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# TESTING THE MODELS OF REGIONAL SPECIALIZATION IN TERMS OF NEW THEORIES OF INTERNATIONAL TRADE

Ph.D. Oana Ancuța STÂNGACIU

Ph.D. Professor Eugenia HARJA

*"Vasile Alecsandri" University, Statistical Direction of Bacău County*

## Abstract

To test intra-industry specialization patterns, in regional profile, was started to determine *the regional indices of marginal specialization* (Brülhart indices), since these decompose the changes that occur in the processes of specialization into three components: *the marginal intra-industry specialization, inter-industry specialization that determine the increase of previous specialization and the inter-industry specialization causing its decrease.*

To capture the dynamic determinants of specialization processes were built *econometric models where were tested only those predictors offered by new theories of international trade.*

**Key words:** inter and intra-industry specialization, the marginal intra-industry specialization index, economies of scale, degree of trade liberalization

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Even today, *economic theories have different perspectives* on the causes and evolution of specialization phenomena. There are different models of specialization based on either traditional theories of international trade, or new theories of trade. *Different approach in theoretical foundations of specialization* comes mainly from the diversity of assumptions used in building specialized models [1].

*New international trade theories* attempt to provide an explanation of regional specialization from a *triple perspective*: the first involves that the region practices *intra-industry trade* based on vertical integration with the world, the second assumes that at the grounds of regional trade are *competitive advantages* rather than comparative, and the third is based on the theory model „*new economic geography*” [2].

*Intra-industry trade* can be explained either by *achieving economies of scale* in companies, either through *the consumer* (modern consumer desire for a large variety of products on the market).

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The most recent approach to evaluate the dynamics of specialization processes is proposed by *Brühlhart* [3]. In this type of analysis the starting point is based on determining the *index of marginal intra-industry specialization*. This (MIIT) is, in fact, Grubel and Lloyd index in which the absolute values of exports and imports in a given period have been replaced by the absolute change in them.

$$MIIT_{ijt} = 1 - INTER_{ijt} = 1 - \frac{|\Delta_t x_{ij} - \Delta_t m_{ij}|}{|\Delta_t x_{ij}| + |\Delta_t m_{ij}|}$$

$\Delta_t x_{ij}$ ,  $\Delta_t m_{ij}$  = import and export growth for product  $i$  from region  $j$  in period  $t$  compared to baseline period.

The indicator provides information on the proportion of trade between the goods of the same kind and, as a Grubel and Lloyd index, *it will take values between 0 and 1* or 100 (if it is expressed as a percentage). If the *marginal specialization* corresponding to product  $i$  from region  $j$  is *inter-industry type*, than MIIT index will have a value of 0 and conversely if the *expansion of specialization* is totally of *intra-industry type* when MIIT will be equal to 1.

To analyze in depth the dynamics of specialization processes, one must decompose in two indicators the marginal specialization of product  $i$  from region  $j$ , as below [4]:

- Inter-industry specialization has led to *increased specialization* (CS)
- Inter-industry specialization that has *effect lowering previous specialization* (SS)

Therefore inter-industry marginal specialization can be written as follows:

$$INTER_{ijt} = \begin{cases} CS_{ijt} & \text{if } \text{sign\_difference}(\Delta_t x_{ij} - \Delta_t m_{ij}) = \text{sign\_difference}(x_{ij0} - m_{ij0}) \\ SS_{ijt} & \text{if } \text{sign\_difference}(\Delta_t x_{ij} - \Delta_t m_{ij}) \neq \text{sign\_difference}(x_{ij0} - m_{ij0}) \end{cases}$$

$x_{ij0}$ ,  $m_{ij0}$  = export either import of product  $i$  from region  $j$  from baseline date

$\Delta_t x_{ij}$ ,  $\Delta_t m_{ij}$  = import and export growth for product  $i$  from region  $j$  in period  $t$  compared to baseline period

From equation it can be seen clearly that in any period  $t$  the marginal inter-industry specialization related to product  $i$  from region  $j$  is either  $CS_{ijt}$  or  $SS_{ijt}$ . Specialization decrease may be due to either lower net exports or net imports decrease and increase in earlier specialization may be determined either by increased net exports or net imports increase.

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To determine the dynamic processes of specialization at regional level, *these three indicators* (MIIT, CS and SS) *will be aggregated by region* [5] depending on the share of trade flows by product from the total regional trade flows:

$$\begin{aligned}
 MIIT\_aggregate_{jt} &= \sum k_{it} MIIT_{ijt} \\
 CS\_aggregate_{jt} &= \sum k_{it} CS_{ijt} \\
 SS\_aggregate_{jt} &= \sum k_{it} SS_{ijt}
 \end{aligned}$$

$$k_{it} = \frac{|\Delta_t x_{ij}| + |\Delta_t m_{ij}|}{\sum (|\Delta_t x_{ij}| + |\Delta_t m_{ij}|)}$$

$\Delta_t x_{ij}$ ,  $\Delta_t m_{ij}$  = import and export growth for product  $i$  from region  $j$  in period  $t$  compared to baseline period

Thus, using the formulas, there can be determined at regional level the indicators MIIT, CS and SS, respectively *the marginal intra-industry specialization and the contribution of inter-industry specialization to the development of specialization processes*.

**To capture the main factors of the dynamics of specialization processes**, it was tested, by building econometric models, the link between the dynamics of specialization processes (which was the dependent variable in the model) and the predictive factors provided, both from traditional theories and new theories of international trade.

As a result, *the dynamics of specialization processes was the dependent variable* and it was the same in all econometric models, since according to factors offered by international trade theories it will be explained the evolution. To define the dependent variable were used indicators quantifying *the marginal intra-industry specialization, as they best capture the dynamic changes in regional specialization processes*.

For this purpose we defined the dependent variable, so this to capture the average dynamic of specialization at regional level in the period 2000-2009 compared to the previous year, but also the changes in specialization processes [4].

Unlike Bastos and Cabral, the variable was determined for each region, and not by section, having the following form:

The dependent variable from region  $j$  is:

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$$CS\ agregat_{jt} - SS\ agregat_{jt}$$

$CS\ agregat_{jt}$ :  $SS\ agregat_{jt}$  = the contribution of inter-industry specialization in the growth of previous specialization (CS index) respectively the contribution of the inter-industry specialization in the decrease of previous specialization (SS index) from region  $j$  at moment  $t$  compared to  $t-1$ .

To note is that, through this variable is simultaneously captured the magnitude, and the direction of changes in regional specialization processes. A value that tends to 1 or -1 of this newly defined indicator reveals that the average regional specialization increases or decreases due to increased or decreased inter-industry specialization compared with the previous period. A value close to zero implies that average regional specialization changes due to changes in intra-industry specialization and not to inter-industry specialization.

In determining the relationship between the dependent variable and predictor factors [4], that influence, was preferable to use *multiple regression analysis*. Building an econometric model and testing the relationship with the dependent variable involved SPSS writing and testing an equation of the form:

$$Y_{jt} = AX_{1jt} + BX_{2jt} + CX_{3jt} + D$$

$Y_{jt}$  = dependent variable defined before

$X_{1jt}$ ,  $X_{2jt}$ ,  $X_{3jt}$  = determinant factors, defined based on international trade theories, covering region  $j$  at moment  $t$

$A$ ,  $B$ ,  $C$  = coefficient of regression equation

Models of new economic geography theory suggest that a decrease in transport costs can lead to concentration of industries, concentration which is followed by increased *economies of scale* at macroeconomic level [6]. At the same time, in all of these models is concluded that there is the possibility that industrial agglomeration may not be sustainable if trade costs will fall below the critical level.

Following the set, reducing transport costs will influence the dynamics of intra-industry specialization processes in terms of the effect they have on industrial agglomerations that increase or dispersion of these clusters. Thus, the growth of industrial clusters will enhance previous specialization, while the dispersion of these clusters leads to decreased specialization. To validate these assumptions will build a model that will capture the three key factors [4,7]: degree of trade liberalization; economies of scale level; size of the market in baseline period

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**Degree of trade liberalization** ( $\Delta_t Open_{jt}$ ) will be approximated by the absolute variation of regional industries openness to trade, and has the following formula:

$$\Delta_t Open_{jt} = Open_{jt} - Open_{jt-1}$$

$$Open_{jt} = \frac{x_{jt} + m_{jt}}{CA_{jt}} \quad Open_{jt-1} = \frac{x_{jt-1} + m_{jt-1}}{CA_{jt-1}}$$

$x_{jt}$ ,  $m_{jt}$ ,  $x_{jt-1}$ ,  $m_{jt-1}$  = export, import from region  $j$  in current period  $t$  and baseline period  $t-1$

$CA_{jt}$ ,  $CA_{jt-1}$  = turnover in local units active in the industry from region  $j$  in the current period  $t$  and baseline period  $t-1$

The second factor, the level of **economies of scale in region  $j$**  ( $Ec\_scale_{jt}$ ), according to Amiti [4,8], can be determined best by the average size of a firm.

$$Ec\_scale_{jt} = \left( \frac{number\_employees_{jt}}{Units_{jt}} \right)$$

$Number\_employees_{jt}$  = number of employees at the end of the year from the local active units of industry in region  $j$  in period  $t$

$Units_{jt}$  = number of local active units from the industry in region  $j$  in period  $t$

The third factor, **the market size in the baseline period** ( $Smarket_{jt}$ ), will be measured by the gross domestic product of industry in region  $j$  in period  $t-1$ .

$$Smarket_{jt} = VAB_{industry_{jt-1}}$$

It is expected that the impact of economies of scale growth of regional industries over specialized processes to be positive, thus being possible to establish a direct link between the independent variables and the dependent variable and therefore the regression coefficients of the determinant factors to be positive.

$$CS_{jt} - SS_{jt} = A \Delta_t Open_{jt} + B Ec\_scale_{jt} + C Smarket_{jt} + D$$

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Using the statistical tool described above it is obtained a multiple regression equation that estimates an econometric model in which independent variables are determinants of specialization according to new theories of international trade (in the model were taken into account the *influence of economies of scale* on the processes of specialization) .

#### **Regional specialization model**

*Amplitude of changes in foreign trade = A x growth of the widening of regional industries towards exterior + B x growth of scale economies at regional industry level + C x size of the market in the baseline period + D*

- *Amplitude of changes in foreign trade* = dependent variable
- *growth of the widening of regional industries towards exterior, growth of scale economies at regional industry level growth of the market in the baseline period* = independent variables or determinants of specialization
- *A, B, C* = regression coefficients of determinants
- *D* = constant of regression equation

Results from SPSS for the multiple regression analysis on each region shows that the *hypothesis that the dynamic specialization processes, an important role is held by factors such as growth of the widening of regional industries towards exterior, growth of scale economies and size of the market in the baseline period, it is checked only in the Central region, whereas in other regions the level of significance (Sig.) of the regression equation and of the coefficients is large.*

To be noted that in the *North-East and South-East it is recorded an acceptance probability of the regression equation greater than 87%*, but the significance of coefficients of determinants in these two regions is very large related to some of them.

Whereas, *in the Central region are found the best results* in terms of significance of the regression equation and coefficients, are to be interpreted in this region results from the testing model.

*Amplitude of changes in foreign trade of Center region = 1,359 x growth of the widening of regional industries towards exterior - 26,351 x growth of scale economies at regional industry level - 0,154 x size of the market in the baseline period + 1,810*

## Testing of regional specialization model from economies of scale view

### North West Region

**Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .704 <sup>a</sup> | .496     | .193              | .1305840                   |

a. Predictors: (Constant), Marimea pietei - Reg. N-V, Sporul deschiderii catre comert - Reg. N-V, Economile de scara - Reg. N-V

**ANOVA<sup>b</sup>**

| Model |            | Sum of Squares | df | Mean Square | F     | Sig.              |
|-------|------------|----------------|----|-------------|-------|-------------------|
| 1     | Regression | .084           | 3  | .028        | 1,638 | .293 <sup>a</sup> |
|       | Residual   | .085           | 5  | .017        |       |                   |
|       | Total      | .169           | 8  |             |       |                   |

a. Predictors: (Constant), Marimea pietei - Reg. N-V, Sporul deschiderii catre comert - Reg. N-V, Economile de scara - Reg. N-V

b. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. N-V

**Coefficients<sup>a</sup>**

| Model |  | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig. |
|-------|--|-----------------------------|------------|---------------------------|-------|------|
|       |  | B                           | Std. Error | Beta                      |       |      |
| 1     | (Constant)                                 | .929                        | .758       |                           | 1,227 | .275 |
|       | Sporul deschiderii catre comert - Reg. N-V | -1,316                      | 1,467      | -.330                     | -.897 | .411 |
|       | Economile de scara - Reg. N-V              | -3,945                      | 19,152     | -.154                     | -.206 | .845 |
|       | Marimea pietei - Reg. N-V                  | -.090                       | .114       | -.625                     | -.787 | .467 |

a. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. N-V

### North East Region

**Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .906 <sup>a</sup> | .821     | .714              | .0556033                   |

a. Predictors: (Constant), Marimea pietei - Reg. N-E, Sporul deschiderii catre comert - Reg. N-E, Economile de scara - Reg. N-E

**ANOVA<sup>b</sup>**

| Model |            | Sum of Squares | df | Mean Square | F     | Sig.              |
|-------|------------|----------------|----|-------------|-------|-------------------|
| 1     | Regression | .071           | 3  | .024        | 7,863 | .026 <sup>a</sup> |
|       | Residual   | .015           | 5  | .003        |       |                   |
|       | Total      | .087           | 8  |             |       |                   |

a. Predictors: (Constant), Marimea pietei - Reg. N-E, Sporul deschiderii catre comert - Reg. N-E, Economile de scara - Reg. N-E

b. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. N-E

**Coefficients<sup>a</sup>**

| Model |  | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|-------|--|-----------------------------|------------|---------------------------|--------|------|
|       |  | B                           | Std. Error | Beta                      |        |      |
| 1     | (Constant)                                 | .723                        | .310       |                           | 2,328  | .067 |
|       | Sporul deschiderii catre comert - Reg. N-E | -.023                       | .311       | -.016                     | -.075  | .943 |
|       | Economile de scara - Reg. N-E              | 1,675                       | 4,944      | .150                      | .339   | .749 |
|       | Marimea pietei - Reg. N-E                  | -.142                       | .085       | -.775                     | -1,664 | .157 |

a. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. N-E

## Center Region

**Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | ,849 <sup>a</sup> | ,900     | ,840              | ,0753189                   |

a. Predictors: (Constant), Marimea pietei - Reg. Centru, Sporul deschiderii catre comert - Reg. Centru, Economile de scara - Reg. Centru

**ANOVA<sup>b</sup>**

| Model |            | Sum of Squares | df | Mean Square | F      | Sig.              |
|-------|------------|----------------|----|-------------|--------|-------------------|
| 1     | Regression | ,256           | 3  | ,085        | 15,052 | ,006 <sup>a</sup> |
|       | Residual   | ,028           | 5  | ,006        |        |                   |
|       | Total      | ,285           | 8  |             |        |                   |

a. Predictors: (Constant), Marimea pietei - Reg. Centru, Sporul deschiderii catre comert - Reg. Centru, Economile de scara - Reg. Centru

b. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. Centru

**Coefficients<sup>a</sup>**

| Model |   | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|-------|---|-----------------------------|------------|---------------------------|--------|------|
|       |   | B                           | Std. Error | Beta                      |        |      |
| 1     | (Constant)                                    | 1,810                       | ,291       |                           | 6,215  | ,002 |
|       | Sporul deschiderii catre comert - Reg. Centru | 1,359                       | ,284       | ,782                      | 4,782  | ,005 |
|       | Economile de scara - Reg. Centru              | -26,351                     | 5,851      | -1,136                    | -4,504 | ,006 |
|       | Marimea pietei - Reg. Centru                  | -,154                       | ,043       | -,919                     | -3,586 | ,018 |

a. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. Centru

## South East Region

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | ,805 <sup>a</sup> | ,648     | ,437              | ,1140652                   |

a. Predictors: (Constant), Marimea pietei - Reg. S-E, Sporul deschiderii catre comert - Reg. S-E, Economile de scara - Reg. S-E

**ANOVA<sup>b</sup>**

| Model |            | Sum of Squares | df | Mean Square | F     | Sig.              |
|-------|------------|----------------|----|-------------|-------|-------------------|
| 1     | Regression | ,120           | 3  | ,040        | 3,070 | ,129 <sup>a</sup> |
|       | Residual   | ,065           | 5  | ,013        |       |                   |
|       | Total      | ,185           | 8  |             |       |                   |

a. Predictors: (Constant), Marimea pietei - Reg. S-E, Sporul deschiderii catre comert - Reg. S-E, Economile de scara - Reg. S-E

b. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. S-E

**Coefficients<sup>a</sup>**

| Model |  | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|-------|--|-----------------------------|------------|---------------------------|--------|------|
|       |  | B                           | Std. Error | Beta                      |        |      |
| 1     | (Constant)                                 | 2,037                       | ,823       |                           | 2,474  | ,056 |
|       | Sporul deschiderii catre comert - Reg. S-E | ,868                        | 1,212      | ,416                      | ,716   | ,506 |
|       | Economile de scara - Reg. S-E              | -24,237                     | 18,619     | -1,255                    | -1,302 | ,250 |
|       | Marimea pietei - Reg. S-E                  | -,284                       | ,118       | -1,559                    | -2,405 | ,061 |

a. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. S-E



## South Muntenia Region

Model Summary

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | ,221 <sup>a</sup> | ,049     | -,522             | ,0933220                   |

a. Predictors: (Constant), Marimea pietei - Reg. Sud, Sporul deschiderii catre comert - Reg. Sud, Economile de scara - Reg. S

ANOVA<sup>b</sup>

| Model |            | Sum of Squares | df | Mean Square | F    | Sig.              |
|-------|------------|----------------|----|-------------|------|-------------------|
| 1     | Regression | ,002           | 3  | ,001        | ,096 | ,965 <sup>a</sup> |
|       | Residual   | ,044           | 5  | ,009        |      |                   |
|       | Total      | ,046           | 8  |             |      |                   |

a. Predictors: (Constant), Marimea pietei - Reg. Sud, Sporul deschiderii catre comert - Reg. Sud, Economile de scara - Reg. S

b. Dependent Variable: Amplitudinea schimbanilor din comert - Reg. Sud

Coefficients<sup>a</sup>

| Model |  | Unstandardized Coefficients |            | Standardized Coefficients |  | t     | Sig. |
|-------|--|-----------------------------|------------|---------------------------|--|-------|------|
|       |  | B                           | Std. Error | Beta                      |  |       |      |
| 1     | (Constant)                                 | ,575                        | ,316       |                           |  | 1,819 | ,129 |
|       | Sporul deschiderii catre comert - Reg. Sud | -,344                       | ,742       | -,205                     |  | -,463 | ,663 |
|       | Economile de scara - Reg. Sud              | -,272                       | 4,620      | -,047                     |  | -,059 | ,955 |
|       | Marimea pietei - Reg. Sud                  | ,004                        | ,040       | ,075                      |  | ,093  | ,929 |

a. Dependent Variable: Amplitudinea schimbanilor din comert - Reg. Sud

## București Ilfov Region

Model Summary

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | ,730 <sup>a</sup> | ,532     | ,252              | ,1856486                   |

a. Predictors: (Constant), Marimea pietei - Reg. Buc.-Ilfov, Sporul deschiderii catre comert - Reg. Buc.-Ilfov, Economile de sca

ANOVA<sup>b</sup>

| Model |            | Sum of Squares | df | Mean Square | F     | Sig.              |
|-------|------------|----------------|----|-------------|-------|-------------------|
| 1     | Regression | ,196           | 3  | ,065        | 1,097 | ,240 <sup>a</sup> |
|       | Residual   | ,172           | 5  | ,034        |       |                   |
|       | Total      | ,369           | 8  |             |       |                   |

a. Predictors: (Constant), Marimea pietei - Reg. Buc.-Ilfov, Sporul deschiderii catre comert - Reg. Buc.-Ilfov, Economile de sca

b. Dependent Variable: Amplitudinea schimbanilor din comert - Reg. Buc.-Ilfov

Coefficients<sup>a</sup>

| Model |   | Unstandardized Coefficients |            | Standardized Coefficients |  | t      | Sig. |
|-------|---|-----------------------------|------------|---------------------------|--|--------|------|
|       |   | B                           | Std. Error | Beta                      |  |        |      |
| 1     | (Constant)  | 1,347                       | ,811       |                           |  | 2,207  | ,078 |
|       | Sporul deschiderii catre comert - Reg. Buc.-Ilfov | ,435                        | ,453       | ,370                      |  | ,960   | ,381 |
|       | Economile de scara - Reg. Buc.-Ilfov              | -14,357                     | 16,480     | -,490                     |  | -,872  | ,423 |
|       | Marimea pietei - Reg. Buc.-Ilfov                  | -,124                       | ,084       | -,743                     |  | -1,486 | ,197 |

a. Dependent Variable: Amplitudinea schimbanilor din comert - Reg. Buc.-Ilfov

## South West Oltenia Region

**Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | ,570 <sup>a</sup> | ,325     | -,080             | 1816511                    |

a. Predictors: (Constant), Marimea pietei - Reg. S-V, Sporul deschiderii catre comert - Reg. S-V, Economile de scara - R

**ANOVA<sup>b</sup>**

| Model |            | Sum of Squares | df | Mean Square | F    | Sig.              |
|-------|------------|----------------|----|-------------|------|-------------------|
| 1     | Regression | ,079           | 3  | ,026        | ,803 | ,544 <sup>a</sup> |
|       | Residual   | ,165           | 5  | ,033        |      |                   |
|       | Total      | ,244           | 8  |             |      |                   |

a. Predictors: (Constant), Marimea pietei - Reg. S-V, Sporul deschiderii catre comert - Reg. S-V, Economile de scara - R

b. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. S-V

**Coefficients<sup>a</sup>**

| Model |  | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig. |
|-------|--|-----------------------------|------------|---------------------------|-------|------|
|       |  | B                           | Std. Error | Beta                      |       |      |
| 1     | (Constant)                                 | ,986                        | ,940       |                           | 1,050 | ,342 |
|       | Sporul deschiderii catre comert - Reg. S-V | 1,433                       | 1,624      | ,378                      | ,882  | ,418 |
|       | Economile de scara - Reg. S-V              | -6,972                      | 14,085     | -,419                     | -,495 | ,642 |
|       | Marimea pietei - Reg. S-V                  | -,121                       | ,188       | -,555                     | -,644 | ,548 |

a. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. S-V

## West Region

**Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | ,568 <sup>a</sup> | ,322     | -,084             | ,0986116                   |

a. Predictors: (Constant), Marimea pietei - Reg. V, Sporul deschiderii catre comert - Reg. V, Economii

**ANOVA<sup>b</sup>**

| Model |            | Sum of Squares | df | Mean Square | F    | Sig.              |
|-------|------------|----------------|----|-------------|------|-------------------|
| 1     | Regression | ,023           | 3  | ,008        | ,793 | ,548 <sup>a</sup> |
|       | Residual   | ,049           | 5  | ,010        |      |                   |
|       | Total      | ,072           | 8  |             |      |                   |

a. Predictors: (Constant), Marimea pietei - Reg. V, Sporul deschiderii catre comert - Reg. V, Economii

b. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. V

**Coefficients<sup>a</sup>**

| Model |  | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig. |
|-------|--|-----------------------------|------------|---------------------------|-------|------|
|       |  | B                           | Std. Error | Beta                      |       |      |
| 1     | (Constant)                               | 1,088                       | ,923       |                           | 1,179 |      |
|       | Sporul deschiderii catre comert - Reg. V | -,248                       | ,744       | -,194                     | -,333 |      |
|       | Economile de scara - Reg. V              | -8,600                      | 17,896     | -,628                     | -,481 |      |
|       | Marimea pietei - Reg. V                  | -,086                       | ,109       | -,839                     | -,794 |      |

a. Dependent Variable: Amplitudinea schimbarilor din comert - Reg. V

*Source: Data from INS*

From the first table in SPSS output, *Model Summary*, the values of R and R<sup>2</sup> indicates that between the dependent variable and independent variables there is a very strong relationship (R = 94,9%) and *the evolution of the dependence is explained in by a rate of 90,0% (R<sup>2</sup>)* of the evolution of determinants.

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The second table, ANOVA, provides the regression equation test results, respectively the value of the statistical significance of Fisher test (Sig.). Since the value Sig. corresponding to the Central region is 0,006, one can say that the *independent variables explain the variation in the dependent variable with a probability of 99,4%*.

From table *Coefficients column B*, there were taken regression equation coefficients for each independent variable and it was written the above model, from *Beta* column there were obtained information on the intensity and direction of the link between each predictor and the dependent variable, and *t-test* results for each coefficient is shown in column *Sig.*

Therefore, between the processes of specialization in the Central region and the three key determinants occur the following links:

- With a probability of 99,5% there is a direct and strong link (78,2%) *growth of the widening of regional industries towards exterior*
- With a probability of 99,4% there is an indirect and strong link with *growth of scale economies at regional industry level*
- With a probability of 98,4% there is a strong and indirect link (-91,9%) with the size of the market from the baseline period

***In conclusion, the processes of specialization in the Center region in the period 2000-2009, are influenced in a proportion of 90,0%, at a 99,4% probability by the growth of the widening of regional industries, growth of scale economies at regional industry level and market size in the baseline period. The main factors that influenced indirectly and in excess of 80%, the changes in regional specialization processes were growth of scale economies at regional industry level and market size in the baseline period (with a probability of 98,4 %).***

This model can be also tested at national level, whereas in its form there are not involved relative measures, and the SPSS analysis results can be found below.

***Amplitude of changes in foreign trade of Romania = 2,684 x x growth of the widening of national industries towards exterior - 7,642 x growth of scale economies at national industry level - 0,014 x size of the market in the baseline period + 1,063***

***Processes of specialization in Romania during 2000-2009, are influenced in a share of 74,4%, at a probability of 93,9% by the degree of the widening of national industries of scale economies at national industry level and market size in the baseline period.***

The main factor that influenced directly and at a rate of approximately 29,7% the changes in the processes of national specialization was the *growth of the widening of national industries towards exterior* (with a probability of 91,2%).

The other two factors, *growth of scale economies at national industry level* and market size in the baseline period, influenced indirectly and in a proportion of 19,2% (with a probability of 64,0%) and 63,8% (with a probability of 86,5%) changes in national specialization processes.

### **Testing of specialization model from the view of scale economies in Romania in period 2000-2009**

**Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .862 <sup>a</sup> | .744     | .690              | .0914067                   |

a. Predictors: (Constant), Marimea pietei - Romania, Sporul deschiderii catre comert - Romania, Economille de scara - Romania

**ANOVA<sup>b</sup>**

| Model |            | Sum of Squares | df | Mean Square | F     | Sig.              |
|-------|------------|----------------|----|-------------|-------|-------------------|
| 1     | Regression | .121           | 3  | .040        | 4,941 | .061 <sup>a</sup> |
|       | Residual   | .042           | 5  | .008        |       |                   |
|       | Total      | .163           | 8  |             |       |                   |

a. Predictors: (Constant), Marimea pietei - Romania, Sporul deschiderii catre comert - Romania, Economille de scara - Romania  
b. Dependent Variable: Amplitudinea schimbanilor din comert - Romania

**Coefficients<sup>a</sup>**

| Model |   | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|-------|---|-----------------------------|------------|---------------------------|--------|------|
|       |   | B                           | Std. Error | Beta                      |        |      |
| 1     | (Constant)                                | 1,063                       | ,386       |                           | 2,750  | ,040 |
|       | Sporul deschiderii catre comert - Romania | 2,684                       | 1,266      | ,545                      | 2,120  | ,086 |
|       | Economille de scara - Romania             | -7,642                      | 7,592      | -,438                     | -1,007 | ,360 |
|       | Marimea pietei - Romania                  | -,014                       | ,008       | -,799                     | -1,779 | ,135 |

a. Dependent Variable: Amplitudinea schimbanilor din comert - Romania

Source: Data from INS

### **Conclusions**

*In terms of models for the new international trade theories*, one can say that in most regions of Romania, *the evolution of the degree of specialization is inversely proportional to the development of economies of scale and market size and directly proportional to the evolution of trade liberalization level.*

*Some of the results are not confirmed by Davis and Weinstein [9] in the 13 countries of the OECD*, as they show that economies of scale and market size have a positive influence on industry structure. Also a strong and proportional relationship between processes of specialization and economies of scale development is confirmed *in the study by Kim [7] in the regions of the U.S.* The author notes that economies of scale effect explains very well the long term evolution of specialization and industrial concentration.

*If we take into account the significance level of the model built*, it is observed that *in most regions of Romania, the models offered by new international trade theories explain quite well the dynamic processes of specialization, confirming thus the current trends stating that the dynamic of the processes of specialization*, this way being confirmed that *in the dynamics of specialization*

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*processes there is a large contribution of intra-industry specialization type and not the inter-industry.*

*The same results were reached by Davis and Weinstein [10] following the comparative analysis among the regions from Japan and 22 countries of the OECD. The authors demonstrate empirically that regional data for the industrial sector in Japan confirm, with a higher probability, the assumptions of the models of new theories of international trade, while the industrial sector developments in OECD confirmed these models at a very small probability.*

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