large volume of low-wage labour. Our empirical evidence supports this. Our sectoral approach acknowledges the substantial variation in wages and employment on the one hand, and the exposure to Chinese imports and technological change on the other. A sectoral approach seems to be a fruitful direction for the analysis of the determinants of the widely observed trend of increasing inequality across OECD countries over the past decades. Future research could shed more light on employment shifts between sectors when detailed micro-level panel data becomes available.

APPENDIX 3.1 – SECTORAL DEFINITIONS

Table A3.1 Sectors

ISIC code	Full name
AtB	Agriculture, Hunting, Forestry and Fishing
C	Mining and Quarrying
D	Total Manufacturing
15t16	Food products, Beverages and Tobacco
17t19	Textiles, Textile Products, Leather and Footwear
20	Wood and Products of Wood and Cork
21t22	Pulp, Paper, Paper Products, Printing and Publishing
23t25	Chemical, Rubber, Plastics and Fuel Products
23	Coke, Refined Petroleum Products and Nuclear Fuel
24	Chemicals and Chemical Products
25	Rubber and Plastics Products
26	Other Non-Metallic Mineral Products
27t28	Basic Metals and Fabricated Metal Products
29	Machinery and Equipment, not elsewhere classified
30t33	Electrical and Optical Equipment
34t35	Transport Equipment
36t37	Manufacturing not elsewhere classified; Recycling

APPENDIX 3.2 – SENSITIVITY TEST

Table A3.2 Effects of dropping a country for intrasectoral earnings inequality

	Full sample (1)	Without CZE (2)	Without DEU (3)	Without DNK (4)	Without FIN (5)	Without GBR (6)	Without IRL (7)	Without SWE (8)	Without USA (9)
Δ Chinese	-0.022	-0.456	0.023	0.689***	0.041	-0.086	0.034	-0.051	-0.071
imports (x 10^{-1})	(0.951)	(0.285)	(0.950)	(0.000)	(0.927)	(0.834)	(0.915)	(0.892)	(0.876)
Chinese imports	0.787***	1.144***	0.596**	0.502***	0.725**	0.833***	0.779***	0.734**	0.774**
(t-1) (x 10^{-1})	(0.007)	(0.004)	(0.011)	(0.000)	(0.040)	(0.006)	(0.001)	(0.020)	(0.045)
Δ Chinese	-0.152***	-0.118***	-0.106***	-0.205***	-0.202***	-0.142***	-0.152***	-0.140***	-0.136
export comp	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.155)
Chinese export	0.014	-0.019	0.034	0.019	-0.005	0.026	0.002	0.024	0.096***
comp (t-1)	(0.444)	(0.511)	(0.292)	(0.486)	(0.869)	(0.254)	(0.929)	(0.348)	(0.006)
Δ Total	0.011	0.013	0.022	0.021	0.044***	0.010	0.012	-0.011	0.004
excluding Chinese imports (x 10^{-1})	(0.616)	(0.535)	(0.473)	(0.432)	(0.000)	(0.650)	(0.626)	(0.620)	(0.879)
Total excluding	-0.056***	-0.051***	-0.048***	-0.065***	-0.097***	-0.060***	-0.051***	-0.033***	-0.066***
Chinese imports (t-1) (x 10^{-1})	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Δ Technology	-0.081	-0.367	0.149	0.450	-0.058	-0.131	-0.420	-0.142	-0.038
	(0.862)	(0.367)	(0.661)	(0.263)	(0.914)	(0.804)	(0.395)	(0.754)	(0.943)
Technology	-0.215	-0.264	-0.150	-0.182	-0.101	-0.227	-0.236*	-0.155	-0.146
(t-1)	(0.220)	(0.217)	(0.235)	(0.146)	(0.447)	(0.214)	(0.098)	(0.486)	(0.464)
Δ Value added	0.001	0.007**	0.000	-0.000	0.004	0.001	-0.007	-0.006	0.000
	(0.880)	(0.026)	(0.957)	(0.941)	(0.303)	(0.829)	(0.306)	(0.455)	(0.968)
Value added (t-	-0.002	-0.004	0.001	-0.003	-0.023***	-0.002	0.007	0.003	-0.005
1)	(0.692)	(0.326)	(0.753)	(0.592)	(0.000)	(0.611)	(0.115)	(0.262)	(0.410)
Bargaining	-0.002***	-0.001***	-0.001***	-0.001***	-0.002***	-0.001***	-0.001***	-0.002***	-0.002***
coverage (t-1)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bargaining	0.011***	0.013***	0.009***	0.007**	0.020***	0.009***	0.010*	0.012***	0.009**
coordination (t-1)	(0.004)	(0.006)	(0.003)	(0.027)	(0.000)	(0.002)	(0.095)	(0.000)	(0.029)
Left government	0.000	0.000	-0.000	0.000	0.000*	0.000**	0.000	0.000	0.000
(t-1)	(0.140)	(0.116)	(0.756)	(0.367)	(0.080)	(0.016)	(0.175)	(0.511)	(0.173)
EPL (t-1)	0.014**	0.003	-0.002	0.018**	0.020***	0.010*	0.011*	0.015*	0.028***
	(0.021)	(0.805)	(0.812)	(0.012)	(0.000)	(0.082)	(0.064)	(0.051)	(0.000)
Unemployment	0.003***	0.004***	0.001	0.001	0.000	0.002***	0.003**	0.004***	0.003***
rate (t-1)	(0.005)	(0.003)	(0.250)	(0.100)	(0.753)	(0.001)	(0.011)	(0.001)	(0.000)
GDP per capita	0.001***	0.001***	0.000	0.002***	0.001***	0.001**	0.001*	0.001***	0.002***
(x 10^{-3}) (t-1)	(0.001)	(0.004)	(0.983)	(0.001)	(0.000)	(0.047)	(0.059)	(0.003)	(0.000)
Lagged	-0.432***	-0.420***	-0.351***	-0.486***	-0.567***	-0.437***	-0.445***	-0.430***	-0.462***
dependent variable	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.132***	0.093***	0.144***	0.130***	0.197***	0.156***	0.134***	0.128***	0.111***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	250	238	214	204	202	226	226	238	202
Adjusted R^2	0.42	0.46	0.42	0.44	0.46	0.43	0.41	0.42	0.45

Note: Error correction model with panel-corrected standard errors and panel-specific AR(1) structure. P-values in parentheses. $^*p<0.1$. $^{**}p<0.05$. $^{***}p<0.01$