# IMPACT ANALYSIS OF VARIOUS EU POLICIES APPLYING I-O TECHNIQUE

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***Abstract:***

*The core objective of this paper is to asses the impact of different scenarios on the basic economic variables in Croatia and in the Bjelovar - Bilogora County, the region of Croatia. This allows the investigation of the medium-term perspectives of selected region with the particular reference to agriculture and overall employment patterns.*

*In this analysis different amounts of the EU funds are injected in the national and regional I-O matrices to derive estimates of the impacts generated by different analysed policies and defined relevant scenarios. I-O brings useful insights into the differing effects on national and regional employment and other important variables stemming from the diversity of the Country's regions in terms of their economic development and structural characteristics.*

*This analysis is performed in a static framework using the GRIT methodology for the regionalization of the national I-O table.*

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## 1. Introduction

In the light of the current situation Croatia has definitely started the path towards EU. The European Council decided on Friday, 18th June 2004 to grant Croatia the status of an official candidate for membership of the European Union.

The most visible advantages of getting the applicant status and later joining EU are from the EU financial support that is set at the disposition to the candidate states and members throughout various funds which are part of the European Union's policies. It is assumed that these expenditures in any phase will affect general economic performance and overall employment patterns at national and regional level and that the impact is likely to differ in sectoral aspect.

Therefore, this paper systematically describes and analyses the effects and benefits of different policy expenditures from various EU sources that are expected in Croatia especially now when Croatia is a candidate country. These EU policies and their impact on the national and regional economic development differ depending on the analyzed different phases in the way towards EU, beginning with the currently active EU's CARDS programme expenditure followed by the pre-accession strategy and its policy instruments Phare, ISPA and SAPARD with corresponding expenditures and ends with the "after accession" EU budget expenditures for the member states throughout Common Agricultural Policy, the Structural Operations and Internal Policies.

The paper is divided in three main paragraphs. Each of the paragraphs tends to present step by step the performed work and the generated results.

After the introduction, the second paragraph is primarily the background to the forthcoming ones and informs about the situation in Croatia and its relations with the EU. It also includes the description of general characteristics of the analysed region and its comparisons to the Country as a whole.

The paragraph is also the one that gives the information on the methodology used for the analysis, calculation of the sectoral linkage coefficients and the brief analysis of the computed multipliers.

The third one gives the information on the policies taken into the consideration, analysed policy instruments and the projected funds inflow to Croatia and the region under study with the relevant national and regional scenarios.

The fourth paragraph is the centre one. It points out the results of the impact analysis performed for each defined scenario and its overall effects on economic development at of the Croatia and selected rural region.

The fifth paragraph gives concluding remarks on the results with some important issues.

# 2. The background to the analysis

## 2.1. The relations between EU and Croatia

After four years of the negotiations the European Council decided in June, 2004 to grant Croatia the status of an official candidate for membership of the European Union. On the basis of the European Commission's analysis, the European Council will have to decide whether and when to open negotiations. The Commission also approved the proposal for a decision of the Council on the European Partnership with Croatia, which is inspired by the Accession Partnerships that have helped prepare countries for eventual EU membership in the past. The Partnership is based on the analysis in the Opinion. Croatia presented its application for membership of the European Union on 21 February 2003 and the Council of Ministers asked the Commission in April 2003 to present its Opinion. In its Opinion, the Commission analysed the Croatian application on the basis of Croatia's capacity to meet the criteria set by the Copenhagen European Council of 1993 and the conditions set for the Stabilisation and Association process. In preparing its Opinion, the Commission has taken into account the "Thessaloniki Agenda for the Western Balkans" adopted by the European Council of June 2003, where the EC President president Romano Prodi stated "that the pace of further movement of the Western Balkans countries towards the EU lies in their own hands and will depend on each country's performance in implementing reforms, thus respecting the criteria set by the Copenhagen European Council of 1993 and the Stabilisation and Association Process conditionality".

This is the base for the following impact analysis, as from now on Croatia can expect the inflow of pre-accession funds and corresponding expenditures and also the funds after accession can be taken into account.

### *2.1.1. The EU 15 compared to Croatia*

The presented figures aim just to give the general information and the "picture" of Croatia in comparison with former EU 15.

- Croatia is a small economy with a population of 4.4 million and a gross domestic product (GDP) at current prices of HRK 176.4 billion or €23.8 billion in 2002.
- The country's population corresponds to about 1.2% of that of the European Union, while its economy is only about 0.26% in GDP terms.
- The GDP per capita is in the order of HRK 40,000 or €5,400 (measured by the average exchange rate 2002).
- The GDP per capita in power purchasing parity (PPP) terms for 1999 was USD 8,267 or 35.9% of the EU average.

## 2.2. The selected region for the impact analysis

One of the first steps of this impact analysis of EU policy funds effects at national and regional economic development was the selection of Croatian rural region. The accent on the rurality was because of the structure of EU financial support (pre-accession and post-accession) which is mainly oriented to agriculture and activities connected with it.

The Croatian County Bjelovar - Bilogora is the example of a rural region in which agricultural employment counts, but at the same time there is a significant share in employment in other sectors. The region is rural according to OECD definition, where rural communities are those with a population density below 150 inhabitants per square kilometres. The County of Bjelovar - Bilogora has the population density of 50.5 inhabitants per square km and it can be characterized as predominantly rural. Moreover, there is no sufficiently strong urban agglomeration to change the predominantly rural characteristic of the region as a whole. Besides the satisfying of the OECD definitions, it is significant to mention that the regional area is in large share agricultural land (37, 23%, according to Agricultural Census in 2003.) and 86% of it is cultivated. The region takes 8,

45% of total agricultural land of Croatia, and 9,7% of total cultivated national agricultural land. Taking all of this into the consideration the selection of Bjelovar-Bilogora County for the case study region was an appropriate choice.

## 2.3. The general characteristics of the methodology used for the performed analysis

The performed methodology for the impact is based on the injection of projected amounts of pre-accession funds and funds available after accession in national and regional I-O matrices.

Within the input-output model it is feasible both the evaluation of the relative importance of any given sector according to its inter sectoral transactions, and the quantitative evaluation of expected impacts on the production, income or employment of the regional or national economy initiated from any exogenous change. I-O analysis in this paper is performed in a static framework using the GRIT methodology for the regionalization of the national I-O table.

The static impact analysis assumes that the structure and technology state of an economy, described by input coefficients (derived from the I-O tables), remain the same over time.

For the impact analysis using this method and with computation of sectoral linkage coefficients (multipliers) the vector of final demand has had to be estimated. The vector of final demand quantifies the direct impact on sectors provoked by the policy scheme described in the corresponding scenario (next chapter).

Once all vectors of final demand have been estimated, the I-O model was applied to assess the overall impacts in terms of income, employment and output induced by different scenarios. The numbers of vectors of output, income and employment had to be equal to the number of scenarios.

### *2.3.1. The aggregation of national table and the derivation of the regional I-O table*

First, the regional table was calculated using the national I-O table. After that the national one was aggregated to the same number of sectors that the regionalized I-O regional table has in order to have comparable analysis of the impacts at national and regional level.

The used national I-O table is the one is from 1997 and it has been derived by the RAS method, based on the direct requirements matrix of year 1987. The 1987 is the last year of the calculation of national I-O table, based on the collected data and other relevant information needed to precede the construction of an I-O table. The Table 1 gives the notice about the characteristics of the used I-O table for the regionalization.

Table 1.Summary characteristic of available national I-O table

| | |
|---|---|
| I-O table | Croatia |
| No. of sectors | Symmetric 60X60 |
| Technology Assumption | Industry technology assumption<br>Product-by-Product |
| Valuation | Basic values, current prices |
| Year | 1997 |
| Intermediate flows | Domestic |

For regionalization of the I-O table with 60 sectors classification scheme, the available employment data at national and regional were used. The employment data (as well as the national I-O table) were provided by the Croatian Central bureau of statistics. The region's contribution to the total national employment is very small; the region's share is just 2.5%. Among the regional sectors with the highest contribution to the Country are agriculture, food and beverage industries and manufacturing

Following aggregation rules many sectors of the national I-O table were aggregated in order to construct the regional table. The aggregation was necessary since the most sectors in the region of Bjelovar-Bilogora were very small with insignificant contribution to the Country. Moreover, many sectors were eliminated since were not existent in the region (regional data showing zero employment). Totally ten sectors were eliminated.

The final classification scheme for the construction of the regional I-O table consists of 14 sectors of economic activity. Agriculture, food industries, textile, miscellaneous manufacturing, construction, trade and services sectors were among those that were not aggregated.

After that the national table was aggregated and it is consisted of 15 sectors. The 15-th sector in the national table makes difference between the national and regional I-O table as it includes other sectors that couldn't have been eliminated from the national economy according to their importance but that have already been eliminated at regional level.

#### *2.3.1.1. The GRIT methodology*

The procedure of regionalization performed for the analysis in this paper is constructed on the basis of the GRIT methodology (Jensen, 1979). This methodology is a system producing variable-interference non-survey based tables. It relies on a series of mechanical steps to derive regional coefficients, but provides the possibility at different stages for the insertion of "superior data", that are data which analysts consider to be more reliable than those obtained by mechanical processes. So, the system is defined as variable-interference in that the analyst interferes with the mechanically produced tables by inserting exogenous information. This methodology incorporates advantages of both survey-based and non-survey methods of regionalization and avoids costs of the former. It allows the calculation of tables to the degree of accuracy definable as "free from significant error". In fact, in the logic of the procedure, since smaller coefficients in a I-O table have an insignificant effect on multipliers, the method of calculation of these coefficients can be considered as operationally irrelevant. Instead, the most significant coefficients can affect enormously the analytical uses of the tables and therefore may be corrected by the insertion of superior data.

The national I-O table is taken as initial data. The stages of the procedure to derive a regional I-O table are (Table 2):

- Adjustments to a national I-O table.
- Adjustment for regional technical coefficients.
- Definition of regional sectors.
- Derivation of a prototype transactions table.
- Derivation of a final transactions table.

Table 2 – Stages of regionalization

| PHASE | STEP |
|---|---|
| I. Adjustments to a national I-O table | Aggregation of sectors (optional)<br>Conversion to a technical coefficients matrix<br>Adjustment for international trade<br>Elimination of intrasectoral flows |
| II. Adjustment for regional technical coefficients | Elimination of non-existing sectors<br>Estimation of regional technical coefficients |
| III. Definition of regional sectors | Insertion of disaggregated superior data<br>Aggregation of regional sectors (optional)<br>Insertion of aggregated superior data<br>Disaggregation of regional sectors (optional) |
| IV. Derivation of a prototype transactions table | Estimation of regional output<br>Estimation of flow matrices<br>Estimation of Final Demand<br>Estimation of Final Payments |
| V. Derivation of a final transactions table | Insertion of superior data<br>Matrix balancing and corrections<br>Calculation of inverse matrix and multipliers<br>Consulting advise |

### *2.3.2. The sectoral linkages*

Apart from the simple representation of intersectoral economic transactions, the input-output model allows the empirical evaluation of the potential of any individual sector to generate economic impacts on a national or regional economy. Specifically, within the input-output model is feasible both the evaluation of the relative importance of any given sector according to its intersectoral transactions, and the quantitative evaluation of expected impacts in the production, income or

employment of the regional or national economy initiated from any exogenous change. The empirical evaluation and the analysis of the economic impacts is done through the sectoral linkages, the calculation of which is usually based on the elements of the total requirements matrix (Leontief inverse).

Within the input-output model any change in the productive capacity of any given sector triggers two distinct results. First, the increase in the total production of sector j at the same time increases sector's j demand for inputs from the rest economic sectors in the model. In this occasion the term backward linkage of sector j is used to represent this kind of internal transactions. On the other hand, the increase of the total production of sector j increases it's total supply to the rest of the economic sectors in the model that are using sector's j product as an input in their production process. In this case the term forward linkage is used to represent these intersectoral transactions.

Traditionally, the impact analysis within input-output models is done with the use of the backward and forward linkages proposed by Rasmussen (1956) and Hirschman (1958). These linkages show the size of structural interdependence in an economy as well as the degree in which the enlargement of a sector can contribute directly or indirectly in the enlargement of other sectors in the model. Because of their last property, backward linkages are also reported in the bibliography as multipliers of output, income or employment depending on their empirical specification.

*a) Chenery and Watanabe (1956) Backward Linkages*

The first empirical attempt to identify the most important economic sectors within the input-output models belongs to Chenery and Watanabe (1956). Specifically they proposed that the degree of backward linkages of each sector should be evaluated based on sector's direct requirements for inputs. They proposed the following backward linkage coefficients for the evaluation of sectoral interdependence based on the direct requirements matrix:

$$\mathbf{BL_j^{CW}} = \sum_{i=1}^{n} \mathbf{a_{ij}} \quad \text{or} \quad \mathbf{BL^{CW}} = \mathbf{e} \cdot \mathbf{A} \qquad (1.1)$$

where $\mathbf{BL^{CW}}$ is the (*nx1*) vector of backward linkage coefficients which reveals the direct dependence of each sector from it's intermediate inputs; ***A*** is (*nxn*) matrix of direct requirements and ***e*** is the (*1xn*) unitary vector. As it is obvious from (1.1) the computed linkages ignore completely the indirect effects from an exogenous change in the economy. For this reason they are often reported also as direct backward linkage coefficients.

Recognizing the above deficiencies, Rasmussen (1956) and Hirschman (1958), proposed the use of the total requirements matrix and not the direct one for the calculation of backward linkages. The calculation of the Rasmussen (1956) and Hirschman (1958) backward linkages is based on the difference between direct and total result that is created by an exogenous change in the final demand of the economic system (*i.e.,* public investments, consumption). This result can concern the total production, the income or the employment of economy.

*b) Rasmussen (1956) and Hirschman (1958) Backward Linkages*

Each element of the total requirements matrix gives the total (direct and indirect) increase in the total output of the supplier sector which is required in order to cover the increase of one unit in the final demand of the products of the purchaser sector. Consequently according to Rasmussen and Hirschman the use of the total requirements matrix provides more reliable results regarding the backward linkages of the sectors within the model. Moreover, it provides an indication of the total (direct and indirect) multiplicative results in the economy from an exogenous change in the system. Specifically they suggested the following linkage indicators:

$$\mathbf{BL_j^{RH}} = \sum_{i=1}^{n} \beta_{ij} \quad \text{or} \quad \mathbf{BL^{RH}} = \mathbf{e} \cdot \mathbf{B} \qquad (1.2)$$

where $BL^{RH}$ is the (nx1) vector of backward linkages each element of which shows the total increase of gross output in the economy which is required for the satisfaction of one unit of

increase in the final demand of sector j, and $\beta_{ij}$ is the corresponding element of the total requirements matrix B.

In other words the Hirschmanian linkages are analyzing the impact that is created in the system through the increased demand for inputs and provide an indication of the degree of interdependence of any given sector within the economy. Because of their multiplicative property, the backward linkages are often reported in the bibliography as output multipliers. It must be stressed in this point that the above indicators do not satisfy the additivity property with respect to the changes in the final demand of the model. That is to say, the increase of final demand of sector alters ex post the size of the backward linkages and consequently it cannot be used in order to interpret any new change in the final demand.

Apart from the output backward linkages, it is also possible within input-output model to determine also the backward linkage coefficients with respect to the household income and the employment of the regional or national economy. These linkage coefficients show the changes created in the household income, or in the employment of the economy that are initiated by any change in the final demand of each individual sector.

Specifically the income backward linkages are calculated as follows:

$$\mathbf{IBL_j^{RH}} = \sum_{i=1}^{n} \mathbf{l_i \beta_{ij}} \quad \text{or} \quad \mathbf{IBL^{RH}} = \mathbf{l' \cdot B} \qquad (1.3\alpha)$$

and

$$\mathbf{l_i} = \mathbf{L_i / X_i} \quad \text{or} \quad \mathbf{l} = \mathbf{L'./ X} \qquad (1.3b)$$

where $IBL^{RH}$ is the (1xn) vector of sectoral income backward linkages, each element of which reveals the change in the total (direct and indirect) household income of the economy initiated by any change in the final demand of each sector separately, l is the (nx1) vector of income technical coefficients, each element of which shows the direct change in the income of each sector of the economy initiated from any change in it's total production and L it is the (1xn) vector of household income.

Accordingly, the employment backward linkages can be calculated as follows:

$$\mathbf{EBL_j^{RH}} = \sum_{i=1}^{n} \mathbf{w_i \beta_{ij}} \quad \text{or} \quad \mathbf{EBL^{RH}} = \mathbf{w' \cdot B} \qquad (1.4a)$$

and

$$\mathbf{w_i} = \mathbf{w_i / X_i} \quad \text{or} \quad \mathbf{w} = \mathbf{W'./ X} \qquad (1.4b)$$

where $EBL^{RH}$ is the (1xn) vector of sectoral employment backward linkages each element of which reveals the change in the total employment of economy which is initiated by any change in the final demand of every given sector, w is the (nx1) vector of employment technical coefficients, each element of which shows the direct change in the employment of each sector in the economy imitated from a change in it's total gross production and, W it is the (1xn) vector of sectoral employment.

*c) Augustinovics (1970) Forward Linkage Coefficients*

An important disadvantage of Hirschman's forward linkage coefficients concerns their underlying hypothesis regarding the change in the final demand of every sector in the model. It is obvious that in real terms it is difficult to alter the final demand of every sector in the same way. In addition, if a great part of the total production of any sector is sold to another sector with low production level relative to the rest of the economy, or a small part of the total production of any sector is sold to another sector with relatively high production level, then the traditional forward linkage coefficients will provide us with misleading results. (Jones, 1976).

To overcome that problem, Augustinovics (1970) suggested the use of the transposed matrix of intermediate sales to compute forward linkage coefficients that reveals the intermediate consumption as a percentage of total sectoral sales including final demand. Specifically, the basic input-output identity can be written in terms of total product supply as (supply-driven model):

$$\mathbf{X'} = \mathbf{X'F} + \mathbf{VA} \qquad (1.5a)$$

and

$$\mathbf{F} = \hat{\mathbf{X}}^{-1}\mathbf{Z} \qquad (1.5b)$$

where, F is a (nxn) matrix of intermediate sales, Z is the (nxn) transactions matrix and VA is the (1xn) vector of final payments.

Solving (1.6a) with respect to output vector we get:

$$\mathbf{X}' = \mathbf{VA}(\mathbf{I} - \mathbf{F})^{-1} \Rightarrow \mathbf{X}' = \mathbf{VA} \cdot \mathbf{B}^{*} \qquad (1.6)$$

here, $B^{*}$ is the (nxn) transposed matrix of total requirements. According to Augustinovics (1970) the forward linkage coefficients should be computed as:

$$\mathbf{FL}_{\mathbf{i}}^{\mathbf{AG}} = \sum_{j=1}^{n} \beta_{ij}^{*} \quad \text{or} \quad \mathbf{FL}^{\mathbf{AG}} = \mathbf{B}^{*} \cdot \mathbf{e}' \qquad (1.7)$$

where $FL^{AG}$ is the (nx1) vector of forward linkage coefficients that shows the total (direct and indirect) change in the total output of the economy that is initiated by a unit change in sector final payments. Using the same analytical approach we can calculate the income and employment forward linkage coefficients as:

$$\mathbf{IFL}_{\mathbf{i}}^{\mathbf{AG}} = \sum_{j=1}^{n} \mathbf{l}_{\mathbf{i}}\beta_{ij}^{*} \quad \text{or} \quad \mathbf{IFL}^{\mathbf{AG}} = \mathbf{B}^{*} \cdot \mathbf{l} \qquad (1.8)$$

and

$$\mathbf{EFL}_{\mathbf{i}}^{\mathbf{AG}} = \sum_{j=1}^{n} \mathbf{w}_{\mathbf{i}}\beta_{ij}^{*} \quad \text{or} \quad \mathbf{EFL}^{\mathbf{AG}} = \mathbf{B}^{*} \cdot \mathbf{w} \qquad (1.9)$$

where, $IFL^{AG}$ and $EFL^{AG}$ are the (nx1) vectors of forward linkage coefficients with respect to household income and employment that show the total change in household income or employment in the economy due to a unit change in the final payments of any given sector.

### *2.3.3. The analysis of the calculated regional sectoral linkages*

Apart of advantages or disadvantages from the calculation of the sectoral linkage coefficients four important theoretical considerations need to be stressed:

1. The production technology within input-output model is assumed to be linear (Leontief type). This in turn implies that all economic sectors exploit completely the factors of production that they have in their disposal (full capacity). Consequently, if for some sectors the factors of production are under-utilized the respective linkage coefficients would be overestimated.
2. If the intermediate supply is not perfectly elastic, then the sectoral linkages would be overestimated.
3. The opportunity cost of inputs is zero; differently an increase in the production of any given sector would lead to a reduction of supply of some other sector.
4. The size of the sectoral linkages depends on the aggregation scheme of the national or regional model. In general, high degree of aggregation leads to high linkage coefficients.

The computed sectoral backward and forward linkage coefficients for Croatia and the County of Bjelovar-Bilogora are presented in Table 3 and 4.

First, according to the Chenery and Watanabe (1956) output backward linkages presented in the first column of Table 4, Chemical and Metal Products is the sector with the highest direct vertical interdependencies within the regional economy. Contrary, Machinery and Motor Vehicles exhibit the lowest backward linkage coefficient value (0.0009) followed by Furniture (0.0783), Transportation (0.0928) and Public Administration, Education and Health Services (0.1378). At national level (Table 3) Construction is the sector with the highest vertical interdependence within the economy, while Wood Products sector has the lowest linkage value.

Sectoral ranking at regional level is identical also according to Rasmussen (1956) and Hirschman (1958) output backward linkage coefficients (second column of Table 4). Again Chemical and Metal Products, Other Manufacture, Trade and Hotels exhibit the highest linkage coefficient values. Specifically, for Chemical and Metal Products the relevant estimate is 2.9756 which mean that an increase in the final demand elements of this particular sector will increase the

total regional output by 2.9 units. The second highest linkage coefficient of Other Manufacture sector is almost one unit lower than that of Chemical and Metal Products (1.8874). Again the lowest values come from Machinery and Motor Vehicles and Furniture (1.0012 and 1.1003, respectively). This means that an one unit increase in the final demand of Trade and Repairing Activities sector will cause only an 1.0012 increase in the total output produced regionally. At national level Construction keeps the highest value and the Wood products Sector the lowest level of the coefficients. Agriculture takes the same eight position of the coefficients value at national and regional level.

Chemical and Metal Products also exhibits among the highest regional income backward linkage coefficient values (third column of Table 4). In particular, Public Administration, Education and Health Services exhibit the highest point estimate (0.4806).

Agriculture, on the other hand, has among the lowest national and regional income backward linkage coefficient together with Machinery and Motor Vehicles.

Textiles and Dressing seems to exhibit the highest employment potentials in the region as the respective backward linkage coefficient is the largest among all regional sectors (0.0088). At national level Public administration and Health Services obtain the first place.

Concerning horizontal interconnections, the computed Augustinovics (1970) output forward linkage coefficient underline again the significance of Chemical and Metal Products sector for the regional economy of Bjelovar-Bilogora County (fifth column of Table 4) and Construction sector for Croatia. Specifically, a unit change in the final payments (i.e., imports, household income, other primary inputs) of Chemical and Metal Products will increase the total output produced in the regional economy by 2.7956 units and a unit change in final payments at national level of Construction will increase the national output level by 2,3858 units.

It is noteworthy the fact that Machinery and Mothor Vehicles although were ranked in the lowest position according to all regional backward linkage coefficients they are among the sectors with the highest horizontal interdepencies. Contrary, Public Administration, Education and Health Services together with Agriculture exhibit the lowest regional output forward linkage coefficient value (1.1593 and 1.1795, respectively).

Public Administration, Education and Health Services exhibit the highest income forward linkage coefficients at national and regional level. Other Manufacture at regional and Machinery and Motor Vehicles sectors at national level and Agriculture at both levels have the lowest forward income potential.

Finally, Textiles and Dressing together with Transportation sector exhibit also the highest regional employment forward linkage coefficient values (last column of Table 4) while nationally Public Administration, Education and Health Services takes first and Textiles and Dressing second highest coefficients' value.

Table 3.National sectoral linkage coefficients

| Sectors | | Chenery & Watanabe OBL | Hirschman & Rasmussen | | | Augustinovics | | |
|---|---|---|---|---|---|---|---|---|
| | | | OBL | IBL | EBL | OFL | IFL | EFL |
| 1 | Agriculture | 0,3782 | 1,7584 | 0,1449 | 0,0033 | 1,7370 | 0,1395 | 0,0034 |
| 2 | Manufacture of Food Products | 0,5153 | 2,0521 | 0,2868 | 0,0048 | 1,9139 | 0,2884 | 0,0051 |
| 3 | Textiles and Dressing | 0,2416 | 1,4178 | 0,2480 | 0,0088 | 1,4233 | 0,2496 | 0,0088 |
| 4 | Wood Products | 0,1844 | 1,2678 | 0,1906 | 0,0066 | 1,7272 | 0,2486 | 0,0077 |
| 5 | Chemical and Metal Products | 0,3422 | 1,7983 | 0,2682 | 0,0037 | 1,6410 | 0,2218 | 0,0029 |
| 6 | Machinery and Motor Vehicles | 0,1952 | 1,3191 | 0,1177 | 0,0010 | 1,2809 | 0,1117 | 0,0009 |
| 7 | Furniture | 0,3018 | 1,5378 | 0,2040 | 0,0051 | 1,5831 | 0,2081 | 0,0048 |
| 8 | Other Manufacture | 0,2905 | 1,5588 | 0,1846 | 0,0078 | 1,6684 | 0,2071 | 0,0079 |
| 9 | Electricity, Water and Gas | 0,4882 | 2,1036 | 0,3815 | 0,0070 | 1,9662 | 0,3525 | 0,0067 |
| 10 | Construction | 0,5465 | 2,2126 | 0,3488 | 0,0064 | 2,3858 | 0,3865 | 0,0070 |
| 11 | Trade and Hotels | 0,3955 | 1,9716 | 0,4134 | 0,0088 | 1,8663 | 0,3915 | 0,0086 |
| 12 | Transportation | 0,4451 | 1,9764 | 0,3770 | 0,0089 | 1,9103 | 0,3505 | 0,0082 |
| 13 | Financial Services and Real Estate | 0,4786 | 1,9180 | 0,2093 | 0,0049 | 1,9180 | 0,2093 | 0,0049 |
| 14 | Public Administration, Education and Health Services | 0,4207 | 1,7263 | 0,8514 | 0,0098 | 1,7263 | 0,8514 | 0,0098 |
| 15 | Other | 0,3809 | 1,6826 | 0,3552 | 0,0030 | 1,9370 | 0,3956 | 0,0037 |

Table 4.Regional sectoral linkage coefficients

| Sectors | | Chenery & Watanabe OBL | Hirschman & Rasmussen | | | Augustinovics | | |
|---|---|---|---|---|---|---|---|---|
| | | | OBL | IBL | EBL | OFL | IFL | EFL |
| 1 | Agriculture | 0,1857 | 1,2454 | 0,0871 | 0,0016 | 1,1795 | 0,0762 | 0,0014 |
| 2 | Manufacture of Food Products | 0,2187 | 1,2827 | 0,1810 | 0,0029 | 1,3585 | 0,1888 | 0,0032 |
| 3 | Textiles and Dressing | 0,2510 | 1,3334 | 0,2265 | 0,0088 | 1,4088 | 0,2260 | 0,0088 |
| 4 | Wood Products | 0,1525 | 1,1860 | 0,1577 | 0,0039 | 1,3257 | 0,1704 | 0,0043 |
| 5 | Chemical and Metal Products | 0,8616 | 2,9756 | 0,3349 | 0,0083 | 2,7956 | 0,2436 | 0,0062 |
| 6 | Machinery and Motor Vehicles | 0,0009 | 1,0012 | 0,0640 | 0,0013 | 1,3656 | 0,0861 | 0,0019 |
| 7 | Furniture | 0,0783 | 1,1003 | 0,1302 | 0,0034 | 1,3174 | 0,1502 | 0,0039 |
| 8 | Other Manufacture | 0,4827 | 1,8874 | 0,1231 | 0,0032 | 1,2279 | 0,0526 | 0,0015 |
| 9 | Electricity, Water and Gas | 0,1655 | 1,2212 | 0,2329 | 0,0050 | 1,4052 | 0,2419 | 0,0053 |
| 10 | Construction | 0,2272 | 1,3150 | 0,1938 | 0,0037 | 1,4314 | 0,2047 | 0,0040 |
| 11 | Trade and Hotels | 0,3073 | 1,4078 | 0,2133 | 0,0064 | 1,4362 | 0,2016 | 0,0064 |
| 12 | Transportation | 0,0928 | 1,1331 | 0,3704 | 0,0059 | 1,3647 | 0,3931 | 0,0064 |
| 13 | Financial Services and Real Estate | 0,2279 | 1,3182 | 0,1853 | 0,0046 | 1,2995 | 0,1760 | 0,0046 |
| 14 | Public Administration, Education and Health Services | 0,1378 | 1,1608 | 0,4806 | 0,0053 | 1,1593 | 0,4803 | 0,0053 |

# 3. The analyzed policy instruments and the definition of the relevant scenarios

This paragraph is divided in three sub-headings. The firs sub-heading describes the pre-accession financial support and the corresponding possible expected expenditures at the national and regional level. The second one refers to post-accession assistance and the projected funds inflow. Both paragraphs shortly describe the weights used for the allocation of the EU funds at national and regional level. The third one gives the detailed description of the scenarios under which the following impact analysis is performed.

## 3.1. The EU pre-accession assistance

The EU policy instruments for pre-accession assistance are Phare, ISPA and SAPARD. At the moment it can be expected that they will be at the disposition to Croatia in a short time (at the beginning of 2005). Therefore, it was reasonable to project the possible annual amounts of these funds at national level and subsequently at regional level.

The on going EU support to Croatia under CARDS Programme (Community Assistance for Reconstruction, Development and Stabilization) was also included in the analysis as it is still not defined whether it is going to be replaced by the pre-accession policy instruments or it will be granted to Croatia continually till the end of 2006.

The active financial framework of CARDS for Croatia was analysed and the average three year amounts are used for the impact analysis. The pre-accession funds expenditures had to be projected at the level of Croatia and than at regional level. The projections at the national level were done using weigh against main economic and geographic indicators of Croatia and the former ten applicant countries.

For ISPA and Phare funds allocation the population number and GDP per capita are concerned. Comparing Croatian indicators with the ten former applicant countries indicators Slovakia is the one most alike Croatia (see Table 4.).

Therefore the possible amount of the Phare and ISPA budget to Croatia is projected using population ratio between Slovakia and Croatia. The annual budgets are projected under assumption that the annual budget of the funds is flexible and can vary in small ranges. The average three year amounts of the funds allocated to Slovakia were used for the projections.

The Sapard funds are allocated on the basis of agricultural area. The projected amount for Croatia is done by indicating the ratio between the agricultural area in Croatia and Slovakia and than calculating within these shares.

Table 5.General indicators of Croatia, Slovakia and the selected Region

| COUNTRY | Total population on 1 January 2004 in millions | GDP in bn euro in 2002 | Surface area in sq.km | Agricultural area in hectares |
|---|---|---|---|---|
| *Slovakia* | 5,40 | 23,70 | 49.036,00 | 2.444.000,00 |
| *Croatia* | 4,40 | 22,40 | 56.542,00 | 1.162.612,00 |
| *Bjelovar-Bilogora County* | 0,133 | | 2.637,00 | 98.183,42 |

The described policy instruments taken into consideration and the amount of the funds inflow projected at national and regional level are presented in Table 6.

Table 6.The EU Policy Funds inflow projected at national and regional level

| Policy instruments | Average annual amounts in mio € | |
|---|---|---|
| | Croatia | Bjelovar-Bilogora County |
| *Current situation - 2004* | | |
| CARDS | 63,0 | 1,89 |
| *Pre-accession policy instruments funds projections* | | |
| ISPA | 38,13 | 1,15 |
| Phare | 53,67 | 1,62 |
| Sapard | 8,7 | 0,74 |
| TOTAL | 100.5 | 3,5 |

## 3.2. The available EU funds "after accession"

After accession, the funds at national and regional level are projected with the similar weight as pre-accession funds. The EU Budget financial framework for 2004-2006 for Slovakia was the foundation for projections of the national and regional possible funds inflows. The average two years (2005 and 2006) amounts of the EU Budget sources were taken into consideration. Than the average annual amounts for Croatia were projected using population ratio between Croatia and Slovakia while the same average annual amounts for the Bjelovar-Bilogora County under heading 1 - Common agricultural policy are calculated using the ratio between the agricultural area of the country and the region and for the projected amounts under heading 2 - Structural Operations the population ratio was taken into the consideration.

The corresponding EU budget appropriations for payments for Internal Policies (heading 3) were not included in this impact analysis. Also, the projected annual amount of the EAGGF market measures expenditures was not included in the impact analysis.

The total volume of the possible annual budget for Croatia is projected to be 404,1 million €, and for the County of Bjelovar-Bilogora 22,5 mio €. The corresponding expenditures are presented in Table 7.

Table 7.The average annual amount of EU financial support "after the accession"

| SOURCE: | Croatia | Bjelovar-Bilogora County |
|---|---|---|
| | In 000 HRK | In 000 HRK |
| 1.a. | | |
| EAGGF-Market measures | 297.519,1 | 25.289,1 |
| EAGGF-Compesatory Direct Aids | 492.603,5 | 41.871,3 |
| Total 1a. | 790.428,4 | 67.186,4 |
| 1b. EAGGF - Rural development | 629.896,5 | 53.541,2 |
| Total heading 1 | 1.420.019,1 | 120.727,6 |
| *2.* | | |
| Structural Funds | 1.286.701,2 | 38.601,0 |
| Cohesion Fund | 343.691,1 | 10.310,7 |
| Total heading 2 | 1.630.392,3 | 48.911,8 |
| TOTAL: | 3.050.717,2 | 169.639,4 |

EXR 1 EUR = 7,55 HRK

## 3.3. The definition of relevant scenarios

The scenarios performed in this analysis of the effects on the economic development are defined as follows:

**Scenario 1** - represents the current situation and includes only the inflow of the CARDS funds at the national and regional level;

**Scenario 2** - takes the amount of the pre-accession funds inflow into the impact analysis;

**Scenario 2a** - is the alternative among those scenarios 1 and 2 and includes the cumulative use of pre-accession funds and currently granted CARDS funds at national and regional level;

**Scenario 3** - It is scenario that assumes the EU accession but the lower level of absorption of funds (in comparison to scenario 4). The pre-accession support is omitted from the scenario because of the fact that a country (a region) cannot be eligible for support from both, pre-accession and full-membership related policy instruments.

The assumed absorption levels are:

- EAGGF guarantee: 0.85 direct payments;0.7 rural development (Guarantee)
- Structural funds: 0.5 EAGGF guidance; 0.5 ERDF; 0.5 ESF
- Cohesion Fund: 0.5

Direct payments are assumed to be fully coupled.

**Scenario 3a** - it is the scenario 3 sub-scenario which assumes that the direct payments are fully decoupled and therefore the total amount is transferred to the final demand of the households.

**Scenario 4** - It is the most optimistic scenario stems from the assumption that all available funds will be absorbed in the country and the region. This scenario didn't take the pre-accession funds into consideration and the impact analysis refers to the effects of inflows of the "post - accession" funds on the current situation - baseline. The direct payments are considered to be fully coupled;

**Scenario 4a** - It is the version of scenario 4 but with the assumption that the direct payments are fully decoupled.

### *3.3.1. The general assumptions of the performed analysis presented in the next paragraph*

Before presenting the results of the performed analysis, these are the assumptions that are important for the understanding of the results and their explanations. They represent some of the limitations of the I-O approach.

- The scenario analysis is static and calculates the effects of different EU's policy instruments on the basic economic variables at the national and region level measured as delta change in comparison to the baseline scenario (current situation)
- Therefore, only the separate-yearly effects of the each EU's policy instrument funds inflow is measured , and the calculations of cumulative effects were not performed
- This analysis predicts possible impact of EU funds on the national and regional economy as net inflows, neglecting the national and therefore also the regional contributions (payments) to EU budget.

### *3.3.2. The sectoral allocation of the funds under each defined scenario - the rise of the final demand*

By now it is clarified that when the output multiplier vector is calculated the overall change in production due to a one-unit variation in the final demand can be quantified. Also, the vector of income coefficients is a quantifier of the effects in terms of income generated by final demand variation. Similarly, the vector of employment coefficients quantifies the change in employment generated by final demand variation. Therefore, for further analysis we need the vectors of final demand. As for each scenario, the total change in final demand was calculated; the next step was the sectoral allocation of identified regional funds inflows. Firstly, each policy instrument was allocated to specific sectors to which they are mainly oriented. Than, using the specific ratios from the EU's sectoral allocations of the each instrument the sectoral distribution of funds was

completed. Where necessary the structure of the investment demand from the I-O tables and the structure of the household demand were applied for the sectoral distribution of the policies' funds inflow. The Tables 8 and 9 represent the sectoral rise of the final demand due to the projected EU funds inflow at regional level.

Table 8.Projections of the change in Final Demand - Specific Scenarios at regional level (▲FD)

| Sectors | | Scenario 1 | Scenario 2 | Scenario 2a | Scenario 3 | Scenario 3a | Scenario 4 | Scenario 4a |
|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 0,00 | 2.233,3 | 2.233,3 | 150.773 | 135.799 | 199.827,4 | 182.210,5 |
| 2 | Manufacture of Food Products | 0,00 | 0,00 | 0,00 | 93.433 | 90.749 | 127.188,6 | 124.030,1 |
| 3 | Textiles and Dressing | 0,00 | 0,00 | 0,00 | 0 | 13.471 | 0,00 | 15.848,7 |
| 4 | Wood Products | 0,00 | 0,00 | 0,00 | 0 | 0 | 0,00 | 0,00 |
| 5 | Chemical and Metal Products | 0,00 | 0,00 | 0,00 | 70.541 | 60.587 | 85.579,8 | 73.868,4 |
| 6 | Machinery and Motor Vehicles | 0,00 | 21.015,9 | 21.015,9 | 117.656 | 94.847 | 153.748,7 | 126.914,6 |
| 7 | Furniture | 0,00 | 0,00 | 0,00 | 0 | 12.890 | 0,00 | 15.164,9 |
| 8 | Other Manufacture | 59.125,0 | 1.041,1 | 60.166,1 | 117.656 | 59.204 | 153.748,7 | 84.982,4 |
| 9 | Electricity, Water and Gas | 24.250,0 | 0,00 | 24.250,0 | 25.781 | 42.908 | 38.964,1 | 59.113,8 |
| 10 | Construction | 105.000,0 | 184.510,3 | 289.510,3 | 678.355 | 636.483 | 1.196.247,6 | 1.146.987,3 |
| 11 | Trade and Hotels | 18.750,0 | 0,00 | 18.750,0 | 4.066 | 27.368 | 8.132,0 | 35.545,8 |
| 12 | Transportation | 0,00 | 129.546,7 | 129.546,7 | 132.639 | 117.211 | 235.439,9 | 217.288,4 |
| 13 | Financial Services and Real Estate | 0,00 | 15.219,2 | 15.219,21 | 156.278 | 199.481 | 302.477,40 | 353.304,9 |
| 14 | Public Administration, Education and Health Services | 265.375,0 | 405.208,5 | 670.583,5 | 127.659 | 132.054 | 251.538,1 | 256.709,5 |
| 15 | Other | 0,00 | 0,00 | 0,00 | 0,00 | 51.785 | 0,00 | 60.923,0 |
| TOTAL | | 472.500,0 | 758.775,0 | 1.231.275,0 | 1.674.837 | 1.674.837 | 2.752.892 | 2.752.892 |

In 000 HRK
EXR 1EUR = 7,55 HRK

Table 9.Projections of the change in Final Demand - Specific Scenarios at regional level (▲FD)

| Sectors | | Scenario 1 | Scenario 2 | Scenario 2a | Scenario 3 | Scenario 3a | Scenario 4 | Scenario 4a |
|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 0,00 | 188,67 | 188,67 | 22.958,85 | 15.543,13 | 49.414,26 | 19.754,23 |
| 2 | Manufacture of Food Products | 0,00 | 0,00 | 0,00 | 11.090,08 | 12.238,33 | 5.802,28 | 15.527,42 |
| 3 | Textiles and Dressing | 0,00 | 0,00 | 0,00 | 0,00 | 750,23 | 0,00 | 882,63 |
| 4 | Wood Products | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| 5 | Chemical and Metal Products | 0,00 | 0,00 | 0,00 | 595,79 | 2.355,84 | 870,34 | 2.940,99 |
| 6 | Machinery and Motor Vehicles | 0,00 | 1.775,48 | 1.775,48 | 4.009,47 | 4.584,40 | 3.389,06 | 6.159,00 |
| 7 | Furniture | 0,00 | 0,00 | 0,00 | 0,00 | 2.359,63 | 0,00 | 2.776,04 |
| 8 | Other Manufacture | 1.925,25 | 2.013,21 | 87,96 | 2.229,94 | 3.993,68 | 3.389,06 | 5.464,04 |
| 9 | Electricity, Water and Gas | 679,50 | 679,50 | 0,00 | 1.985,98 | 2.737,09 | 2.901,14 | 3.784,79 |
| 10 | Construction | 2.944,50 | 9.931,25 | 6.986,75 | 40.117,66 | 31.220,01 | 51.731,77 | 51.731,77 |
| 11 | Trade and Hotels | 453,00 | 453,00 | 0,00 | 121,98 | 1.248,62 | 243,96 | 1.569,42 |
| 12 | Transportation | 0,00 | 3.907,13 | 3.907,13 | 4.563,66 | 7.679,17 | 8.056,51 | 11.721,81 |
| 13 | Financial Services and Real Estate | 0,00 | 1.285,76 | 1.285,76 | 5.658,38 | 7.921,86 | 10.460,09 | 13.123,01 |
| 14 | Public Administration, Education and Health Services | 9.399,75 | 21.630,75 | 12.231,00 | 4.193,53 | 4.893,34 | 8.065,81 | 8.889,12 |
| TOTAL | | 15.402,00 | 26.462,75 | 41.864,75 | 97.525,33 | 97.525,33 | 144.324,27 | 144.324,27 |

In 000 HRK
EXR 1EUR = 7,55 HRK

## 4. The impacts analysis of the new final demand effects at national and regional economic development

The results at regional level in this paragraph are shortly analyzed and the stress is the main aim of the paper is to assess the implications for inter-sectoral rural employment patterns of policy changes. Because the analysis is concentrated on three main aspects: rurality, employment and agriculture within a medium-term perspective it was interesting to see the impacts of defined policy instruments funds inflow at national level and in the specific rural region.

### 4.1. The effects on national and regional gross output

The Tables 10 and 11 present the percentage changes in the output at national and regional level. According to the results in scenario 1 the CARDS Programme affects total national and regional output level nearly with the same intensity. The difference is in the sectoral improvement of the output. The highest impact on the national and regional output in this scenario has the rise of the final demand in sector of Public Administration, Education and Health Services. It has nearly the same effect at the bought levels. But, it can be seen that the Construction and Other

Manufacture contribute with higher impact to the change in national output than to the change in regional in regional output level.
The results of the pre-accession funds inflow at both analyzed levels show that the total output change is again nearly the same but the sectors that employ higher impact on the output change of the economy as a whole differ at national and regional level. Transportation and Construction are the two sectors whose rise in final demand has the strongest impact at the national and regional output level, while at national level the first rank takes the sector of Public Administration, Education and Health Services. The sector of Financial Services and Real Estate at regional level has considerably higher impact on the output level of an economy than at the national level. As this scenario has included also the agricultural expenditure (SAPARD) at both national and regional level can not be found significant effect but it can be the reason of the small amounts of the funds available for these expenditures under this scenario. The scenario 2a only shows the effects of the cumulative use of CARDS and pre-accession funds.

The conclusion according to the results in these three vectors of output changes is that the sectors with important affects on the economies under study are public administration, education and health services, construction, transportation, electricity, water and gas and the sector other manufacture.

The scenario 3 analysis shows the significant sectoral rise of the output at both national and regional level after the accession with partial absorption of the funds. When the direct payments are concerned at national level there is no difference in the rise of total output whether they have been assumed coupled or decoupled. But at regional level coupled direct payments show lower impact on total regional gross output level. There is also a significant difference among rise of the total output induced by the rise of the final demand in Agriculture, again at regional level. If the direct payments are coupled Agriculture contributes with the higher impact on the regional output level than when they are concerned to be decoupled. At national level it is seen that this is not so influential.

The results of the funds inflow after the accession with full absorption level (scenarios 4 and 4a) show the highest difference between the national and regional level. According to these results the post-accession funds affect much strongly the output level of total regional economy. This is something that should have been expected because of the regional rural characteristics and the structure of the analyzed EU policy instruments.

The rise of total national output level due to a rise of national final demand in scenarios 4 and 4a has no difference, which means that the coupled and decoupled direct payments haven't shown any dissimilarity although at the regional level the decoupled direct payments affect a bit higher the rise of the total output.

Sectoraly these effects differ at national and regional level. The overall impact of the Agriculture is stronger at regional than at national level. The same is with the sectors Manufacture of Food Products and Machinery and Motor Vehicles while the sector Other Manufacture has stronger overall impact at national level (almost double) when the direct payments are assumed to be fully coupled and nearly the same impact on the output level when the direct payments are fully decoupled. Sector Electricity, Water and Gas is affecting the regional output more forceful than the national which can be also said for the sector Financial Services and Real Estate. The opposite is the overall impact of sectors Transportation and Public Administration, Education and Health services that are more intensively affecting the output at national level.

As it is visible from the figures in tables 10 and 11 the Construction sector is the one that has the highest overall impact on the output level of the national and regional economy. For the coupled and decoupled direct payments this impact is almost the same at national level but it is higher for the scenario 4 (coupled direct payments) at regional level.

Table 10.Percentage change in total output at national level by the policy scenarios

| Sectors | | Scenario 1 | Scenario 2 | Scenario 2a | Scenario 3 | Scenario 3a | Scenario 4 | Scenario 4a |
|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 0,00% | 0,02% | 0,02% | 1,10% | 1,00% | 1,46% | 1,34% |
| 2 | Manufacture of Food Products | 0,00% | 0,00% | 0,00% | 0,93% | 0,90% | 1,27% | 1,23% |
| 3 | Textiles and Dressing | 0,00% | 0,00% | 0,00% | 0,00% | 0,20% | 0,00% | 0,24% |
| 4 | Wood Products | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% |
| 5 | Chemical and Metal Products | 0,00% | 0,00% | 0,00% | 0,29% | 0,25% | 0,36% | 0,31% |
| 6 | Machinery and Motor Vehicles | 0,00% | 0,07% | 0,07% | 0,41% | 0,33% | 0,53% | 0,44% |
| 7 | Furniture | 0,00% | 0,00% | 0,00% | 0,00% | 0,44% | 0,00% | 0,52% |
| 8 | Other Manufacture | 0,84% | 0,01% | 0,86% | 1,68% | 0,84% | 2,19% | 1,21% |
| 9 | Electricity, Water and Gas | 0,74% | 0,00% | 0,74% | 0,79% | 1,32% | 1,20% | 1,81% |
| 10 | Construction | 0,86% | 1,47% | 2,33% | 5,56% | 5,22% | 9,81% | 9,40% |
| 11 | Trade and Hotels | 0,11% | 0,00% | 0,11% | 0,02% | 0,15% | 0,05% | 0,20% |
| 12 | Transportation | 0,00% | 1,78% | 1,78% | 1,84% | 1,62% | 3,26% | 3,01% |
| 13 | Financial Services and Real Estate | 0,00% | 0,14% | 0,14% | 1,44% | 1,83% | 2,78% | 3,25% |
| 14 | Public Administration, Education and Health Services | 1,32% | 2,02% | 3,34% | 0,64% | 0,66% | 1,25% | 1,28% |
| 15 | Other | 0,00% | 0,00% | 0,00% | 0,00% | 0,19% | 0,00% | 0,23% |
| TOTAL | | 0,26% | 0,42% | 0,67% | 0,97% | 0,97% | 1,61% | 1,61% |

Table 11.The percentage changes in the regional total output by the policy scenarios

| Sectors | | Scenario 1 | Scenario 2 | Scenario 2a | Scenario 3 | Scenario 3a | Scenario 4 | Scenario 4a |
|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 0,00% | 0,02% | 0,02% | 2,10% | 1,42% | 2,61% | 1,81% |
| 2 | Manufacture of Food Products | 0,00% | 0,00% | 0,00% | 1,20% | 1,32% | 1,53% | 1,68% |
| 3 | Textiles and Dressing | 0,00% | 0,00% | 0,00% | 0,00% | 0,60% | 0,00% | 0,71% |
| 4 | Wood Products | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% |
| 5 | Chemical and Metal Products | 0,00% | 0,00% | 0,00% | 0,37% | 1,48% | 0,55% | 1,85% |
| 6 | Machinery and Motor Vehicles | 0,00% | 0,29% | 0,29% | 0,65% | 0,75% | 0,89% | 1,00% |
| 7 | Furniture | 0,00% | 0,00% | 0,00% | 0,00% | 1,16% | 0,00% | 1,36% |
| 8 | Other Manufacture | 0,49% | 0,02% | 0,51% | 0,57% | 1,02% | 0,86% | 1,39% |
| 9 | Electricity, Water and Gas | 0,85% | 0,00% | 0,85% | 2,47% | 3,41% | 3,61% | 4,71% |
| 10 | Construction | 0,43% | 1,01% | 1,44% | 5,81% | 4,52% | 9,00% | 7,49% |
| 11 | Trade and Hotels | 0,09% | 0,00% | 0,09% | 0,03% | 0,26% | 0,05% | 0,33% |
| 12 | Transportation | 0,00% | 0,98% | 0,98% | 1,15% | 1,93% | 2,03% | 2,95% |
| 13 | Financial Services and Real Estate | 0,00% | 0,65% | 0,65% | 2,87% | 4,02% | 5,31% | 6,66% |
| 14 | Public Administration, Education and Health Services | 0,96% | 1,25% | 2,20% | 0,43% | 0,50% | 0,82% | 0,91% |
| TOTAL | | 0,23% | 0,37% | 0,60% | 1,45% | 1,49% | 2,15% | 2,20% |

## 4.2. The effects on Income

The results of the new final demand affecting the income level of the national and regional economy are given in the Tables 12 and 13. These figures show some similar trends as the previous two. It means that the changes in total income level of the economy among different scenarios for pre-accession period between national and regional economy are almost the same.

The changes differ among sectors at national and regional level but it can be seen that the ranking of the sectors is also nearly the same. The stronger overall impact on the income level has the sector public administration, education and health services when scenario 1 is concerned and the sector of Other Manufacture is second, followed by the third position of the Construction. Transportation takes the second place in scenario 2 and in its alternative scenario 2a Construction and Transportation change places.

The partial absorption of the funds in scenario 3 and 3a shows the lover impacts on total national income level, mainly caused by the fact that Public Administration, Education and Health Services is the sector with the highest intersectoral dependences in the country and that in scenario 2a the funds allocated to it are almost four times higher than in scenarios 3 and 3a. The highest impact on the income has the rise of the final demand of Construction sector, than Other Manufacture and finally, Agriculture takes the third place.

The scenarios 4 and 4a show the difference of the income change at the level of total economy and sectorally comparing region and Croatia. At national level when fully coupled direct payments are concerned the highest overall impact on the income has Construction followed by Transportation. Than lines the sector Other Manufacture, followed by Financial Services and Real Estate Sector and Agriculture. Manufacture of Food Products, Electricity, Water and Gas and Public Administration, Education and Health Services are the sectors with similar overall income impacts.

The decoupled direct payments at national level caused the exchange of the overall impacts among the sector of Transportation and Financial Services and Real Estate. The impact of the

Agriculture is slightly declining but the impact of Trade and Hotels and sector Textiles and Dressing is somewhat rising as well as the impact of the sector Electricity, Water and Gas.

The sectoral impacts on overall regional income show the highest impact of the Construction like it is at the national level. But, as decoupled direct payments are concerned all of the sectors show a slight rise of the effects at regional income level, especially Furniture, Textiles and Dressing and Chemical and Metal Products. Comparing national and regional changes the Construction at regional level is more sensitive on the coupled and decoupled allocation of the funds and is considerably decreasing the effects on the regional income level when the funds are fully decoupled. The same stream shows the Agriculture which showed decreased overall income effects when the direct payments are concerned to be fully decoupled.

Table 12.The percentage change of the national income

| Sectors | | Scenario 1 | Scenario 2 | Scenario 2a | Scenario 3 | Scenario 3a | Scenario 4 | Scenario 4a |
|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 0,00% | 0,03% | 0,03% | 2,04% | 1,84% | 2,70% | 2,46% |
| 2 | Manufacture of Food Products | 0,00% | 0,00% | 0,00% | 0,89% | 0,86% | 1,21% | 1,18% |
| 3 | Textiles and Dressing | 0,00% | 0,00% | 0,00% | 0,00% | 0,22% | 0,00% | 0,26% |
| 4 | Wood Products | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% |
| 5 | Chemical and Metal Products | 0,00% | 0,00% | 0,00% | 0,32% | 0,27% | 0,39% | 0,33% |
| 6 | Machinery and Motor Vehicles | 0,00% | 0,09% | 0,09% | 0,48% | 0,39% | 0,63% | 0,52% |
| 7 | Furniture | 0,00% | 0,00% | 0,00% | 0,00% | 0,50% | 0,00% | 0,59% |
| 8 | Other Manufacture | 1,12% | 0,02% | 1,14% | 2,22% | 1,12% | 2,91% | 1,61% |
| 9 | Electricity, Water and Gas | 0,73% | 0,00% | 0,73% | 0,78% | 1,30% | 1,18% | 1,79% |
| 10 | Construction | 0,92% | 1,62% | 2,55% | 5,97% | 5,60% | 10,53% | 10,09% |
| 11 | Trade and Hotels | 0,09% | 0,00% | 0,09% | 0,02% | 0,13% | 0,04% | 0,17% |
| 12 | Transportation | 0,00% | 1,75% | 1,75% | 1,79% | 1,58% | 3,17% | 2,93% |
| 13 | Financial Services and Real Estate | 0,00% | 0,14% | 0,14% | 1,44% | 1,83% | 2,78% | 3,25% |
| 14 | Public Administration, Education and Health Services | 1,32% | 2,02% | 3,34% | 0,64% | 0,66% | 1,25% | 1,28% |
| 15 | Other | 0,00% | 0,00% | 0,00% | 0,00% | 0,18% | 0,00% | 0,21% |
| TOTAL | | 0,46% | 0,74% | 1,20% | 0,87% | 0,89% | 1,49% | 1,52% |

Table 13.The percentage change of the regional income

| Sectors | | Scenario 1 | Scenario 2 | Scenario 2a | Scenario 3 | Scenario 3a | Scenario 4 | Scenario 4a |
|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 0,00% | 0,02% | 0,02% | 2,60% | 1,76% | 3,22% | 2,23% |
| 2 | Manufacture of Food Products | 0,00% | 0,00% | 0,00% | 1,15% | 1,27% | 1,47% | 1,61% |
| 3 | Textiles and Dressing | 0,00% | 0,00% | 0,00% | 0,00% | 0,59% | 0,00% | 0,70% |
| 4 | Wood Products | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% |
| 5 | Chemical and Metal Products | 0,00% | 0,00% | 0,00% | 0,44% | 1,74% | 0,64% | 2,17% |
| 6 | Machinery and Motor Vehicles | 0,00% | 0,29% | 0,29% | 0,65% | 0,75% | 0,89% | 1,00% |
| 7 | Furniture | 0,00% | 0,00% | 0,00% | 0,00% | 1,17% | 0,00% | 1,38% |
| 8 | Other Manufacture | 0,92% | 0,04% | 0,96% | 1,06% | 1,90% | 1,62% | 2,61% |
| 9 | Electricity, Water and Gas | 0,82% | 0,00% | 0,82% | 2,41% | 3,32% | 3,52% | 4,59% |
| 10 | Construction | 0,43% | 1,01% | 1,44% | 5,82% | 4,53% | 9,03% | 7,51% |
| 11 | Trade and Hotels | 0,09% | 0,00% | 0,09% | 0,03% | 0,26% | 0,05% | 0,33% |
| 12 | Transportation | 0,00% | 0,92% | 0,92% | 1,07% | 1,81% | 1,90% | 2,76% |
| 13 | Financial Services and Real Estate | 0,00% | 0,67% | 0,67% | 2,94% | 4,11% | 5,43% | 6,81% |
| 14 | Public Administration, Education and Health Services | 0,96% | 1,24% | 2,20% | 0,43% | 0,50% | 0,82% | 0,90% |
| TOTAL | | 0,40% | 0,66% | 1,06% | 1,28% | 1,39% | 2,00% | 2,13% |

## 4.3. The Employment effects

The results of the national and regional employment changes due to a sectoral change in a final demand are represented in Tables 14 and 15. At the national level the sector with the highest overall impact on the employment in the pre-accession period (scenario 1, 2 and 2a) is Public Administration, Education and Health Services followed by Construction, Other manufacture and Electricity, Water and Gas. The same sectoral ranking according to the strength of the effects on the economy is at regional level with the minor difference in the figures.

The effects of new final demand on the employment level of total regional economy are smaller than at the national level in pre accession period, but in scenario 3 and 4 they are significantly higher referring to total rise of regional employment and sectorally referring to the rise of total employment caused by the sectoral rise of final demand in all sectors except construction and transportation.

What is noteworthy at national level it difference of the impact of the scenario 2a and scenario 3 and 3a at total employment level. The scenario 2a shows the highest rise of the total employment at national level even though the funds inflows in total are larger in scenario 3. This is mainly the consequence of high vertical and horizontal interconections of sector of Public Administration, Education and Health Services in the national economy (seen in the paragraph 2.3.4.) and the sectoral allocation of the funds within the presented scenarios.

Construction has the highest impact on the employment (scenarios 3 and 4 and 3a and 4a) in national and regional economy but when the direct payments are allocated decoupled the effects of construction show the downward trend particularly significant at regional level. Comparing the coupled and decoupled allocation of the direct payments all sectors, except already mentioned construction and agriculture demonstrate the rise of the impacts. At regional level the decoupled direct payments have the stronger impact on the employment of the economy as a whole while at national level they don't differ significantly.

Table 14.The percentage changes of the national employment

| Sectors | | Scenario 1 | Scenario 2 | Scenario 2a | Scenario 3 | Scenario 3a | Scenario 4 | Scenario 4a |
|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 0,00% | 0,02% | 0,02% | 1,42% | 1,27% | 1,88% | 1,71% |
| 2 | Manufacture of Food Products | 0,00% | 0,00% | 0,00% | 0,97% | 0,94% | 1,32% | 1,29% |
| 3 | Textiles and Dressing | 0,00% | 0,00% | 0,00% | 0,00% | 0,20% | 0,00% | 0,24% |
| 4 | Wood Products | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% |
| 5 | Chemical and Metal Products | 0,00% | 0,00% | 0,00% | 0,40% | 0,34% | 0,48% | 0,41% |
| 6 | Machinery and Motor Vehicles | 0,00% | 0,15% | 0,15% | 0,84% | 0,67% | 1,09% | 0,90% |
| 7 | Furniture | 0,00% | 0,00% | 0,00% | 0,00% | 0,48% | 0,00% | 0,56% |
| 8 | Other Manufacture | 0,86% | 0,02% | 0,87% | 1,71% | 0,86% | 2,23% | 1,23% |
| 9 | Electricity, Water and Gas | 0,69% | 0,00% | 0,69% | 0,73% | 1,22% | 1,10% | 1,68% |
| 10 | Construction | 0,91% | 1,60% | 2,52% | 5,90% | 5,53% | 10,40% | 9,97% |
| 11 | Trade and Hotels | 0,08% | 0,00% | 0,08% | 0,02% | 0,12% | 0,03% | 0,15% |
| 12 | Transportation | 0,00% | 1,44% | 1,44% | 1,48% | 1,30% | 2,62% | 2,42% |
| 13 | Financial Services and Real Estate | 0,00% | 0,14% | 0,14% | 1,44% | 1,83% | 2,78% | 3,25% |
| 14 | Public Administration, Education and Health Services | 1,32% | 2,02% | 3,34% | 0,64% | 0,66% | 1,25% | 1,28% |
| 15 | Other | 0,00% | 0,00% | 0,00% | 0,00% | 0,28% | 0,00% | 0,33% |
| TOTAL | | 0,41% | 0,65% | 1,06% | 1,01% | 1,01% | 1,72% | 1,71% |

Table 15.The percentage changes of the regional employment

| Sectors | | Scenario 1 | Scenario 2 | Scenario 2a | Scenario 3 | Scenario 3a | Scenario 4 | Scenario 4a |
|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 0,00% | 0,02% | 0,02% | 2,65% | 1,79% | 3,28% | 2,28% |
| 2 | Manufacture of Food Products | 0,00% | 0,00% | 0,00% | 1,19% | 1,31% | 1,52% | 1,66% |
| 3 | Textiles and Dressing | 0,00% | 0,00% | 0,00% | 0,00% | 0,56% | 0,00% | 0,66% |
| 4 | Wood Products | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% |
| 5 | Chemical and Metal Products | 0,00% | 0,00% | 0,00% | 0,43% | 1,68% | 0,62% | 2,10% |
| 6 | Machinery and Motor Vehicles | 0,00% | 0,29% | 0,29% | 0,65% | 0,75% | 0,89% | 1,00% |
| 7 | Furniture | 0,00% | 0,00% | 0,00% | 0,00% | 1,17% | 0,00% | 1,37% |
| 8 | Other Manufacture | 0,80% | 0,04% | 0,83% | 0,92% | 1,65% | 1,40% | 2,26% |
| 9 | Electricity, Water and Gas | 0,82% | 0,00% | 0,82% | 2,41% | 3,32% | 3,52% | 4,59% |
| 10 | Construction | 0,44% | 1,04% | 1,48% | 5,99% | 4,66% | 9,28% | 7,72% |
| 11 | Trade and Hotels | 0,08% | 0,00% | 0,08% | 0,02% | 0,23% | 0,04% | 0,29% |
| 12 | Transportation | 0,00% | 0,95% | 0,95% | 1,11% | 1,86% | 1,95% | 2,84% |
| 13 | Financial Services and Real Estate | 0,00% | 0,64% | 0,64% | 2,81% | 3,94% | 5,20% | 6,52% |
| 14 | Public Administration, Education and Health Services | 0,96% | 1,25% | 2,20% | 0,43% | 0,50% | 0,82% | 0,90% |
| TOTAL | | 0,30% | 0,50% | 0,79% | 1,30% | 1,45% | 2,01% | 2,18% |

## 5. Concluding remarks

The main aim of the regional policies can be defined as raising the regional development level to national one and raising the regional contribution to national economic development. This aim involves first the increase in production of goods and services indicated by faster growth of the regional GDP and employment level.

By increase of production, development is possible in all fields - economic, political and social. For the Croatian region the increase of production is important because it has suffered the war destruction and significant lack of the investment activities, losing an important position in the market for which its capacities were built in time of former socialist Yugoslavia.

Although, the results in the analysis point out the rise of regional GDP by 0,64 percentage points as a result of all included pre-accession funds and CARDS expenditures and it can have a significant share in total regional GDP growth rate, but it looks not enough to speed up convergence of rural region to national level. More substantial effects on economic development of the region may be expected to come from the changes in the economic structure which I-O Method can not estimate.

Therefore, all of these positive tendencies should be supported with special national strategy for economic development at regional level, especially concerning the most important production sectors in the region - agriculture, manufacture of food products and construction. The employment in public sector should be reduced and in that way the annual funds transfers should be directed in the larger amount towards agriculture, manufacture and construction.

The result in the analysis of the post-accession funds inflow into the present national and regional economic structure points the rise of total national output approximately by 1,5 % and regional output by approximately 2% and it is significant, but refers to the most optimistic scenario - total absorption of the possible available funds after accession. Only if all mentioned assumptions are fulfilled the presented changes could be expected to happen.

The comparative analysis between national and regional level shows no significant difference among sectoral ranking when the impact on all variables (output, income, employment) is concerned in pre-accession period (scenarios 1, 2 and 2a).

But, the variation is considerable when the post-accession period is concerned. The region shows higher rise of the income, employment and output of the economy as a whole. Sectoral analysis shows similar sectoral effects on the macro-economic variables of both national and regional economies when the sectoral ranking is concerned but the distinction is high among sectors especially agriculture (has the stronger impact on the regional output level, employment and income than agriculture at national level).

In this way the simulated policy impacts have been evaluated and the analysis shows that the analysed policy instruments have larger impact on the development of the rural Region within the Country. This was the starting assumption and the performed analysis showed that the difference actually exists. These impacts differ at national and regional level especially in period "after accession", which is the expected consequence of the structure of the funds and the annual available funds amounts.

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