SERVICES SECTOR IN LITHUANIA:
LABOUR PRODUCTIVITY AS A FACTOR OF GROWTH

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This paper examines the tendencies of Lithuanian services sector's value added and labour productivity during 1995–2006. Comparative analysis of the average annual labour productivity growth in manufacturing and service industries reveals arguments supporting the W. Baumol's consideration that there can be sporadic productivity increases in nonprogressive sectors. During 1995–2000, labour productivity growth in services exceeded productivity growth in manufacturing. The paper offers an interpretation of the Verdoorn law for empirical regularities of the relationship between the cross-sectorial labour productivity growth rate and the value added growth rate.

Introduction

Economic growth and de-industrialisation are important topics discussed in economic literature. Economic statistics provides an empirical evidence of the changing structure of economics in many countries. It is characterised by a gradual process of decline in the share of agriculture and manufacturing and a rise in the share of services. The service sector produces the major part of gross output in modern economies and makes a substantial contribution into employment. According to A. H. G. M. Spithoven, "services are crucial for the functioning of a society and an economy. Nonetheless, they have not been given the attention they deserve and remain poorly understood by the economics profession. In many studies, services are taken to be technologically sluggish or stagnant, and this then, is regarded as an explanation for their rising share in overall employment" (Spithoven, 2000).

De-industrialization tendencies suggest that the growth of the service sector tends to be associated with negative effects on the economic growth. Economic growth theory recognizes increasing returns as a factor generating economic growth. Labour productivity signifies the potential of growth. Labour-saving innovations associated with technological changes vary among the industries, however, manufacturing industries move ahead more rapidly than service and

agriculture. Capital intensity, research intensity, skills of workforce are variables related to productivity growth and therefore factors of the manufacturing sectors's output growth. W. Baumol's theory stresses that productivity improvements in services appear to be occasional and the labour-intensive nature of most services had become a constraint for productivity growth (Baumol, Towse, 1997). Therefore, an increase in the share of services implies a reduction in the rate of productivity of the national economy. Baumol's model of unbalanced growth points out the existence of progressive and nonprogressive sectors of the economy. Imbalances in productivity growth lead to expenditure shifts into sectors of lower productivity. Sectors of lower labour productivity will accept the level of wages in the labour market. A higher overall wage level based on a higher overall labour productivity signifies the potential availability of a relatively rapid increase in wages as compared with the increase in productivity. Due to the slow rate of productivity growth in labour-intensive service industries as compared with manufacturing, service-oriented economies tend to sag. However, many modern economies undergo a de-industrialization, have become service-oriented economies and experience even a higher rate of productivity growth.

The evidence provided in the productivity measurement research based on US statistical data suggest that labour productivity growth in the service industries after 1995 has accelerated at the same level as the economywide rate (Triplett, Bosworth, 2003). The average labour productivity growth in the service-producing industries during 1995–2001 was even higher than in the manufacturing. It follows that service industries experienced changes of the way of production. The level of productivity in the industry is determined by a number of factors, however, explanations of long-term productivity changes stress the technological change, i.e. the change in the quality and quantity of capital. The growth of the output has been induced by a more intensive use of the capital factor in the production of services. In some service industries, labour productivity growth has been related to investments into technological innovations. The increase of the share of such industries contributes to labour productivity acceleration in the overall economy.

The growth of the service sector suggests the idea of large-scale production. Large-scale production is supposed to be more efficient due to returns to scale. Economic growth theory recognizes increasing returns to scale as a factor generating economic growth through the growth in productivity. P. J. Verdoorn's and N. Kaldor's empirical analysis of growth has demonstrated the tendency of increasing returns to scale in the industrial sectors of economy (Verdoorn, 1993). Named after the name of author, P. J. Verdoorn's law acknowledges the relationship between the rate of growth in the output and the growth of productivity due to increasing returns. According to N. Kaldor, economies of scale are generated through technical change and improvement of skills. Technological innovations will cause an increase in labour productivity. P. J. Verdoorn and N. Kaldor stress the existence of increasing returns in the manufacturing industries. Nevertheless, the particular attention to the manufacturing sector as the engine of economic growth is based on the positive causal relationship between output growth and productivity growth in manufacturing, defined by the empirical tests. Such empirical evidences could be weakened as the economies undergo structural changes. P. Rayment suggests that structural

changes in the manufacturing sectors are induced by labour migration from industries with relatively low skill intensities to industries with relatively high skill intensities (Rayment, 1981). Nelson and Winter have identified such factors of labour productivity growth as capital intensity, research intensity, skills of workforce (Nelson, Winter, 1982). With the processes of service industries changing so rapidly and capital intensity and technical innovations becoming features of service processes, the Kaldor–Verdoorn law should be reassessed in the context of service and manufacturing industries.

During the last decade Lithuania experienced a rapid growth and restructuring. The share of services, construction, manufacturing sectors increased, at the same time that of agriculture substantialy decreased. More detailed analysis of largest sectors of national economy provides an empirical evidence of the changing nature of services, including trends in employment and productivity. The rapid growth of the output and the limited supply of labour as constraints could be recognized as specific characteristics of the national economy. Therefore, questions of the character of labour productivity growth in different sectors of the economy, and the relationship between the rate of economic growth and labour productivity growth are supposed to provide evidence in the discussion about the potential of growth in the modern economies.

The aim of this paper is to assess Baumol's model of unbalanced growth in a rapidly growing economy by analysing the labour productivity growth pattern in manufacturing and service industries and to examine the relationship between the rate of growth in value added and the growth in labour productivity according to the Kaldor–Verdoorn law.

Examination of the relationship between the growth in value added and growth in productivity provides arguments for the hypothesis that the Verdoorn–Kaldor law, estimated using cross industry data, could be used to explain the disparities in growth rates among various sectors of the economy.

Method

The study method is based on a comparative analysis of national statistics data on labour productivity. The relationship between the rate of value added growth and the growth of labour productivity was estimated by a linear regression analysis. The significance of results was analysed by standard R-squared and F tests.

Labour productivity was calculated as value added per person engaged in production. Productivity was computed for the economic activities of the standard NACE statistical classification: industry; trade, hotels and restaurants, transport, storage; financial intermediation, real estate, renting; public administration, services for social sphere. Productivity growth was estimated for the goods-producing industry and various service-producing industries as well as the aggregated service-producing industry. We compare productivity change during the period 1995–2006 and the average annual labour productivity growth rate during the five-year periods of 1995–2000 and 2001–2006.

The relationship between the growth of labour productivity and the growth of output was formulated as the Kaldor–Verdoorn law and took the form

$$p = a_1 + b_1 q,$$

where p is the growth of labour productivity, q the growth of output, and a_1, b_1 are the regression coefficients. The slope coefficient b is commonly referred to as the Verdoorn coefficient.

We have used annual time series value added data to estimate the relationship. Nevertheless, Verdoorn and Kaldor analysed the effect of the law on industry, while in this paper we provide interpretations of empirical relationship for various sectors of the economy.

Trends in economic growth and employment

In the recent years, Lithuania has experienced an increase of the share of service, manufacturing, construction sectors in the total value added and a decrease in the share of agriculture. The share of services value added in the total economy accounted for 55.7% in 1995 and increased to 59.4% in 2006, and the share of manufacturing during this period has increased from 19.9% to 22.0%. The share of agriculture in value added declined from 11.5% in 1995 to 5.5% in 2006. In (1990–2003), the share of services increased and of manufacturing in the value added declined in almost all industrial countries – manufacturing accounted for 20%; in some countries (Luxembourg, Greece, the United Kingdom, the United States) its share

was less than 15% (Wolfl, 2005). The value added produced in the service sector accounts for a bulk of gross value added (service sector accounted for 80% in value added in the EU-15) (Pilat, Wolfl, 2005).

Structural changes in the Lithuanian economy show the tendencies of post-industrialisation development.

Data of national statistics show a strong growth in value added in the service sector and manufacturing (Fig. 2). The annual growth rate of gross value added during the period 1995–2006 was 11%, and the growth of value added in service industries was even more rapid (12.1%) than in manufacturing (10.9%).

Changes in the volume of output reflect the rapid growth of the national economy, caused by the growth of investment, changes in employment and a considerable rise of demand. Final consumption expenditure at constant prices during the period 1995–2006 increased almost 1.87 times, the annual average rate of change being 5.83. Gross capital formation at constant prices increased even more – 2.25 times with the annual average rate of increase 7.66%. During the period 2000–2005,
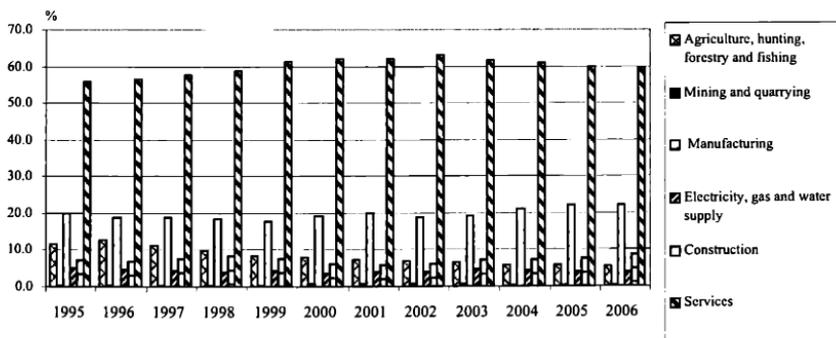

Fig. 1. Structure of value added in Lithuania, 1995–2006
Source: Statistical Yearbook of Lithuania (1996–2007). Department of Statistics of the Government to the Republic of Lithuania, Methodical Publishing Centre.

Fig. 2. Gross value added in Lithuania, 1995–2006, at constant prices (2000 = 100, in million Euro*)
Source: Statistical Yearbook of Lithuania. (1996–2007). Department of Statistics of the Government to the Republic of Lithuania, Methodical Publishing Centre.
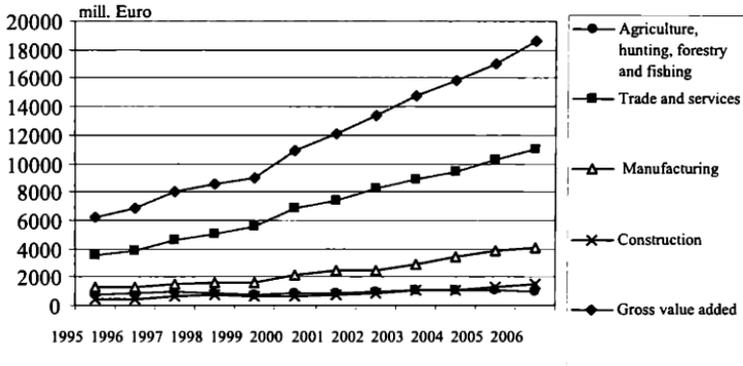
* Millions of Euro since 1999/01/01, millions of Ecu – before 1998/12/31.

investment in fixed assets in some service sectors considerably insreased. Investments in fixed assets in hotel and restaurant business increased 3.8 times, in real estate, renting and business activities 21 times, in wholesale and retail trade 2 times.

Tendencies in labour supply did not show considerable changes. During 1998–2006, the absolute number of employed was relatively stable. The national statistical data on employment show a variation in the dynamics of the share of employment in different economic activites (Fig. 3).
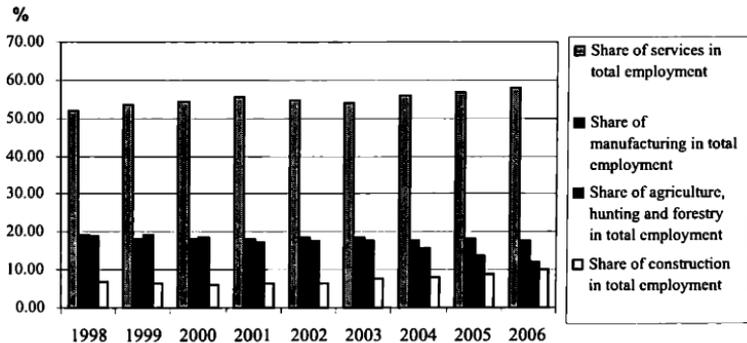

Fig. 3. Share of economic activities in total employment in Lithuania, 1998–2006
Source: Statistical Yearbook of Lithuania (1996–2007). Department of Statistics of the Government to the Republic of Lithuania, Methodical Publishing Centre.

Fig. 4. Tendencies in the number of employed in goods-producing and services-producing industries, 1995–2006
Source: Statistical Yearbook of Lithuania (1996–2007). Department of Statistics of the Government to the Republic of Lithuania, Methodical Publishing Centre.
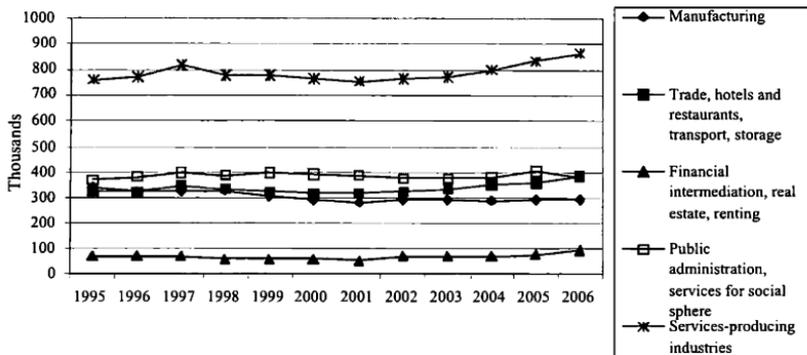
Supply of labour decreased in the manufacturing and grew in traditionally less productive sectors such as trade, hotels and restaurants, financial intermediation and real estate. The decrease of the number of employed in 2006 versus 1995 in manufacturing reached 13.3%, the increase in the trade, hotels and restaurants, transport, storage being 19.1%, in infinancial intermediation, real estate 36%, in public administration and services of social sphere 4% (Fig. 4).

The increase of demand for products of service industry, determined by the development of tourism and the growth of income, was the reason for employment growth in this sector. Globalisation of the labour market after the accession of Lithuania to the EU and movement of workforce was the other factor of changes in employment.

The tendency of a rapid economic growth and the shift of labour to the less productive service-producing industries suggests a situation in economic literature called Baumol's disease. It is argued that because of the

natural constraint of productivity in labour-intensive industries, productivity growth in service-oriented economies tends to slow down. Therefore, the economic growth tends to decelerate.

Labour productivity growth in manufacturing and service industries

During 1995–2006, annual labour productivity growth in manufacturing averaged to about 12.3% and was higher than in services. This rapid growth of labour productivity was more intensive during 1995–2000 and slower in the next five years. The period of rapid growth in labour productivity shows evidences that labour productivity in services exceeds labour productivity in manufacturing (Table 1).

The situation when labour productivity growth in services exceeds labour productivity growth in manufacturing contravenes W. Baumol's theory of unbalanced growth and services as nonprogressive sectors of the economy. As J. E. Triplett and B. Bosworth have examined

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Table 1. Average annual growth in labour productivity, 1995–2006

	2006/1995	2000/1995	2006/2001
Manufacturing	12.3%	13.8%	10.4%
Services producing industries	10.8%	14.3%	7.9%
Trade, hotels and restaurants, transport, storage	10.7%	12.3%	10.0%
Financial intermediation, real estate, renting	7.8%	20.8%	–4.8%
Public administration, services for social sphere	12.2%	13.1%	11.6%

that the labour productivity growth in service industries after 1995 was higher than in the goods-producing industries, they asserted that Baumol's disease has been cured in the U.S. (Triplett, Bosworth, 2003). As the example of the Lithuanian economy shows, Baumol's disease has been cured here as well. However, our data show that the increase in labour productivity growth in services was confined to one industry – financial intermediation, real estate, renting. It can be illustrated by W. Baumol's consideration that there can be sporadic increases in productivity in a nonprogressive sector (Baumol, 2002). It could be related to the increase in investments to technology of service production and therefore changes in labour use patterns. Information and communication technologies usually prevail in financial enterprises. The rapid growth in productivity in financial intermediation, real estate, renting industry could be related to the rise of financial markets where financial enterprises make their earnings. This explanation could be based on the dramatic changes in labour productivity – from 20.8% of the annual average growth in 1995–2000 to a decrease to 4.8%. In our opinion, the rapid growth of labour productivity in the finance sector could be explained by investments in

information technologies as well as a rapid increase in credit markets.

Relationship between the rate of growth in value added and the growth in labour productivity

Results of linear regression of labour productivity growth on value added growth are summarized in Table 2.

The result of linear regression is significant for all the industries under analysis. The R^2 indicator shows a strong linear relationship of productivity growth to value added growth in manufacturing as well as service industries. Kaldor explained the effect of output growth on productivity by the benefit of return on scale – by such factors as the increasing specialization due to an increase in output, the introduction of technical innovations to the process of production, product differentiation due to the increase in product output. As the results of regression show, a strong relationship between labour productivity growth and growth in value added is not specific to industry.

The Verdoorn coefficient is positive in every industry and is statistically significant at the 0.05 level. The Verdoorn coefficient b_1 implies a constant value of returns to scale of

Table 2. Regression of labour productivity growth on value added growth, 1995–2006

Sectors	Regression coef. a1	Regression coef. b1	R^2 (F)
Manufacturing	0.017	0.983	0.76 (27.8)
Services-producing industries	0.006	0.843	0.79 (33.3)
Trade, hotels and restaurants, transport, storage	0.017	0.724	0.57 (12.1)
Financial intermediation, real estate, renting	−0.046	1.225	0.55 (11.1)
Public administration, services for social sphere	0,012	0.880	0.72 (23.1)

1.01. As McCombie and Roberts note, if there are constant returns to scale, there is no relationship between productivity and output (McCombie, Roberts, 2007). Therefore, productivity was determined by technological factors of production rather than by the growth in output. Our analysis does not provide arguments enough to confirm the hypothesis about the appropriateness of the Verdoorn–Kaldorn law for the cross-sectorial analysis.

Conclusions

Data of the national statistics show a significant growth in value added in the services sector and manufacturing: the annual growth rate of gross value added during the period 1995–2006 was 11%, the growth of value added in service industries being even more rapid (12.1%) than in manufacturing (10.9%).

Tendencies in labour supply show that the share of the number of employed in services grew during the last decade and almost reached 60% in 2006, whereas the number of employed in manufacturing slightly decreased to 20% in 2006. Supply of labour decreased in manufacturing and grew in traditionally less productive sectors such as trade, hotels and restaurants, financial intermediation and real estate.

Tendencies in the services sector labour productivity growth show that services are a "nonprogressive" sector of economics. Labour productivity growth in manufacturing exceeded the growth in services during 1995–2006, the average annual growth of labour productivity in manufacturing being 12.3% and in services sectors 10.8%. Comparative analysis revealed a period when annual labour productivity growth in services was higher than in manufacturing – productivity growth in manufacturing averaged about 13.8% and in services industries 14.3% during 1995–2000. In our opinion, it supports the W. Baumol's consideration that there can be sporadic increases in productivity in the nonprogressive sector, rather than the J. E. Triplett's and B. Bosworth's idea about the changing pattern in services production and therefore a nonconformity to Baumol's disease conception. However, our data show that the relative increase in labour productivity growth in services was confined to one industry – financial intermediation, real estate, renting. In our opinion, the rapid growth of labour productivity in the finance sector could be related to an increase in credit markets and investment in information technologies.

Rapid growth, especially in services industries, suggests that large-scale production

provides more output due to returns to scale. The Verdoorn–Kaldor relationship between the growth of labour productivity and the growth of output has been assessed. Results of linear regressions show a statistically significant relationship and constant returns to scale for various industries. Constant returns to scale reflect a substantial cross-sectorial externalities, therefore growth rate disparities among various sectors of economy cannot be explained by disparities in return to scale as the Verdoorn–Kaldor law implies. Our analysis does not provide arguments enough to confirm the hypothesis about the appropriateness of the Verdoorn–Kaldorn law for the cross-sector analysis.

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SERVICES SECTOR IN LITHUANIA: LABOUR PRODUCTIVITY AS A FACTOR OF GROWTH

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Summary

The paper deals with the tendencies of Lithuanian manufacturing and services sector value added and labour productivity during 1995–2006. Data of national statistics show a significant growth in value added in the service sector and in manufacturing: the annual growth rate of gross value added was 11%, the growth of value added in service industries being even more rapid (12.1%) than in manufacturing (10.9%).

Tendencies in labour supply show that the share of the number of employed in services grew during the last decade. Labour supply diminished in manufacturing and grew in traditionally less productive sectors such as trade, hotels and restaurants, financial intermediation and real estate.

The annual growth of labour productivity during the study period in manufacturing reached 12.3% and in the services sector 10.8% annually. Tendencies in

services sector labour productivity growth show that services are a "nonprogressive" sector of economics. However, comparative analysis revealed a sporadic increase in productivity in the "nonprogressive" services sector in 1995–2000: the average annual labour productivity growth in services was 14.3% and in manufacturing 13.8%. In our opinion, it supports W. Baumol's consideration that there can be sporadic increases in productivity in the nonprogressive sector, rather than J. E. Triplett's and B. Bosworth's idea about the changing pattern in services production and therefore the nonconformity with Baumol's Disease conception.

The paper provides an interpretation of the Verdoorn law of empirical regularities in the relationship between cross-sectorial labour productivity growth rate and value added growth rate. The Verdoorn–Kaldor relationship between the growth of labour productivity and the growth of output has been assessed. Results of linear regressions show a statistically significant relationship and constant returns to scale for various industries. Constant returns to scale reflect substantial cross-sectorial externalities, therefore growth rate disparities among various sectors of economy cannot be explained by disparities in return to scale as the Verdoorn–Kaldor law implies.

PASLAUGŲ SEKTORIAUS PLĖTRA LIETUVOJE – DARBO PRODUKTYVUMAS KAIP AUGIMO VEIKSNYS

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Santrauka

Straipsnyje analizuojamos paslaugų ir pramonės sektorių pridėtinės vertės bei darbo produktyvumo kitimo tendencijos 1995–2006 metais. Straipsnio tikslas – išanalizavus paslaugų ir pramonės sektorių darbo produktyvumo kitimo pobūdį, įvertinti *Baumol* nesubalansuoto augimo apraiškas sparčiai augančioje ekonomikoje ir įvertinti pridėtinės vertės ir darbo produktyvumo augimo pagal *Verdoorn–Kaldor* dėsningumą ryšį.

Straipsnyje naudojamas lyginamosios analizės tyrimo metodas, kuris pritaikytas analizuojant nacionalinės statistikos duomenis apie paslaugų ir pramonės sektorių Lietuvoje pridėtinę vertę bei darbo produktyvumą ir atskleidžiant darbo produktyvumo didėjimo skirtumus pramonės ir paslaugų sektoriuose. Regresinės analizės metodu apskaičiuota pridėtinės vertės ir darbo produktyvumo didėjimo parametrų tiesinė priklausomybė.

Tyrimo rezultatai parodė, kad, plėtojantis Lietuvos ekonomikai, paslaugų sektorius didėjo sparčiau nei pramonės. 1995–2006 m. vidutinis metinis bendros pridėtinės vertės augimas buvo 11 proc., pramonės – 10,9 proc., paslaugų – 12,1 proc. 1995–2006 m. darbo produktyvumas pramonėje kasmet didėjo vidutiniškai 12,3 proc., paslaugų sektoriuje – 10,8 proc. 1995–2006 m. produktyvumo kitimo tendencijos patvirtina darbo produktyvumo augimo tempų skirtumų pramonės ir paslaugų sektoriuose koncepciją, išnagrinėtą W. Baumol, paslaugas įvardijant kaip „ne-

progresyvų" ekonomikos sektorių. Tačiau 1995–2000 m. matyti kitokia darbo produktyvumo didėjimo tendencija – darbo produktyvumo kitimas paslaugų šakose buvo spartesnis negu pramonės. Aiškinant šią darbo produktyvumo didėjimo tendenciją, mokslinėje literatūroje pateikiami du požiūriai. Tai W. Baumol koncepcijos teiginiai, kad paslaugų sektoriuje galimas laikinas darbo produktyvumo santykinių augimo tempų padidėjimas, siejamas su technologijų diegimu. Kitaip darbo produktyvumo paslaugų sektoriuje santykinių augimo tempų didėjimą aiškina J. E. Triplett and B. Bosworth. Jų teigimu, spartus darbo produktyvumo paslaugų sektoriuje augimas yra sisteminis reiškinys ir atskleidžia kapitalo veiksnio reikšmės didėjimą paslaugų gamybos procesuose, taip pat spartų inovacijų diegimą. Darbo autorės nuomone, aiškinant spartesnį darbo produktyvumo didėjimą paslaugų sektoriuje būtų tiksliau remtis W. Baumol požiūriu į laikiną darbo produktyvumo santykinį padidėjimą paslaugų sektoriuje.

Nagrinėjant darbo produktyvumo ir ekonomikos augimo sąsajas, straipsnyje remiamasi *Verdoorn–Kaldor* dėsningumu. Regresinės analizės rezultatai atskleidė, kad tiesinė pridėtinės vertės ir darbo produktyvumo didėjimo priklausomybė statistiškai reikšminga, tačiau skirtingoms ekonomikos šakoms būdingas vienodas masto ekonomijos poveikis. Todėl darbo produktyvumo skirtumų negalima paaiškinti masto ekonomijos poveikiu.