STRUCTURAL STABILITY ANALYSIS OF THE ROMANIAN MANUFACTURING INDUSTRY IN THE PERIOD 1990-2017

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Abstract. *The profound changes affecting the Romanian economy after 1990 point to the usefulness of analyzing the structural stability of the Romanian industry as a driver of economic development. In this context, the present paper analyzes the structural transformation of the Romanian industry looking at the dynamics of the output of the subsectors of the manufacturing industry. The results suggest that the largest structural changes took place in two distinct periods, one represented by the transition to a market economy, after 1990 and the second period marked by Romania's accession to the European Union in 2007. The extent to which the manufacturing industry was affected by structural changes is also reflected by the results of the Dickey-Fuller unit root test indicating that 7 of the 10 subsectors analyzed are non-stationary in levels.*

Keywords: *structural changes, manufacturing industry, Dickey-Fuller unit root test.*

1. Introduction

The analyze of the ideal case of a single sector economy or an economy characterized by a small number of sectors Kuznets (1973) suggest that economic growth is mainly driven by productivity growth in the economy as a whole. However, the reallocation of production factors between different sectors of the economy plays an important role in optimizing the use of resource (Matsuyama 2008, Ray 2010), while at the same time indicating one of the fundamental mechanisms of structural change.

The existence of market rigidities affects the flexibility with which the production factors reallocate between the sectors. The effect of the reallocation can be seen at the level of production of the sectors and sub-sectors of the economy. In this respect, the change in the share of sectorial

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output in the aggregated output is an appropriate indicator to capture structural transformations. Given this, the paper analyzes the historical evolution of these shares for 10 subsectors of the manufacturing industry.

2. Structural stability of the Romanian manufacturing sector in the period 1990-2017

The historical evolution of the Romanian industry after 1990 suggests the possible presence of structural changes at the level of the manufacturing industry. How extensive are these structural changes? How can these structural changes provide relevant information for modeling the structural evolution at the sectoral level?

The identification of the degree to which the evolution of the subsectors reflects the structural changes and not the positive or negative impact of the evolution of the manufacturing industry as a whole depends on the process of reallocating the resources in the direction of the more competitive subsectors.

Given this we have calculated wsy_i as described below:

$$wsy_i = \frac{Y_i}{Y} . \qquad (1)$$

Where Y represent the manufacturing industry output, and Yi the subsectors output

The sectoral structural weights were calculated for a number of 10 subsectors, as follows: (1) Manufacture of food products; beverages and tobacco products; (2) Manufacture of textiles and related products; (3) Manufacture of wood, paper, printing and reproduction; (4) Manufacture of coke and refined petroleum products; (5) Manufacture of chemicals and chemical products; (6) Manufacture of rubber and plastic products and other non-metallic mineral products; (7) Manufacture of basic metals and fabricated metal products, except machinery and equipment; (8) Manufacture of computer, electronic and optical products; (9) Manufacture of machinery and equipment n.e.c.; (10) Manufacture of furniture; other manufacturing. The gross added value of the selected subsectors represents over 80% of the gross added value in the manufacturing industry, indicating that the selection of the subsector is significant.

The most pronounced dynamics of structural changes were recorded (see Figure 1) in the case of two subsectors: Manufacture of basic metals

and fabricated metal products, except machinery and equipment and Manufacture of machinery and equipment n.e.c.

The analysis of Figure 1 also indicates that the largest structural changes occurred in two distinct periods. The first period is represented by the transition to a market economy, after 1990. The second period is marked by Romania's accession to the European Union in 2007.

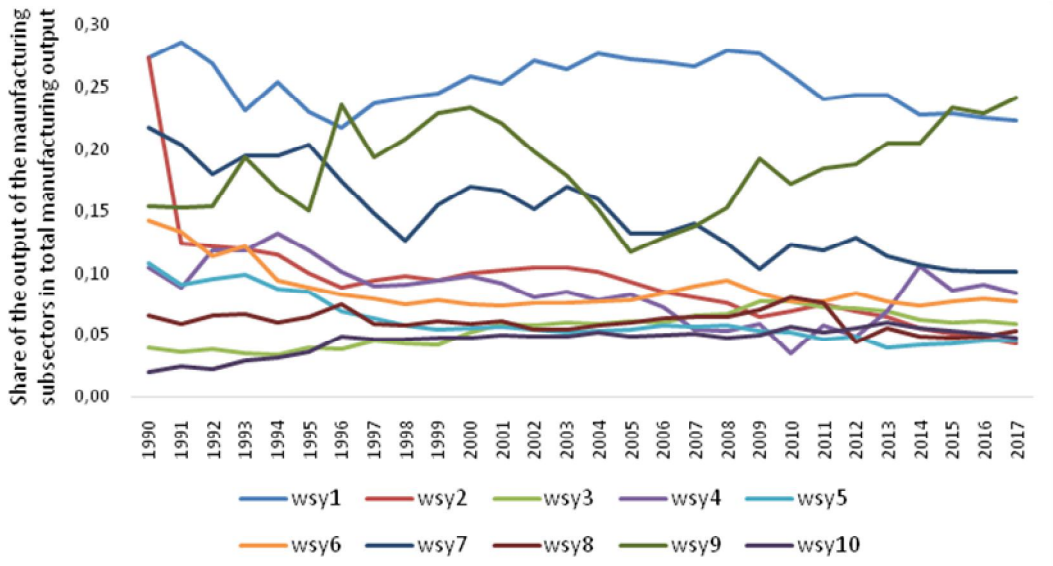

Figure 1. Structural evolution of the manufacturing industry.

Source: Own calculations based on data from the National Institute of Statistics and Eurostat

Note: wsy1 – wsy10 indicates the weight of the 10 subsectors analyzed in the order presented above

The positive evolution of the subsector Manufacture of machinery and equipment n.e.c. reflects the successful privatization, especially in the case of Dacia, which in turn generated positive and visible effects at the level of the subsector. The phenomenon indicates the important role of investments in particular foreign direct investments. The positive effect is not only manifested at the level of technological changes and subsequent increases in productivity, but also from the perspective of introducing efficient management and best practices found at European and international level. This has allowed a sustainable growth of production at company and sectoral level.

The dynamics of structural changes is also correlated with the complexity of the products exported by the analyzed subsectors. The

growth in complexity of the economy is also affecting the intersectoral relations which in turn is reflected in the dynamics of internal and external demand (Jackson et al. 1989, Prasad, 1997). This leads to an increased production of some industrial subsectors, as well as an output contraction of other subsectors. If we compare the complexity of the products exported by the main subsectors of the Romanian manufacturing industry, in 1990 and 2017 respectively, we observe the increase in complexity of the Romanian exports. At the level of 1990, Manufacture of textiles and related products mainly exported footwear, the 566th place out of 773 products in the classification of exported products complexity, responsible for 2.3% of Romania's exports (Observatory of Economic Complexity 2018). At the level of 2017, the subsector Manufacture of machinery and equipment n.e.c., mainly exported specific components for cars, the 167th place out of 1238 products in the classification of the complexity of the exported products, responsible for 9.7% of Romania's exports. The increase of the export complexity is also visible at the aggregate level, indicating the increase of the competitiveness of the national economy, especially after 2004. However, we can observe the competitiveness deficit of Romania compared to the main trading partners.

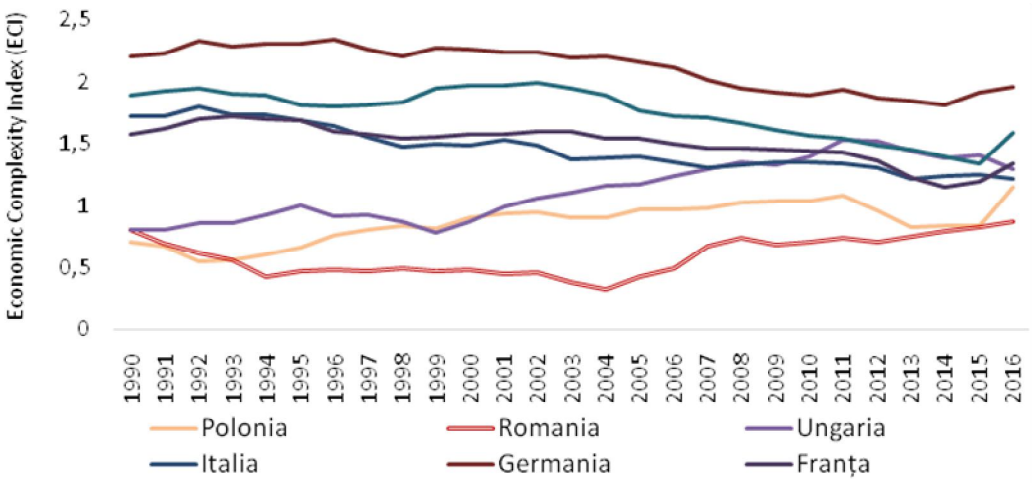

Figure 2. Evolution of the complexity of Romania's exports, compared to the main trading partners.

Source: Observatory of Economic Complexity (2018).

The Dickey-Fuller unit root test was applied for the 10 analyzed subsectors of the manufacturing industry so to have a rigorous imagine of their structural stability.

Table 1.
Testing the structural stability of the subsectors of the manufacturing industry. The results of the unit root econometric test.

Sector	Dickey-Fuller test (ADF)			
	Levels		First order differences	
	t Statistic	Probability	t Statistic	Probability
Manufacture of food products; beverages and tobacco products	–1.79	0.37	–6.11	0.00
Manufacture of textiles and related products	0.58	0.99	–4.67	0.00
Manufacture of wood, paper, printing and reproduction	–0.67	0.84	-4.92	0.00
Manufacture of coke and refined petroleum products	–1.82	0.36	–6.24	0.00
Manufacture of chemicals and chemical products*	–3.45	0.02	–6.45	0.00
Manufacture of rubber and plastic products and other non-metallic mineral products*	–4.44	0.00	–3.58	0.01
Manufacture of basic metals and fabricated metal products, except machinery and equipment	–1.18	0.67	–5.45	0.00
Manufacture of computer, electronic and optical products	–2.82	0.07	–6.12	0.00
Manufacture of machinery and equipment n.e.c..	–1.84	0.35	–6.31	0.00
Manufacture of furniture; other manufacturing*	–3.06	0.04	–2.07	0.27

Source: Own calculations.

Note: * Stationary in levels, ** Stationary in first order differences. All tests were performed by including in the regression equations the constant, except for Manufacture of furniture; other manufacturing for which no exogenous variable was included.

The results (see Table 1) indicate that 7 out of the 10 analyzed subsectors are non-stationary in levels, suggesting the presence of structural changes. The cases in which the structural changes were identified classify in two categories: (1) the subsectors that registered a strong output contraction after 1990; and (2) the subsectors that registered a significant increase in output reflecting important changes in the

international demand for their products or the presence at the level of the subsector of some companies that were successfully privatized.

3. Conclusions

The analysis of the structural stability of the 10 subsectors of the manufacturing industry suggests several conclusions.

Firstly, the largest structural changes occurred in two distinct periods. The first period is represented by the transition to a market economy, after 1990. The second period is marked by Romania's accession to the European Union in 2007.

Secondly, the dynamics of structural changes is also correlated with the complexity of the products exported by the analyzed subsectors. The growth in complexity of the economy is also affecting the intersectoral relations which in turn is manifested in the dynamics of internal and external demand.

Thirdly, the extent of the structural changes in the manufacturing industry is reflected in the results of the Dickey-Fuller unit root test. In this vain, 7 of the 10 analyzed subsectors are non-stationary in levels.

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