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Structural transformation and economic development in the best performing sub-Saharan African states

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Abstract

Research background: Economic development in sub-Saharan Africa is of paramount importance, yet it escapes most of the attempts to understand it better in the economic discourse, and it remains a sensitive issue in politics, contradicting stakeholders at national and international levels. The region still lags behind others in terms of technological advancement and economic development. It has grown significantly in the precedent decade, but the extent of growth has not sufficiently translated to its development. Determining strategies for sub-Saharan Africa is a scientific challenge, which requires more attention. In the globalized, interconnected reality, solving problems of the South is in the best interest of the North.

Purpose of the article: The aim of this research is to analyze structural changes as factors of economic development in the best performing sub-Saharan African countries on the grounds of new structural economics in order to provide policy implications.

Methods: Namibia, Botswana, South Africa and Gabon were selected as best performing economies in the region. Based on the literature review and the analysis of descriptive statistics, profiles of sample countries were set. This in turn allowed to determine the potential explanatory variables for OLS model of economic development. In the model, factors relating to labour productivity, technology and structural change were included. The data was sourced from WDI (World Development Indicators) database, Gretl software was used for computations.

Findings & Value added: This paper contributes to the literature by attempting to explain structural changes in the process of economic development in the sub-Saharan region on the sample of best performing states. Results of the study revealed that there is no common way of economic development in sub-Saharan Africa. However, best performing states are characterized by relative advantage in human capital. Based on the results, policy implications were proposed with respect to technology promotion, natural resources management, and quality of institutions. The research was limited by data availability and reliability.

Introduction

It is ambiguous to say, that European societies are focused with European problems. It is more plausible to say that modern societies refuse engagement in international problems and demand to concentrate on national issues, as the support for Brexit has proven. In accordance with decreasing benefits principle, developed societies appreciate the attained level of growth, regional integration, and more broadly, globalization less and less. We may be experiencing a cyclical crisis of democracy, as predicted by Fukuyama (1992, p. 47). However, this tendency makes development policies even more valid issue in domestic, but also in a global perspective (i.a. Birdsall *et al.*, 2005; Easterly & Pfitze, 2008; Harman & Williams, 2014).

Forgetting to address the problems of developing economies comes with the consequences. The income gap across the World does not seem to close. The differences of wealth between nations raise negative consequences for international stability (Devarajan & Kanbur 2007; Harman & Williams, 2014, pp. 935–940). This is aggravated by income disparities inside middle and low-income economies, which remain the source of instability for decades (Kuznets, 1972, p. 198; WDI, 2017). Persisting to call Official Development Assistance system “help” and refusing to admit its instrumentalisation, has backfired (Easterly & Pfitze, 2008). The growing threat of terrorism, social exclusion, ethnic fractionalization, and illegal migrations disturb *the status quo* of North/South relations and calls for reflection at the same time.

Perversely, development policies, weather we talk about them in developed or developing countries perspective, are always nationally oriented (Williamson 2004). Imposition of monetary stability and fiscal balance, trade liberalization, public expenditure control, etc., all these are decided at the national government level, which takes (or not) global conditions into account (Devarajan & Kanbur, 2013, p. 13). The repercussions of development strategies on other nations are generally not considered. States are egoistic and egocentric in their development strategies. However, some states are more independent in shaping their policies, while others, volun-

tarily or under the pressure, rely on the advice of foreign entities (transition countries in Europe being a clear example of that) (Berglof, 2015, p. 122). In the case of the countries with middle and low incomes, their policies in modern history were under a strong influence of financial institutions and commercial partners (Chauvet & Collier, 2009, p. 512). The findings of development economists played an important role in moderating these visions (Stiglitz, 2011, p. 231; Devarajan & Kanbur, 2013, p. 17).

Development studies, particularly these focused on sub-Saharan Africa — the poorest region in the globalized World, require an in-depth analysis. The purpose of this paper was to analyse structural changes' impact on the economic development in the best performing sub-Saharan African countries in order to determine directions for successful strategies and provide some policy implications. This paper explores whether new structural economics as defined by Lin (2012, 2015) add to our understanding of economic development in sub-Saharan Africa on the example of Botswana, Gabon, Namibia, and South Africa after 1980.

Descriptive statistic methods and linear regression modelling methods were used in data analysis. Comparative and systemic analysis were applied in the interpretation of the results of empirical study.

Paper is organized in 4 sections. After research methodology is explained, literature review section focused on development and sub-Saharan Africa studies follows. Next, the results of data analysis are presented and discussed. Final section summarizes the main conclusions of the research.

Research methodology

In this paper first, the characteristics of identified group of the sub-Saharan African leaders performance were analysed based on the comparative analysis of the data within the group, with the regional aggregate, and with laggard economies (Niger, Central African Republic, and Eritrea — the four countries with lowest HDI index based on 2014 data). Finally, regression models were estimated in order to detect crucial structural change factors of development. Field study and qualitative research experience from sub-Saharan African countries (9) supported the process of results interpretation.

The rationale of choosing Botswana, Gabon and South Africa, and Namibia as best performing economies involved various aspects, as none of the available indicators alone seems reliable enough. These countries score the highest in the Human Development Index ranking (Table 1), as com-

pared with the other countries in the region¹. In the overall HDI 2014 rank for 188 countries 36 of the bottom countries are sub-Saharan (HDI below 0.532; the rank includes 46 sub-Saharan countries), which means that the positions 106, 110, 116, and 126 are placing selected countries relatively high, as regional leaders. The complexity of HDI as indicator allows to reflect the qualitative dimension in the growth processes, which is crucial in the economic development (Fukuyama, 1992; Acemoglu & Robinson, 2015). Despite the fact that growth and GDP (gross domestic product) indicators are exploited in this research (HDI data time span is too limited), it was decided not to make them the parameters for the choice of the best performing countries sample.

Botswana, Gabon and South Africa, and Namibia are in the group of 10 most competitive African economies according to Global Competitive Index 2015–2016 (Table 1). We shall note that 15 out of the bottom 20 economies in GCI 2015–2016 are sub-Saharan African, and the laggard economies are not even included in the rank. The position in the ranks can be additionally supported by the field experience from studied countries (South Africa, Botswana, Namibia), as compared with other countries (i.a. Burkina Faso, Senegal, Congo Republik, Ivory Coast, Mozambique). Moreover, Botswana and Namibia were among the first sub-Saharan economies in which functioning democracies emerged (Fukuyama, 1992, p. 35). South Africa is a member of the informal BRICS group, and its outstanding performance is also recognized.

Data analysis was based on descriptive statistics and ordinary least squared regression models for the sample countries. In order to approximate the successful development policy, GDP per capita was chosen as dependent variable representing economic development (Calderón, 2009). Next, in a number of trials on data for sample countries, indicators related to structural change were selected (Table 2). The methodology suggested by Lin in 2004 and explored by Bruno *et al.* (2015, p. 133) using Technology Choice Index was not explored due to lack of data for the selected countries. Since Buera and Kaboski (2008) and Herrendorf *et al.* (2013) include sectoral reallocations of economic activity across three broad sectors (agriculture, manufacturing, and services) which accompanies the process of modern economic growth as a trend of structural change, the dependent variables address these factors and industry.

Individual correlation matrix for studied countries allowed to summarize dependent variables related to economic structure influential for GDP per

¹ It was decided not to include Cabo Verde in the group (0.646 HDI 2014), because of limited data availability and its geographical characteristics (island country).

capita in 1980–2015. Next, individual OLS (Ordinary Least Squares) regression models were estimated for 2000–2014 (South Africa), 1997–2014 (Botswana), 2001–2014 (Gabon), and 1997–2013 (Namibia), limited by the data availability. Variance inflation factors were checked for every model in order to avoid collinearity problem, while Durbin-Watson test was performed against autocorrelation in the models.

The most important limitation of this research was data availability. A number of explanatory variables were excluded because the data was missing either for the required period of time or for all the observations. This concerned especially intangible aspects (ex. education; R&D government spending), but also trade (detailed production and export values) and labour market (data available for Botswana and SA). All computations were performed in Gretl software.

New structural economics in sub-Saharan context

New structural economics (NSE) are a voice in the market/state role debate, which provides a certain view on the role of the governments to promote development and enable required technology transfer in the most efficient way, based mostly on the experience of Asian countries (Vučković, 2014; Devarajan & Kanbur, 2013). NSE attempts to integrate structuralism with more traditional neoclassical thinking (Berglof, 2015, p. 116; Fine & Van Waeyenberge, 2013, p. 361, *passim*). According to this theory, industrialisation is the core of development policy agenda (Sato, 2013, p. 326; Bruno *et al.*, 2015, p. 150). While “old” structuralism blamed market failure for distorting structural transformation, “new” structuralism recognizes market forces as driving force of transformation. However, since the differences between more and less advanced economies lie in different comparative advantages arising from their respective endowment structures, appropriate industrial policy is required to guide these forces towards the “right” sectors, in which the country has its comparative advantage (Lin, 2012). NSE proposes a demand-side theory on the appropriate financial and endowment structure for an economy (Lin *et al.*, 2013, pp. 109–119)

The fundamentals of structuralist hypotheses were formulated in the 1950s by economists such as Paul Rosenstein-Rodan, Ragnar Nurkse, W. Arthur Lewis, Hans Singer and Gunnar Myrdal (Berglof, 2015, pp. 115). They recognized the structural differences between underdeveloped and developed economies and emphasized the need to study an economic system in its totality. Latin American countries were to a large extent an inspiration for those works. Market failures in production of steady growth,

inefficiency of price mechanism, and weak institutions hindering industrialization and technological progress, were to be overcome by state involvement in economy (Williamson, 2000; Devarajan *et.al.*, 2001). Industrialization is considered crucial to include less developed economies in the benefit from general technological progress (Prebisch, 1950, p. 2). According to Prebisch (1950, p. 49), each country must be examined in order to determine whether its economic structure and existing conditions make those ideas practicable, or whether other ways of dealing with the cycle must be found. Hirschman (1984) adds that importing a set of techniques from outside the economy, which the economy knows nothing about, will not contribute to its advancements (p. 91). This voice will be next supported by the failure of structural adjustment programs — regardless particular reasons — in majority of African states upon which they were imposed (Chauvet & Collier, 2009, p. 512).

The overall message of new structuralism is to make the governments more respectful of markets and incentives; to show greater awareness of the potential of government failures; and to focus specifically on market failures rather than vague shortcomings of the private sector (Rodrik, 2011, p. 227). However, Rodrik (2011) warns that the market failures and appropriate strategies to overcome them may not be easy, both to identify and to introduce. In Rodrik's comment we can detect the general idea to agree with Lin's main idea, and the general concern whether those ideas are in fact applicable in practice. So does Stiglitz, but he puts more impact on the government's role, entrepreneurship, technology, and human capital development (2011, p. 230, *passim*; Shuaibu & Oladayo, 2016, p. 541). Fine & Van Waeyenberge (2013, p. 361) find it less theoretically and practically significant, though they admit Lin's works to have some influence on the evolution of development economics, as they say by virtue of its origins, and the weight these carry. What is also not included in the NSE, but advertised by Devarajan and Kanbur (2007, p. 379), is that development discourse, shall include the third element of civil society, not stay focused purely on market state nexus which dominates the main thinking for decades.

Recommendations of NSE contradict the mantra to stabilize, privatize, and liberalize, as it is considered potentially disadvantageous for emerging economies in the context of global trade (Stiglitz, 2011). The policies of advanced economies in sectors such as agriculture, where a number of African states finds their comparative advantage, discourage their performance (Berglof, 2015). Unless these countries climb to a higher value-added industries and diversify their exports, they may be trapped under the convergence threshold (Stokke, 2004). Treating Washington consensus as

a set of commandments was considered as a too generous promise even by Williamson (2004).

Understanding underdevelopment requires deep knowledge of the structure of employment and production, and why these structures do not change to eliminate the productivity gap (Berglof, 2015, p. 121), as according to Kuznets (1973) structural transformation is one of the main features of modern economic growth. Lin builds on what Kuznets already recognized: the state's role in the process, the importance of single authority, which acts in the national interest, monitors and selects the necessary institutional and legal adjustments, and attempts to provide the proper channels for economic advance while mitigating its adverse effects (Kuznets, 1977, pp. 9–10).

Based on laggard economies experiences, Gollin and Parente (2002, pp. 160–164) suggest that low agricultural productivity can substantially delay industrialization. In their cross section study, there is a negative relationship between agricultural productivity and the share of employment in agriculture. In turn, they have found a positive relationship between the growth in a country's agricultural productivity and the movement of labour out of agriculture, because countries experiencing increases in agricultural productivity are able to release labour from agriculture into other sectors of the economy. Since the output per worker in non-agriculture is substantially higher than in agriculture, this transformation of employment increases the average productivity (Gollin & Parente, 2002, p. 164).

The idea of new structural economics as advertised by Lin (2013, 2015), is to go beyond neo-classical structural and neo-liberal approaches to development, and acknowledge that the benevolent, informed and competent state has a significant role to play as a leader of change and as a cushion to any market dysfunctionalities. At the same time, the market is fundamental to resource allocation, innovation and industrial diversity (Lin, 2012). State is supposed to shape the strategy of growth and correct any market failures. It directs the economy to the latent comparative advantage, which is the neoclassical comparative advantage, but not exploited (Sejkora & Buryan, 2015, p. 1).

The endowment structure — labour, natural resources and capital — both human and physical — are dynamic in time and represent the total available budget that the country can allocate to primary, secondary, and tertiary industries to produce goods and services (Lin & Treichel, 2012, p. 6). Convergence is possible once the industry/technology is aligned with the economy's comparative advantage (Lin, 2012, p. 307). The role of the government, which is aware of the economy's comparative advantage, is to provide soft and hard infrastructure in order to reduce transaction costs, compensate pioneer firms for externalities (such as information externali-

ties) and temporarily protect infant industries. Access to information and conscientious distribution of information amongst chosen agents is crucial element of the theory (Lin, 2015, p. 161).

Therefore in Lin's NSE theory, it is assumed that the state has a certain capacity and motivation to act in a general interest of the economy as a system. Therein lies the dilemma. In Africa, institutions bear a systematic and significant relationship to economic performance (Devarajan *et al.*, 2001, p. 12; Bates *et al.*, 2012, p. 519). The region is generally condemned by the quality of democracy and institution and corruption indexes, which put a number of countries in the fragile states catalogue (Kekic, 2007, pp. 3-5; FFP, 2017). So from one stand point, can we indeed agree that the state can assume the role of manager of change, suggested by Lin, while from the other — can it not be done? Structural adjustment experiences have shown that the liberalization check list — market will do the rest, did not work out (Stiglitz, 2011). It was largely because of exogenous rivalry interests and endogenous mismanagement, lack of social responsibility and cohesion (Williamson, 2000). Experiences of successful reformers in sub-Saharan Africa depict that the introduction of reforms requires consultative processes, which results in a broad consensus for reform (Devarajan *et al.*, 2001, p. 11). Berglof (2015, p. 122) suggests that interventionist policies may be necessary for economic development today, so it is more about how to intervene then, if to intervene, and how to ensure that such interventions are not captured by particular interests.

Transition economies inherited distorted economic structures resulting from the attempt to defy comparative advantage under socialism (Berglof, 2015, p. 116), while sub-Saharan economies inherited distorted economic structures resulting from colonialism, which made them the “periphery” economies (as called in early structuralism theories). In many countries in sub-Saharan region, the extent and nature of institutions is a consequence of the “extractive institutions” policies imposed by the European settlers (Acemoglu & Robinson, 2012, p. 3077). Heavy government intervention after independence in Africa was partly a reaction to the laissez-faire of the colonial era. A number of conflicts and distortions in governance in the region complicated the process of economic development. Despite the fact that in the literature on the relations of democracy and economic development nexus, any such relationship is weak (Przeworski *et al.*, 2000; Chauvet & Collier, 2009), certainly the quality of governance rather than supporting elites (Berglof, 2015), contributes to economic performance.

Despite recent economic growth and raising investment attractiveness of the region (Milczarek, 2014, p. 153), the poverty has not declined enough, especially in the aspects of agricultural productivity, productive employ-

ment, education, and stubbornly high mortality rates (Devarajan & Kanbur, 2013, p. 12). Endowed with an unfavourable set of initial conditions and being peripheral to world's economy, the region may be unable to attract a critical scale of industrial activities and, as some transition economies in the Central Eastern Europe: “*witness the collapse of their industrial bases, drastically cutting local demand and setting real restrictions to efforts and policies of indigenous growth*” (Kallioras & Petrakos, 2010, p. 678).

Generally, still majority of populations in sub-Saharan region are employed in agriculture. In a number of states, large fraction of individuals is engaged in farming, but the productivity of the agricultural sector is low relative to the non-agricultural sector (Gollin & Rogerson, 2010, p. 53). Also, subsistence and partly subsistence agriculture still dominates in the region. According to Bates (2012, 2015), dictators in Africa in order to stay in power were assuring the endorsement of military and urban elites. Favouring the urban areas was depended upon their ability to demobilize the rural electorate. This required keeping cheap import and food, maintained overvalued exchange rates and subsidies or controls on food prices, which was undermining the local agriculture (Bates & Block, 2013, p. 374). Labour market mobility, crucial for structural change, is in some cases of the region related to cultural and social aspects (Fukuyama, 1992, pp. 77–78).

Sub-Saharan region can be considered as suffering from the inability to structurally upgrade from low value added to high value-added production. According to Lin & Treichel (2012), structural upgrading requires investments in education, research and development, and physical infrastructure. On the other hand, failing to do so, may risk de-industrialization which may come as a consequence of rising competitive pressure from China and other fast growing emerging economies.

Economic development by African leaders

African best performing group is ahead of the sub-Saharan region when it comes to the human capital development reflected by the access to education and research activity². This may indicate that these states recognize and support the process of industrialization by supporting the quality of labour force, which in turn may allow its mobility (Gollin & Parente, 2002; Lin, 2012, p. 166). Not only the average literacy rate among adults and youth in the leading group is exceeding regional performance, but also the

² Lack of data availability did not allow to include these factors into the model, however, static data analysis allows to draw some opening remarks of this section.

differences between them are not high (Table 3). It allows a plausible conclusion that the access to the basic education is common in the best performing group. However, in order to climb to higher value-added activities in the production process, also secondary and tertiary education must be well-developed. The leaders are more advanced as compared to the region³, however more effort is needed. Also, considered the value of GINI index (Table 1), which indicates the presence of inequalities, there is a risk of bias in access to technical and higher education for privileged groups.

When it comes to the scientific journals indicator⁴, we can see again that the best performing group is outstanding the regional performance. This indicator represents the existing stock of knowledge absorbed in embodied and disembodied technology; it shows the overall productivity of researchers and reflects the capacity to transfer, diffuse, and develop technology. This capacity is rising in the region after 2000 (Figure 1). It varies across the region (standard deviation 1469), but also in the best performing group (4149), as South Africa is an outlier (9679). Once the variable is transformed to *per capita* value, the outstanding performance of the leading group compared to region is confirmed, but the disparities within the group are less important. Hence, the technological capacity and readiness is far more advanced in the sample group than in the region on average.

Compared to the laggard group and the regional average, also the value added per agricultural worker is significantly higher in the best performing group (Table 3). Agriculture value added per worker indicates the growing productivity of the sector, a consequence of human and physical capital quality. This may indicate the potential ability of the workforce to migrate to other sectors (Gollin & Parente, 2002). The studied group performance in this aspect suggests that the intangible assets of these countries are more advanced than the regional average, which may be interpreted as a potential source of their better performance. High per worker value added in agriculture seems to confirm the conclusions based on scientific articles values.

Despite sharing important elements of economic system, the best performing group is not homogenous. Therefore, a long term (1980–2015)

³ The regional mean as shown in Table 3, and this estimate may be higher than in the reality. It was based on available data, whereas a number of countries does not provide such information. In these countries access to tertiary education is generally lower and if would be included, probably would further decrease the regional outcome.

⁴ Patent registration is used as an indicator of technological advancement, however this data is not available for the sample. Scientific and technical journal articles refer to the number of scientific and engineering articles published in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences.

analysis of their structures will be followed by an in-depth individual policy discussion (2000–2015).

Clearly there is a difference between South Africa and the rest of the sample, but also among Botswana, Gabon, and Namibia, when it comes to the sectoral structures and trends in their economies. GDP value of Botswana, Gabon and Namibia accounted for 12% of South African GDP value in 2015. Considerably less people are employed in agriculture sector in South Africa than in Botswana, Gabon, and Namibia. South African agricultural employment has fallen after the minimum wage legislation was introduced in the beginning of 2000 (Bhorat *et al.*, 2014, p. 1416). As mentioned before, the size of South African economy far surpasses the other economies in the sample. South Africa is also more advanced in structural transformation and replacing industry with services in the GDP composition. In South Africa and Namibia, the share of services in GDP has surpassed industry. In Botswana this happened only in the turn of the century. However, while in South Africa and Botswana the process amplifies, in Namibia it advances at a slower pace (Figure 2).

In Gabon, on the other hand, a moderate increase of industry is observable in 2001–2015, while the services importance does not rise (Figure 3). This tendency reversed after 2011, since services started to grow, but it is hard to predict whether this trend will continue. Looking into the past experiences, it may be a temporary turn and a consequence of dropping prices of oil. Gabon depends on raw material exports, especially on fuels. In Figure 3, a steady decrease of agriculture share in GDP is observable. It may not necessarily be a positive trend, especially that agriculture was contributing to the overall growth when oil prices were dropping in Gabon. Bearing in mind that the decrease of agriculture importance, despite its growing value added, is not followed by the increase of the manufacturing, we may assume either the flow of labour to services (which could be positive) or to industry (which can be positive, but also negative if leads to more dependence on oil extraction).

A correlation matrix of GDP per capita and depended variables was computed for each country individually in a long term 1980–2015. Depended variables of GDP per capita are summarized in Table 4. In the case of Gabon, some computations were not available because of limited data availability. The results reveal structural changes influence especially on Botswana, Namibia, and Gabon. As reasonably expected, positive and significant impact of growing value added of all sectors was found. However, it was quite surprising that a reverse trend was found for Gabon. However, when a short data analysis was tested (using the observations 2001–2009), a positive correlation was found with increasing industry and manufactur-

ing value added also in the case of Gabon. Another positive and significant detected correlation is the number of scientific articles per capita, which may approximate the level of technology absorptive capacity in the economy, as noted before. This would support the view that the best performing countries increase their level of technology, which may indicate state' focus on technology promotion in their development strategy.

The differences appear when the sectors' value added to the GDP composition is compared. While the decreasing role of agriculture, expected in the scope of new structural economics, applies in all cases, the share of industry is growing in Namibia, while decreasing in Botswana. This may be explained by the countries' characteristics. Botswana is highly dependent on diamond industry, so decreasing the significance of industry and increasing of services may indicate a shift of labour force and diversification of economy. On the other hand, Namibia increases its incomes from industry, including mining, as the sector has been lately growing in the country.

The structure of South African economy seems most set, with no movements importantly influencing the GDP per capita. However, it is noteworthy that the level of GDP per capita has not increased as significantly as in other countries in the sample, in the studied period. The South African economy started from a higher level of development and industrialization. Most influential for South African development seems to be the increasing agricultural value added per worker and scientific journals, but also natural resources rent, trade value, and services value in trade, in relation to GDP. It appears that raising the productivity of exploited endowments is the way to increase the GDP per capita in this state in the long run.

Therefore, in the next step of the research, based on the correlation matrix individual OLS models were estimated. Since the goal of the paper was to analyse structural changes of successful economies, time span was reduced to recent policies. Considering the change in development agenda after the lost decade of the nineties' it seemed more suitable to analyse the post Millennium Summit period. The time span used varied for individual cases based on data availability.

South Africa model depicted a strong 0,99 R-squared value. In the Durbin-Watson statistic test, the presence of autocorrelation (a relationship between values separated from each other by a given time lag) in the residuals (prediction errors) from a regression analysis was not detected as the value level was 1,99; also the collinearity problem was not observed (Table 5). A positive and strong correlation of the value added of manufacturing was found. The negative impact of industry value added to % of growth was also revealed by the model. It can be interpreted that the growth resulting from industry has a negative impact on GDP in per capita terms. Posi-

tive effects of decreasing role of industry in GDP may further explain the negative effect of trade, as the exports are largely depending on the mining industry. The results indicate positive impact of increasing manufacturing activities, which are higher value-added activities than i.a. mining for the South African economy.

R-squared value in Botswana regression model has revealed significant correlation (0,99); variance inflation factors value was acceptable, and the autocorrelation was not found (1,89 Durbin-Watson value; rho 0.031). A positive and significant correlation with increasing value added per worker in agriculture, and value added of services and industry were found. Given that based on the descriptive statistics generally the share of industry is lowering towards services sector in Botswana, the diamond trade persists to be a crucial source of GDP income (Table 6). We can assume that the development in Botswana is tied with the extraction of natural resources, however positive structural change in the economy have also been introduced. Certainly, the positive performance of agriculture indicates a positive transformation of the economy.

In the correlation matrix, significant and positive impact of increasing technological potential with economic development was revealed for Botswana. A model taking into account the increasing technological progress instrumented by the logarithm of scientific journals articles per capita has confirmed the positive impact of both researchers potential and services on GDP per capita (Table 7).

The OLS regression model for Gabon passed the Durbin-Watson autocorrelation test (1,89) and the no collinearity problem was observed. In the model, the data for period 2001–2014 was analysed. The model was well fit, with 0,91 R-squared value. The results of the estimation have revealed a positive impact of services commitment to annual growth and increase in absolute value added of industry. Also lowering natural resources rent in the GDP seems to be positively correlated with GDP per capita in this country. This may suggest that with decreasing prices of oil, the country profits from the services sector.

In the Namibia model, the R-squared value was high (0,99), variance inflation factors values did not raise the collinearity problem, as no autocorrelation was detected (2,04 Durbin-Watson value; rho -0.022). A significant correlation with increasing value added of services and natural resources rents on GDP per capita in Namibia. It reveals that the Namibian economy profits from the natural resources rents, the growing value added per worker in agriculture, and the increasing value of services. Namibia, being a large but low populated country with stable democratic system, is strongly connected with the South African economy (independence from 1990),

and its mining industry is still expanding. In Namibia, the role of tourism is also important, and with political stability future income from this sector may also be expected.

Discussion

Berglof (2015) found that the emphasis of economic structure change without enough emphasis on institutional change is not desirable for African development. Learning from the European transition experience, he suggests that long-term stability of economic reforms can only be ensured when accompanied by political reforms. In the new structural economics, this has not been put as a primary concern, which in turn makes it questionable, if these can indeed be applied for the sub-Saharan region. Among the leaders of economic performance, South Africa, Botswana, Namibia, and Gabon all relatively stable and democratic states are found so far. It confirms, that in the sub-Saharan context, chances to ensure sustainable growth are better, once sound domestic policies and institutions are established (Devarajan *et al.*, 2001, pp. 4–40; Kose & Prasad, 2012).

Impositions of changes is much more complicated if a state is bordering unstable neighbours. Failing states inflict very large costs on their neighbours (Chauvet *et al.*, 2010, 976–977). It appears that the southern part of Sub-Saharan Africa has become a hub of economic development, which definitely profits from the relative stability. In the past, South Africa alone was the outstanding performer in the region, but today the group of leaders has grown. President Mugabe's stepping down in late 2017 presents an opportunity to further enlarge the southern hub's range.

The results of this study imply that structural change in best performing economies is not a parallel, but individual process, which is possible because of the endogenous capacity to guide changes (i.a. Calderón, 2009; Bruno *et al.*, 2015). Development indeed follows structural change and good governance seems to enable the process (Fosu, 2012). However, it is not evident if the paradigm of NSE goes any further than the endogenous and neo-classical theories of growth already went, in a way which would provide a break in the development policy implications for the region.

Also, technology is a significant factor in the leader's performance; it is positively correlated with economic development, but also with the increasing role of services and decreasing role of agriculture sector to GDP (though positively with value added per agricultural worker).

Sub-Saharan African states are depending on their endowment structures rather than managing them. Countries rich in natural resources, profit

from raw material exports and do not diversify their economies enough, despite the fact that the dependence on industrial, service and agriculture sectors as GDP components varies across the region. The experiences of best performing economies analysed in this study shows that there is no uniform way to develop. As Birdsall *et al.* (2005) claim, the most successful development stories have been based on innovative policies, often heterodox. African best performers experiences inscribe in this thinking.

Conclusions

In this research four best performing sub-Saharan countries performance was analysed. Relative advantage in human capital of the best performing countries implies that successful growth strategies require inputs to education, which in turn increases labour productivity and mobility towards higher value-added sectors of economy. However, despite relative homogeneity of the leaders towards the region, which marks out their potential of development, absolute heterogeneity was found within the group. In Gabon, the distribution of income favours social inclusion, Botswana seems to undergo most intensive technological change, and South African economy is outstanding due to the size, attained level of structural transformation and industrialisation. Each of the leaders is in a different stage of structural transformation and the process proceeds at individual pace.

Since three out of four best performing countries are found in the southern corner of Africa, a positive impact of the largest South African economy on bordering Namibia and Botswana's development paths can be assumed. Therefore, we can conclude that the countries in the sub-Saharan region may profit from the proximity of large and relatively stable economies.

The regression analysis for the sample countries has revealed that there is no common way of economic development, even in similar economic environment of the region. Depending on individual endowment structures and the level of attained industrialization, different policies are required. The fact that the more advanced South African economy profits from the increasing value added of manufacturing, while in Botswana and Namibia the positive increase of services has been revealed calls to ask a crucial question for African development. Does it mean that the new leaders will not industrialise or does it mean that new sequence of structural transformation requires first the rise of services and next manufacturing?

Despite the fact that Botswana, Namibia and South Africa's value added of industry to GDP is comparable, in Botswana the growth of industry sec-

tor is positive, while in South Africa decreasing industry contribution to annual growth has a positive impact on development. South Africa and Gabon seem to depend on natural resources rents in GDP too much, which in the case of Gabon is additionally reflected in a positive impact of increased contribution of services to annual growth. Plausibly, while decreasing raw material prices influence the natural resources rents contribution to GDP, the services sector accounts for the growth in Gabon. Botswana seems to be managing natural resources rents in a most efficient way; increasing technology which enables the transformation of raw materials makes it less dependent of global prices and demand.

It was found that the increase of value added per worker in agriculture contributes to economic development in best performing countries. Hence, increasing productivity of agriculture seems important policy implication for Sub-Saharan states. Based on the results, technology progress is crucial for the structural transformation and economic development. However, reaching to the frontier of world technology requires intensification of research and higher and technical education to implement institutional arrangements and policies facilitating entry and exit of firms and investments.

In the future research, it would be interesting to extend the analysis on the structure of exports and imports from best performing countries. Also, research of the factors which contribute to structural changes will follow this study. It may be necessary to concentrate on Botswana and South Africa, as more data is available for these countries. Moreover, it would be useful to conduct case studies analysis which would allow to deepen the policy implications for individual cases.

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Annex

Table 1. Rationale for choosing best performing economies sample group for the research (2014 data, unless otherwise stated)

Country:	SA	Gabon	Botswana	Namibia	Regional*
HDI index 2014	0.666	0.684	0.698	0.628	n.a.
GDP per capita ^a	7593	10 752	7080	6000	1660
GINI index ^b	63.38	42.18	60.46	60.97	43.98 ^f
Growth rate ^c	1.10	0.92	2.70	3.01	2.00
Agri. % emp. ^d	4.6	24.2	26.4	31.4	49.41
Agri. va % GDP ^e	2.37	4.69	2.41	6.69	17.50
GCI rank 2015	85	103	71	49	-

* Regional average - based on WDI data for sub-Saharan region aggregate.

^a – 2015 data, const. 2010 USD; ^b-data respectively for: 2011, 2005, 2009, 2009; ^c – mean per capita growth rate (annual %) in 2006-2015; ^d - data respectively for 2014, 2005, 2010, 2015, aggregate data was computed as a mean of any available latest data from 2005 (28 observations were found); ^e - Agriculture, value added (% of GDP).

Source: own elaboration based on GCI (2016) and WDI (2017).

Table 2. Explanation of data used for OLS regression models

Variable	Long definition
Agri_va_per_worker	Agriculture value added per worker (constant 2010 US\$)
Agri_va_of_GDP	Agriculture, value added (% of GDP)
Agri_va_% growth	Agriculture, value added (annual % growth)
Agri_va	Agriculture, value added (constant 2010 US\$)
Industry_va_of_GDP	Industry value added (% of GDP)
Industry_va_% growth	Industry value added (annual % growth)
Industry_va	Industry, value added (constant 2010 US\$)
Services_va_of_GDP	Services, etc., value added (% of GDP)
Services_va_% growth	Services, etc., value added (annual % growth)
Services_va	Services, etc., value added (constant 2010 US\$)
Manufact_va_of_GDP	Manufacturing, value added (% of GDP)
Manufact_va_% growth	Manufacturing, value added (annual % growth)
Manufact_va	Manufacturing, value added (constant 2010 US\$)
Natural resources of GDP	Total natural resources rents (% of GDP)
Trade of GDP	Trade (% of GDP)

Table 2. Continued

Variable	Long definition
Trade in services of GDP	Trade in services (% of GDP)
Scientific articles pc	Scientific and technical journal articles per capita

Note: Industry comprises mining and quarrying, manufacturing, electricity, gas and water. Manufacturing is the physical or chemical transformation of materials of components into new products, whether the work is performed by power- driven machines or by hand, whether it is done in a factory or in the worker's home, and whether the products are sold at wholesale or retail. Included are assembly of component parts of manufactured products and recycling of waste materials (ISIC, 1990).

Source: Regional average - based on WDI data for sub-Saharan region aggregate.

Table 3. Human capital indicators in best performing vs. regional and laggard group countries performance in sub-Saharan Africa in 2015

Country group:	Best performing	Sub-Saharan	Laggard group*
HDI 2014 index	0.669	0.518	0.370
Adult literacy**mean	89%	67%	42%
- stand. dev.	4	20	20
Youth literacy***	95%	76%	52%
- stand. dev.	3	19	25
Secondary edu.*a	78%	54%	Na
Tertiary educ.*b	14%	10%	Na
Scientific journals ^c	2494	424	16
Scientific journ. pc	$8,05 \times 10^{-5}$	$2,11 \times 10^{-5}$	$2,28 \times 10^{-6}$
Agri_va	4338	1222	1041 ^d

*Lowest HDI performance countries: Niger, Central African Republic, Eritrea, Chad.

** Adult literacy rate, population 15+ years, both sexes (%), 2015 data.

*** Youth literacy rate, population 15-24 years, both sexes (%), 2015 data.

Agriculture value added per worker is a measure of agricultural productivity. Value added in agriculture measures the output of the agricultural sector (ISIC divisions 1-5) less the value of intermediate inputs. Agriculture comprises value added from forestry, hunting, and fishing as well as cultivation of crops and livestock production. Data are in constant 2010 U.S. dollars.

^a - secondary education enrolment, gross %; ^b - tertiary education enrolment, gross %; ^c - data for 2013, latest available; ^d - data not available for Eritrea.

Source: own elaboration of WDI data (04.01.2017).

Table 4. Correlation of depended variables with GDP per capita (constant 2010 USD) based on individual best performing sub-Saharan countries models

Country	BWA ^a	GAB ^b	NAM ^c	SA ^d
Agriperworkerconstant2010US	0.21	-0.71	0.13	0.70
Agri_va_of_GDP	-0.83	na	-0.61	-0.35
Agri_va_annual % growth	0.08	0.11	-0.38	0.08
Agri_va	0.87	-0.70	0.43	0.58
Industry_va_of_GDP	-0.73	na	0.67	-0.19
Industry_va_annual % growth	-0.46	0.26	0.14	0.15
Industry_va	0.96	0.13	0.99	0.78
Services_va_of_GDP	0.87	na	-0.47	0.21
Services_va_annual % growth	-0.27	0.09	0.41	0.28
Services_va	0.97	-0.52	0.98	0.70
Manufac_va_of_GDP	0.25	na	0.45	-0.64
Manufac_va_annual % growth	-0.09	0.36	-0.14	0.09
Manufac_va	0.97	-0.59	0.95	0.73
Natural resources of GDP	0.36	-0.18	0.21	0.81
Trade of GDP	-0.46	0.53	0.55	0.82
Trade in services of GDP	-0.67	na	-0.63	0.60
Scientific articles pc	0.89	-0.34	0.78	0.87

a - observations 1980 – 2014 5% critical value (two-tailed) = 0.3338 for n = 35;

b - using the observations 1981 – 2014 5% critical value (two-tailed) = 0.3388 for n = 34;

c- using the observations 1990 – 2014 5% critical value (two-tailed) = 0.3961 for n = 25;

d - using the observations 1980 – 2014 5% critical value (two-tailed) = 0.3338 for n = 35;

Table 5. OLS regression model of GDP per capita in South Africa in 2000–2013

Variable	Coefficient	Std. Error	t-ratio	p-value	VIF
const	1943.17	166.178	11.6933	<0.0001	
Manufac_va	1.3522e-07	4.99226e-09	27.0859	<0.0001	2.326
Industry_va_%growth	-26.7582	5.75053	-4.6532	0.0009	1.025
Trade of GDP	-20.1896	3.98968	-5.0605	0.0005	2.352

OLS using observations 2000-2013 (T = 14)

Source: own elaboration based on WDI 2017 data.

Table 6. OLS regression model of GDP per capita in Botswana 1997–2014

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	<i>VIF</i>
const	920.007	234.69	3.9201	0.0015	..
Agri_va_per_worker	0.954824	0.222742	4.2867	0.0008	1.643
Services_va	6.10943e-08	2.29508e-09	26.6196	<0.0001	2.240
Industry_va	9.84287e-08	6.55578e-09	15.0140	<0.0001	1.570

OLS, using observations 1997-2014 (T = 18)

Source: own elaboration based on WDI 2017 data.

Table 7. OLS regression model of GDP per capita in Botswana 1997–2014, with alternative variables

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	<i>VIF</i>
const	15129.1	4496.12	3.3649	0.0063	..
Scient_log	1163.21	452.146	2.5726	0.0259	1.591
Services_va	3.29e-07	4.33e-08	7.5930	<0.0001	1.591

OLS, using observations 1997-2014 (T = 18)

Source: own elaboration based on WDI 2017 data.

Table 8. OLS regression model of GDP per capita in Gabon 2001–2014

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	<i>VIF</i>
const	7654.67	844.749	9.0615	<0.0001	..
Services_va_% growth	71.2914	15.424	4.6221	0.0009	1.690
Natural resources	-50.8327	11.4566	-4.4370	0.0013	1.809
Industry va	2.40599e-09	3.4254e-010	7.0240	<0.0001	1.093

OLS, using observations 2001-2014 (T = 14)

Source: own elaboration based on WDI 2017 data.

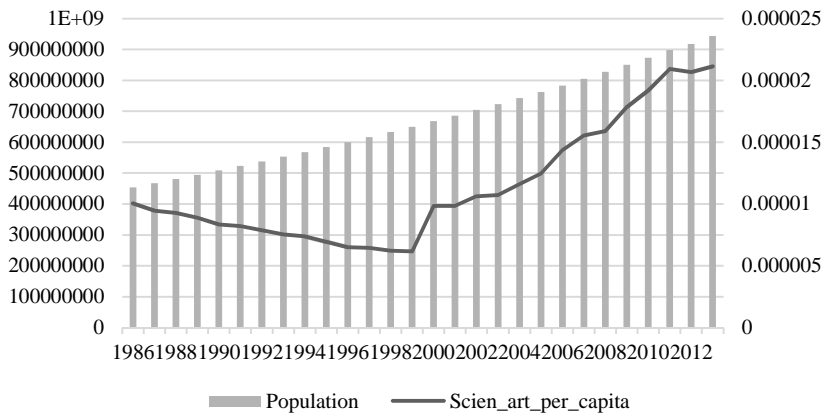
Table 9. OLS regression model of GDP per capita in Namibia in 1997–2013

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	<i>VIF</i>
const	1517.15	294.793	5.1465	0.0002	..
Natural resources	91.6273	20.1571	4.5457	0.0005	1.566
Services_va	6.34e-08	3.07e-09	20.6848	<0.0001	1.636
Agri_va_per_worker	0.12559	0.06818	1.8420	0.0884	1.127

OLS, using observations 1997-2013 (T = 17)

Source: own elaboration based on WDI 2017 data.

Figure 1. Scientific articles per capita and population growth in sub-Saharan Africa in 1986–2013



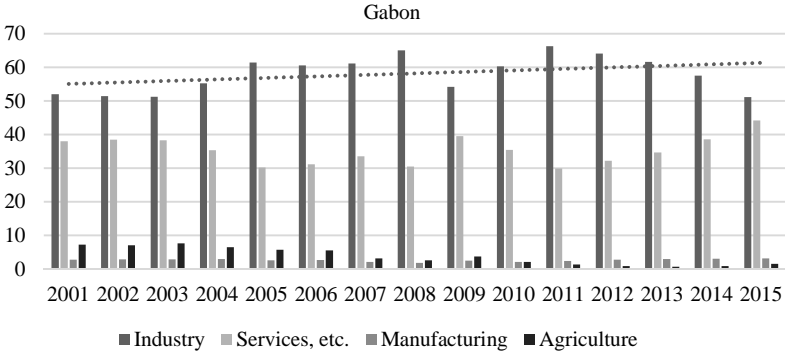
Source: own elaboration based on WDI data (2017).

Figure 2. Industry and services shares in GDP in South Africa, Botswana, and Namibia in 1980–2015



Source: own calculations based on WDI (2017).

Figure 3. Structure of GDP in Gabon in 2001–2015



Source: own calculations based on WDI (2017).