The Slovakian Forest-Based Sector in the Context of Globalization

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This paper investigates the impact of the global economy on the forest-based sector in Slovakia in the early years of the 21st century. Indicators such as gross domestic product, production value of forestry-wood sectors, net exports, foreign direct investments, and the ratio indices of foreign direct investment to GDP in industrial production and foreign direct investment to production value were used to analyze this sector in the context of globalization. Multiple regression analysis was used to determine the factors that significantly affect the development of the forest-based sector and to shed light on how globalization impacts the analyzed sector. The results showed that the forest-based sector had a minor impact of the Slovak economy with less than 5% share on the whole GDP. Using multiple regression analysis it was found that globalization factors such as foreign direct investment and net export did not have a significant influence ($p > 0.44175$) on the forest-based sector during the investigated period. Nevertheless, the highest globalization indicators were detected by the pulp and paper industry ($\bar{x}$ = 2.72; 29.14) and the furniture manufacturing ($\bar{x}$ = 1.60; 27.57). The highest variability of FDI was identified in the forest sector (v_x = 72.38%; 67.32%) by influence of zero FDI in the last three years and in the wood industry (v_x = 38.90%; 38.51%).

Keywords: Globalization; Economics; Forest-based sector; Macroeconomic indicators

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INTRODUCTION

Globalization is a spontaneous and undirected process of integration of countries into a single economic system (De Nicolo and Juvelar 2014). Bhagwati (2004) presents globalization as a theory of global economic growth, where the development of advanced countries causes an increase in the standard of living, resulting in poverty reduction in developing countries. Šestáková *et al*. (1999), Mayer-Foulkes (2015), and Min and Smyth (2014) confirmed that globalization relates to an increasing internationalization of markets for products and services, financial markets, financial systems, corporations and industries, technology, and competition. However, globalization involves more than economic activities; it influences transnational and transcultural integration (Stone 2003). Norback and Persson (2014) argue that capital movement liberalization and the deregulation of financial services opens markets for trade and investment. The resulting increase in international competitiveness and the development of information and communication technologies contribute to the process of globalization.

McMillan *et al*. (2014) found that governments play an important role in the globalization process, which takes place through the integration of countries through international groups and organizations, such as the General Agreement on Tariffs and Trade (GATT), the World Trade Organization (WTO), the International Monetary Fund (IMF), and the Organization for Economic Cooperation and Development (OECD).

The impact of globalization on the global economy can be defined through its features: the creation of strong regional associations, the growth of economic power of multinational corporations, the creation of economies with modern communication networks, the versatile use of human creativity, the proportional relationship between the ability to transform information into knowledge, and the competitiveness of the economy (Dreher 2006; Dreher *et al.* 2008; Potrafke 2015). As Paschalis-Jakubowicz (2010b) indicates, the impact of economic globalization on forestry and related industries is inconsistent, as there is evidence that the impact of globalization may be both positive and negative (Meller 2013).

As defined by the European Commission, the forest-based sector includes the upstream forest resource and ancillary forestry activities as well as the downstream forest-based industries (EC 2013). Serious consequences for forestry enterprises are evident in highly forested countries, where forest management is very important (Paschalis-Jakubowicz 2010a). One of the major impacts is the migration of sawmills, pulp, paper, and wood industries away from the sites where these factories have had an important role in local development (Birdsey and Pan 2015). Choi and Schellhase (2015) argue that applying the criteria of rationalization and competitive advantages can disrupt local and regional economies, leading to market collapse. This relationship, generally called "the chain of wood," can block the local benefits of globally connected markets based on supply and demand (Parobek *et. al* 2014), leading to the loss of livelihoods in whole regions that are currently adapted for forestry. The competitiveness of indigenous raw materials has declined, especially in developed countries that have high standards of sustainable forest management. For consumers, the benefits of globalization are derived from global supply flows. This fact has far-reaching consequences for forests, the environment, and employment (Paschalis-Jakubowicz 2010c).

Globalization brings new challenges that were reviewed by Bond and O'Byrne (2014), Klieštik and Cúg (2015), Vavrová (2014), and Závadský and Závadská (2014). Dreher *et al.* (2008) stated that there are new demands on statistics and indicators designed to help governments and companies to evaluate development processes and design appropriate policies. The level of globalization can be measured in different ways, as established by Chang *et al.* (2015), Dreher (2006), Menzie and Ito (2006, 2008), Dreher *et al.* (2008), Gurgul and Lach (2014), and Potrafke (2015). Most often, globalization is measured using the KOF index of globalization from the Swiss Federal Institute of Technology Zurich (Dreher 2006; Dreher *et al.* 2008; ETH 2014). The KOF index includes economic, social, and political dimensions of globalization. The three dimensions of the KOF index are defined by the methodology of ETH (2014). The overall level of globalization is calculated by a weighted average of the values of economic, social, and political globalization. The most recent assessments were published on March 5, 2015 by the Swiss Federal Institute of Technology Zurich and included an analysis of 207 countries in the year 2012. Slovakia took 17th place within the overall globalisation ranking which includes 207 countries (ETH 2015). Based on previous literature, it can be stated that the

given research work has focused on the globalization assessment mostly at the national level and only partially at the level of individual industries within the national economy. In this regard, the present work analyzes the forest-based sector in context of the globalization by selected globalization factors.

EXPERIMENTAL

The research methodology consisted of three phases. In the first phase, methods of summary, synthesis, and analysis of the field were used, and a short review of forest-based sector development was prepared. In the second phase, the relevant data characterizing the forest-based sector of Slovakia were collected. The results were evaluated in the third phase using descriptive and statistical methods, with emphasis on multiple regression analysis. The goal of this approach was to reveal main factors affecting the evolution of the forest-based sector and how globalization impacts the analyzed sector.

Data Collection

Data were drawn from the Statistical Office of the European Union (EUROSTAT), the Statistical Division of the United Nations Food and Agriculture Organization (FAOSTAT), the Slovak Statistical Office (SSO), and the National Bank of Slovakia (NBS).

The Statistical Classification of Economic Activities in the European Community (NACE) was used to separate out the different activities of the forestry-wood sector (EUROSTAT 2015b). This classification has been used by the European Union since 1970 and it is divided into sections A through U. Forestry and logging are included in "Section A - Agriculture, Forestry, and Fishing." The manufacture of wood and paper is described in "Section C - Manufacturing."

The integration of various groups in forestry and logging in Slovakia is in accordance with the NACE 02 classification and includes 02.1, "Silviculture and other forestry activities," and 02.2, "Logging." For the timber industry, NACE 16 includes 16.1, "Sawmilling and planning of wood," and 16.2, "Manufacture of products of wood, cork, straw and plaiting materials." The manufacture of pulp, paper, paperboard, and the production of paper and paperboard, is included in NACE 17, and are divided into two groups, 17.1, "Manufacture of pulp, paper and paperboard," and 17.2, "Manufacture of articles of paper and paperboard." NACE 31 includes only one group, 31.0, "Manufacture of furniture."

Used Indicators

The following indicators were selected to evaluate the impact of the global economy on the forest-based sector: gross domestic product (GDP); production value of forestry-wood sectors; net exports, foreign direct investments (FDI); and the ratio indices FDI to GDP in industrial production and FDI to production value.

GDP is the key macroeconomic indicator for the evaluation of the development and performance of an economy (Zimková and Úradníček 2004), and it is expressed as:

$$\text{GDP} = C + S + I + E_{\text{N}} \quad (1)$$

where C is the consumption (in €), S are savings (in €), I are investments, and E_N is net exports (in €).

Ho (2012) argued that the openness of the economy can be analysed on the basis of the net exports, foreign direct investment, and the share of foreign direct investment in GDP. Pekarskienea and Susnieneb (2015) presented that FDI is one of the driving forces of globalization in a small open country, in the present case Slovakia. As already mentioned, foreign direct investments and net exports were used as indicators of globalization. The FDI indicators provide information about international investment activities in the form of equity investments, related loans, and losses arising from invested capital. The OECD definition of FDI is in accordance with that of the Statistical Office of the European Union (EUROSTAT) and the International Monetary Fund (IMF). The National Bank of Slovakia defines FDI as follows:

$$\text{FDI} = \text{Capital} + \text{Reinvested Profit} + \text{Other Capital} \quad (2)$$

Equity (share) capital includes non-resident deposits in basic (share and equity) capital. Reinvested profit is directly proportional to the investor's share (direct equity participation) of profit distributed as dividends. Other capital includes those received and provided as loans, including debt securities and supplier loans, between direct investors and their affiliated companies, or between other companies in their group. These loan relationships are captured in intercompany claims and obligations (NBS 2015).

Net export is the difference between the amount of products that are exported, or shipped out of the country, and the amount imported, or shipped into the country. It is calculated as (Zimková and Úradníček 2004):

$$\text{Net Exports} = \text{Exports} - \text{Imports} \quad (3)$$

According Jelacic and Bicanic (2010) the ratio indices of foreign direct investment to gross domestic product in industrial production (I_X) is calculated as:

$$I_X = \text{FDI} / \text{GDP in industrial production} \quad (4)$$

Indicator foreign direct investment to production value (I_Y) is calculated as (Merkova *et al.* 2012):

$$(I_Y) = \text{FDI} / \text{production} \quad (5)$$

From the above mentioned indicators (I_X and I_Y), the variation coefficient and the arithmetic mean were subsequently calculated.

Variation coefficient (v_x) is a standardized measure of dispersion of a probability distribution or frequency distribution. It is often expressed as a percentage, and is defined as the ratio of the standard deviation s_x to the mean $\bar{x}$ (Everitt 1998). The meaning of the variation coefficient in relation to the influence of the globalization indicators presents the continual proportion where *e.g.* the higher rate of variation coefficient by globalization indicator the higher level of instability of FDI into the given industry.

The arithmetic mean ($\bar{x}$) is the sum of a collection of numbers divided by the number of numbers in the collection (Miles and Shevlin 2006). This indicator was used to compare individual industries of forest-based sector according the ratio indicators of the globalization.

Methods of the Research Evaluation

The data were evaluated based on descriptive, graphical, and statistical analyses. The multiple regression analysis (McClave, Benson and Sincich 2001; Miles and Shevlin 2006; Hair *et al* 2007) was used to determine the significant factors that affect the evolution of forest-based sector and from which it was concluded, how the globalization impact the analyzed sector. Statistical analysis and graphical presentations were done using the statistical software Statistics 10.0.

Inputs to the multiple regression for investigation of the impact of globalization on forest-based sector consists of production of forest-based sector (dependent variable), foreign direct investment, and net exports of forest-based sector (independent variables). The influence on the forest-based sector was investigated by the multiple regression method. The influence significance of the globalization factors (foreign direct investments and net export of forest-based sector) on the production of forest-based sector was the presumption for setting up a hypothesis. The general formula of multiple regression is as follows (Hair *et al* 2007),

$$Y = b_0 + b_1X_1 + b_2X_2 \quad (6)$$

where Y is production of the forest-based sector (mill. €), X_1 is FDI of forest-based sector (mill. €), and X_2 presents the net exports (mill. €). The multicollinearity of independent variables X was assessed by the VIF coefficient (Variance Inflation Factor).

All of the results are presented as point estimates with their associated 95% confidence intervals. Statistical significance is defined by the associated p-value. When the values of p are in the interval $0.01 < p \leq 0.05$ then the differences are "significant" (95.0%). If $p > 0.05$ then the difference is "non-significant" (90.0%).

RESULTS AND DISCUSSION

The inquiry results follow the position of the forest-based sector (FBS) within the Slovak national economy, development of the FBS globalization indicators, and significance assessment of the influence of globalization indices on the FBS production during the research period 2005 to 2012.

Table 1 shows the development of the share of the forest-based sector industries on the GPD of the Slovak Republic during the investigated period. Paper and pulp industry reached the highest average share (1.80%) of the forest-based sector, followed by the wood industry with 1.21%. Forestry took the lowest average value with only 0.74%. However, the total share of the forest-based sector production on the overall GDP of the country presented on average less than 5% during the given period. Following these first inquiry results it can be stated that the forest-based sector had a minor impact on the Slovak economy.

Table 1. Share of the Forest-Based Sector (FBS) Industries on the GDP of the Slovak Republic

Share of the FBS [%] / Year	2005	2006	2007	2008	2009	2010	2011	2012	$\bar{x}$
Forestry	0.90	0.79	0.80	0.73	0.59	0.68	0.73	0.68	*0.74*
Wood Industry	1.08	1.16	1.14	1.14	0.90	1.78	1.35	1.13	*1.21*
Paper and Pulp Industry	1.76	1.80	1.87	1.84	1.78	1.78	1.72	1.82	*1.80*
Furniture Industry	1.42	1.27	1.46	1.05	0.93	1.01	0.99	0.96	*1.14*
Forest-based sector (total)	3.75	5.03	5.28	4.75	4.21	5.24	4.79	4.58	*4.88*

Further, the GDP development of the country was compared with the index of the production development of the FBS and globalization indicators, *i.e.* net export and FDI in FBS (Fig. 1).

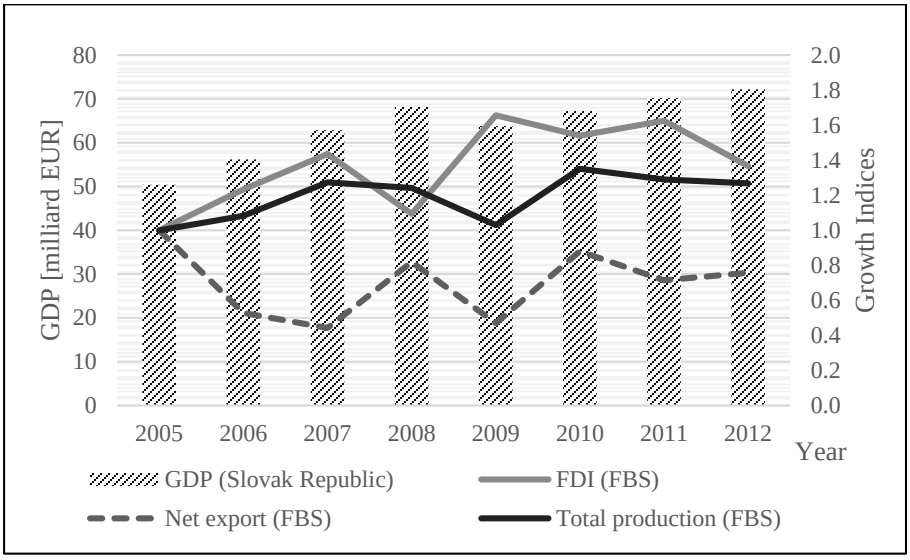

Fig. 1. Comparison of the GDP total with the indices of the production, FDI and net export of the forest-based sector in the Slovak Republic (2005 presents the base year)

The GDP development exhibited a growing linear trend (R^2=0.83) with average growing index 1.31 (base year 2005). This trend was revealed also in the average growth of FBS in amount of 1.22. However, the average growth index of the net export (0.66) as well as the average growth index of FDI (1.42) were likely not reflected in the final FBS production. To be more concrete, *e.g.* the FDI in the FBS grew about 51% from 2008 to 2009. On the other hand, production growth of FBS decreased about 17% in the same time span. The same example presents a rapid decline of net exports by 66% which was confirmed by the growth of FBS production in the amount of 27% in the period 2005-2007. Because of these facts, the influence of other factors on the FBS can be assumed. The approval and implementation of the strategic goals for the necessity of increasing the share of timber processing in the national conditions by the year 2010 is one of the important factors (State program of the use of national resources and raw materials of the Slovak

Republic, 2002). This measure was approved by reason of a high export share of raw timber in amount of 25%. The goal of this state program was to increase the low finalization and value added of wood products, as well as the number of working places mostly in the country and regions with high unemployment rate a to use potential possibilities for generation of GDP. These strategic steps were reflected in the reduction of the net export mentioned in the period 2005 to 2007. The influence of the global economic crisis (2008 to 2009), or more precisely influence of derived demand on products and services that caused the decline of the GDP, as well as the FBS production and decrease of net export was another significant factor. However, the economic crisis did not influence FDI into the FBS, which increased by a mentioned 51% from 2008 to 2009.

Based on the stated findings, it was hypothesized that the globalization factors (FDI and Net export) had no significant impact on the forest-based sector. Using the multiple regression analysis it was found out that indicators including FDI and net export had no significant influence ($p > 0.44175$) on FBS production during the investigated period by satisfying the condition of non-correlation of independent variables (coefficient VIF = 0.76). Herewith the null hypothesis was not rejected.

Nevertheless, the influence of globalization on the forest-based sector was also characterized by two ratio indicators, which are presented in Tables 2 and 3.

Table 2. Share of FDI in the Forest-based Sector Industries on the GDP of the Industrial Production

Indicator of Globalization [%] / Year	2005	2006	2007	2008	2009	2010	2011	2012	$\bar{x}$	v_x
FDI Forestry / GDP in industrial production	0.05	0.05	0.05	0.03	0.03	0.00	0.00	0.00	*0.03*	*72.38*
FDI WI / GDP in industrial production	0.65	0.93	0.87	1.33	2.25	1.71	1.71	1.42	*1.36*	*38.90*
FDI PPI / GDP in industrial production	2.11	2.58	2.77	0.79	4.42	3.24	3.15	2.66	*2.72*	*37.99*
FDI FM / GDP in industrial production	2.09	1.79	1.91	1.93	1.58	1.23	1.31	0.99	*1.60*	*24.36*

WI, wood industry; FM, furniture manufacturing; PPI, pulp and paper industry

According to assessment of the globalization indicator based on the share of FDI in the forest-based sector industries on the GDP of the industrial production (Table 2), it can be stated that the following were the highest values of globalization that were reached in the pulp and paper industry ($\bar{x}$ = 2.72) and furniture manufacturing ($\bar{x}$ = 1.60). On the other hand, the highest variability of FDI was identified by the forestry sector (v_x = 72.38%) due to zero FDI values in the last three years. Ignoring this fact, the highest variability of FDI was found in the wood industry (v_x = 38.90%). In general, FBS reached a high rate of variation coefficient (v_x = 43.40 %) during the investigated period. As Merkova and Drabek (2010), Merkova *et al.* (2012), and Merkova *et al.* (2015) concluded, the evidence of this situation can consist of turbulent development on the global market in relation to the forest-based sector, and unstable foreign trade policy of the whole country as well as of the investigated sector, *etc*.

The evaluation of the globalization indicator following the share of FDI in the forest-based sector industries on their production (Table 3) shows on growing trend of the influence of the globalization on wood industry and pulp and paper industry by the year 2009 and forestry and furniture manufacturing industries by 2008. After 2009, the FDI declined in all industries of FBS.

Table 3. Share of FDI in the Forest-Based Sector Industries on their Production

Indicator of Globalization [%] / Year	2005	2006	2007	2008	2009	2010	2011	2012	$\bar{x}$	v_x
FDI Forestry / Forestry production	1.09	1.24	1.28	0.92	0.78	0.00	0.00	0.00	*0.85*	*67.32*
FDI WI / WI production	12.52	16.99	16.00	23.56	40.06	18.40	24.41	24.13	*22.01*	*38.51*
FDI PPI / PPI production	24.96	30.27	31.06	8.74	40.04	34.69	35.25	28.15	*29.14*	*32.46*
FDI FM/ FI production	30.60	29.61	27.31	37.08	27.39	23.22	25.56	19.78	*27.57*	*18.78*

The following were the highest globalization indicators achieved for the pulp and paper industry ($\bar{x}$ = 29.14) and furniture manufacturing ($\bar{x}$ = 27.57) during the investigated period. The results of the variation coefficient referred the same fact as the first globalization indicator (FDI on GDP in industrial production). The highest variability of FDI was identified in forestry (v_x = 67.32%) by influence of zero FDI in the last three years and in wood industry (v_x = 38.51%). In general, FBS reached high rate of variation coefficient (v_x = 39.26%) during investigated period.

These results are supported by the findings of Merková, Drábek and Jelačić (2011) and Sujova *et al*. (2015), who found that the average growth of both indicators means that the globalization rate of forest-based sectors increased in the wood industry, especially in the pulp and paper industry. In contrast, furniture manufacturing slightly decreased its rate of globalization according to both indicators in the last year. However, low to zero FDI led to a rapid fall in the globalization rate of the forestry sector, which confirmed the findings of Hajdúchová and Hlaváčková (2014).

CONCLUSIONS

1. Using the multiple regression analysis, it was found that globalization factors including FDI and net export had no statistically significant influence ($p > 0.44175$) on the forest-based sector (FBS) during the investigated period. Nevertheless, the highest globalization indicators were detected for the pulp and paper industry ($\bar{x}$ = 2.72; 29.14) and the furniture manufacturing ($\bar{x}$ = 1.60; 27.57), which is in agreement with the entrance of foreign companies in these two industries in the given time period. On the other hand, the FBS was characterized by high level of instability of FDI (v_x = 43.40%) during the research period, especially in the forestry (v_x = 72.38%; 67.32%) due to zero

FDI in the last three years and in the wood industry (v_x = 38.90%; 38.51 %). The reasons behind this can be attributed to turbulent development on the global market in relation to the forest-based sector, and unstable foreign trade policy of the whole country as well as of the investigated sector, etc.

2. Following the share of FBS (less than 5%) on the whole GDP for a given time period, it can be concluded that the forest-based sector had a minor impact on the Slovak economy. Comparing the individual industries of the FBS, the paper and pulp industry (1.80%) and the wood industry (1.21%) reached the highest average share on the whole GDP of the Slovak Republic. Development of the GDP in the Slovak Republic had a linear growth (R^2=0.83). However, the growth indices of the globalization factors (FDI and next export) in relation to production in the forest-based sector exhibited asymmetrical development.
3. The influence of the globalization on the instability rate of FDI in the FBS was confirmed by the share of FDI in the forest-based sector industries on their production. Significant decline of FDI in the FBS after 2009 was the consequence of the global financial crisis or derived demand for the wood products.
4. The analysis suggests that Slovakia should focus particularly on higher value-added products, which could be achieved by the complex utilization of wood raw materials. This effort would improve the contributions of the forestry and timber industries to regional development. In addition, wood-processing should strive to increase its competitiveness by implementing modern management methods, using new technologies, or concentrating production on a larger scale. There is also a need for optimal solutions that reflect the principles of sustainable development.

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