THE IMPACT OF PRODUCTION FACTORS AND ECONOMIC STRUCTURES ON ECONOMIC DEVELOPMENT

Manuela Tvaronavičienė[1], Toma Lankauskienė[2]

Vilnius Gediminas Technical University, Saulėtekio al. 11, LT-10223 Vilnius, Lithuania
E-mail: [1]manuela@vgtu.lt; [2]toma.lankauskiene@gmail.com (corresponding author)

Abstract. The research area of economic growth has passed a long history. Studies on the origin of economic growth date back to the 18th century. Contemporary scientific literature also debates different issues of economy. The presented paper reviews the genesis of the most significant groups of theories about economical growth. The ultimate aim of the presented investigation is to identify the role of economic structures in the process of sustainable development. Hence, following an overview of the main theories of economic development and highlighting a niche of changes in economic structures, the paper focuses on the approaches towards driving forces for changing economical structures. The article also raises a hypothesis about the transformation of production factors that first affect economic growth and then economic structures. It is supposed that the countries having a different level of development, may experience different effect caused by the impact of similar selected driving forces of economic growth, which, in turn, differently restructure national economies.

Keywords: economic growth, production factors of sustainable development, sectors of economy, economic structures.

JEL Classification: O10;O14;040

GAMYBOS VEIKSNIŲ IR EKONOMIKOS STRUKTŪRŲ ĮTAKA EKONOMINIAM VYSTYMUISI

Manuela Tvaronavičienė[1], Toma Lankauskienė[2]

Vilniaus Gedimino technikos universitetas, Saulėtekio al. 11, LT-10223 Vilnius, Lietuva
El. paštas: [1]manuela@vgtu.lt; [2]toma.lankauskiene@gmail.com

Santrauka. Ekonominio augimo kaip tyrimo srities istorija ilga. Ekonominio augimo studijų genezė siekia XVIII amžių, diskusijos tęsiasi ir šiuolaikinėje mokslinėje literatūroje. Šiame straipsnyje apžvelgiamos pačios svarbiausios ekonominio augimo teorijų grupės. Pagrindinis tyrimo tikslas – identifikuoti ekonominių struktūrų vaidmenį darnaus vystymosi procese. Po pagrindinių ekonomikos vystymosi teorijų genezės analizės, išryškinant ekonomikos struktūrų kaitos nišą, imamės ekonomikos struktūrų kaitą veikiančių veiksnių požiūrių apžvalgos. Iškeliame hipotezę, kad transformuodamiesi gamybos veiksniai pirmiausia paveikia ekonomines struktūras, o tik tada ekonominį augimą. Skirtingai išsivysčiusios šalys, manytina, patiria skirtingą poveikį, sukeltą tų pačių ekonominį augimą skatinančių veiksnių, kurie savo ruožtu skirtingai restruktūrizuoja šalių ekonomikas.

Reikšminiai žodžiai: ekonominis augimas, darnaus vystymosi gamybos veiksniai, ekonomikos sektoriai, ekonomikos struktūros.

Introduction. Sustainable economic growth: emphasis on driving Forces and a mode of economic growth

The scientists investigating economic growth devote close attention to production factors affecting the development of national economies (e.g. Bond *et al.* 2010; Sarkar 2007; Briec, Cavaignac 2007; Kosempel 2004) and focus on fluctuations in the sectors of economy (e.g. Jaimovich 2011; Halkos, Tzeremes 2008; Tanuwidjaja, Thangavelu 2007; Sonobe *et al.* 2004). An ongoing discussion generates how different factors affect economic growth, sustainable development and transformation of separate sectors of the taken economies (e.g. Karnitis 2011; Grybaite 2011; Stańczyk 2011; Korsakiene *et al.* 2011; Balkyte, Tvaronaviciene 2011; Tvaronaviciene, Lankauskiene 2011; Tvaronaviciene 2012; Tvaronaviciene, Grybaite 2012; Kaźmierczyk 2012). Since the variety of approaches and theories coexist, have a look at the genesis of the main theories to identify the interrelation of economic growth (partly sustainable development), production factors and economic structures. Economic growth is unanimously measured by percentage change in GDP or GNI per capita from one year to another. Economic development acquires an additional dimension specifically necessary to sustain the standard of living through changing driving forces and a mode of economic growth. To put in other words, economies raising their GDP or GNI per capita through exploiting their national natural resources are not considered as sustainably growing. Sustainable economic growth nowadays is associated with an increase in living standards through economic progress, the development of knowledge based and innovation susceptible sectors, but not with exploiting nonrenewable natural resources, which as a rule, are controlled by the limited groups of societies. Hence, at present, economic growth is being analyzed in light of aims for sustainable development, despite the goal of economic development remains the enlargement of asset creation speed (Clark 1990) and acceleration of competitive human well-being creation (e.g. Balkyte, Tvaronaviciene 2010; Lankauskiene, Tvaronavicienė 2011). It can be claimed that difference between economic growth and sustainable economic development lies in an adopted approach – purely quantitative or considering qualitative changes (e.g. Pisani, Jacobus 2006; Ciegis, Ramanauskiene 2009; Ruchi 2009; Lankauskiene, Tvaronaviciene 2012).

1. Genesis of theories about economic growth

The concept of sustainable economic growth emerged much later in comparison with the area of research on economic growth. One of the most prominent classics of economic growth theory was Adam Smith whose famous book *An Inquiry into the Nature and Causes of the Wealth of Nations* was issued in 1776. He argued that the enlargement of production rather than the trade sector would create greater wealth in the country. Market forces, named "an invisible hand of the market", are better regulators than the state (Willis 2005). Smith considered work specialization as proxy for increasing productivity. Hence, according to Smith, economic development can be related to the process of specialization and diversification of the economic sector. Later, Allyn Young (1928) wrote that "industrial differentiation was and remained the type of a change characteristically associated with the growth of production" (Lankauskiene, Tvaronaviciene 2012). Similarly, Landes (1969) claimed that the most evident effects brought about by the Industrial Revolution were an increase in the variety of products and occupations and gains in productivity (Jaimovich 2011). Another classic was David Ricardo. He introduced the concept of a "comparative advantage" of countries. According to his theory, countries should concentrate on producing and then selling goods to have advantage in producing their assets such as land, mineral resources, labour, technical or scientific expertise. Ricardo suggested that in comparison with producing everything such a way was more beneficial to national economic growth (Lankauskiene, Tvaronaviciene 2012). In 1936, the British economist John Maynard Keynes published the *General Theory of Employment, Interest and Money*. The argument put forward by Keynes was that the free market was not necessarily positive force as many who followed Adam Smith believed. Keynes explained that real investment was the key to growth, i.e. investment in new (rather than replacement) infrastructure projects. He asserted that such kind of investment would have a positive effect on job creation and further generation of wealth (Willis 2005; Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012).

It can be noticed that the state plays an important role in different approaches of economic growth. The state can even act as an interventionist having a profound impact on further development. The theory of Marxism provides the following stages of development: ancient feudalism, capitalism and socialism (Willis 2005). Another distribution of development theories is based on continental models (e.g. Lee 2006; Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012).

The following groups of growth and development theories could be suggested after a vast amount of a relevant analysis of scientific literature considering post -1945 development theories: linear stages-of-growth theories, the theories and patterns of structural changes, the international dependence revolution, the neo-classical free-market counterrevolution, the new growth theory, the unified growth theory (Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012). The above presented groups theories will be characterized below in the paper devoting more attention to the linear stages-of-growth and patterns of structural changes. Reasons for the mode of focus will be explained respectively.

2. Structural change in the theories of economic growth

One of the most known representatives of linear stages-of-growth theories is W. Rostow stating that a country has to accumulate the needed amount of savings in order for the country to take the stage of take–off as the path from underdevelopment (traditional society) to self-sustaining growth (Rostow 1960; Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012). The idea of the importance of economic sectors has been incorporated into his model. Rostow provided a traditional society (the one that has not reached the stage of self-sustaining development or even take– off stage) based on agriculture (Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012). The take-off stage included the features of technical innovation, changes in international economic development, investments and savings accumulation, a substantial manufacturing sector and appropriate institutional arrangements, e.g. a banking system. The maturity phase has to contain the extended range of technology and 10–20 percent savings of national income. The stage of development – the age of mass consumption - provided widespread consumption of durable goods and services and increased spending on welfare services. It was supposed that all advanced countries had passed the stage of "take-off into self-sustaining growth". Underdeveloped countries that were still in either the traditional society or at the "preconditions" stage had only to follow a certain set of rules of development to take off in their turn into self-sustaining economic growth (Theobald 1961; Willis 2005; Todaro, Smith 2011; Lankauskiene, Tvaronavičienė 2012). The theory of stages provided by Rostow is usually taken as "the pre-eminent theory of development through the early 1960s" (Dietz 1983; Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012). One of the principal strategies of development necessary for any take-off was the mobilization of domestic and foreign savings in order to generate sufficient investment to accelerate economic growth (Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012).

Economic mechanism by which more investment leads to more growth can be described in terms of the Harrod-Domar growth model, today often referred to as the AK model based on a linear production function. The main question elaborated by Harrod and Domar was about the circumstances under which economy could be capable to achieve steady growth. The authors viewed instability in economic growth as a result of failure to equate a "warranted" and "natural" rate of growth. The warranted rate of growth is dependent on the savings rate and given capital requirement per unit of output. The natural rate is the maximum long-run sustainable rate of growth (Ruttan 1988; Todaro, Smith 2011). To grow, economies must save and invest a certain proportion of their GDP. The more they can invest, the faster they can grow. However, the actual rate they can grow for any saving and investment is the amount of an additional output obtained from an additional unit of investment (Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012).

The structural-change theory concentrates on the process through which underdeveloped economies transform their domestic economic structures from traditional subsistence agriculture to more modern, more urbanized and more industrially diverse manufacturing and service (Todaro, Smith 2011; Lankauskiene, Tvaronavičienė 2012). W. Arthur Lewis, John Fei, Gustav Ranis (Choo 1971; Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012) are the economists associated with the elaboration of the structural-change theory.

According to, e.g. Lewis, the structure of economic sectors, especially the development of manufacturing (in terms of employment) is closely related to the process of economic growth (Lewis 1955; Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012). Other economies attributed to the stream structural-change theory also claimed that economies should shift their path from agriculture to manufacturing.

Like the earlier introduced Lewis model, the patterns of the development analysis of structural change focus on the sequential process through which the economic, industrial and institutional structure of underdeveloped economy is transformed over time to permit new industries to replace traditional agriculture as the engine of economic growth. However, in contrast to the Lewis model and the view on the original stages of development, increased savings and investment are perceived by the patterns of development analysts as necessary but not sufficient conditions for economic growth. In addition to the accumulation of capital, both physical and human, a set of interrelated changes in the economic structure of the country are required for the transition from a traditional economic system to a modern one (Todaro, Smith 2011). The major hypothesis of the structural change model is that development is an identifiable process of growth and changes the main features of which are similar in all countries. However, the model does recognize that differences can arise among countries in the pace and pattern of development, depending on their particular set of circumstances. The factors, influencing the development process include the endowment and size of national resources, governmental policies and objectives, the availability of external capital and technology and the international trade environment (Todaro, Smith 2011; Lankauskiene, Tvaronaviciene 2012).

As mentioned above, the other theories of growth can be grouped into the clusters of the international dependence revolution, the neo-classical free-market counter-revolution, the new growth theory and the unified growth theory. In the context of our paper, we only mention the

main representatives of those theories and then switch back towards production factors and economic structures. Robert Solow, the Nobel prize winner, is a famous theoretic of economic growth. Despite some criticism (e.g. Prescott, 1988; the Solow's model have become a classical example of economic growth. Solow focused on investigating the impact of the patterns of capital, labour and technology on economic development taking into account investment and capital depreciation processes (Solow 1988). Later, the theory of endogenous growth appeared (King, Rebelo 1993; Eltis 2000; This theory as well as the latest unified growth theory (Galor 2010) in principle did not indicate new driving forces of economic growth.

3. Sustainable economic growth through the lenses of economic structures: interrelation of production factors and economic structures

After the overview of the main theories about economic development we have came to the conclusion that despite the variety of economic growth theories, rather limited scope of factors affecting the development of economies are being distinguished. The theories differ in conceptual approaches towards the processes of economic growth and the role of certain factors. The list of factors, as mentioned above, is comparatively limited. As economic growth is hardly possible without parallel change in economic structures, we raise a hypothesis that factors affecting economic growth first influence economic structures. It is assumed that differently developed countries, experience different effect caused by the impact of the same selected driving forces of economic growth, which, in turn, differently restructure economic structures.

In order to verify the hypothesis, review the latest economic literature listed in the database of the Web of Sciences. In this case, we can find that a group of authors claims that an industrial structure evolves with economic development. They provide evidence indicating that since the reform and opening up of economy in 1978, China has undergone rapid economic growth and dramatic industrial restructuring with the proportion of primary, secondary and tertiary industry changed respectively from 28%, 48% and 24% of GDP in 1978 to 11%, 49% and 40% in 2008. Using panel data collected from 31 provinces for the past three decades, this paper has empirically examined the relationship between economic growth and the industrial structure. Based on the results from the unit root test, co-integration test and Granger causality test, the article concludes that two variables are order-1 integrated, short-run economic fluctuation causes the disproportion of the industrial structure while long-run bidirectional causal relationship exists between the disproportion of the industry structure and economic aggregate fluctuation. This paper has also investigated the

determinants of Chinese industrial structure and found that influential factors include per capita GDP, domestic consumption propensity, urban–rural disparity, the scale of labour force and capital stock, property right protection and administrative effectiveness (Dong *et al.* 2011).

Another paper proposes an economic model for analyzing dynamic interaction among capital accumulation, the economic structure and preference in a perfectly competitive economic system. The system consists of three sectors: agriculture, industry and service. A typical consumer's utility is dependent on the consumption of agricultural and industrial goods, services, housing and wealth. The size of the territory is given and public land ownership is assumed. The model presented in this study is influenced by the structural approach provided, for example, by Leontief, Sraffa and Pasinetti. Traditional models of neoclassical growth such as the Solow-Swan one-sector model, the Uzawa two-sector model and Ricardian models of Samuelson and Pasinetti, may be considered from a structural point of view as special cases of the model discussed in this study (Zhang 1996).

With reference to co-integration tests, another paper estimates the long-run relationship between real per capita GDP, per capita stock of physical capital, measures of financial development and financial structure (Luintel *et al.* 2008). The results are quite revealing. First, for the majority of sample countries, financial structure appears significant to explain economic growth (Luintel *et al.* 2008). The relationship between financial structure and economic development can be examined on the basis of the competing theories of financial structure and include bank-based, market-based and financial services, the law and finance. They are being briefly discussed in what follows (Luintel *et al.* 2008). A large body of empirical literature has attempted to evaluate this debate. Early studies focus on the UK and US as market-based systems versus Japan and Germany as bank-based systems (). They rigorously compare and contrast the country-specific financial structure, that is, an assortment of financial markets, instruments and intermediaries in operation, and conclude that financial structure is important for economic growth. However, Goldsmith (1969), highlighting their shortcomings, argues that these four industrialized countries have resembling real per capita income levels and historically share similar growth rates.

Consequently, it is hard to attribute their analogous growth rates to the alternative forms of either the bank-based or market-based financial system. Similarly, assert that although UK, US, Germany and Japan did experience the periods of divergent growth rates, nonetheless, "it is very difficult to draw broad conclusions about bank-based and market-based financial systems from only four countries". They argue that the empirical assessment of the role of financial structure should be based on a broad dataset that encompasses wide-ranging national experiences (Luintel

et al. 2008). The bank-based theory emphasizes a positive role of banks in development and growth and stresses the shortcomings of market-based financial systems. The theory claims that banks can finance development more effectively than markets in developing economies, and, in the case of state-owned banks, market failures can be overcome and the allocation of savings can be undertaken strategically (Luintel *et al.* 2008). By contrast, the market-based theory highlights the advantages of well-functioning markets in promoting successful economic performance, and stresses the problems of bank-based financial systems. Big, liquid and well-functioning markets foster growth and profit incentives, enhance corporate governance and facilitate risk management, diversification and customization of risk management devices (Luintel *et al.* 2008). The third theory of financial-services stresses the key financial services provided by financial systems. Financial services are crucial to creating a new firm, industrial expansion and economic growth. This theory is actually consistent with both bank-based and market-based views. Although it embraces both, it minimizes their importance in that the distinction between bank-based and market-based financial systems matters less than it was previously believed (Luintel *et al.* 2008). The standard econometric specification of growth models in cross-country studies regresses real per capita GDP growth on a number of growth determinants. Our approach is time series. Given the non-stationarity of data, the co-integrating (long-run) relationship between output, physical capital stock, financial development and financial structure are estimated. Our basic specification is (Luintel *et al.* 2008):

$$logt(Q/L)=a0+a1logt(K/L)+a2logt(FS)+a3logt(FD)+e1, \ (1)$$

where, Q is output, L is labour, K is physical capital stock, FS and FD are the measures of financial structure and financial development respectively, e1 is the error term. In empirical estimations, we use real per capita output (YP) and real per capita capital stock (KP), since consistent time series on labour force do not exist for most of our sample countries. A high value of FS means a system that is more of a market-based variety while a lower FS means more of the bank-based system (Luintel et al. 2008). Eq. (1) is an empirical model of our benchmark. From a theoretical perspective, this can be viewed as a generalized Cobb–Douglas production function where financial development and financial structure account for total factor productivity (Luintel *et al.* 2008). Our sample consists of low and middle income countries representing different stages of development and economic structures. They also share significantly different experience of growth. It is, therefore interesting to formally test if it is valid to pool the dataset of these countries. This is important not least because there is a growing concern about the panel and cross-section tests, in that they ne-

glect cross-country heterogeneity (Luintel et al. 2008). We find evidence of significant cross-country heterogeneity in the relationship between financial development, financial structure and economic growth. The tests show that data on the countries displayed in our sample cannot be pooled (Luintel et al. 2008). We also examine how the effects of financial development and financial structure change when (i) countries become economically more developed and get richer; (ii) the financial structure of countries develops and converges to that of the US; (iii) the level of the overall financial development of countries converges to that of the US. The main policy message that emanates from our analyses is that financial structure matters for economic growth (Luintel et al. 2008).

One more paper indicates that changes in social structures occurring during the process of economic growth can be considered direct consequences of this process, while other changes are caused by factors such as technological progress affecting simultaneously social structures and growth. The author focuses on that part of the circular argument that goes from growth to social structures (Bourguignon 2005). It does not consider the effect of social changes on growth. It is attempted to isolate the pure "income effect" in the evolution of social structures and to disentangle the effect of economic growth from the effect of other factors in observed changes in social structures (Bourguignon 2005). First, the nature of statistical relationships existing between social indicators and development across countries and/or across periods is being examined, further the theoretical models of the effect of economic growth on social structures with an emphasis on several dimensions of social differentiation and on economic inequality is being scrutinized. Next, the author (Bourguignon 2005) focuses on empirical evidence for supporting this structural view of the consequences of growth for social structures. The conclusion is that emphasis has to be put on the importance of sector shifts, the role of the market in integrating economy and society and the social costs of sector adjustment (Bourguignon 2005).

The following paper examines the economic implications of demographic change in the Chinese context. The equation for growth is being extended by the authors incorporating age structure dynamics and applied to data for the period 1989–2004 at Chinese provincial-level. It was found that changes in demographic structure, especially the contribution of fertility decline to lower youth dependency, have helped in fuelling economic growth in China since 1989. The effect of demographic change on income growth operates mainly through its impact on steady state income levels and the effect of age structure is more pronounced in provinces that are more open to market forces. It was also established significant feedback effect of economic growth on demographic behaviour through the mechanisms of birth rates, marriage age and life expectancy

(Wei, Hao 2010). During recent years, there has been an increasing awareness of the explanatory power of variables in the population age structure concerning regression to economic growth. A new cross-country regression model for the effects of changes in the age structure on economic growth has been estimated. The new model has been used and recent probabilistic demographic forecasts for India to derive the uncertainty of rates for predicted economic growth caused by uncertainty about demographic development (Prskawetz *et al.* 2007).

Even though the phenomenon of structural change is as old as the very problems of economic development, up to now, the term 'economics of structural change' has been practically unknown. The enormous heterogeneity of studies in this area, inherently related to the complexity of the matter, does not lend itself easily to a unified approach, and only recently there have been some attempts, e.g. by Baranzini and Scazzieri in 1990 and Landesmann and Scazzieri in 1996 (Silva, Teixeira 2008) to organize the theoretical approach in a systematic manner. Second, the terms 'structure' and 'structural change' are widely used in economic research under very different meanings which, in many cases, have no connection with 'structural change analysis' (Silva, Teixeira 2008).

As shown in Fig. 1, during the last few decades, more precisely from the *late 1980s onwards, there has been a growing interest* in structural change analysis. The rising importance of this approach is also related to the establishment, in 1990, of a new journal highly dedicated to the topic — *Structural Change and Economic Dynamics.*

Publications on the economics of structural change were analyzed in terms of eleven main topics selected on the basis of the undertaken literature review. The selected topics cover (1) development, (2) technical change and innovation, (3) convergence and growth, (4) economic fluctuations, (5) international trade, (6) employment and migrations, (7) industrial dynamics, (8) institutions and policies, (9) regional and urban economics, (10) measurement and methods, (11) environment and sustainability (Silva, Teixeira 2008).

The findings (Fig. 2) reveal that the marked rise in papers aimed at discussing structural change analysis in the more recent period is accompanied by a change in the main topics of the analysis explored. Along with 'convergence and growth' that remains the most relevant category throughout the period under study, but which has recently lost ground, there is a notable increase in 'international trade', 'technical change and innovation' and the topics of analysis the importance of which has been continuously rising and is particularly relevant in more recent years (Silva, Teixeira 2008).

The results of bibliometric research have helped in deriving a picture of the overall evolution of structural change analysis from its ancient roots (1700s–1890s) to the more recent period crossing the chronological dimension and type of research proceeded (appreciative, historical, empirical and formal). Based on the number of citations, Fig. 3 reflects the most influential contributions in the field (e.g., Pasinetti, Leontief, Goodwin, Nelson, Freeman, Dosi, Schumpeter) together with an indication of the main topics of analysis, more significant research clusters (Marxian
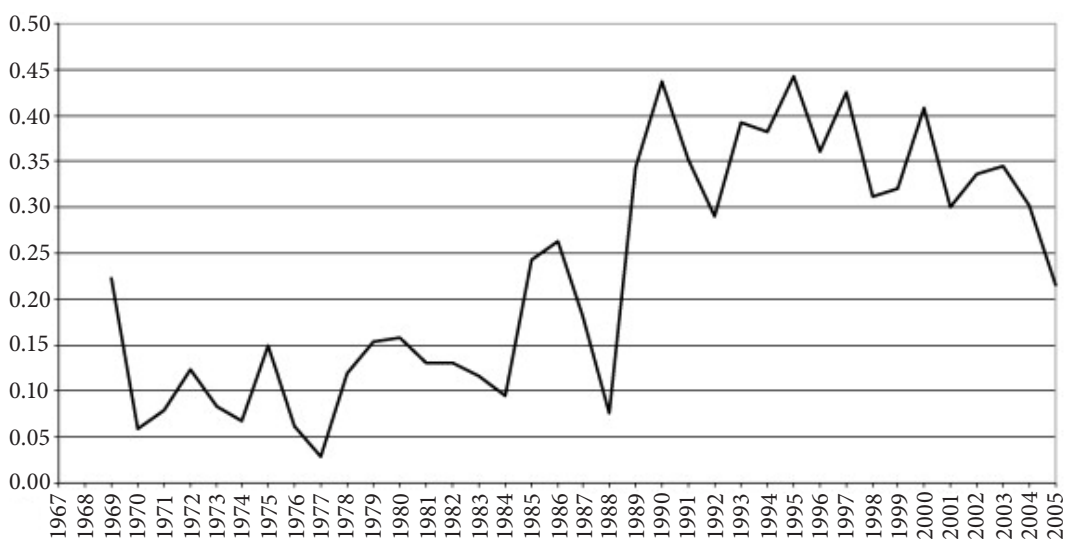

Fig. 1. The evolution of the relative weight of articles to structural change in the total articles published in Econlit, 1969–2005. Note: The line results from dividing the number of papers on structural change by the total number of papers published in each year in journals indexed in Econlit. Just as a reference, the number of papers published under the heading of 'structural change' totalled 1247 between 1969 and 2005, whereas the corresponding number for all areas is 453457 (Silva, Teixeira 2008)
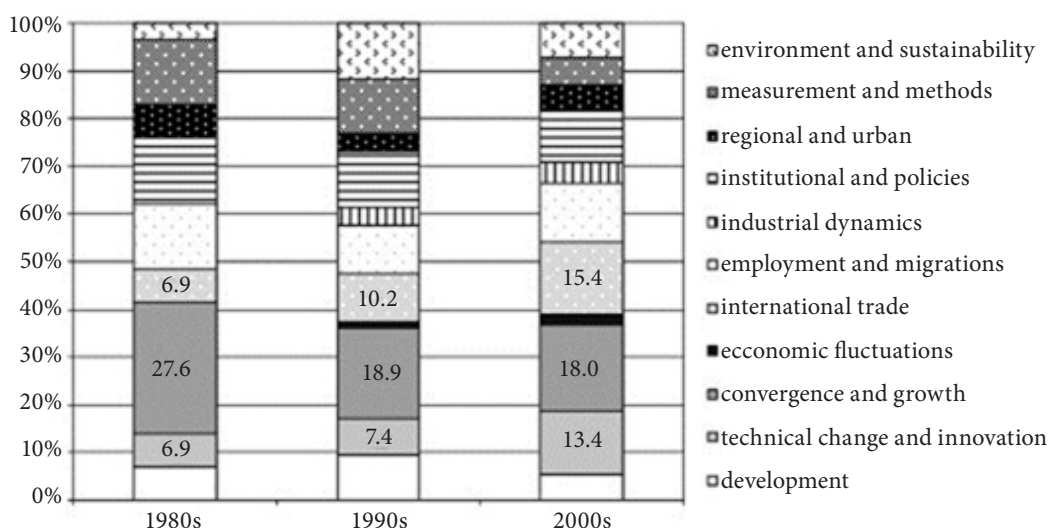
Fig. 2. The distribution (%) of papers on structural change by JEL codes. Source: Authors' own computations based on articles published in the journals collected from the Econlit database, 1969–2005 (n = 910) (Silva, Teixeira 2008)

school, new school and development, 'traverse', neo-schumpeterian and evolutionary, environment) and links among (clusters of) researchers that are further provided in the following sections. Another source presents, in addition, an illustration of the strategy designed for organizing relevant literature used in the present paper. Following a brief characterization of the earlier foundations of structural change analysis (Section 3), investigation (and discussion) into relatively separate fields of pure theoretical and applied/ historical approaches within the realm of structural change analysis is pursued (Sections 4 and 5). Then (Section 6), the analysis of a more recent period marked by a strong rise of interest in the field and a change in the main topics of research is performed (Silva, Teixeira 2008).

Both methodologies are congruent with relating the recent rise of interest in structural change analysis with an attempt to develop an alternative approach to the mainstream economic theory when analyzing the relationship between technical change and economic growth. Not only do technological issues gain increasing relevance during the period under study, but also the most influential authors/ studies can be seen as strong representatives of such a new perspective in the study of technological change. Furthermore, our analysis shows that the 1990s witnessed increasing relevance of formal work, which is in close agreement with the attempt to consolidate this new approach as an alternative to the rigorous modelling framework of neoclassical economics. Evidence concerning more recent years does not confirm this tendency, although it refers only to a half of the decade, which might reflect the strong impetus towards empirically led work prompted by the emergence of the New Economy and its impact on the overall workings of the economic system (Silva, Teixeira 2008).

Along with a relative deficit of formal work, our analysis also reveals that most contributions put great emphasis on technology-driven growth (although combined with factors such as institutional change and industry dynamics), lacking an appropriate (micro-based) treatment of the demand side. The development of a dynamic theory of demand and its connections with the formal treatment of structural and technological change seems, therefore, to constitute a highly promising avenue for future research (Silva, Teixeira 2008).

German economy is export-oriented, and therefore Germany's export is primarily based on manufacturing products. As the lion's share of exports is concentrated in only four manufacturing sectors, we have singled them out as the 'export core' and separated it from the rest. Our conjecture was that total as well as sector output and employment are differently affected by structural change in these two manufacturing subsectors where a special interest in their impact on business-related services has been taken (Franke, Kalmbach 2005). To inquire about these questions, an input–output framework has been employed by the authors. One advantage of this approach is that it allowed them to evaluate the role of technological change, at least insofar as it is represented by input–output coefficients. In addition, the influence of increasing import penetration on intermediate demand could be assessed. As a matter of fact, on the basis of the German input–output tables for 1991–2000, both factors were shown to have significant consequences for economic activity. Import penetration had generally negative effects on output while the effects of technological change were mostly positive with the notable exception of the subsector 'other manufacturing', for which it turned out to be negative (Franke, Kalmbach 2005).

Technological change had a particularly strong positive impact on business-related services. In the decomposition of the growth rates of the sector output, up to the one-third (for business-related services in a narrow sense) or even almost one half (for business-related services in a broader sense) of the growth of these subsectors could be attributed to economy-wide changes in technological input–output coefficients. This is even more astounding as they grew more than twice as fast as the total economy. As the authors have used commodity-by-commodity input–output tables, the explanation given in literature that outsourcing took place cannot be examined. The reason may therefore be found in an increasing necessity for the production of goods themselves to make the use of new and specialized services to preserve competitiveness. Closer investigation into this issue is, however, beyond the scope of the present input–output tables (Franke, Kalmbach 2005). In the second part of the paper, a series of experiments has been conducted. In the main series, the authors focused on hypothetical consequences when certain features of historical structural changes between 1991 and 2000 were assumed to be limited to one of the manufacturing subsectors while the rest of economic data maintained its base-year values. Several scenarios of such isolated structural change were considered. In the simplest, only the technological coefficients of the chosen sector are permitted to change. The other scenarios include changes in import and export shares and (simple form of) induced investment. Solving respective models for the initial and final years, differences in output and employment can, by construction, be attributed to selected variables (Franke, Kalmbach 2005). For ISC both in the export core and other manufacturing even an elementary technological scenario had a clearly positive effect on the total output. If ISC in the export core additionally takes international trade and induced investment into account, positive effects from the shares of increasing export of this sector markedly dominate negative effects from its increasing import shares. The output growth rates of business-related services more than doubled. In contrast, the same scenario for ISC in other manufacturing affects their output results from the technological scenario only very moderately; nevertheless, this outcome is still better than negative changes in most of other sectors (Franke, Kalmbach 2005). To sum up, business-related services are unambiguous winners from technological change in manufacturing industries on the one hand and from the export strength of the parts of German manufacturing on the other. Except perhaps for the sector which ISC is assumed to affect directly, they profit the most (in terms of growth rates). With respect to effects from other features of structural change in the manufacturing sector, business-related services still tend to have an advantage over the majority of other sectors. We emphasize that manufacturing is still a decisive component

of German economy. However, it is not a homogeneous sector, but regarding relative weights as well as structural change and its impact on other production sectors, it is useful to distinguish the export core from other manufacturing. Second, it is inappropriate to view the sector of services as a new growth engine. Our analysis revealed that especially the subsector that exhibited by far the highest growth over the 1990s, business-related services, is closely linked to the manufacturing sector and owes a significant portion of its positive performance to the structural change that took place in this part of economy (Franke, Kalmbach 2005).

Figure 3, presented below, shows the prospect of benchmarking industry: transition economies in 2000 and change from pre-transition. Despite the indicated percentage share of employment in industry in most of the countries, the figure shows that the share is assumed to increase along with GDP growth in transition countries during the taken period in the long perspective.

Another contemporary paper has presented a framework for benchmarking structural adjustment in transition economies. A simple model we provide allows us examining both the causes of over-industrialization in centrally planned economies and the pattern of adjustment towards market-based equilibrium during transition. We simulate two channels through which central planning may have led to over-industrialization. These two channels are the preferences of central planners for industrial goods over services and a technological handicap that slowed down the rate of growth in industrial productivity. The results of our simulations suggest that distortion in preferences probably was a more important reason for over-industrialization than the technological handicap (Raiser *et al.* 2004).

Turning to transition, the prediction of rapid deindustrialization obtained from the analytical framework is strongly borne out by evidence. Adjustment in the accession countries has by no means been faster than in the CIS. One major difference in the pattern of adjustment across the region has been changes in agricultural employment. In the richest transition countries, agriculture has shed employment during transition and is now generally smaller than would be predicted by income levels. This might be explained by a relatively high reservation wage among industrial workers due to the existence of a social safety net and relatively high mobility out of temporary unemployment. Thus, workers in advanced countries have preferred the experience of a spell of unemployment to the return to "the village". The opposite is true in most CIS countries where such a safety net was not available and many people have been forced back into subsistence farming (EBRD, 1997) (Raiser *et al.* 2004).

Empirical analysis suggests a number of implications for accession: (1) Structural adjustment in industry is far from complete in all accession candidates. Further downsizing in industry is to be expected in the long run if these countries
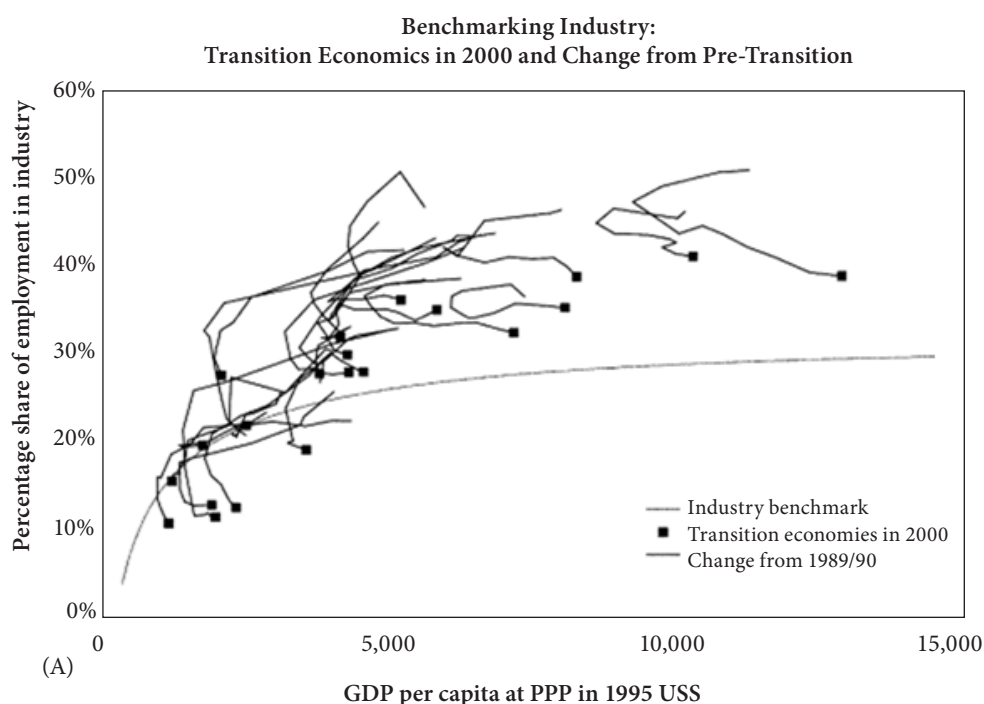
Benchmarking Industry:
Transition Economics in 2000 and Change from Pre-Transition

(A)

GDP per capita at PPP in 1995 USS

Fig. 3. Benchmarking industry: transition economies in 2000 and change from pre-transition. (B) Benchmarking industry: accession candidates in 2000 and change from pre-transition. (C) Benchmarking industry: CIS economies in 2000 and change from pre-transition (Franke, Kalmbach 2005)

are to continue to move towards adopting a market economy industrial structure. The pace of adjustment in industry shows the signs of slowing in a number of countries, however. (2) In agriculture, wealthier and more rapidly reforming accession candidates have continued to reduce the shares of their labour forces in agriculture, and are now actually quite close to what is seen in many EU member states. Agriculture has been a particular problem for EU policy making for many years, and this finding suggests that in the long run the impact of accession countries on this problem may not be as great as might have been feared. (3) A number of accession candidates have shares of employment in non-market-oriented services that are significantly greater than would be expected in market economies of similar incomes with potentially significant implications for the public finances of these countries (Raiser *et al.* 2004). Turning to the issue of economic development patterns more generally, the paper raises an interesting hypothesis that the patterns of industrialization may change systematically depending on the date of take-off and the distance to the technological leader in the world. While direct empirical tests of this prediction may be difficult, it would seem worthwhile to conduct further research into the matter and draw implications for development strategies. Thus, as industrialization is no longer available as a major outlet for surplus rural labour, the focus of policies might shift towards creating conditions for employment in services (Raiser *et al.* 2004). The analysis presented in this

paper remains incomplete in several important respects. The model is very simple and suffers from restrictive assumptions. As a heuristic device, it is nevertheless quite powerful. More sophisticated theoretical research has begun, however, to integrate economic growth and structural change into a unified analytical framework Empirically, the derived benchmarks fail to control the effects of economic specialisation in the global market and the availability of natural resources, which may have an important bearing on the allocation of employment. Measures for natural capital across the world have recently been calculated by the World Bank and could be integrated into analysis in future research (for the first attempt see Finally, a closer examination of variations in the patterns of adjustment across transition economies would seem promising regarding dynamic implications of large-scale labour reallocation from industry back to agriculture in the CIS in particular (Raiser *et al.* 2004).

One more paper indicates that Turkish exports are subject to structural changes as Turkey integrates into global production networks. Integration, which leads vertical specialization in production and changes in the commodity composition of Turkish exports in favour of non-traditional commodities, paces up during the periods of an economic reform. As the export shares of non-traditional commodities, which have higher import and income sensitivity but lower real exchange rate elasticity, increases, the coefficients of the aggregate export function change accordingly.

Nevertheless, high import and income elasticity of exports imply that the global growth pattern plays a significant role in determining exports of Turkey (Saygılı, H., Saygılı, M. 2011).

4. Concluding remarks

The following observations could be noticed while scrutinizing economic growth and development theories. The analysis of the theories noticeably conveys the profound basement targeted for country development through production factors and structural change.

The process of sectoral diversification and increasing specialization within economy could be found in an idea that dates back to the oldest development theorists. Structural change models and their representatives provide profound ideas that structural changes are needed for the country targeted to reach self-sustained development. According to those theories, development could be reached only by transferring a traditional agriculture sector to the manufacturing sector and then to the diversified sector of services. Another implication considers common structural change patterns of development showing that each country has to overcome in order to reach sustainable development.

To conclude, even though development and economic growth theories may seem contradictory, each of them put emphasis on specific driving forces or factors of economic development. Nevertheless, the factors of production are limited.

The research paper has raised and verified a hypothesis that factors affecting economic growth at the same time affect economic structures. We claim that differently developed countries experience different effect caused by the impact of similarly selected driving forces of economic growth, which, in turn, differently restructure rather widely discussed economic structures the treatment of which, as a respective composition of industrial sectors, seems to us the most productive from the research point of view, since containing limitations revealed above.

References

Adam Smith. 1776. *An inquiry to the wealth of nations*. Scotland: W. Strahan and T. Cadell, London.

Balkytė, A.; Tvaronavicienė, M. 2010. Perception of competitiveness in the context of sustainable development: facets of "Sustainable competitiveness", *Journal of Business Economics and Management* 11(2): 341–365.

Balkyte, A.; Tvaronaviciene, M. 2011. The role of migration for Sustainable developing economy: Lithuania in the EU context, *Journal of Security and Sustainability* 1(2): 133–145. http://dx.doi.org/10.3846/jbem.2010.17

Bond, S.; Leblebiciog, A.; Schiantarelli, F. 2010. Capital accumulation and growth: a new look at the empirical evidence, *Journal of Applied Econometrics* 25: 1073–1099. http://dx.doi.org/10.1002/jae.1163

Bourguignon, F. 2005. The effect of economic growth on social structures, in Philippe Aghion and Steven N. Durlauf (Editors). *Handbook of Economic Growth*. Chapter 27, Volume (B): 1701–1747. ISSN 1574-0684, ISBN 9780444520432, 10.1016/S1574-0684(05)01027-0. (http://www.sciencedirect.com/science/article/pii/S1574068405010270)

Briec, W.; Cavaignac, L. 2009. An extension of the multi-output state-contingent production model, *Economic Theory* 39: 43–64. http://dx.doi.org/10.1007/s00199-007-0308-6

Choo, H. J. 1971. On the empirical relevancy of the Ranis- Fei model of economic development: comment, *American Economic Review* 61(4): 695–703.

Clark, J. R. 1990. *Macroeconomics for Managers*. Boston: Allyn and Bacon, INC.

Čiegis, R.; Ramanauskienė, J. 2009. Sustainable development and its assessment, *Applied Economics: Systematic Research* 3(2): 143–153.

Dietz, J. 1983. Theories of development, *Journal of Economic Issues* (Association for Evolutionary Economics) 17(4): 1160–1162.

Dong, X.; Song, S.; Zhu, H. 2011. Industrial structure and economic fluctuation—Evidence from China, *The Social Science Journal* 48(3): 468–477. ISSN 0362-3319, 10.1016/j.soscij.2011.05.002. (http://www.sciencedirect.com/science/article/pii/S0362331911000802)

Eltis, W. 2000. *The classical theory of economic growth.* Macmillan, Basingstoke. http://dx.doi.org/10.1057/9780230598201

Franke, R.; Kalmbach, P. 2005. Structural change in the manufacturing sector and its impact on business-related services: an input–output study for Germany, *Structural Change and Economic Dynamics* 16(4): 467–488. ISSN 0954-349X, 10.1016/j.strueco.2004.09.001. (http://www.sciencedirect.com/science/article/pii/S0954349X04000670)

Galor, O. 2010. The 2008 Lawrence R. Klein lecture-comparative economic development: insights from unified growth theory, *International Economic Review* 51(1): 1–41. http://dx.doi.org/10.1111/j.1468-2354.2009.00569.x

Grybaitė, V. 2011. Towards measurement of sustainable development: systems of indicators, *Journal of Security and Sustainability Issues* 1(1): 17–24.

Halkos, G.; Tzeremes, N. 2008. Trade efficiency and economic development: evidence from a cross country comparison, *Applied Economics* 40: 2749–2764. http://dx.doi.org/10.1080/00036840600970302

Jaimovich, E. 2011. Sectoral differentiation, allocation of talent, and financial development, *Journal of Development Economics* 96: 47–60. http://dx.doi.org/10.1016/j.jdeveco.2010.07.005

Karnitis, E. 2011. Strategy and efficient mechanisms to improve security and sustainability of the natural gas supply in Baltic States, *Journal of Security and Sustainability Issues* 1(1): 3–15.

Kaźmierczyk, J. 2012. Information technology systems and their impact on the employment level in the polish banking sector, *Journal of Security and Sustainability Issues* 1(3): 187–195.

Keynes, J. M. 1936. *The General Theory of Employment, Interest and Money.* United Kingdom: Palgrave Macmillan.

King, R. G.; Rebelo, S. T. 1993. Transitional dynamics and economic growth in the neoclassical model, *American Economic Review* 83(4).

Korsakienė, R.; Breivytė, I.; Wamboye, E. 2011. Sustainable development and Human Development Index, *Journal of Security and Sustainability Issues* 1(2): 103–112.

Kosempel, S. 2004. A theory of development and long run growth, *Journal of Development Economics* 75: 201–220. http://dx.doi.org/10.1016/j.jdeveco.2003.08.004

Landes, D. 1969. *The Unbound Prometheus.* Cambridge University Press, Cambridge.

Lankauskiene, T.; Tvaronaviciene, M. 2011. Interrelation of countries' developmental level and foreign direct investments performance, *Journal of Business Economics and Management* 12(3): 546–565.

Lankauskienė, T.; Tvaronavičienė, M. 2012. Production factors and structural changes in economy sectors: genesis of theoretical approaches, in *Conference proceedings "Contemporary Issues in Business, Management and Education'2012"*, Vilnius, Lithuania. ISSN 2029-7963/ISBN 978-609-457-323-1 http://dx.doi.org/10.3846/16111699.2011.599412

Larrain, J. 1989. *Theories of development: capitalism, colonialism and dependency.* Cambridge Polity press.

Lee, D. 2006. The Korean Economy in Transition: in Search for a New Model, *Global Economic Review* 35(2): 207–230. http://dx.doi.org/10.1080/12265080600715475

Lewis, W. A. 1955. *The theory of economic growth.* Homewood, Ill.: Richard D. Irwin.

Luintel, K. B.; Khan, M.; Arestis, P.; Theodoridis, K. 2008. Financial structure and economic growth, *Journal of Development Economics* 86(1): 181–200. ISSN 0304-3878, 10.1016/j.jdeveco.2007.11.006. (http://www.sciencedirect.com/science/article/pii/S0304387807001009)

Pisani, D.; Jacobus, A. 2006. Sustainable development – historical roots of the concept, *Environmental Sciences* 3(2): 83–96. http://dx.doi.org/10.1080/15693430600688831

Prescott, E. C. 1988. Robert M. Solow's neoclassical growth model: an influential contribution to economics, *Scandinavian Journal of Economics* 90(1): 7–12. http://dx.doi.org/10.2307/3440145

Prskawetz, A.; Kögel, T.; Sanderson, W. C.; Scherbov, S. 2007. The effects of age structure on economic growth: An application of probabilistic forecasting to India, *International Journal of Forecasting* 23(4): 587–602. ISSN 0169-2070. 10.1016/j.ijforecast.2007.08.001 (http://www.sciencedirect.com/science/article/pii/S0169207007000970)

Raiser, M.; Schaffer, M.; Schuchhardt, J. 2004. Benchmarking structural change in transition, *Structural Change and Economic Dynamics* 15(1): 47–81. ISSN 0954-349X. 10.1016/S0954-349X(03)00027-4.(http://www.sciencedirect.com/science/article/pii/S0954349X03000274)

Rostow, W. 1960. *The stages of economic growth: a non communist manifesto.* London: Cambridge University Press.

Ruchi, M. 2009. Sustainable development- how far is it sustainable? *Proceedings of World Academy of Science, Engineering & Technology* (51): 754–757.

Ruttan, V. W. 1988. The new growth theory and development economics: a survey, *Journal of Development Studies* 35(2): 1–26. http://dx.doi.org/10.1080/00220389808422562

Sarkar, D. 2007. The role of human capital in economic growth revisited, *Applied Economics Letters* 14: 419–423. http://dx.doi.org/10.1080/13504850500447323

Saygılı, H.; Saygılı, M. 2011. Structural changes in exports of an emerging economy: Case of Turkey, *Structural Change and Economic Dynamics* 22(4): 342–360. ISSN 0954-349X. 10.1016/j.strueco.2011.08.001. (http://www.sciencedirect.com/science/article/pii/S0954349X11000543)

Silva, E. S; Teixeira, A. A. C. 2008. Surveying structural change: Seminal contributions and a bibliometric account, *Structural Change and Economic Dynamics* 19(4): 273–300. ISSN 0954-349X, 10.1016/j.strueco.2008.02.001.(http://www.sciencedirect.com/science/article/pii/S0954349X08000192)

Solow, R. M. 1988. Growth theory and after, *American Economic Review* 78(3): 307–317.

Sonobe, T.; Hu, D.; Otsuka, K. 2004. From inferior to superior products: an inquiry into the Wenzhou model of industrial development in China, *Journal of Comparative Economics* 32: 542–563. http://dx.doi.org/10.1016/j.jce.2004.05.001

Stańczyk, J. 2011. European security and sustainability issues in the context of current international environment, *Journal of Security and Sustainability Issues* 1(2): 81–90.

Tanuwidjaja, E.; Thangavelu, S. 2007. Structural change and productivity growth in the Japanese manufacturing industry, *Global Economic Review* 36(4): 385–405. http://dx.doi.org/10.1080/12265080701694603

Theobald, R. 1961. Reviews. Toward a practical theory of economic growth, *American Journal of Economics & Sociology* 20(3): 327–331. http://dx.doi.org/10.1111/j.1536-7150.1961.tb00590.x

Todaro, M. P.; Smith, S. C. 2011. *Economic development,* eleventh edition. Pearson Education limited: England. 865 p.

Tvaronavičienė, M.; Lankauskienė, T. 2011. Peculiarities of FDI performance in developed, developing and underdeveloped countries, *Business: Theory and Practice* 12(1): 50–62.

Tvaronavičienė, M. 2012. Contemporary perceptions of energy security: policy implications, *Journal of Security and Sustainability Issues* 1(4): 235–247.

Tvaronaviciene, M.; Grybaite, V. 2012. Sustainable development and performance of institutions: approaches towards measurement, *Journal of Security and Sustainability Issues* 1(3): 167–175.

Tvaronavičienė, M.; Lankauskienė, T. 2011. Plausible foreign direct investment' impact on sustainable development indicators of differently developed countries, *Journal of Security and Sustainability Issues* 1(1): 25–36.

Wei, Z.; Hao, R. 2010. Demographic structure and economic growth: Evidence from China, *Journal of Comparative Economics* 38(4, December): 472–491. ISSN 0147-5967, 10.1016/j.jce.2010.08.002. (http://www.sciencedirect.com/science/article/pii/S014759671000065X)

Willis, K. 2005. *Theories and practices of development.* Routledge, Taylor & Francis group: London and New York.

Young, A., 1928. Increasing returns and economic progress, *The Economic Journal* 38: 527–542.
http://dx.doi.org/10.2307/2224097

Zhang, W.-B. 1996. Preference, structure and economic growth, *Structural Change and Economic Dynamics* 7(2): 207-221. ISSN 0954-349X, 10.1016/0954-349X(95)00024-H. (http://www.sciencedirect.com/science/article/pii/0954349X9500024H)

Manuela TVARONAVIČIENĖ. Prof. at the Department of Economics and Management of Enterprises, the Faculty of Business Management, Vilnius Gediminas Technical University. Research interests: economic growth, investment, innovations, economic sector development.

Toma LANKAUSKIENĖ. Phd student at the Department of Economics and Management of Enterprises, the Faculty of Business Management, Vilnius Gediminas Technical University. Research interests: economic growth, development economics, sustainable development.