

# THE DYNAMIC OF REGIONAL TRADE SPECIALISATION PATTERN IN ROMANIA

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**Abstract:** *The paper analyses the evolution of the regional trade specialization pattern in Romanian regions, by studying the dynamic of their comparative advantages over the period 2000 - 2009. The study finds that, in almost all regions (exceptions are North-East and South-East Region) the international specialization has increased for products in which regions were initially relatively less specialized and has decreased for those in which they were initially highly specialized. Finally, most regions recorded large respectively small specialization improvements in products for which the internal respectively external demand expanded at the fastest rate over the time.*

**Keywords:** FOB exports, CIF imports, Lafay index, comparative advantage, sections of the Combined Nomenclature (CN)

**JEL Classification:** C10, F10, F49, O11

## 1. INTRODUCTION

The analysis of the regional trade specialization patterns and their adaptation to internal and external demand primarily implied to use the econometric tools (regression and correlation) to highlight the structural stability of specialization models, and secondly to evaluate this structural change in terms of economic efficiency.

### 1.1. Database

The **database**, for my analysis, was provided by the National Institute of Statistics. The **regional import and export trade flows, in the period 2000-2009, are presented by sections of the Combined Nomenclature (CN)**. Data are presented on sections of CN because Romania's foreign trade statistics is made in accordance with the methodology used internationally. The imported and exported goods have been classified, since 1994, by Combined Nomenclature (CN), which is also the basis of the tariff customs. National Institute of Statistics is the official source for such data. Before 1

January 2007, when Romania joined EU, the statistical information on external goods trade have been collected by the National Customs Authority, the institution which collect customs declarations. Based on their dates on establish the level of exports and imports – the Extrastat statistical system. Starting with January 1, 2007 Intrastat system became operational, so that international trade statistics are obtained by summing data from systems Intrastat (Intra-EU trade - data collected by INS) and Extrastat (Extra-EU trade - data collected by the NCA).

To provide a pertinent analysis of the regional specialization, the interpretation was made first in terms of level of technology into products of manufacturing industry and secondly in terms of factor intensity use. To do such an analysis I built a **table of correspondence** between the National Classification of Economic Activities in Romania (**NACE** - at division level), Classification of products and services Activities (**CPSA** - at group level), CN (**CN** - at the chapter) - aggregation of correspondence, between the three classifications at the division level, was made according to official correspondence in the much higher level of detail - and the **classification of industries according to technological intensity** (according to a classification UNIDO 2005) and by **the factor intensity use** (as classified Neven D.J. in the study "Gain and losses from 1992" 1990).

From these data I determined the **Lafay index which quantifies the degree of regional specialization**. This index represents the comparative advantage of intra-industry specialization for a product and it is determined by multiplying the difference of normalized trade balance of the product and the total normalized trade balance area with the proportion of trade (export + import) of the total regional flows. At regional level the amount of index by CN sections must be equal to zero. Positive values for this index imply comparative advantage for a product, so there is intra-industry specialization, and negative values indicate import dependence. A high value/low level of this index is associated with intra-industry high/low specialization.

$$LF_i = 100 \left( \frac{(x_i - m_i)}{(x_i + m_i)} - \frac{\sum_{reg} (x_i - m_i)}{\sum_{reg} (x_i + m_i)} \right) \frac{(x_i + m_i)}{\sum_{reg} (x_i + m_i)}$$

Where:  $x_i$  = the value of exports by CN section,  $m_i$  = the value of imports by CN section,

$\sum_{reg}$  = sum of index by region

## 1.2. Methodology

**Econometric instruments used** to assess the temporal stability of the comparative advantages of specialization processes (Zaghini, 2003) implies building a regression equation where the independent variable represents the value of the Lafay index at the beginning of the period (in 2000) and the dependent variable represents the value of the index at the end of period (in 2009). Regression equation is as follows:

$$LF_{2009} = \alpha + \beta LF_{2000} + \varepsilon$$

Where:  $LF_{2009}$  and  $LF_{2000}$  = Lafay index for 2009 and 2000

$\alpha$  și  $\beta$  = parameters of linear regression equation

$\varepsilon$  = residual error

*Interpretation of the regression analysis based on the regression parameter ( $\beta$ )* can be made as follows:

- if  $\beta$  is equal to 1 the process of specialization *did not change* during the analyzed period
- if  $\beta$  is greater than 1 then in that region the degree of specialization *increased* or fallen to those products where there is the *advantage* or disadvantage already
- if  $\beta$  is between 0 and 1 then *average specialization index remained unchanged* but increased to products where values were small and declined to products where there were high levels
- dacă  $\beta$  is less than zero - *the processes of specialization have changed*

However, only parameter regression analysis is not sufficient to accurately determine whether changes in the structure of the advantages / disadvantages comparison determines the modifications of the degree of specialization. In fact, the regression parameter tells us what happens on average and does not give us clear information about changes in the dispersion of the distribution of comparative advantages. To obtain such evidence I consider the following equation:

$$\frac{VAR(LF_{2009})}{VAR(LF_{2000})} = \frac{\beta^2}{R^2}$$

Where:  $VAR(LF_{2009})$  și  $VAR(LF_{2000})$  = variances of the independent and dependent variable

$R^2$  = coefficient of determination of the regression equation

Interpretation of results can be made from two perspectives, as follows:

➤ *In terms of the correlation coefficient (R) of the regression equation:*

- *If the values are large and tend to 1 – there are not changed the relative positions of the products*
- *If the values are small and tend to 0 – there are significant changes in distribution structure such that the structure has high mobility*

➤ *In terms of the relationship between the regression parameter ( $\beta$ ) and correlation coefficient (R):*

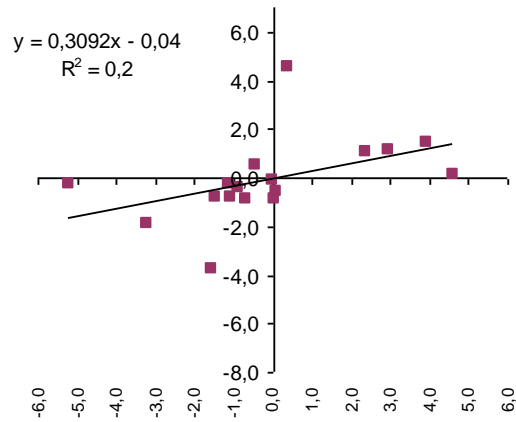
- *If they are equal ( $\beta = R$ ) - dispersion of the distribution remains unchanged*
- *If the regression parameter is greater than the coefficient of correlation ( $\beta > R$ ) - which means that the dispersion increases the degree of specialization has increased*
- *If the regression parameter is smaller than the coefficient of correlation ( $\beta < R$ ) - dispersion decreases as a result decreases the degree of specialization.*

"Regression effect" (given by  $\beta$ ) and "mobility effect" (given by  $1-R$ ) provides information on changes in the distribution of comparative advantage over a period. It may be that the regression parameter to suggest a decrease in the degree of specialization due to proportional changes toward the average, but the overall effect should be the other way because of changes occurring in distribution structure.

## 2. DYNAMIC OF REGIONAL TRADE SPECIALISATION PATTERNS

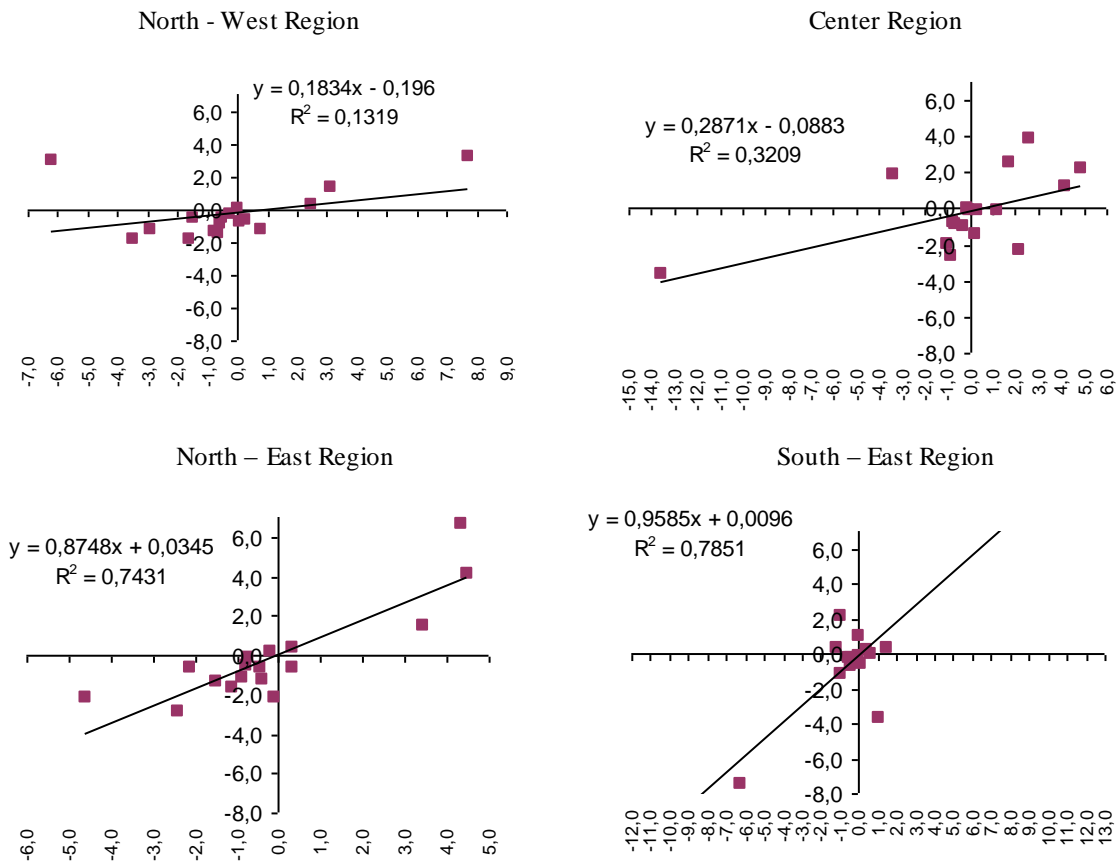
*Applying to the database the previously econometric instruments* I obtained the next graphical representations (Figure 1 and 2). *Thus, at the national level*, as shown in Figure 1, *the degree of specialization has remained on average the same* during 2000-2009, whereas the regression parameter is between 0 and 1 ( $\beta = 0,31$ ). Also, the regression parameter value close to zero and the mean value at the correlation coefficient ( $R = 0,45$ ), however indicates that there were *significant changes in distribution structure of comparative advantages*.

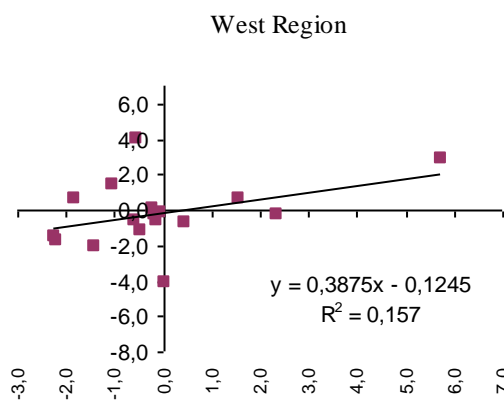
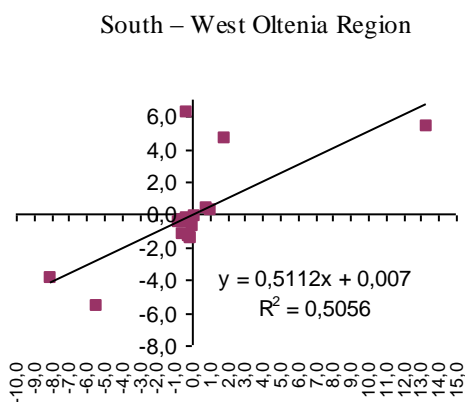
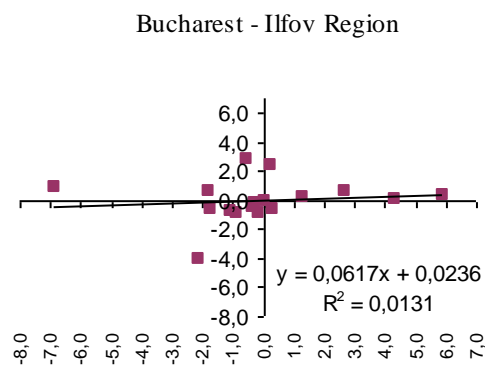
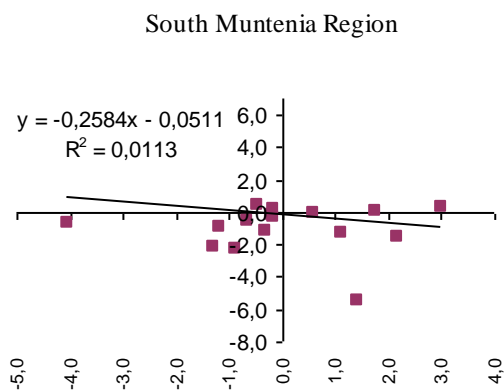
**Figure 1 - Dynamic of intra-industry specialization processes in Romania  
(Corelograma of Lafay index in 2000 and 2009)**



Source: own processing based on information provided by NIS

**Figure 2 - Corelograma of regional Lafay index by CN sections in 2000 and 2009**





Source: own processing based on information provided by NIS

Because the value of the regression parameter is less than the coefficient of correlation, **I conclude** that in Romania, even if there is a slight decrease in degree of specialisation, there are significant changes in distribution structure of comparative advantages whereas the effect of mobility outweigh the effect of regression. This means that Romania has specialised in sectors where the initial phase was less specialised and despecialised in sectors where the initially was highly specialised.

Since by regions the dynamic of degree of specialisation is different, further, I analyze this phenomenon in each region, based on information provided by Figure 2.

### North-West Region

In this region the degree of specialization has remained on average the same during 2000-2009, whereas the regression parameter is between 0 and 1 ( $\beta = 0,18$ ). Also, the small value of parameter regression (close to zero) and the small value of the coefficient of correlation ( $R = 0,36$ ), indicate that there were significant changes in the structure of comparative advantages.

Because of the regression parameter is less than the coefficient of correlation, **I conclude** that in this region even if there is a slight decrease of specialization are, however, significant changes in

*distribution structure of comparative advantages whereas the effect of mobility outweigh the effect of regression. This means, that the region has specialized in sectors where it was less specialized and despecialized in the sectors where it was highly specialized.*

### **Center Region**

In this region *the degree of specialization has remained on average the same* during 2000-2009, whereas the regression parameter is between 0 and 1 ( $\beta = 0,29$ ). Also, the small value of parameter regression (close to zero) and the small value of the coefficient of correlation ( $R = 0,57$ ), indicate that *there were significant changes in the structure of comparative advantages.*

Because of the regression parameter is less than the coefficient of correlation, **I conclude** that in this region *even if there is a slight decrease of specialization are, however, significant changes in distribution structure of comparative advantages whereas the effect of mobility outweigh the effect of regression. This means, that the region has specialized in sectors where it was less specialized and despecialized in the sectors where it was highly specialized.*

### **North-East Region**

In this region *the degree of specialization has remained the same* during 2000-2009, whereas the regression parameter is between 0 and 1 ( $\beta = 0,87$ ). Also, the high values of parameter regression (close to 1) and the coefficient of correlation ( $R = 0,86$ ), indicate that *there were no significant changes in the structure of comparative advantages.*

Because of the regression parameter is greater than the coefficient of correlation, **I conclude** that in this region *there is a slight increase of specialization and no, significant changes in distribution structure of comparative advantages. This means, that the region has specialized in sectors where it was highly specialized and despecialized in the sectors where it was less specialized.*

### **South-East Region**

In this region *the degree of specialization has remained the same* during 2000-2009, whereas the regression parameter is between 0 and 1 ( $\beta = 0,96$ ). Also, the high values of parameter regression (close to 1) and the coefficient of correlation ( $R = 0,89$ ), indicate that *there were no significant changes in the structure of comparative advantages.*

Because of the regression parameter is greater than the coefficient of correlation, **I conclude** that in this region *there is a slight increase of specialization and no, significant changes in distribution structure of comparative advantages. This means, that the region has specialized in sectors where it was highly specialized and despecialized in the sectors where it was less specialized..*

### **South Muntenia Region**

In this region *the degree of specialization has reversed* during 2000-2009, whereas the regression parameter is negative ( $\beta = -0,27$ ). Also, the small value of parameter regression (close to zero) and the small value of the coefficient of correlation ( $R = 0,11$ ), indicate that *there were significant changes in the structure of comparative advantages*.

Because of the regression parameter is less than the coefficient of correlation, ***I conclude*** that in this region *even if there is a decrease of specialization are, however, significant changes in distribution structure of comparative advantages whereas the effect of mobility outweigh the effect of regression. This means, that the region has specialized in sectors where it was less specialized and despecialized in the sectors where it was highly specialized.*

### **Bucharest-Ilfov Region**

In this region *the degree of specialization has remained on average the same* during 2000-2009, whereas the regression parameter is between 0 and 1 ( $\beta = 0,06$ ). Also, the small value of parameter regression (close to zero) and the small value of the coefficient of correlation ( $R = 0,11$ ), indicate that *there were significant changes in the structure of comparative advantages*.

Because of the regression parameter is less than the coefficient of correlation, ***I conclude*** that in this region *even if there is a slight decrease of specialization are, however, significant changes in distribution structure of comparative advantages whereas the effect of mobility outweigh the effect of regression. This means, that the region has specialized in sectors where it was less specialized and despecialized in the sectors where it was highly specialized.*

### **South – West Oltenia Region**

In this region *the degree of specialization has remained on average the same* during 2000-2009, whereas the regression parameter is between 0 and 1 ( $\beta = 0,51$ ). Also, the average value of parameter regression and the high value of the coefficient of correlation ( $R = 0,71$ ), indicate that *there were no significant changes in the structure of comparative advantages*.

Because of the regression parameter is less than the coefficient of correlation, ***I conclude*** that in this region *there is a slight decrease of specialization and no significant changes in distribution structure of comparative advantages whereas the effect of mobility outweigh the effect of regression. This means, that the region has specialized in sectors where it was less specialized and despecialized in the sectors where it was highly specialized*



## West Region

In this region *the degree of specialization has remained on average the same* during 2000-2009, whereas the regression parameter is between 0 and 1 ( $\beta = 0,39$ ). Also, the small value of parameter regression and the average value of the coefficient of correlation ( $R = 0,40$ ), indicate that *there were significant changes in the structure of comparative advantages*.

Because of the regression parameter is less than the coefficient of correlation, ***I conclude*** that in this region *even if there is a slight decrease of specialization are, however, significant changes in distribution structure of comparative advantages whereas the effect of mobility outweigh the effect of regression. This means, that the region has specialized in sectors where it was less specialized and despecialized in the sectors where it was highly specialized.*

***In conclusion***, as can be seen in figure 3, *in most regions the degree of specialization has slight decrease because the increasing of specialization in the sectors where it was less specialized, it was compensated with the decreasing of specialization in the sectors where it was highly specialized. Therefore, during 2000-2009, the comparative advantages have, generally, decreased, and their structure's distribution has high mobility (except the North-East and South-East where the degree of specialization has increased due to the increased of specialization in those sectors they were already specialized, so the structure's distribution of comparative advantages does not change).*

**Figure 3 - The evolution of comparative advantages and the mobility of the structure during 2000-2009**

Regions	Comparative advantages	The mobility of the structure	Specialization	
			increasing	decreasing
North-West	decreasing	average		x
Center	decreasing	average		x
North-East	increasing	small	x	
South-East	increasing	small	x	
South Muntenia	decreasing	high		x
Bucharest-Ilfov	decreasing	high		x
South – West Oltenia	slight decreasing	small		x
West	slight decreasing	average		x

Source: own processing based on information provided by NIS

### 3. ADAPTING REGIONAL SPECIALIZATION TO THE DEMAND

*The results of previous analysis* - the temporal stability of the comparative advantage's structure - has revealed that the *regional specialization processes have changed* over the period 2000-2009, whereas the degree of mobility is relatively high.

To assess if these changes represent *the adjustment of productive structures* to the dynamic of demand, I propose, further, to build a *model of specialization* in which the cumulative curves of Lafay indexes, depending on demand, from 2000 and 2009 are compared (Zaghini A., 2003).

Since, by definition the sum of the Lafay index by sections is zero, *the cumulative curve will begin at the positive or negative value* corresponding to the first section with the lowest dynamic *and finish at zero* by adding a positive or negative value associated to the section with the highest dynamic of the demand.

To build the plot, I put on OX axis the CN sections ordered ascending by the demand dynamics and on the OY axis the cumulative value Lafay index.

*The cumulative curves of Lafay indexes will increase at the sections where comparative advantages exist and decrease where there are disadvantages.*

A regional specialization model can be considered *efficient if that region gain comparative advantages of the products whose market demand is growing* since it involves strengthening the position of the regional economy on the international market.

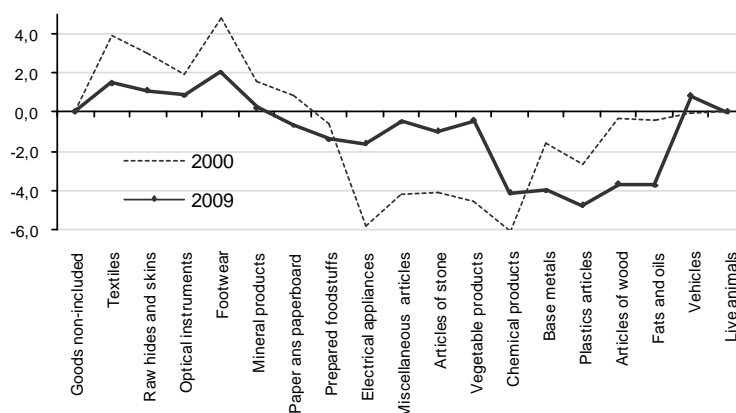
*In conclusion, a reduction of comparative advantages* (or an increase of comparative disadvantage) to the products with *low dynamic of the demand* can be interpreted as a *positive trend* of development of regional economy, and vice versa, a reduction of the comparative advantages (or an increase of comparative disadvantage) to the products with high dynamics demand can be considered a negative development of regional economy. Every economy should have flexible and competitive production structures that would increase the comparative advantages of those products where demand is growing faster.

#### 3.1. The specialisation models in terms of internal demand

To build this model I ranked first in ascending *order all CN sections according to the dynamic of the internal demand expressed by regional imports* (2009 compared to 2000). Then, I determined the

values of the Lafay cumulative curve by summing, adding position with position indices calculated at the section.

**Figure 4 - The specialisation model in Romania between 2000-2009  
(in terms of internal demand)**



Source: own processing based on information provided by NIS

As can be seen in Figure 4, the *dynamic of specialization patterns in Romania in terms of internal demand* (imports) has the following trends:

- for *products* with relatively constant or changed slightly demand (*small dynamic*) the *comparative advantages* has decrease in 2009 compared to 2000
- for *products* with *average demand dynamics* the *comparative disadvantages* has recorded a *fall* in 2009 compared to 2000
- for *products* with *growing demand* the *comparative disadvantage* has decrease in 2009 compared to 2000 (except for means of transport where disadvantages turns to the comparative advantages)

***In conclusion, in Romania the changes*** in the specialization model *for products with small and average internal demand dynamics* (the decreasing/increasing of comparative advantages/disadvantages at the products where it is a small or average demand dynamics) *are "efficient"* for the national economy. I can not say the same thing about changes in the specialisation model, *for goods where there was a high dynamic*. Thus, rather to decrease the small comparative disadvantages from 2000, those have increasing further in 2009. This is a sign that *Romania's productive structures were*

not competitive and flexible enough, compared to those from abroad, to satisfy an increasingly higher internal demand and „other countries" have satisfied the excess demand.

At regional level, adaptation of the specialisation model to the internal demand is different, but, generally, I can say, according to figures 5 and 6, that *most regional economies respond efficient to the demand growth* by increasing/decreasing the comparative advantages/disadvantages or turning disadvantages into comparative advantages (*except the North-West and South-Muntenia*).

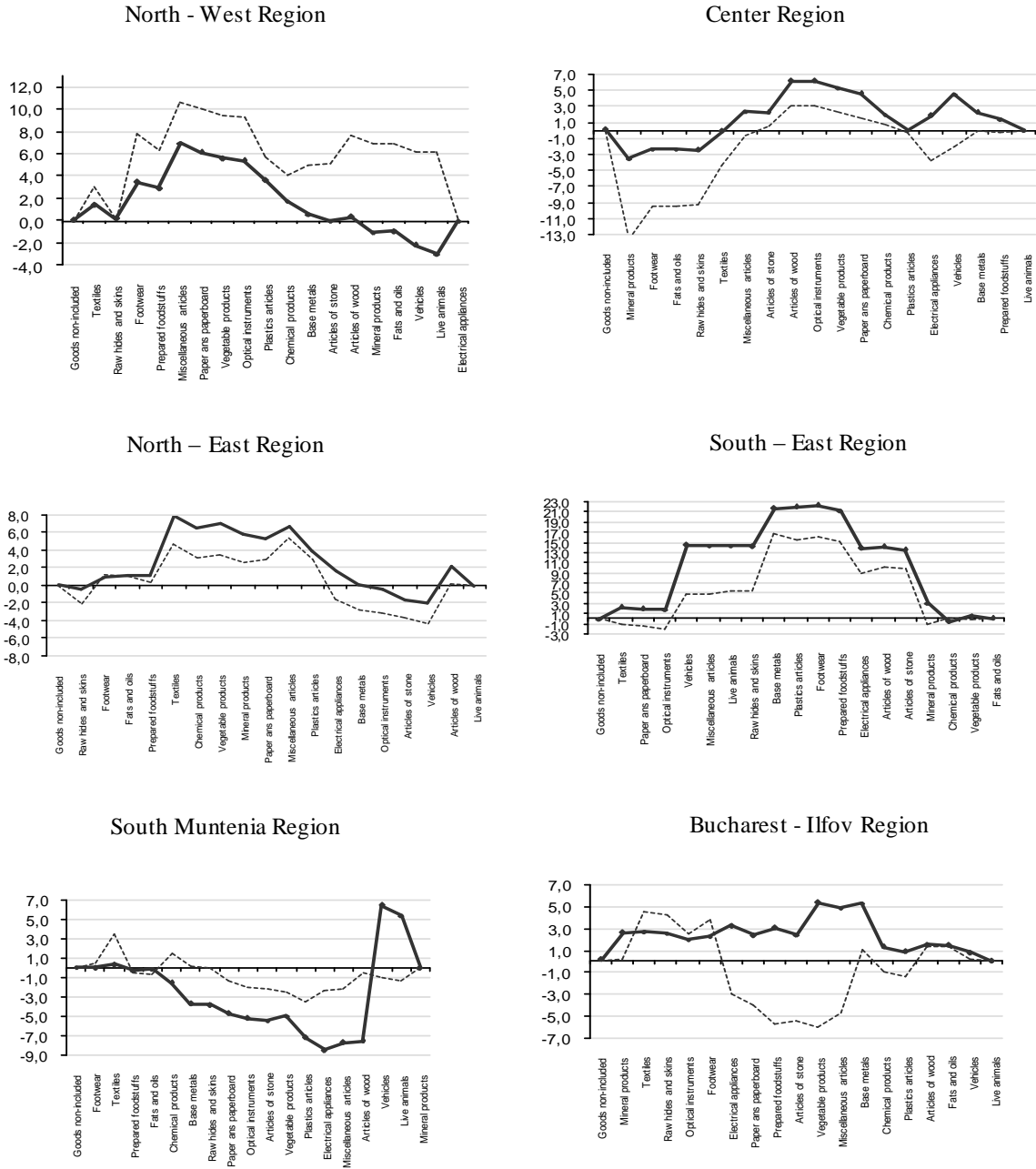
Its important to emphasize that the changing patterns of regional specialization in terms of internal demand, implied in fact the growth of comparative advantages or the decreasing of the disadvantages in all categories of products, which would mean that the regional production structures are competitive and try to satisfy the demand, regardless of its dynamics.

**Figure 5 - Adapting regional specialization pattern to the internal demand dynamics between 2000-2009**

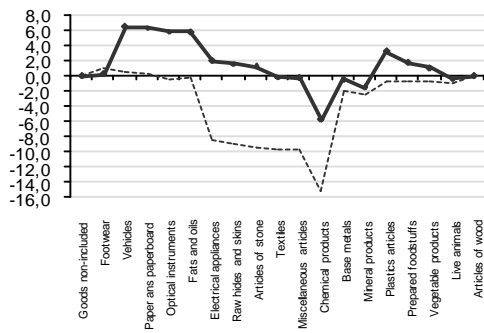
Regions	Internal demand dynamics		
	small	average	high
North-West	comparative advantages decreasing	comparative advantages decreasing	advantages turns into comparative
Center	comparative disadvantages	comparative advantages increasing	disadvantages turns into comparative advantages
North-East	comparative advantages increasing	comparative advantages increasing	comparative disadvantages
South-East	disadvantages turns into comparative advantages	comparative advantages increasing	small and constant comparative advantages
South Muntenia	comparative advantages decreasing	comparative disadvantages	disadvantages turns into comparative advantages
Bucharest-Ilfov	comparative advantages decreasing	disadvantages turns into comparative advantages	small and constant comparative advantages
South – West Oltenia	comparative advantages increasing	disadvantages turns into comparative advantages	disadvantages turns into comparative advantages
West	comparative advantages increasing	comparative advantages increasing	disadvantages turns into comparative advantages

Source: own processing based on information provided by NIS

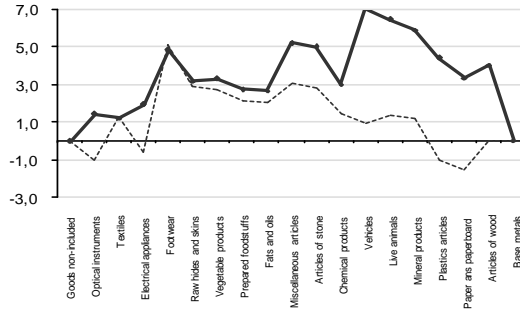
**Figure 6 - The regional specialization model in terms of internal demand, between 2000-2009**



South – West Oltenia Region



West Region

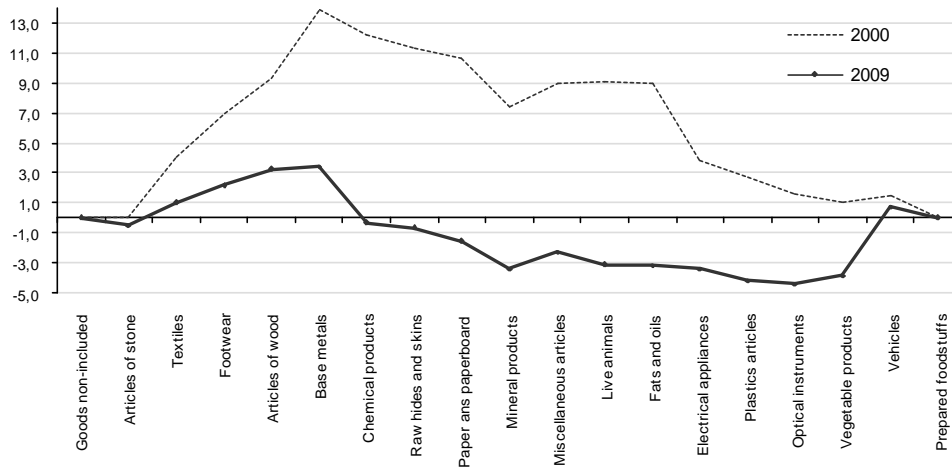


Source: own processing based on information provided by NIS

### 3.2. The specialisation models in terms of external demand

To build this model I ranked first in ascending order all CN sections according to the dynamic of the external demand expressed by regional exports (2009 compared to 2000). Then, I determined the values of the Lafay cumulative curve by summing, adding position with position indices calculated at the section.

**Figure 7 - The specialisation model in Romania between 2000-2009  
(in terms of external demand)**



Source: own processing based on information provided by NIS

As can be seen in Figure 7, the *dynamic of specialization patterns in Romania in terms of external demand* (exports) has the following trends:

- for *products* with relatively constant or changed slightly demand (*small dynamic*) the *comparative advantages* has decrease in 2009 compared to 2000
- for *products* with *average demand dynamics* the *comparative disadvantages* has recorded a *fall* in 2009 compared to 2000
- for *products* with *growing demand* the *small comparative advantage* has decrease and turns in disadvantages in 2009 compared to 2000 (except for means of transport where the comparative advantages remain)

***In conclusion, in Romania the changes*** in the specialization model for *products with small external demand dynamics* (the decreasing of comparative advantages at the products where it is a small demand dynamics) are "*efficient*" for the national economy. I can not say the same thing about changes in the specialisation model, *for goods where there was a average and high dynamic*. Thus, rather to increase the comparative advantages from 2000, those have decreasing turns in turns in disadvantages in 2009. This is a sign that *Romania's productive structures were not competitive and flexible enough*, compared to those from abroad, to satisfy an increasingly higher external demand. *Exceptions are the means of transport*, whose high comparative advantages, strengthens Romania's position on the international market with such products.

***At regional level***, adaptation of the specialisation model to the external demand is different, but, generally, I can say, according to figures 8 and 9, that ***most regional economies not respond efficient to the demand growth*** by increasing the comparative advantages or turning disadvantages into comparative advantages (except are North-East and South-East who have preserved the advantages especially in products with a high dynamic of the external demand).

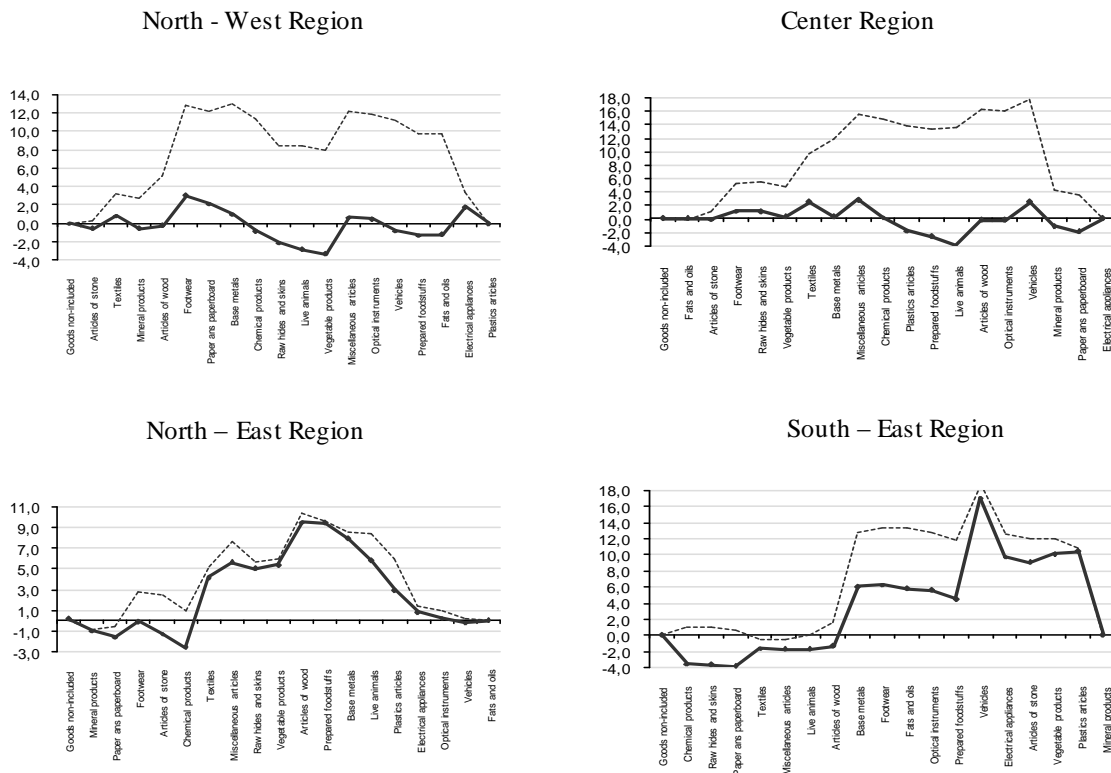
*Its important to emphasize that the changing patterns of regional specialization in terms of external demand, implied in fact the decreasing of comparative advantages and turns in disadvantages in all categories of products, which would mean that the regional production structures are not competitive and flexible enough to satisfy the demand, regardless of its dynamics.*

**Figure 8. Adapting regional specialization pattern to the external demand dynamics between 2000-2009**

Regions	External demand dynamics		
	small	average	high
<b>North-West</b>	comparative advantages decreasing	advantages turns into comparative disadvantages	advantages turns into comparative disadvantages
<b>Center</b>	comparative advantages decreasing	advantages turns into comparative disadvantages	advantages turns into comparative disadvantages
<b>North-East</b>	advantages turns into comparative disadvantages	comparative advantages decreasing	comparative advantages decreasing
<b>South-East</b>	advantages turns into comparative disadvantages	comparative advantages decreasing	comparative advantages decreasing
<b>South Muntenia</b>	advantages turns into comparative disadvantages	advantages turns into comparative disadvantages	advantages turns into comparative disadvantages
<b>Bucharest-Ilfov</b>	advantages turns into comparative disadvantages	comparative advantages decreasing	advantages turns into comparative disadvantages
<b>South – West Oltenia</b>	constant comparative disadvantages	disadvantages increasing advantages decreasing	advantages turns into comparative disadvantages
<b>West</b>	constant comparative advantages	advantages turns into comparative disadvantages	comparative advantages decreasing

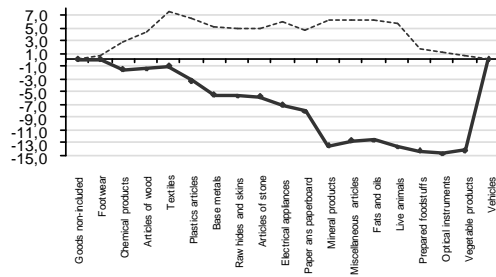
Source: own processing based on information provided by NIS

**Figure 9 . The regional specialization model in terms of external demand, between 2000-2009**

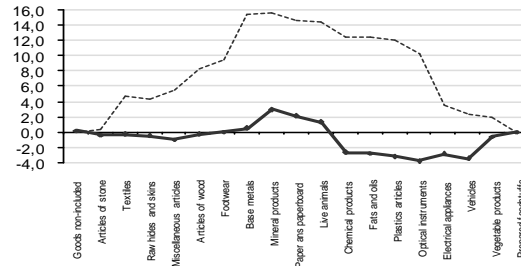




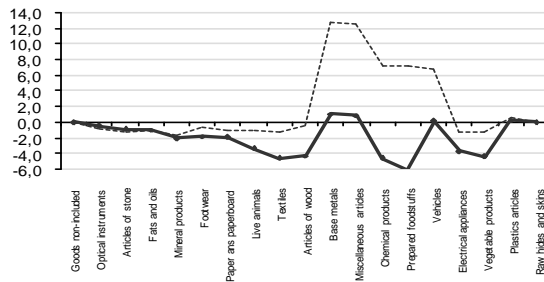
### South Muntenia Region



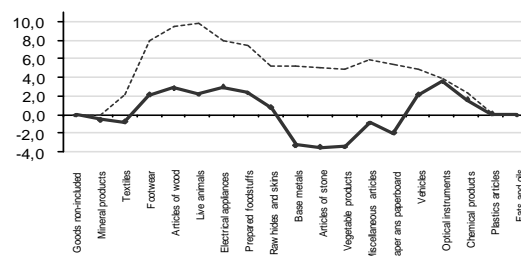
### Bucharest - Ilfov Region



### South – West Oltenia Region



### West Region



Source: own processing based on information provided by NIS

## CONCLUSION

*The results of this analysis* – The dynamic of regional trade specialization pattern in Romania - in terms of the temporal stability of the distribution structure of comparative advantages, has revealed that *at the regional level the specialization processes have changed* between 2000-2009, whereas the degree of mobility is relatively high.

In most regions recorded *a decline in comparative advantage due to high mobility of the structure of their distribution* (except North-East and South-East where the degree of specialization has increased due to increased of specialization in those sectors that are already specialized, therefore distribution structure of comparative advantage does not change).

*To assess* if these changes are the final results of efficient adaptation of productive structures to demand dynamic I built two models of specialization, one *in terms of internal demand* and the other in terms of *external demand*.

Changing patterns of regional specialization, has assumed that *in terms of internal demand* the increasing of the comparative advantages or decreasing of disadvantages and *in terms of external*

*demand* the decreasing of their advantages and turns in disadvantages for all products. Which would mean that regional production structures are competitive for internal market - they try to satisfy demand- while for the foreign markets are not sufficiently flexible and competitive in order to satisfy a growing demand.

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