INDUSTRY WAGE PREMIUM AND TRADE PATTERNS WITH EUROPEAN UNION: CROATIAN EXPERIENCE

Valerija Botrić

ABSTRACT

Croatia experienced different adjustment mechanisms in private and public sector in terms of wage corrections during the recent economic downturn. Previous studies document that public sector, mostly due to collective bargaining procedures, enabled the employees to enjoy both relatively more secure and better paid jobs. The aim of this paper is to shift the focus on the manufacturing sector, due to its exposure to the international competition. The initial hypothesis is that two aspects have shaped the wage dynamics in the manufacturing sector during the recent period – crisis and European Union (EU) integration. By relying on the Labour Force Survey (LFS) data, and restricting the analysis to the manufacturing sector, we explore the development of the industry wage premium in the analysed segment of the Croatian economy. To that end Mincer–type wage equations were estimated for each year in the period 2004-2012. Furthermore, the identified industry wage premiums are analysed with respect to the international trade indicators. Specifically we investigate whether the intra-industry trade changes and patterns with the EU had impact on wages in Croatia’s tradable sector. In order to empirically investigate this relationship, we use Eurostat COMEXT and Croatian LFS data.

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**KEY WORDS:** intra-industry trade, industry wage premium, Croatia, EU integration.

**POVZETEK**


**KLJUČNE BESEDJE:** medpanožna menjava, plačne premije v industriji, Hrvaška, integracija EU

**INTRODUCTION**

Croatia is a small open economy, recently under the dominance of two powerful external factors – global economic crisis and European Union (EU) accession process. The latter process entails complete liberalization of trade with EU countries and expected successful integration of the domestic producers on the wider common market. The process could also incur costs, which could also have impact on the labour market. The trade liberalization process is associated with competition pressures which might encourage employers to reduce labour costs either by reducing price or quantity of labour input in the production.
As Brülhart and Elliot (2002) explain, the size of the costs is assumed to be in line with smooth adjustment hypothesis, which states that the costs will be lower if trade is mostly intra-industry in nature. So the trade with EU and specific pattern of trade play an important role in the success of the integration process, but could also be significant for the local labour market developments. However, integration process also implies adopting product market regulations and changes in domestic institutional setting and both might create additional pressures for domestic firms.

Public debates and previous studies in Croatia emphasize the difference in adjustment mechanisms of private and public sector in terms of wage (and employment) corrections during the recent economic crisis. The general conclusion is that the public sector, mostly due to collective bargaining procedures, enabled the employees to enjoy both relatively more secure and better paid jobs. The aim of this paper is to investigate the parallel processes in manufacturing sector, in particular the segment expected to compete on the international market. The initial hypothesis is that two aspects have shaped the wage dynamics of manufacturing during the recent period – crisis and EU integration.

The integration process and its effects are dynamic in nature. To assess the overall impact of the integration process on labour market adjustment would consequently require building and estimating a model in a dynamic framework. Due to the fact that there are no prior estimates for Croatia, we focus on the relatively simple estimation strategy in order to provide first insights. Naturally, the wages and their dynamics do not depend only on trade patterns. In addition to personal characteristics of workers, labour market factors – including wage bargaining process, tax policy, strength of the unions, skills demand and supply, etc. – are the most important determinants of wage determination. Instead of trying to capture all these aspects we focus on specific industry features and trade patterns and abstain from other possible determinants.
The next section briefly summarizes the main findings from the literature in order to provide theoretical framework for the empirical analysis. Section 3 discusses data sources and provides preliminary insights on the subject. Section 4 presents empirical strategy, while results are summarized in Section 5. The last section offers conclusions.

THEORETICAL FRAMEWORK

The idea that labour markets (wages) are under the influence of trade patterns, and that different segments of the labour force (skilled vs. unskilled) are expected to have different consequences of trade increases and/or liberalization, is standard textbook case of trade economics. The traditional models of Heckscher-Ohlin and famous Stolper-Samuelson theorem are frequently used to analyse the effects of trade liberalization (Grossman and Rogoff, 1995). One of the issues emphasized within the literature is that in the long run, when factors of production are mobile across industries, standard Heckscher-Ohlin’s theory predicts that factor prices will be equalised across industries and any differences in wages for similar types of work will eventually disappear. The empirical studies have usually not been able to find evidence of the long-run relationship.

Another point can be attributed to Krugman (2008) who states that the nature of trade has significantly changed during the past decades and this is not frequently taken into account in the empirical studies. The literature on the effects of globalisation on wage inequality that documented rising skill premia in developing countries and skill upgrading in industrial economies has questioned the traditional trade theories (Goldberg and Pavcnik, 2007). Some studies suggested that sectoral affiliation of workers plays important role in assessing the trade effects on wages (Hoekman and Winters, 2005). Furthermore, Hölscher, Perugini and Pompei (2011, 274) emphasize that transition economies were faced with wage disparities associated with the unfolding of market wage setting, productivity differentials and returns to education that were magnified by market distortions.
Relying on theoretical models, we can foresee benefits from increased integration-related trade connected with product variety. This love for variety (Krugman, 1980) increases consumers’ utility, but on the other hand produces new competitiveness pressures for the domestic firms. One assumption is that, as a result, domestic firms will adopt more efficient behaviour (Helpman and Krugman, 1985). If the nature of trade is more intra-industry (defined as intensive trade of similar products within the same industry) than inter-industry (when the division of trade products is more clear, implying trade of products with different quality) it is assumed that the consequence will be relatively low adjustment costs of production factors reallocation through smooth adjustment process. Such success stories are more likely in case when developed economies are integrating. Whether integration induces low adjustment costs in case of transition economies is a question that deserves empirical verification.

In general we can assume several adjustment mechanisms of labour markets to changing trade patterns. The first one is related to the increased variety gains as previously described (Krugman, 1981). It could be foreseen that the internal restructuring due to increased competition on the domestic market will result in closing down of low competitive firms (Melitz, 2003). We can also foresee the case when the effect will be entirely shifted to the reduction of labour costs, without closing down of enterprises (Davis and Harrigan, 2011). Both adjustment mechanisms have been documented in Croatia on a case-level basis.

The focus of this paper is on the trade patterns at the level of economic activity, and in particular the question whether different patterns exert different wage pressures. The attention to the latter issue has been frequently drawn within the analysis of the EU accession process of transition economies, related to the smooth adjustment hypothesis. The hypothesis states that if intra-industry trade (IIT) has higher share in the overall trade between the countries, the integration associated adjustment costs will be less severe than in cases when the share of inter-industry trade is relatively higher. Azhar and Elliot (2008) suggest that increases in trade will result in changes in imports and export on
a sector/product level. If the trade patterns are for the most part inter-industry in nature, than these sector changes will be reflected in transferring production resources between industries, from contracting to expanding industries. If there are large differences in relative production factor endowments of the two trading countries, the costs of adjustments from one industry to another will be higher. The costs will also be higher if the labour market rigidity is high. This could be either a consequence of formal regulations (strict Labour code) or informal practices (low occupational mobility). Transition economies in general have inherited relatively low occupational mobility and strong unions who favoured regulation and Croatia is an example where these issues have frequently been debated in public discussions.

The intra-industry trade is further disaggregated into horizontal intra-industry trade (which is the trade of relatively close substitute products within the same industry) and vertical intra-industry trade (which is the trade of differentiated products within the same industry). The theoretical foundations for horizontal intra-industry trade (HIIT) can be found in Helpman and Krugman (1985) and vertical intra-industry trade (VIIT) in Caves (1981). Vertical intra-industry trade models can be associated either with consumer demand for different product qualities (Falvey and Kierzkowski, 1987) or segmentation of production process across regions as a result of multinational activities (Markusen and Venables, 2000). Empirical studies frequently show that the trade between developed economies has large share of IIT and also large share of HIIT.

Smooth adjustment hypothesis has been frequently assessed and confirmed or refuted in empirical studies. Part of the differences in results could certainly be attributed to the different measures of intra-industry trade and labour cost changes. Brülhart, Elliott and Lindley (2006) suggest individual employees sectoral and occupational distance indicator within the manufacturing sector. Earlier studies have used industry employment change as an indicator of adjustment cost (Brülhart and Elliott, 1998; Greenaway et al., 1999), while others made use of job turnover indicator (Brülhart, 2000; Andersson, Gustafsson and Lundberg,
2000). Over the years more consensual tone has been achieved for the measurement of intra-industry trade, where researchers mostly agree that marginal intra-industry trade is more appropriate for dynamic analysis of the changes in the labour market. Another frequently used indicator of intra-industry trade – Grubel-Lloyd index has been challenged in the literature (Brülhart and Elliott, 1998) for its ability to disentangle trade patterns especially in the cases of transition countries, which usually have large trade imbalances as well as structural changes.

Following previously established concepts in the literature, the aim of this paper is to provide empirical analysis of the accession period in Croatia.

DATA SOURCES AND PRELIMINARY ANALYSIS

Analysis relied on LFS data, a survey performed by Croatian Central Bureau of Statistics. Individual LFS data without identifier has been used in empirical estimation. Since 2007, LFS methodology includes panel component. The data used was not anonymised, so the panel component could not be utilised for the research purposes. In order to avoid double-counting the same respondent, the individual responses have been used only when they appeared the first time in the panel (Drinkwater and Robinson, 2011).

In order to provide the perspective of the industry, some indicators had to be aggregated to the relevant NACE (national classification of economic activities used by the statistical office) classification. This has been done both in the case of the labour market and trade data. The same version of NACE classification, the more recent one, has been used throughout the analysed period (in Croatia referred to NKD 2007). To produce IIT indicators, Eurostat COMEXT data has been used. Estimates were made on the most detailed level of aggregation (CN8), which enables correspondence between CN-PRODCOM-NACE classifications. Using the available Eurostat correspondence procedures, the data were aggregated to the most recent NACE 2-level classification (NKD2007) throughout the analysed period.
Trade with the EU countries presents a large segment of overall Croatian international trade, which is one of the arguments behind the integration process. However, the question is whether this trade resembles more the North-South pattern or the pattern which develops between similarly developed economies. To provide some insights, we present the intra-industry trade indicators. The methodology applied has been previously frequently used in the literature (Abd-el-Rahman, 1991; Fontagné and Freudenberg, 1997; Freudenberg and Lemoine, 1999). IIT can be estimated following the concept of trade overlap:

\[
\text{Trade overlap} = \frac{\min(\text{exports}, \text{imports})}{\max(\text{exports}, \text{imports})}
\]

The expression is evaluated at the disaggregated level of product classification (CN 8). If it is above certain threshold, then it is assumed that significant trade overlap exists and the trade is considered to be two-way (or IIT). Threshold of 10 percent, frequently used in the literature, is applied in order to avoid the possible sensitivity of the results to this parameter. The results presented in the paper are aggregated to the described levels (industry, activity).

Figure 1 IIT with EU-15 and industrial production (1998=100) in Croatia

Source: Central Bureau of Statistics and author’s estimates based on COMEXT.
The previous data shows that the share of two-way trade (IIT) between Croatia and EU-15 is relatively low, but it seems to be increasing in the last few years. The industrial production pattern, on the other hand, reveals the severe impact the crisis had on Croatian economy. Since we are analysing labour market effects, we have to keep in mind that all of the changes in specific industries should not be attributed to trade effects. Clearly, crisis had important effect on the demand for labour, which we cannot assume that is evenly distributed across the economy. Additionally, some industries have followed the defensive restructuring through shedding labour (Botrić, 2012a). It does not necessarily imply that retained workers have suffered from wage cuts or were able to gain additional wage increases. Thus, the overall effect on the industry level cannot be assumed in advance.

The intra-industry trade varies significantly among specific industries. Also, trade patterns might be quite different across time. To illustrate this, we present the shares of intra-industry trade in Croatian trade with EU-15 in two specific years – 2000 and 2010. The results are presented in Figure 2.

Figure 2 IIT shares in total trade across industries

Source: author’s estimates based on COMEXT data.

NACE codes refer to the manufacture of: 10 – food products; 13 – textiles; 14 – wearing apparel; 15 – leather and related products; 16 – wood and

The data clearly shows that intra-industry trade shares in the overall trade are not the same through time. It might be suspected that integration process in general increases the share of IIT, however there are examples where the trend is reversed. In Croatian case, there is a sharp decline in IIT in leather industries, but some other industries have also recorded decline. On the other side of the spectrum seem to be wearing apparel and rubber manufacturing, which have recorded increase in IIT. One of the arguments behind these data could be attributed to restructuring of specific enterprises. However, we might also argue that these data are year-specific, since it has been frequently argued in the public debates that Croatian exports and imports dynamics is erratic due to the lack of consistent economic policies.

In addition to IIT, it is interesting to note the differences between horizontal and vertical intra-industry trade across industries in Croatia. In order to distinguish between HIIT and VIIT, a standard unit value approach has been applied in the paper (Fontagné and Freudenberg, 1997). A ratio between unit value of exports and unit value of imports has been evaluated against a threshold according to the following expression:

$$\frac{1}{1 + \alpha} \leq \frac{\text{Unit value of exports}}{\text{Unit value of imports}} \leq 1 + \alpha$$

Horizontally differentiated products are those for which the evaluated ratio of unit values falls between the specified borders, implying that the differences between unit values of exports and unit values of imports for that product are small. In that case, we interpret this as products of similar quality, in particular when the expression is evaluated at the low level of aggregation (as is
Vertically differentiated products are those for which the unit value ratio falls outside the borders, implying that either the goods from the home market are at the lower end of the EU market (unit value ratio is below the lower boundary) or they are up-market goods (for those whose unit value ratio exceeds $1+\alpha$). Unit values have been calculated as the ratio of the value of trade in EUR and a corresponding quantity in tons. Threshold value $\alpha$ has been set to 15 percent, which is a frequently utilized value. Horizontal intra-industry trade across industries is presented in Figure 3, while vertical intra-industry trade is presented in Figure 4.

Figure 3 HIIT shares in total trade across industries

Source: author’s estimates based on COMEXT data.

In general we can assume that industries that have higher shares of horizontal IIT are exporting the products of the same quality as the products imported on the home market. This can be taken as evidence of an ability to compete. In year 2000 two industries stand out in this respect – wearing and apparel and leather industry. However, one decade after, both industries have lost their initial position. The increase in HIIT in the same period has been recorded by other transport equipment (which contains highly erratic in terms of export activity shipbuilding industry) and rubber and plastic products industry. However, the overall share of HIIT even in those industries is around 15 percent, which is not high.

Figure 4 VIIT shares in total trade across industries

Source: author’s estimates based on COMEXT data.

The data in Figure 4 shows that vertical intra-industry trade shares are high (higher than 50 percent of overall trade) in furniture, electrical equipment and fabricated metal products. Thus, although there seems to be a two-way trade developed in these industries, Croatia is more likely to export low quality and import high quality products. This has been documented by Botrić (2012b) who disaggregates vertical IIT into upmarket and downmarket products and finds that among analysed Western Balkan countries Croatia had the highest, but stagnating share of upmarket products in its trade with EU-15 during the 2005-2010 period.

If we compare the results presented in Figures 3 and 4, we will notice that the share of vertical intra-industry trade is higher than the share of horizontal IIT in most analysed industries. This shows that the patterns of trading within the same industries are more related to exporting low quality products and importing higher quality products. There are few exemptions to this pattern. In 2000 we can notice that wearing apparel had higher share of HIIT than VIIT. However, this situation has not remained until 2010 when two other industries had higher shares of HIIT: chemical products and pharmaceutical products.

Even though we cannot specify fully dynamic model, still we argue that the changes in the international competition pressures (and not the level of pressure itself) affect firms’ behaviour and consequently employees. The dynamics of the intra-industry trade in time is explored with marginal intra-industry trade (MIIT) indicators, which capture the relative changes in trade between two periods. Similar to IIT, the literature proposes various indicators. We follow the methodology proposed by Brülhart (1994) and calculate MIIT based on following expression:

\[
MIIT = 1 - \frac{|\Delta X - \Delta M|}{|\Delta X| + |\Delta M|}
\]

Where X refers to exports and M refers to imports, both of which are on a detailed level of aggregation. This index varies between 0 and 1, where 0 indicates marginal trade in the particular
industry to be completely of the inter-industry type, and 1 repre-
sents marginal trade to be entirely of the intra-industry type. The
indicators presented in this section are subsequently used in the
empirical analysis.

EMPIRICAL STRATEGY

Basic empirical strategy is to estimate the Mincer-type wage
equation, which includes following traditional labour market
variables:

**Age and age-squared.** The persons can expect relatively dif-
ferent wages with respect to their age. It could be argued that
older persons have important experience, which cannot be meas-
ured directly with other observable variables. However, there are
arguments that diminishing returns are associated with age, so
in order to capture this effect all the specifications include age-
squared.

**Gender.** It has been frequently addressed in the literature,
even in the case of Croatia (Nestić, 2010) that women obtain on
average lower wages than men. Consequently, we include dummy
variable - which takes value 1 if a person is male - into our spec-
ification.

**Living in urban areas.** It is frequently argued that urban areas
offer wider variability in jobs, and consequently also that impor-
tant business centres are frequently located in such areas. Wage
patterns are related to the urbanisation degree. To capture this ef-
fact, we include a dummy variable which has value 1 if a person
lives in urban or semi-urban area.

**Education** is measured by the qualifications obtained and ag-
gregated to the three levels – lower secondary, upper secondary
and tertiary. Due to the fact that the classification has changed
during the analysed period, the categories within each segment
are not the same. Prior and including the year 2009, as lower
secondary education, categories »No school«, »1-3 basic school
grades«, »4-7 basic school grades« and »Basic school« are con-
sidered. As upper secondary education, categories »School for skilled and highly skilled workers«, »Vocational secondary schools« and »Grammar school« are included. As tertiary education, categories from »Non-university college« to »Doctorate« are considered. From the year 2010, the classification is as following. Lower secondary includes three categories up to basic school. Upper secondary includes all the varieties of high school education in Croatia, including short specialised after high school courses that enable students for certain activities (like craftsmanship certificates). Tertiary starts with short university programmes (2 or 2.5 years) and finish with doctorate. In order to avoid multicolinearity, upper secondary has been excluded from estimation.

Occupation in the analysis is defined as the occupation of the main job listed by the employed person. Following occupation-dummies have been included in the specifications: Armed forces occupations; Managers; Professionals; Technicians and associate professionals; Clerical support workers; Service and sales workers; Skilled agricultural, forestry and fishery workers; Craft and related trades workers; Plant and machine operators, and assemblers; Elementary occupation.

There are two sets of estimates. The first one is concentrated on the issue of industry wage premium. To that end, previous list of variables is augmented with dummy variables for each NACE-2 industry. Since we are interested only in manufacturing sector, workers from other economic activities are not included in the sample. In order to avoid multicolinearity, we have excluded activity NACE 19 – manufacture of coke and refined petroleum products because the total trade with European Union in this segment was negligible throughout the analysed period.

The first specification, consequently, has the following form:

\[
\ln \text{wage} = \alpha + \beta_1 \text{age} + \beta_2 \text{age}^2 + \beta_3 \text{male} + \beta_4 \text{urban} + \beta_5 \text{lower} + \beta_6 \text{upper} \\
+ \sum_{i=7}^{14} \beta_i \text{occupation}_{i-5} + \sum_{j=10}^{32} \delta_j \text{activity}_j + \epsilon
\]
The estimates have been repeated for each year in the period 2004-2012. In this case we are interested in the delta-coefficients and in order to save space, only these are presented in Table 1.

In case of alternative specification, most of the variables are the same, but instead of the dummy variables for economic activity, IIT indicators have been used for the NACE-2 level activity a worker is employed in. Three specific IIT indicators were used: HIIT (the share of horizontal intra-industry trade in intra-industry trade), VIIT (the share of vertical intra-industry trade in intra-industry trade) and MIIT (the change of intra-industry trade between two periods). In that case we have a specific coefficient related to that variable, and these results are presented in Tables 2, 3 and 4. Both results are presented and discussed in following section.

RESULTS

The results of the estimation in Table 1 reveal that there is an industry wage premium within Croatian manufacturing sector. Relative to the sector that had the lowest share of trade with the EU countries throughout analysed period, some industries had consistently lower wages. This implies that the openness to competition of those industries and orientation towards the foreign markets results in relatively lower wages (after controlling for education, age, sex, occupation and living area of their workers). Important fact is that we were not able to find any positive significant coefficient in the analysed period. Thus, those industries that are competing on the international market are not able to compensate their workers in the same way that those oriented towards the local market. Not only that we can see negative wage premium for the manufacturing sector vs. for example, public sector and other non-tradables, we have also detected tradable versus non-tradable pattern within the manufacturing sector.

It is interesting to notice that traditional labour-intensive industries – such as food, textiles, wearing apparel, leather – have consistently significant negative wage premium, even after controlling for worker-specific characteristics. This suggests that
labour intensive industries continue to compete on the international market with relatively lower labour costs, even though the competition from Asian markets has significantly increased during the last decades.

Another interesting point is that, even during this relatively short timeframe, we can notice that changes occur. The relative wage premiums are not the same through time. We cannot conclude that this is solely the consequence of increased pressures from the international trade. The analysed period and the effects of crisis could play an important role in the structure of the sample (changing the relative shares of specific types of workers), but also the willingness of workers to disclose certain information in a survey.

Table 1 Estimated industry wage premium coefficients

<table>
<thead>
<tr>
<th>NACE activity</th>
<th>Estimated coefficients (standard errors) across years</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>-0.20*** (0.05) -0.27*** (0.06) -0.24*** (0.09) -0.23*** (0.07) -0.23** (0.10) -0.24* (0.11) -0.18** (0.08) -0.20*** (0.07)</td>
</tr>
<tr>
<td>11</td>
<td>-0.30*** (0.06) -0.13** (0.07) -0.26*** (0.07) -0.15 (0.10) -0.03 (0.08) -0.17 (0.11) -0.20 (0.13) -0.17 (0.10)</td>
</tr>
<tr>
<td>12</td>
<td>-0.20* (0.11) -0.15 (0.11) -0.22* (0.12) -0.20 (0.14) 0.41*** (0.13) 0.01 (0.15) -0.14 (0.17) -0.03** (0.13)</td>
</tr>
<tr>
<td>13</td>
<td>-0.56*** (0.06) -0.44*** (0.07) -0.65*** (0.10) -0.43*** (0.08) -0.15 (0.11) -0.40** (0.13) -0.58*** (0.10) -0.33*** (0.10)</td>
</tr>
<tr>
<td>14</td>
<td>-0.58*** (0.05) -0.50*** (0.06) -0.68*** (0.07) -0.50*** (0.09) -0.40*** (0.07) -0.46*** (0.10) -0.45*** (0.08) -0.42*** (0.08)</td>
</tr>
<tr>
<td>15</td>
<td>-0.62*** (0.05) -0.45*** (0.07) -0.60*** (0.07) -0.30*** (0.10) -0.23*** (0.08) -0.40*** (0.11) -0.42*** (0.12) -0.34*** (0.09)</td>
</tr>
<tr>
<td>16</td>
<td>-0.49*** (0.05) -0.42*** (0.06) -0.56*** (0.07) -0.40*** (0.09) -0.22*** (0.07) -0.36*** (0.10) -0.40*** (0.12) -0.28*** (0.08)</td>
</tr>
<tr>
<td>17</td>
<td>-0.35*** (0.06) -0.40*** (0.07) -0.28*** (0.07) -0.25*** (0.10) -0.18*** (0.08) -0.15 (0.11) -0.22*** (0.12) -0.26*** (0.09)</td>
</tr>
<tr>
<td>18</td>
<td>-0.33*** (0.06) -0.25*** (0.07) -0.32*** (0.07) 0.02 (0.10) -0.28*** (0.08) -0.31*** (0.11) -0.35*** (0.12) -0.33*** (0.10)</td>
</tr>
<tr>
<td>19</td>
<td>-0.29*** (0.05) -0.21*** (0.07) -0.24*** (0.07) -0.33*** (0.10) -0.13*** (0.08) -0.18*** (0.11) -0.25*** (0.12) -0.26*** (0.09)</td>
</tr>
<tr>
<td>20</td>
<td>0.05 (0.07) 0.19** (0.08) -0.48*** (0.08) 0.12 (0.10) -0.15 (0.09) -0.00 (0.14) 0.11 (0.14) 0.09 (0.10)</td>
</tr>
<tr>
<td>21</td>
<td>-0.24*** (0.05) -0.24*** (0.07) -0.31*** (0.07) -0.21*** (0.10) -0.28*** (0.08) -0.17*** (0.11) -0.40*** (0.12) -0.29*** (0.09)</td>
</tr>
<tr>
<td>22</td>
<td>-0.24*** (0.05) -0.24*** (0.07) -0.31*** (0.07) -0.21*** (0.10) -0.28*** (0.08) -0.17*** (0.11) -0.40*** (0.12) -0.29*** (0.09)</td>
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<tr>
<td></td>
<td>23</td>
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<tr>
<td></td>
<td>44,85</td>
</tr>
<tr>
<td>N</td>
<td>3371</td>
</tr>
</tbody>
</table>

Notes: *** denotes significance at 1 level, ** at 5 and * at 10 percent.


To further elaborate the issue of trade pressures on the wages, we have explicitly included horizontal intra-industry trade share, vertical intra-industry trade share and marginal intra-industry trade estimated on the level of NACE-2 activity into relevant

Source: author's estimates based on LFS and COMEXT data.
equations. Controlling for individual labour market indicators (education, age, gender, occupation and living area), we focus on the relationship between intra-industry trade and wages. Specifically, we analyse whether the industries in which the intra-industry trade with the EU have on average higher or lower wages. The results for the analysed period are presented in following tables. All of the estimated coefficients from the wage equations are not presented in order to save space, but could be available from the author upon request.

Table 2 Estimated HIIT coefficients in wage equations

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated coefficient (standard error)</th>
<th>N</th>
<th>Adjusted R2 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>-0.90*** (0.07)</td>
<td>3371</td>
<td>37.67</td>
</tr>
<tr>
<td>2005</td>
<td>-0.28*** (0.05)</td>
<td>3134</td>
<td>37.70</td>
</tr>
<tr>
<td>2006</td>
<td>-0.88*** (0.06)</td>
<td>3182</td>
<td>36.67</td>
</tr>
<tr>
<td>2007</td>
<td>-0.74*** (0.09)</td>
<td>2986</td>
<td>45.76</td>
</tr>
<tr>
<td>2008</td>
<td>-0.33*** (0.05)</td>
<td>2798</td>
<td>45.44</td>
</tr>
<tr>
<td>2009</td>
<td>-0.42*** (0.08)</td>
<td>1434</td>
<td>42.14</td>
</tr>
<tr>
<td>2010</td>
<td>-0.60*** (0.15)</td>
<td>1327</td>
<td>39.53</td>
</tr>
<tr>
<td>2011</td>
<td>-0.66*** (0.17)</td>
<td>1045</td>
<td>41.57</td>
</tr>
<tr>
<td>2012</td>
<td>-0.29** (0.13)</td>
<td>1009</td>
<td>41.06</td>
</tr>
</tbody>
</table>

Source: author’s estimates based on LFS and COMEXT data.

Table 2 presents the pressures coming from the share of horizontal intra-industry trade. The results indicate that throughout the period industries which had higher shares of horizontal intra-industry trade with the EU countries (i.e. trading within industries that competed with similar products of similar quality), had at the same time lower wages. This implies that competition was predominately by cost reductions methods and integration effect in that context requires adjustment costs related to wage reductions.
### Table 3 Estimated VIIT coefficients in wage equations

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated coefficient (standard error)</th>
<th>N</th>
<th>Adjusted R2 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>-0.15*** (0.03)</td>
<td>3371</td>
<td>34.83</td>
</tr>
<tr>
<td>2005</td>
<td>-0.12*** (0.03)</td>
<td>3134</td>
<td>37.48</td>
</tr>
<tr>
<td>2006</td>
<td>-0.09*** (0.03)</td>
<td>3182</td>
<td>32.63</td>
</tr>
<tr>
<td>2007</td>
<td>-0.22*** (0.03)</td>
<td>2986</td>
<td>45.29</td>
</tr>
<tr>
<td>2008</td>
<td>-0.25*** (0.03)</td>
<td>2798</td>
<td>45.44</td>
</tr>
<tr>
<td>2009</td>
<td>-0.26*** (0.04)</td>
<td>1434</td>
<td>42.87</td>
</tr>
<tr>
<td>2010</td>
<td>-0.19*** (0.04)</td>
<td>1327</td>
<td>39.63</td>
</tr>
<tr>
<td>2011</td>
<td>-0.28*** (0.04)</td>
<td>1045</td>
<td>43.17</td>
</tr>
<tr>
<td>2012</td>
<td>-0.25*** (0.05)</td>
<td>1009</td>
<td>42.41</td>
</tr>
</tbody>
</table>

Source: author’s estimates based on LFS and COMEXT data.

The results presented in Table 3 show that similar patterns occur when the IIT patterns are vertical, i.e. trading within similar industries with differentiated products. Still the higher share of vertical intra-industry trade is associated with lower wages. This would suggest that whenever trying to compete within similar industries on the European market, pressures for Croatian workers in those industries increased in terms of demands for wage reductions. The reason for this could be that the competition method is concentrated on prices and not the innovativeness or quality of the products traded.

### Table 4 Estimated MIIT coefficients in wage equations

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated coefficient (standard error)</th>
<th>N</th>
<th>Adjusted R2 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>-0.19*** (0.06)</td>
<td>3371</td>
<td>34.57</td>
</tr>
<tr>
<td>2005</td>
<td>-0.35*** (0.07)</td>
<td>3134</td>
<td>37.73</td>
</tr>
<tr>
<td>2006</td>
<td>-0.80*** (0.06)</td>
<td>3182</td>
<td>36.08</td>
</tr>
<tr>
<td>2007</td>
<td>-0.81*** (0.09)</td>
<td>2986</td>
<td>45.84</td>
</tr>
<tr>
<td>2008</td>
<td>-0.41*** (0.07)</td>
<td>2798</td>
<td>45.35</td>
</tr>
<tr>
<td>2009</td>
<td>-0.29*** (0.09)</td>
<td>1434</td>
<td>41.48</td>
</tr>
<tr>
<td>2010</td>
<td>-0.14* (0.07)</td>
<td>1327</td>
<td>38.91</td>
</tr>
<tr>
<td>2011</td>
<td>-0.81*** (0.12)</td>
<td>1045</td>
<td>43.41</td>
</tr>
<tr>
<td>2012</td>
<td>0.08 (0.10)</td>
<td>1009</td>
<td>40.79</td>
</tr>
</tbody>
</table>

Source: author’s estimates based on LFS and COMEXT data.
As the results of the estimation show, until 2011 the higher marginal intra-industry trade in the activity was associated with significantly lower wages. This means that the more industry actively tried to integrate into the European market by trading products of similar value, the lower average wage it was able to offer to its workers. The accession period in Croatian industry was consequently associated with increased pressures on its workforce in tradable sector.

CONCLUSIONS

The paper has addressed the issue of industry wage premium and trade pressures on wages in Croatian manufacturing sector. The estimates have revealed that within manufacturing sector there is an industry wage premium. Specifically, relative to the economic activity that virtually had no trade with EU-15 during the 2004-2012 period, all other activities had negative wage premiums. In case of labour intensive activities, those negative wage premiums were consistently significant.

To further investigate the issue, wage equation has been re-specified in order to explicitly include the indicators of horizontal IIT, vertical IIT and marginal intra-industry trade with EU-15. The analysis has confirmed that the higher the respective intra-industry trade indicator in specific economic activity, the lower the relative wage of the workers in that industry. This implies that the more specific industry is integrated in the common EU market, the more it tries to compete with relatively cheaper labour force.

The analysis presented in the paper points to the conclusion that there is an additional tradable vs. non-tradable wage policy issue within the manufacturing sector itself. It has been frequently emphasized that this Dutch decease has important consequences for the overall Croatian competitiveness position. However, previous analysis in the literature did not go beyond the public-private gap or the manufacturing-services gap. The analysis in this paper implies that the effects are possibly even deeper.
The notion that there are industry wage premiums is of particular importance for Croatian labour market policy. It has been frequently emphasized that the labour market in Croatia is rather rigid and suffering from low occupational and any other sort of mobility. This implies that workers “stuck” in low-wage industry are most likely to have fewer prospects to move to other industries. Without increased mobility, however, there are even lesser chances for decreasing wage premiums in the future.

REFERENCES


