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Project II “Inequality And Growth In Emerging Economies: A Comparative Analysis In The Case Of Brics”

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About the BRICS Policy Center

The BRICS Policy Center / Centro de Estudos e Pesquisas BRICS (BPC), a think tank linked to the Institute of International Relations of PUC-Rio (IRI / PUC-Rio), is an independent, non-partisan and non-profit center for reflections in the city from Rio de Janeiro.

The BPC's mission is to contribute to the advancement of a rights based development agenda and promotion of equality in the countries of the global south, throughout the production of critical and relevant knowledge for the public debate about the transformations in the international system and its consequences at the local, national and regional levels.

The opinions expressed herein are the sole responsibility of the author(s), and do not necessarily reflect the position of the institutions involved.

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Executive Summary

Inequality is one of the most deeply rooted characteristics of underdevelopment. Though also present in highly industrialized countries, its magnitude and consequences are more serious in developing countries. The phenomenon of inequality, in terms of its root, causes and effects, seem to belongs to socio-economic studies, since it is a multidimensional phenomenon.

The BRICS countries (Brazil, Russia, India, China and South Africa) matter for the future of global inequality. BRICS proclaims a demand-driven developmental model, which gives more choices to the less developed countries. Inequalities within the BRICS are therefore of global significance. The nature of economic growth within the BRICS nations has a significant impact on changes in inequality within other countries, both rich and poor (Gu *et al.,* 2016). The BRICS countries share an additional number of important features that warrant a joint analysis. They all play an increasingly important role on the global scene in an attempt to provide a counterweight to the developed countries' dominant power position (Krozer, 2016)

This research is divided into two parts: In the first part using the most recent available data (1990-2018) we analyse many aspects of BRICS national and global activities through various indicators. Analysis with indicators will reveal the position of BRICS compared to other developed countries, and at the same time the differences and similarities within the group. In the second part, using panel data techniques, we explore empirically the relationship between inequality and growth over the period 1995-2018.

Part one

We first analyse the trend of economic growth because growth is indicative of the dynamics of an economy. BRICS, except Russia, demonstrate positive growth rates which especially for China and India are extremely high. China has even higher growth rates than some of the world's most developed economies. Subsequently, we proceed to the analysis of BRICS economic structure, as this is a key factor which determines the countries' economic performance and at the same time reveals the growth level and perspectives. We examine the shares of the Agriculture, Industry, and Services Sectors in terms of their overall value added to the economy's total product. Generally speaking, in lower income countries, the share of the agricultural sector in GDP is expected to be higher, compared to other sectors, and as the economy grows, this percentage shrinks, while the shares of industry and services in GDP increase. Comparing the BRICS countries' percentages of economic sectors' value-added, we can say that the service sector is the most important for all BRICS while the manufacturing sector is bigger for the case China. In this sense, we can say that the economic structure of BRICS approaches that of developed countries, although in the latter the value added of the services sector accounts for more than 70% of GDP. Additionally, the type and quality of services differ.

Then, we procced on to BRICS' Innovation Indicators analysis. Since innovation is a critical factor for the sustainable development of an economy, it can affect inequality in different ways. Although innovation is not a major factor in influencing inequality, different technological change strategies can lead to different results in distributive terms, which either exacerbate or mitigate inequality. Looking at the innovation performance of BRICS we analysed three different versions of innovation indicators: (a) Research and development (R&D) expenditures expressed as percentage of GDP, (b) High Tech exports as percentage of total exports, and (c) Information and Communication Technology goods' exports (ITC). We observed that BRICS are on a positive development path in this sector, but in no way outperform the developed countries. Another important indicator we choose to analyse is the Economic Freedom Indicator. This index documents the positive relationship between economic freedom and a variety of positive social and economic goals. The ideals of economic freedom are strongly associated with healthier societies, cleaner environments, greater per capita wealth, human development, democracy, and poverty elimination. Compared to developed economies, BRICS are exhibiting clearly lower levels.

Then we procced to analysis of some indicators that capture the quality of people's lives and provide a multidimensional portrait of the progress of societies. In this context, we analyse the government's health and education expenditure. Regarding goverment spending on health in relation to developed countries, BRICS spend a smaller percentage of their GDP. This percentage ranges between 11% of GDP (in the case of Brazil and South Africa) and 5% of GDP (other BRICS). On the other hand, government spending on education as percentage of GDP has been rising during the recent years (2005-2016), for all BRICS. It is worth noting that for Brazil and South Africa this percentage is even higher than that of developed economies and the world average, while Russia and India are moving at lower levels. However, this expenditure as percentage of GDP remains low and does not exceed 6%. It should be noted here that the levels of government spending on education between BRICS and developed economies are obviously not comparable, because developed countries start from a different level of income and quality of education.

Regarding inequality, one might expect that the BRICS' high growth rates, which are approaching or exceed in some cases those in developed countries (such as China), should be associated with lower inequality rates, while the opposite is true. We observed extremely high-income inequality rates for all BRICS, with South Africa and China having the higher rates.

Executive summary - Part two

In this part, using panel data techniques, we explore empirically the relationship between inequality and growth, for BRICS over the period 1995-2018. We estimate two different regression equations applying different model specifications. In the first model, the depended variable is GDP per capita growth (%), and we examine the factors that affect economic growth (inequality is among other explanatory variables). In the second model, the dependent variable is inequality proxied by the Gini coefficient, and we examine the factors that affect inequality (among explanatory variables are economic growth, financial growth and other social inequality measures).

The results of the empirical analysis indicate that the relationship between inequality and growth, is not statistically significant (inequality does not affect growth and vice versa). Regarding the other factors that determine inequality and growth, International Trade asserts a positive effect on both (increases growth bur reduces inequalities) while FDI asserts a negative effect. A possible explanation for this positive effect could be that BRICS countries by being integrated rapidly into world markets, mainly through trade, have achieved such growth rates as to allow them to reduce overall inequality. However, we must emphasize here that our results do not refer to inequality within BRICS. Regional analysis on this issue reveal that there are substantial income inequalities within each individual country. So, for trade to contribute in reducing income inequality within BRICS , trade policies must be implemented to reduce both between and within inequalities. These can include export promotion programmes that target to support smaller firms to enter in the global market. By doing so they provide equal opportunities to both unskilled-intensive small firms and skilled-intensive large firms in global markets, which then contributes to reducing income inequality. A possible explanation of the negative effect of FDI on income inequality could be , that FDI raises the relative demand for higher-skilled labor, which in turn leads to an increase in both the wages and employment levels of high-skilled workers relative to those of low-skilled workers. Policy measures for reversing this negative effect, could include the increase of the level of human capital, by increased government spending on education and health services which promote the labor productivity and the living standards. The negative impact of the financial-sector growth on inequality (in the sense that it increases inequality) could be an indication for policies that allow poorer individuals to have cheaper access to financial resources. Finally, the positive impact of other social variables (women's employment and access to technology) on inequality is an indication that governments need to create opportunities for women to participate in the labor market and enhance the access of the population to modern technological developments.

Contents

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1. Introduction

Inequality is one of the most deeply rooted characteristics of underdevelopment. Though also present in highly industrialized countries, its magnitude and consequences are more serious in developing countries. The phenomenon of inequality, in terms of its root, causes and effects, belongs to wider socio-economic studies, since it is a multidimensional. Economic inequalities in income and wealth, social inequalities in health, education and access to welfare services, gender and racial inequalities, cultural and religious discrimination, barriers to political participation, all are main instances of inequalities, global in scope, often intertwined and influencing each other. However, economic inequalities seem to encapsulate effectively most aspects of this phenomenon, and hence the emphasis of our study.

Uneven income distribution hinders economic growth as it implies a reduction of the consumption power for most of the population. High differences in educational and health levels, and discrimination based on gender, dramatically reduce the potentiality for individual self-realization, as well as the amount of human resources available for societal progress. Deep inequalities among social classes and groups undermine social cohesion and the legitimacy of political institutions. All these inequalities go against widely shared values of social justice, equitable and sustainable development, individual freedom and collective empowerment, cultural pluralism and peaceful coexistence. While the processes influencing declines or increases in inequality are global and interlinked, the responses to these processes are specific, heterogeneous and uneven (Martineli, 2016).

The OECD (2011) reports seven reasons that cause increasing income inequality: First globalisation had little impact on both wage inequality and employment trends. Second, technological progress has been more beneficial for workers with higher skills. Third, regulatory reforms and institutional changes increased employment opportunities but also contributed to greater wage inequality. Fourth, the changes in working

conditions (part-time work, decline of collective bargaining) also contributed to rising earnings inequality. Fifth, changing family structures (single-headed households) make household incomes more diverse and reduce economies of scale. Sixth, capital income inequality increased more than earnings inequality in two-thirds of OECD countries. Finally, a seventh reason is that tax and benefit systems have become less redistributive in many countries since the mid-1990s.

The BRICS countries (Brazil, Russia, India, China and South Africa) matter for the future of global inequality. Together, they account for a huge proportion of the earth's population and geographical space. BRICS by creating the New Development Bank (NDB) and Contingent Reserve Arrangement (CRA), and the Chinese-led Asian Infrastructure Investment Bank (AIIB) pose a challenge to today's international financial system. BRICS proclaim a demand-driven developmental model, which gives more choice to the less developed countries. Thus, inequalities within the BRICS are of global significance. The nature of economic growth within the BRICS nations has a significant impact on changes in inequality within other countries, both rich and poor (Gu *et al.,* 2016).

BRICS countries share an additional number of important features that warrant a joint analysis. They all play an increasingly important geopolitical role on the global scene in an attempt to provide a counterweight to the developed countries' dominant power position (Krozer, 2016). This role has been enhanced by their rising economic potential, both as consumers and suppliers in the world market. The aim of this research is first to measure the inequality level inside the BRICS and second, using appropriate panel data techniques, to explore empirically the relationship between inequality and growth. Thus, the main research questions are:

1. What is the inequality level in each BRICS -group member? Are there any distinct similarities or differences?

2. How inequality affects the growth rate of BRICS economies?

As bulk of research on BRICS examines only the impact of socio-political factors on inequality. We believe that our work contributes to this area, because, since inequality is mainly an economic phenomenon, our model includes economic factors together with other socio-political factors to provide a more coherent understanding.

2. Brics – Comparisons

In this chapter, we analyse BRICS through various socio-economic indicators. We do not focus our analysis only on the national level but we try to capture the global position and activity of the BRICS as well. For a more coherent presentation, we group the indicators in various groups that contain common themes.

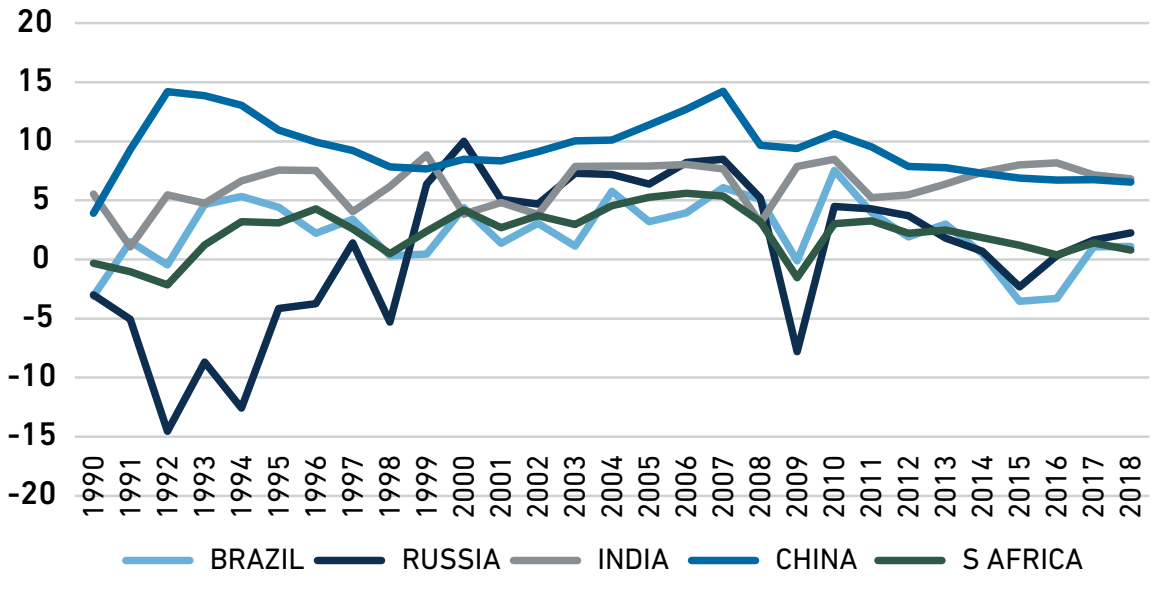
2.1 Economic Performance Indicators

2.1. a) Growth rates

Though GDP as a measure of economic growth is partially acceptable because it is easier to quantify the production of goods and services, it fails to capture the distribution of income across society something that is becoming more pertinent in today's world with rising inequality levels in the developed and devel-

oping world alike. GDP growth cannot differentiate between an unequal and an egalitarian society if they have similar economic sizes. As can be seen from Chart 1 , over the period 1990-2018, the growth rates for the BRICS (with the exception of Russia) are positive. We also see consistently very high growth rates for China and India. Russia seems to have been severely affected by the 2008 crisis as well as South Africa and Brazil, while for China and India, there is only a slowdown in the already high positive growth rates.

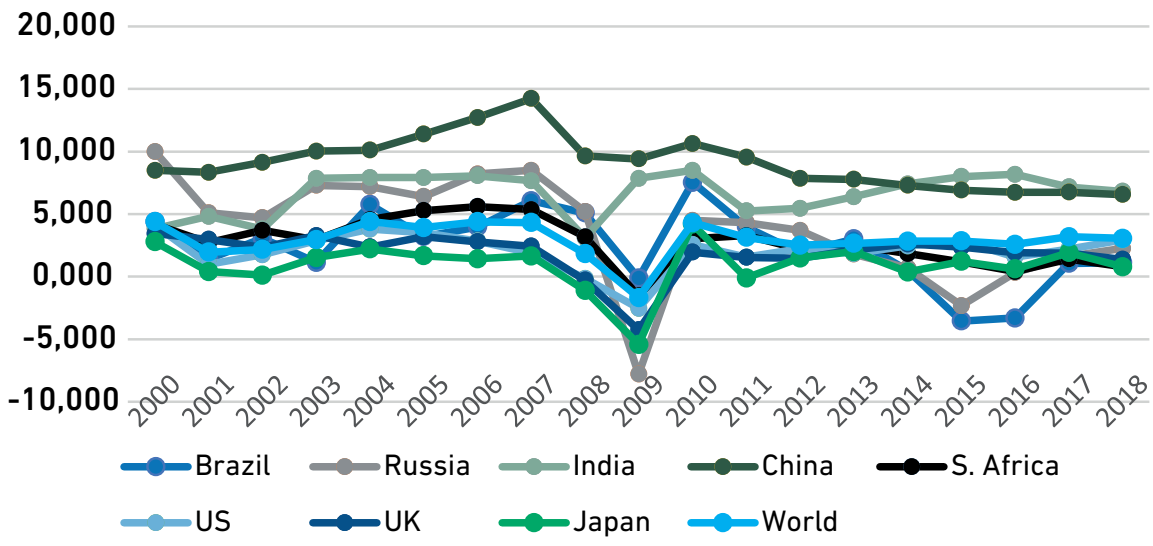
Chart 1. BRICS - GDP growth annual %, 1990-2018



Source WDI and authors; calculations

For comparison purposes, but also for better understanding of trends, in Chart 2 we present GDP growth rates comparing BRICS with developed economies. It is clear here that all the countries in the sample (except China and India) have been negatively affected by the 2009 crisis. Moreover, China, shows higher growth rates even than the most developed economies in the world.

Chart 2. GDP annual growth % BRICS and Selected economies 2000 - 2018



Source WDI and authors; calculations

2.1. b) Economic structure

A country's production structure is the basic source of its economic performance. It determines the rate of firm level innovation, diversification of economy, and direction of structural change. One should look at the shares of Agriculture, Industry, and Services in the overall value added of the economy's total product. Generally speaking, in lower income countries the agricultural sector participates with a higher percentage in GDP, and as the economy grows, this percentage shrinks, while the share of industry and services in GDP increases. In this section we present the economic structure of BRICS, in order to determine their status and their relative trends. In the agricultural sector, India and China present the largest share of GDP among the BRICS, albeit with a downward trend (Chart 3), while in the manufacturing sector, China possess, by far, the largest share in GDP compared to the rest of the group (Chart 4).

Chart 3. Value Added of Agricultural % GDP

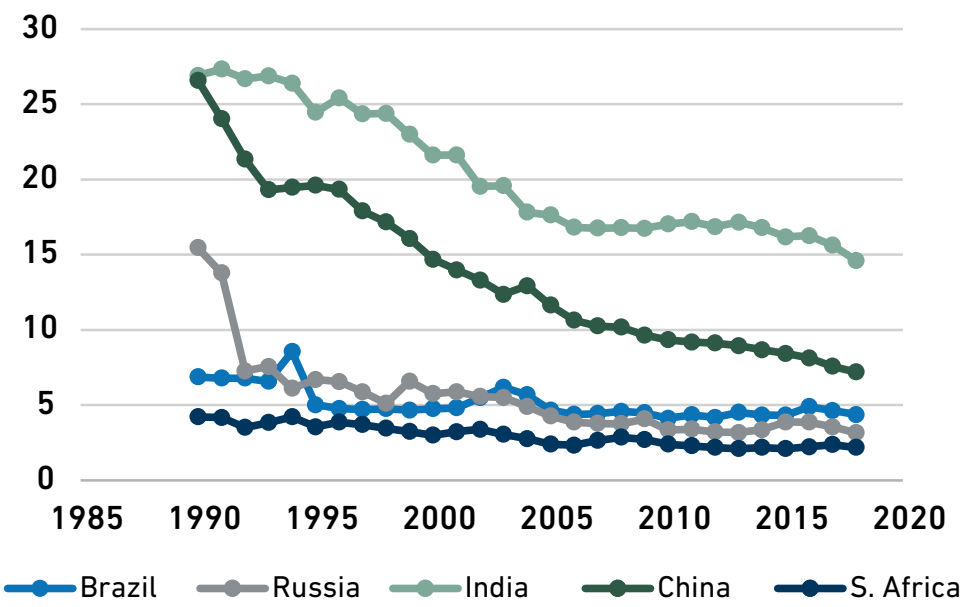
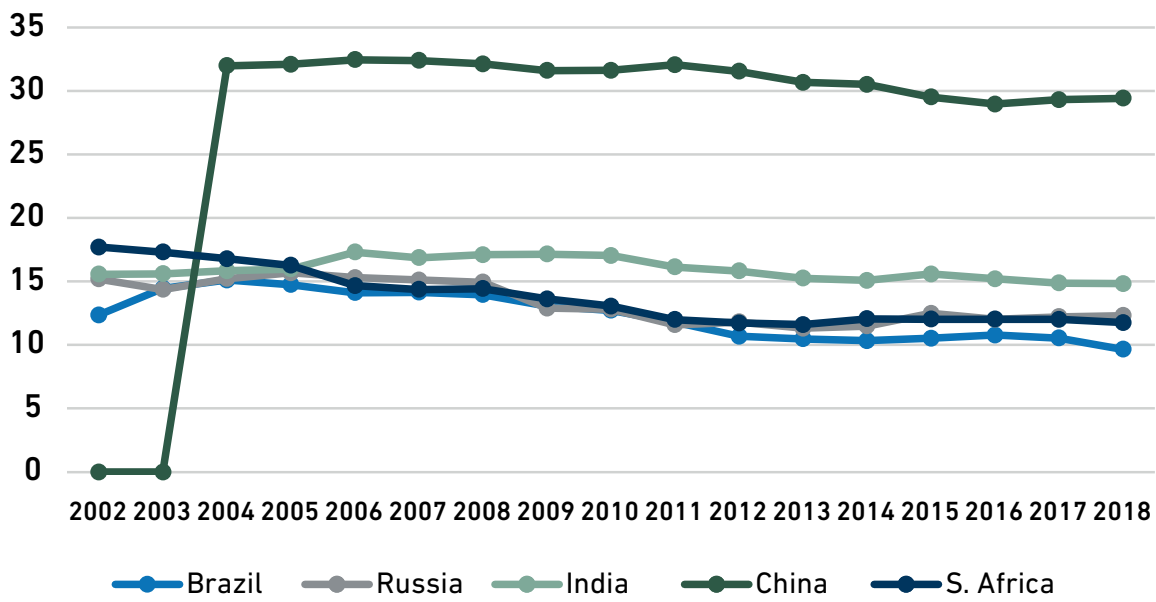


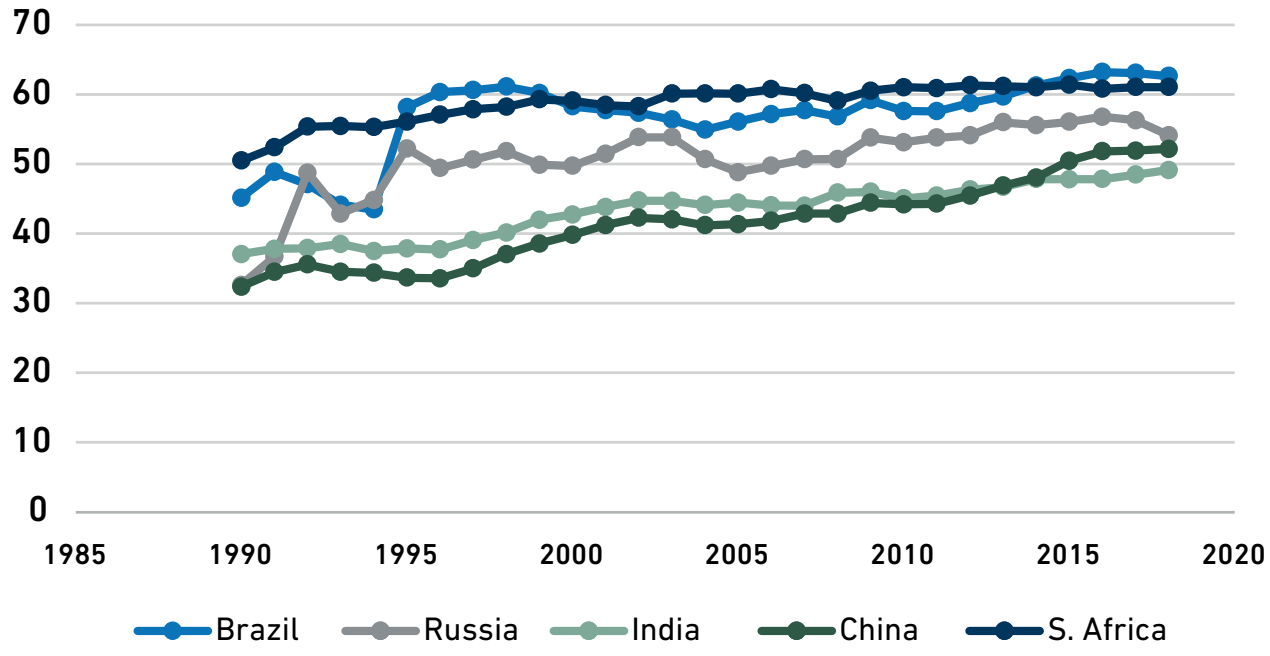
Chart 4. Value Added of Manufacturing % GDP



Source: TheGlobalEconomy and authors' calculations

Regarding the Services sector Brazil and South Africa show the largest shares of Value Added in GDP while China ranked last amongst BRICS (Chart 5).

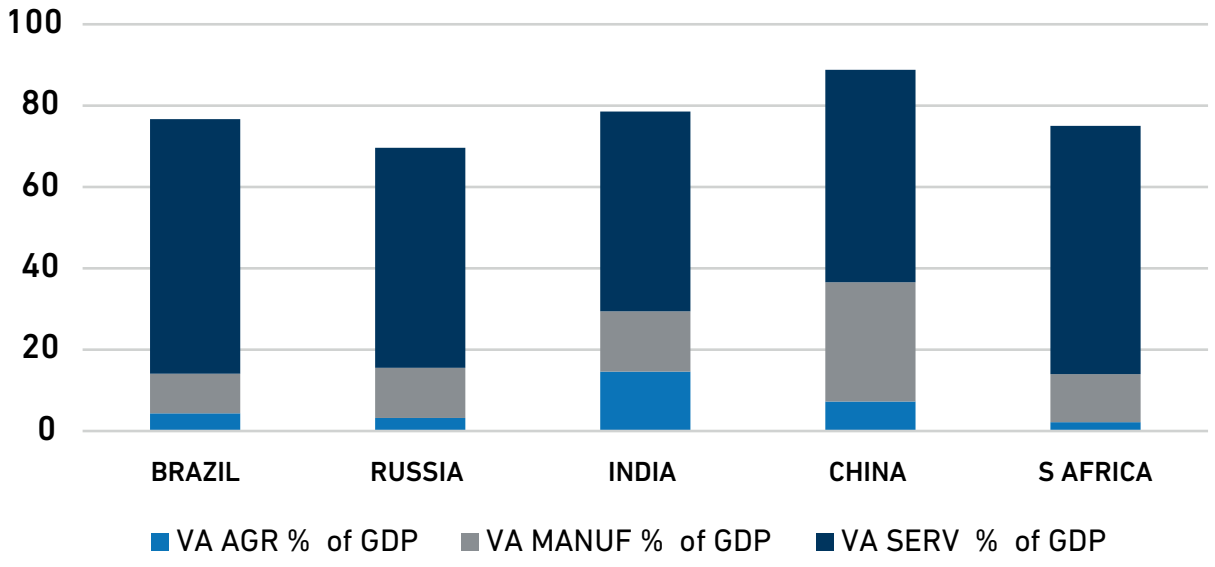
Chart 5. Value Added in Services % GDP



Source : TheGlobalEconomy and authors' calculations

In Chart 6, we use the latest available data (for 2018) to show an indicative picture of the BRICS recent economic structure. Comparing the value added percentages per sector , we can say that, for all BRICS, the service sector is the most important while the manufacturing sector is bigger for the case of China. In particular, the value added of the services sector in Russia, Africa and Brazil contributes more than 50% to GDP. Thus, we can conclude that since the share of services expands, BRICS are clearly still on developing process. In this sense, we can say that the economic structure of BRICS approaches that of developed countries, although in the latter the added value of the services sector accounts for more than 70% of GDP and also the type and quality of services differ significantly.

Chart 6. Brics-Value Added Per Sector As % Of Gdp, 2018



Source: TheGlobalEconomy and authors' calculations

2.2. Poverty- Income Inequality Indicators

We first start with income-inequality comparisons. A rough way to compare income distributions is to use summary measures such as the Gini coefficient. The Gini coefficient ranges from 0 (complete equality) to 1 (complete inequality).

Another way to present the income distribution is to take the ratio of incomes at two points in the distribution. We calculate the 90/10 ratio which takes the ratio of the top 10% of incomes (Decile 10) to the lowest 10% of incomes (Decile 1).

Because we believe that the issue of inequality is very important for the development and prosperity of all countries, we will present the evolution of this ratio (90/10), for individual BRICS, over the period 1980 -2014 (using the most recent data from the Global Consumption and Income database Project), and then, for comparison purposes, we will present in the same diagram the BRICS and selected developed countries, in order to show the position of the BRICS on the issue of income inequality.

Chart 7A. Income Distibution Interdeciles 90/10

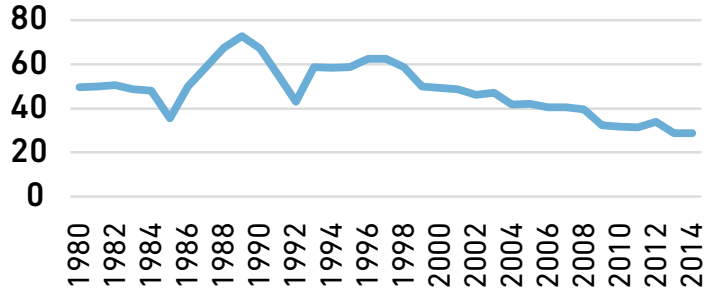


Chart 7B. India - Income Distibution Interdeciles 90/10

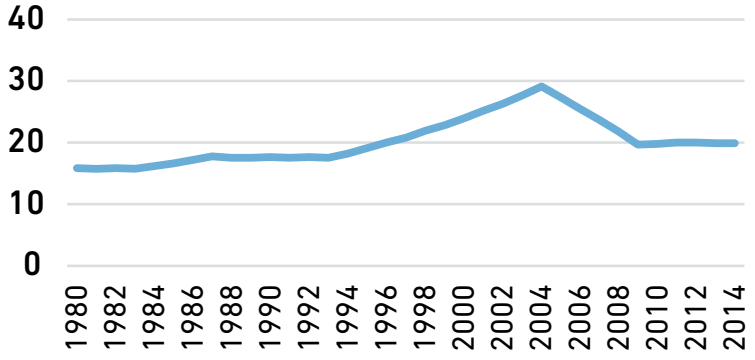


Chart 7C. Russia - Income Distibution Interdeciles 90/10

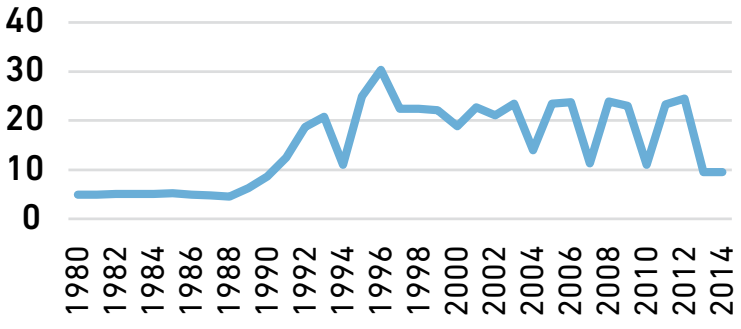


Chart 7D. China - Income Distibution Interdeciles 90/10

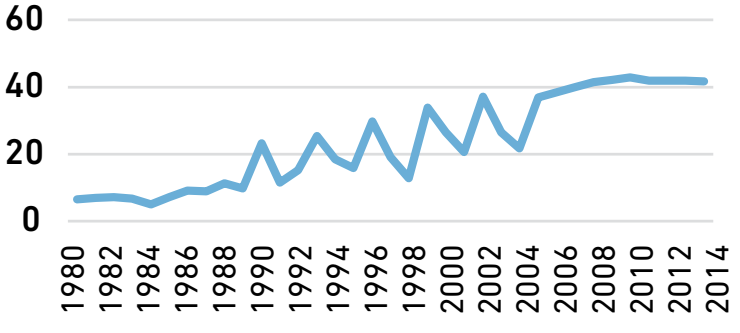


Chart 7E. Africa - Income Distibution Interdeciles 90/10

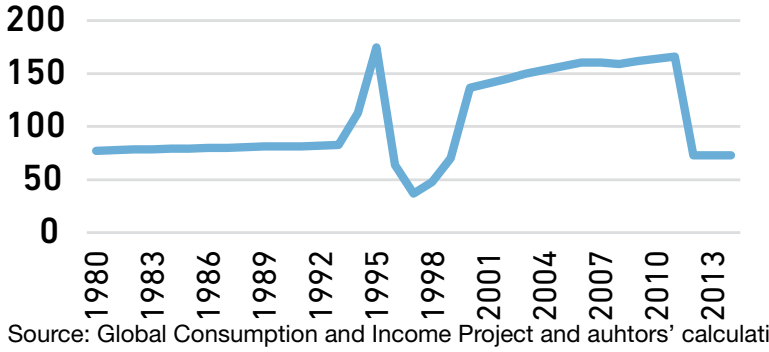
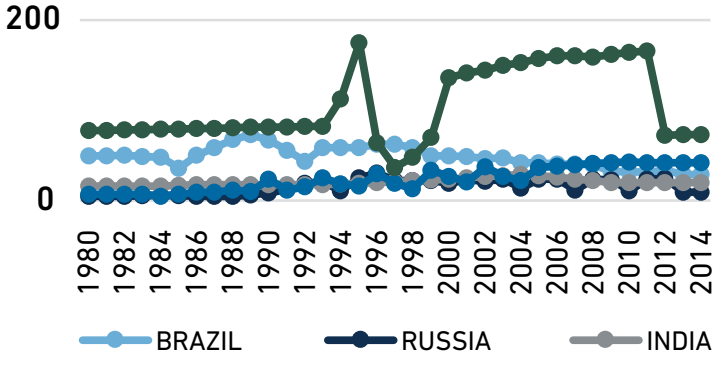


Chart 7F. BRICS - Income Distibution Interdeciles 90/10

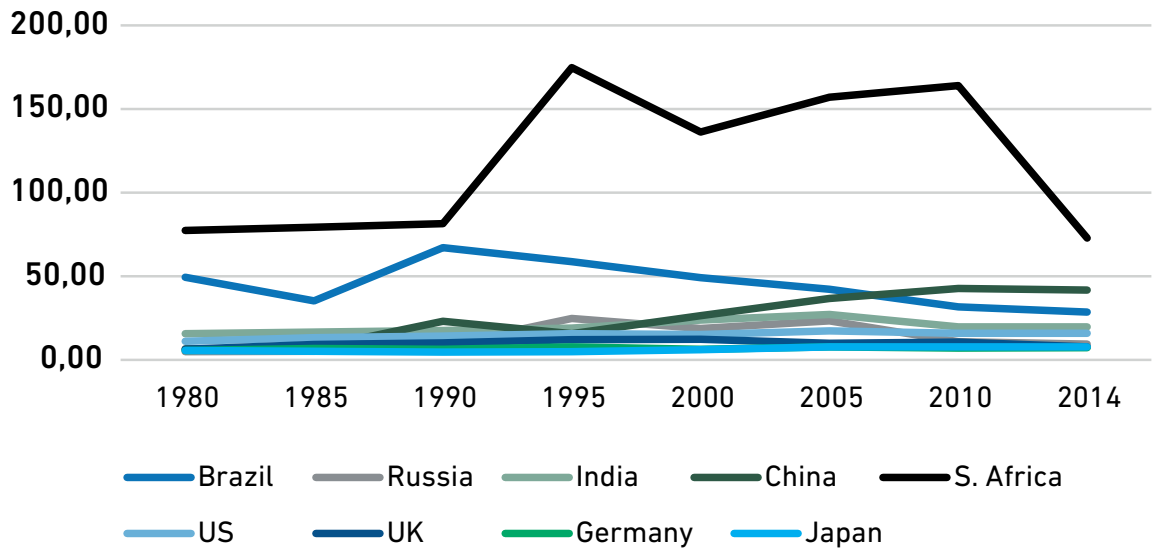


Source: Global Consumption and Income Project and auhtors' calculation

What we observe from Charts 7a-7f, is the remarkably high income inequality ratios for individual BRICS. South Africa and Brazil have the highest inequality ratios, with the rest of the BRICS are moving at lower levels. However, the trend towards these rates is declining, with the exception of China. China's case is a surprise, because due to the nature of the regime and the extremely high growth rates, one would expect to see low inequality ratios. However, on the contrary, the inequality ratios are rising.

For comparison purposes, we divide the 1980-2014 period into five years subperiods and we calculate the 90/10 ratio of the top 10% of incomes to the lowest 10% of incomes every five years . The results are shown in chart 8.

Chart 8. BRICS and Selected Developed Economies
Income Distibution Interdecil 90/10



Source: Global Consumption and Income Project and auhtors' calculation

Here the difference between the countries of the sample is clearer. For example, for the last year (2014) the richest 10% of the population of Russia earned 10 times more than the poorest 10%; for India the equivalent figure was 20 times more, for Brazil it was 28 times more, for China 41 times and for S Africa a staggering 72 times higher. So, we observe very high rates (and in the cases of China and South Africa really extreme) compared to the rest of the developed countries where the richest 10% get at most 7 times more than the poorest 10%.

At this point, since there is much debate about the relationship between growth and inequality, and the results of empirical research are contradictory, it is interesting to see the evolution of some growth indicators and to compare them with the inequality rates. Comparing growth (Chart 2) and income inequality ratios (Chart 8) we observe that despite the high growth rates, the income inequality levels inside BRICS remain at extremely high levels, and this fact causes skepticism about the development model of these dynamic emerging economies.

2.3. People indicators

2.3. a) Health and Education

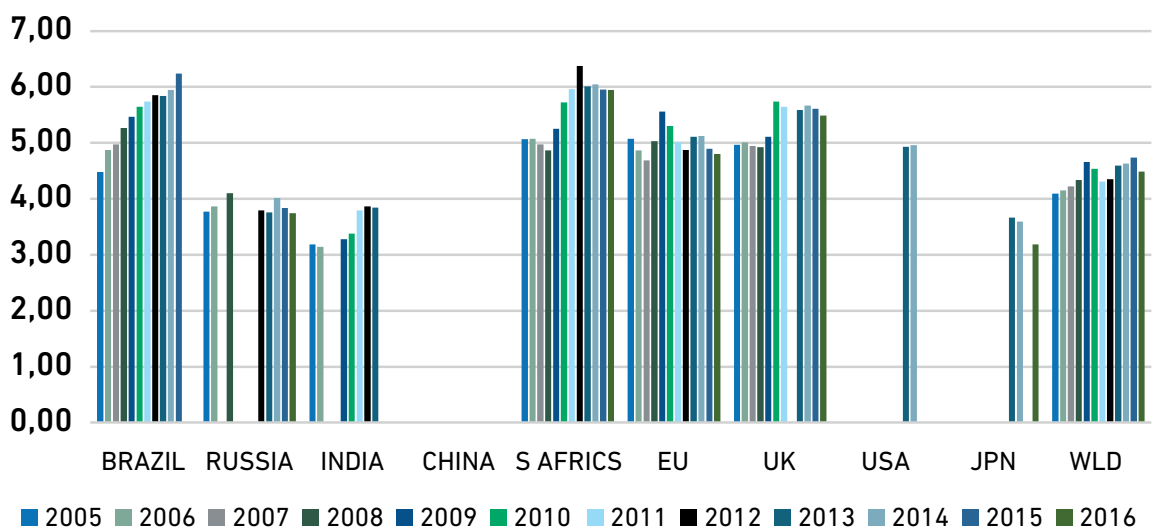
Inequalities, besides economic related, affect other important aspects of quality of life, including differences in opportunities in the educational and health sphere. Education and health are basic components of sustainable development. Education raises people's productivity and creativity and promotes entrepreneurship and technological advances. Better health is central to human happiness and well-being. It also makes an important contribution to economic progress, as healthy populations live longer, are more productive, and save more. Increased productivity is an indicator of economic growth and this can be achieved through greater investment in labor and capital. However, investment in capital can only be fully utilised if there is a healthy and educated workforce available in the economy. Thus, health and education both play a vital role in improving productivity and economic growth.

Government spending plays a key role in creating equal opportunities for education and access to health services. Governments, by improving health and education levels, improve human resources which are fundamental to the development process as well as an important tool in the fight against poverty (UN, 2002)

Chart 9 shows public spending on education as a percentage of GDP for the BRICS and selected developing countries. Unfortunately, there are no continuous series for all years and for all countries (i.e. China does not publish any data after 1999, on any database other than China's official statistical services, but these data is not editable) however, we can still obtain an indicative picture on the subject.

What we observe from Chart 9 is that the government spending on education as percentage to GDP has been rising in recent years for all BRICS. It is noteworthy that for Brazil and South Africa this percentage is higher even from the equivalent of developed economies and the world average, while Russia and India are moving at lower rates. However, as a percentage of expenditure on GDP, it remains low and does not exceed 6% of GDP. It should be noted here that the levels of education spending between BRICS and developed economies are obviously not comparable, because developed countries start from a different level of income and quality of education as well.

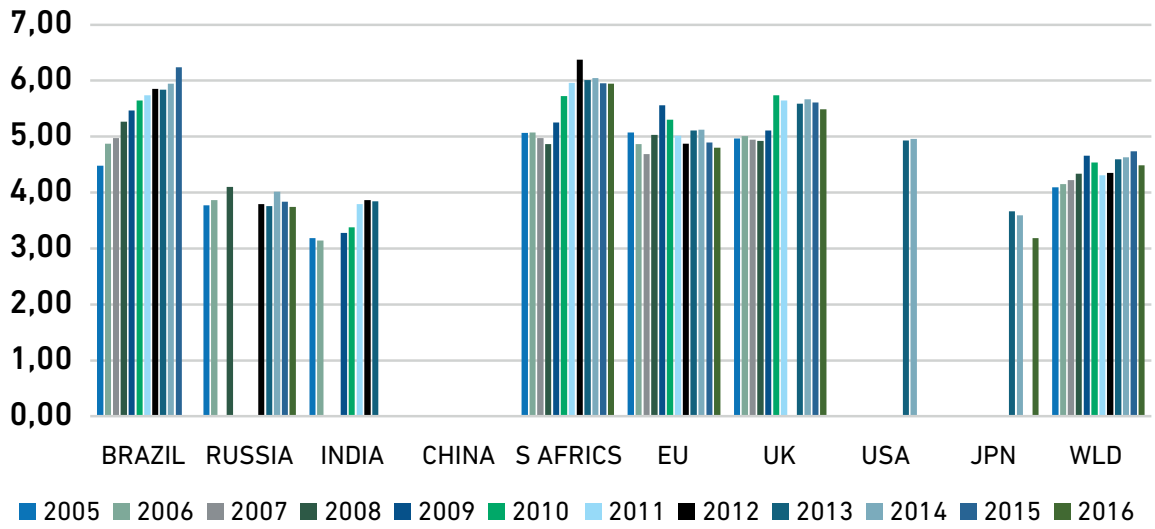
Chart 9. Goverment Spending on education % GDP
BRICS and Selected Developec Economies



Source: The GlobalEconomy and authors' calculations

Regarding goverment spending on health (see Chart 10), we observe the following: In relation to developed countries, BRICS spend less percentage of their GDP. Among BRICS, Brazil and South Africa present the highest expenditure on health as a percentage of GDP, while China, India and Russia are moving at lower levels, showing a steady trend.

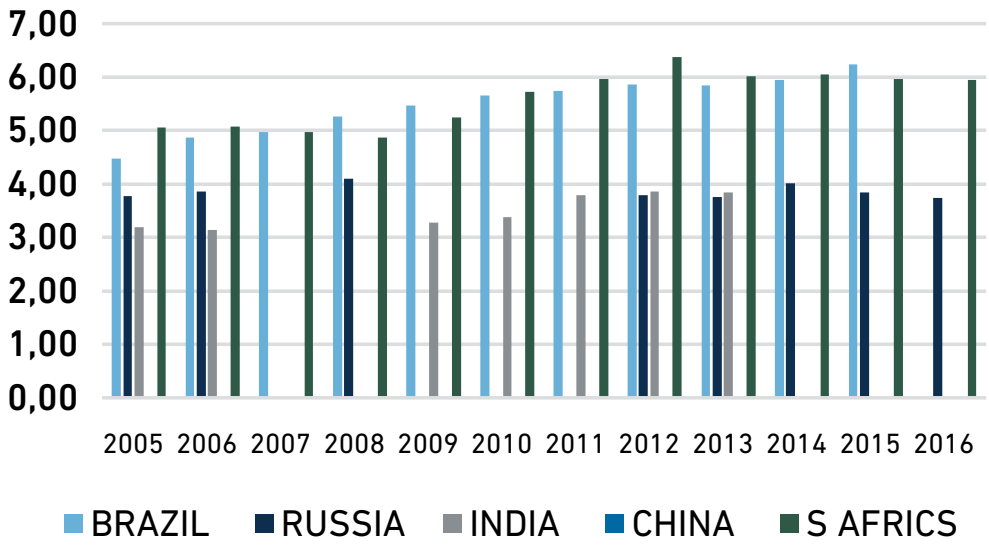
Chart 10. Goverment Health Spending % GDP
BRICS Selected - Developed Economies



Source: The GlobalEconomy and authors' calculations

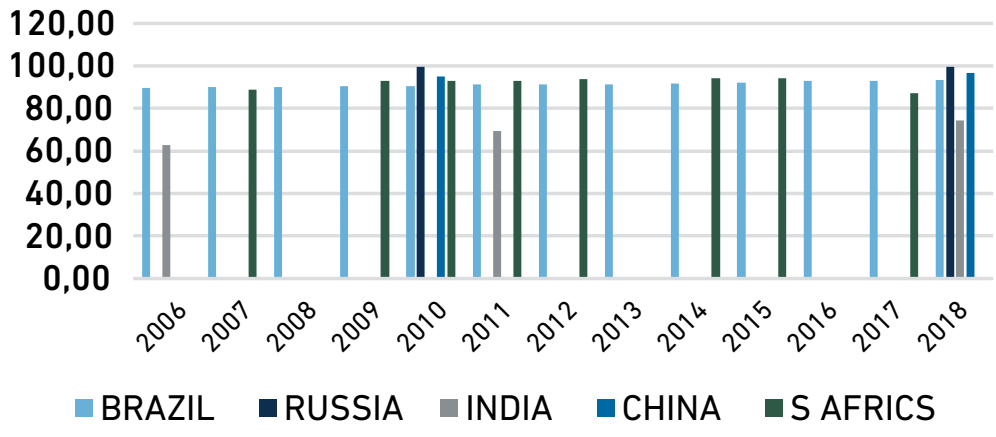
Then, in order to examine the effectiveness of health and education spending, in terms of inputs/outputs we proceeded to the following comparisons: for education we look at the relationship between education spending (input) and literacy rates (see Charts 11 and 12).

Chart 11. Goverment spending % GDP



Source: The GlobalEconomy, WDI and authors' calculations

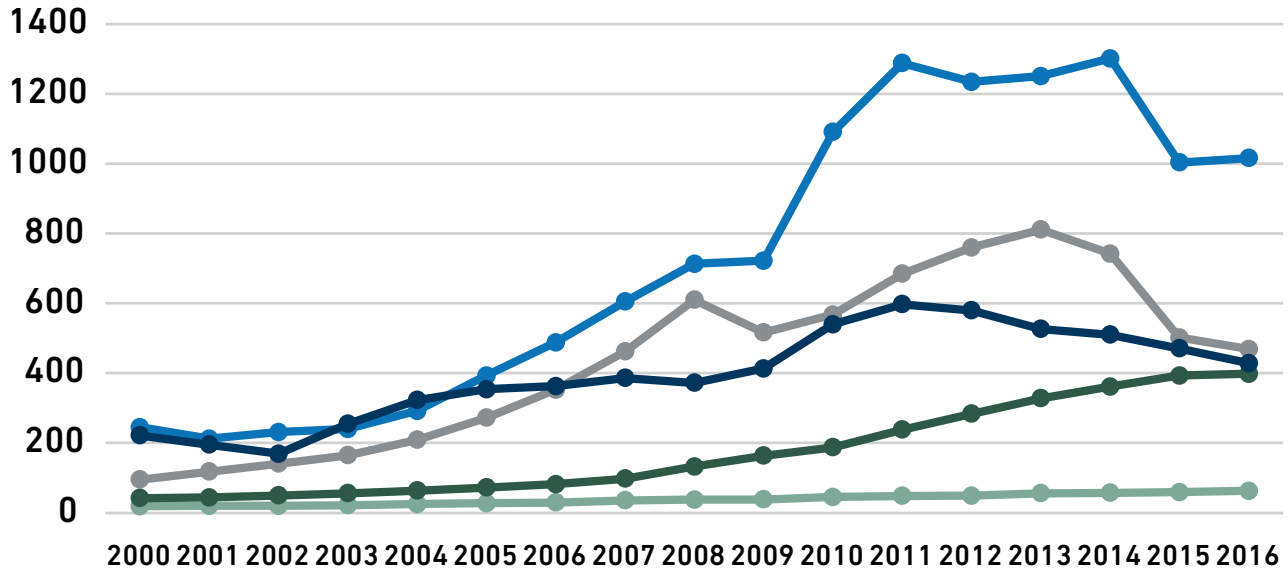
Chart 12. Literacy rate adult (% of people ages 15 and above)

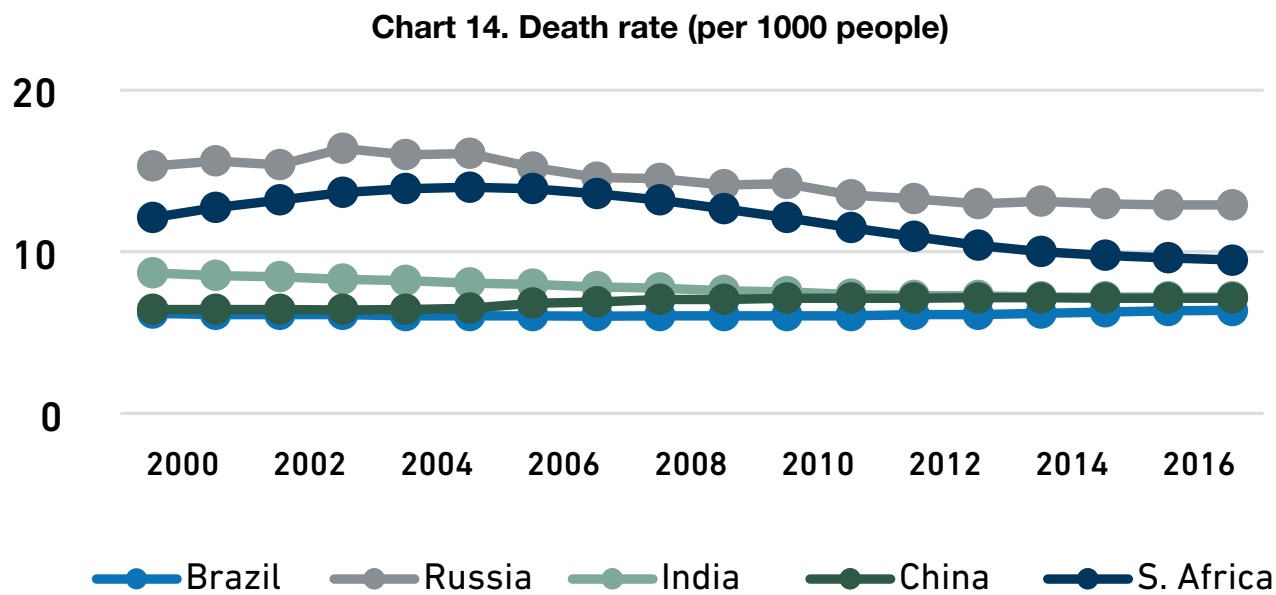


Source: The GlobalEconomy, WIR and authors' calculations

Although education spending is relatively low (less than 6% of GDP), the literacy rate in all of BRICS with the exception of India is very high, approaching 90%. The verses we have about Russia, China and India only concern two years, 2010 and 2018, but they are indicative of the relationship between the two indicators. We note the case of India where the literacy rate is less than 70%, and the lowest among the BRICS.Similarly for health we look at the relationship between health spending per capita (input) and life expectancy (outputs).

Chart 13. Health Spending per capita





Source: The GlobalEconomy, WIR and authors' calculations

On the charts 13 and 14 above , we observe that Brazil, which has the largest increase in health spending (as a percentage of GDP) among BRICS , has a stable mortality rate. It seems that there does be observed the expected interaction between these rates. We observe the same for China. In contrast to Russia and South Africa, there is a dramatic reduction in the death rate compared to the increased costs for health. Finally, for India, we observe a "consistency" between these sizes, as neither health spending nor the rate of death has changed in the last 20 years or so.

2.4. States and Markets Indicators

2.4. a) Innovation

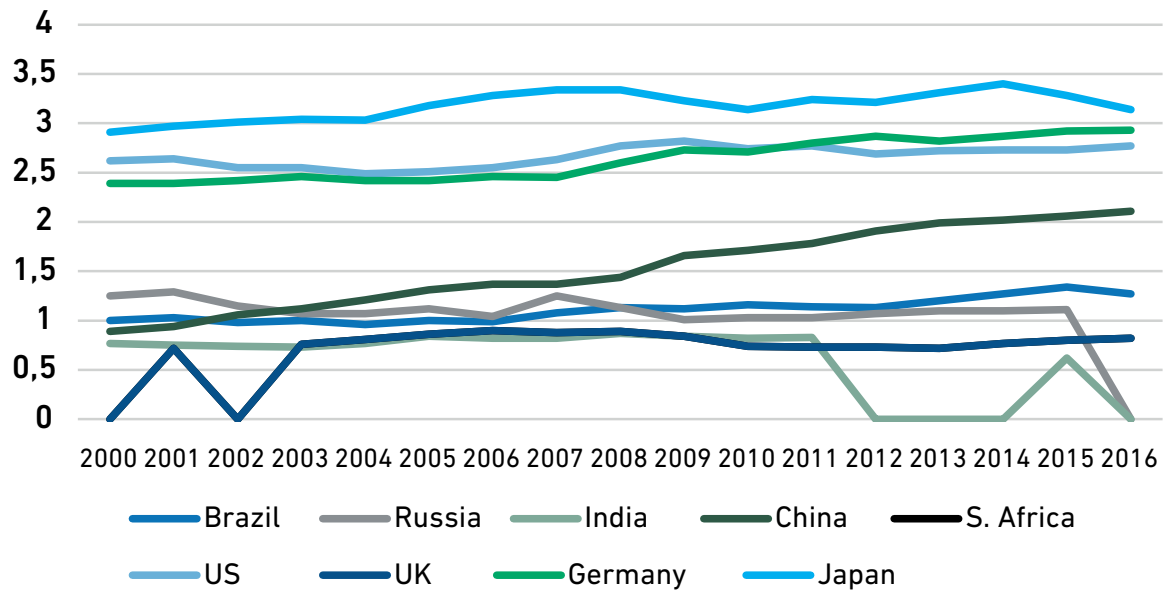
Innovation is a critical factor in the sustainable development of an economy. The course of innovation is not only economical or financial, but also depends on sociopolitical parameters that differ between emerging economies. In additon, innovation can affect inequality in different ways. Although innovation does not constitute a main influence factor on inequality, different strategies of technological change may lead to different outcomes in distributive terms, which either exacerbates or mitigates inequality. We will look at innovation in three different versions:

- Research and development (R&D) expenditures as a percent of GDP
- High_tech exports as percentage of total manufacturing exports
- Information and Communication Technology goods' exports (ITC) as percentage of total goods' exports.

2.4. a) 1. Research and development (R&D) expenditures

R&D expenditure, expressed as a percentage of GDP , include both capital and current expenditures in four main sectors: Business enterprise, Government, Higher education and Private non-profit. R&D covers basic research, applied research, and experimental development. The figures (chart 15) show clearly higher R&D spending (as a percentage of GDP) of developed countries (excluding England) compared to BRICS. The United States, Japan and Germany account for about 3% of GDP for R&D.

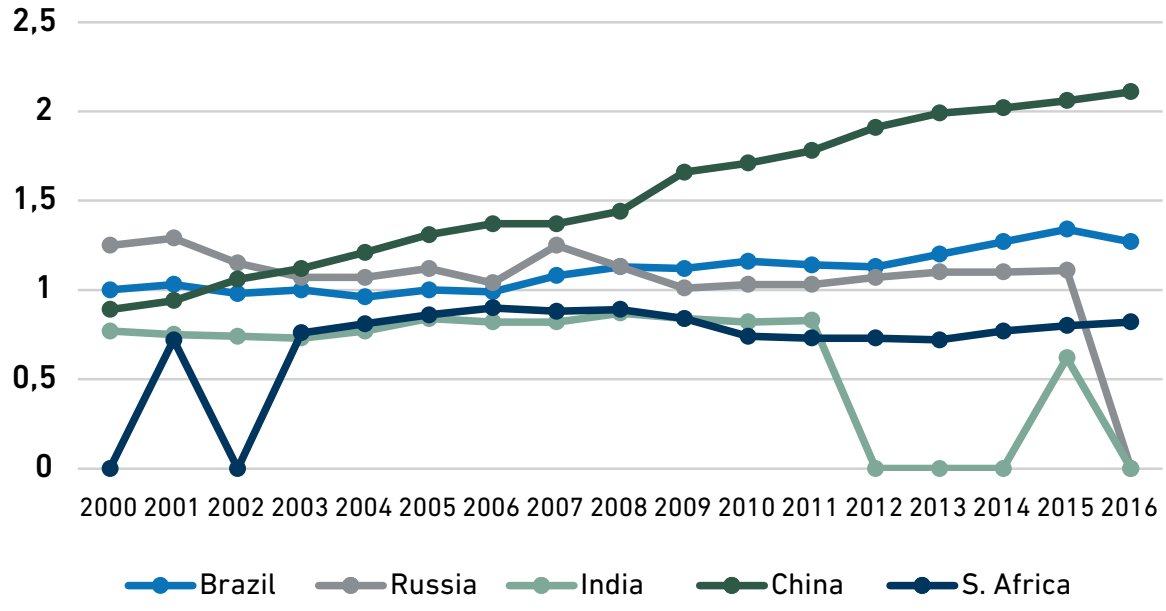
Chart 15. R&D Expenditure as % of GDP - Selected Economies



Source: The GlobalEconomy and authors' calculations

Among BRICS, China has the highest R&D spending approaching 2% of it's GDP Russia and Brazil are moving at lower levels, while for India and South Africa these spending is below 1% of GDP.

Chart 16. BRICS - R&D expenditure % GDP



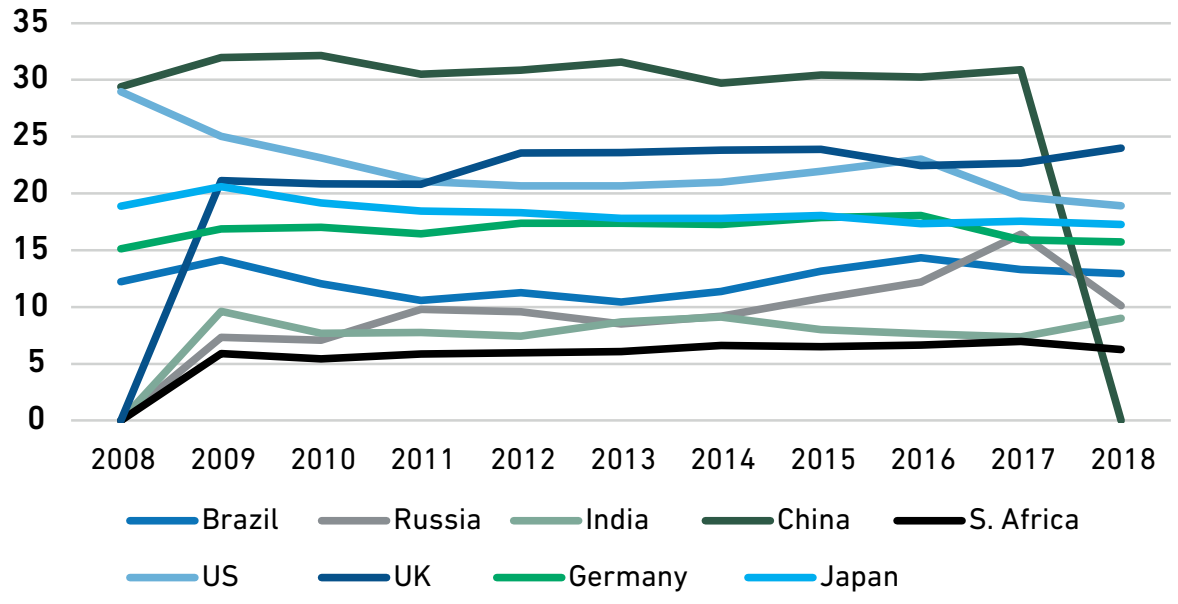
Source: The GlobalEconomy and authors' calculations

2.4. a) 2. High-tech exports

The R&D expenditure is reflected in the corresponding High-tech exports (percentage of manufacturing exports , chart 17). High-technology exports are products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery. Important here, the case of China, where high-tech exports account for even higher exports than the United States. Although China's spending on R&D as a percentage of GDP is not high, exports of products that require investment in such expenditures is high. A possible explanation may be the fact that China , given the volume of foreign investment in its territory, can follow the tactic "learning by doing" by copying

know-how without producing it. In the last 30 years, China, through Multinational Enterprises (MNEs) has received the largest volume in the world, of Foreign Direct Investment in its territory. Multinationals carry intangible assets which include R&D , patents, and trade marks and the reorientation of R&D expenditures towards a downstream development.

Chart 17. Hightech exports % of manufacturing exports - Selected Economies

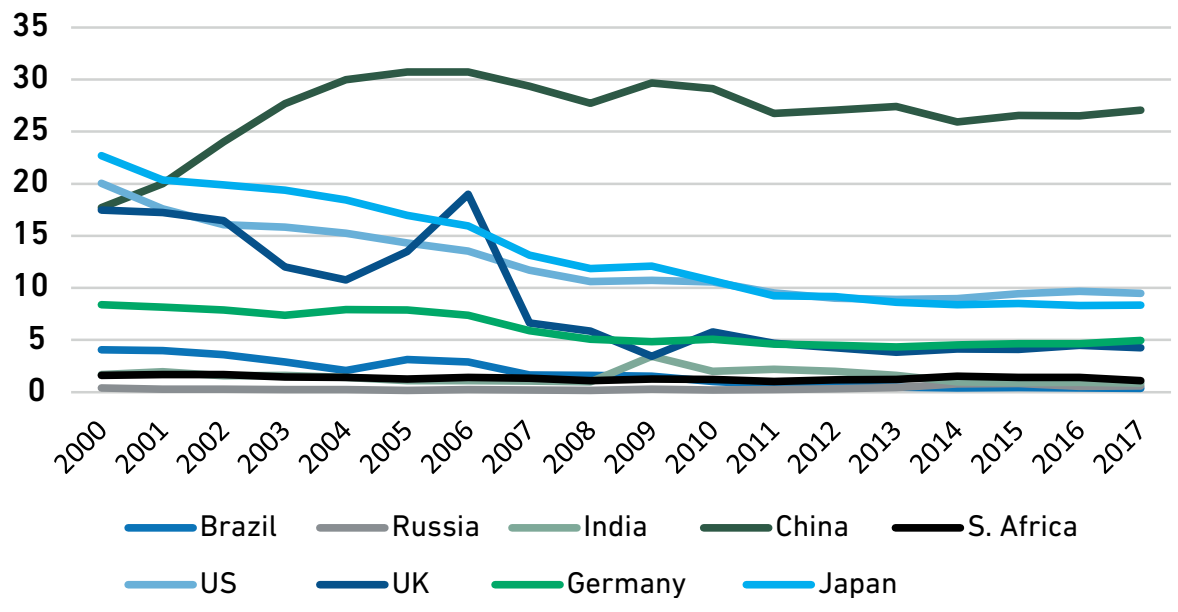


Source: The GlobalEconomy and authors' calculations

2.4. a) 3. Information and Communication Technology goods' exports (ITC)

ITC exports include computers and peripheral equipment, communication equipment, consumer electronic equipment, electronic components, and other information and technology goods (miscellaneous). Regarding the ITC goods' exports , as percentage of total exports, China displays the highest rates compared to all other countries in the sample,(even the developed ones) while the rest of the BRICS are moving at lower levels than those of developed countries, with South Africa, Russia and India occupying the lowest positions.

Chart 18. Information Technology Exports % total goods Exports

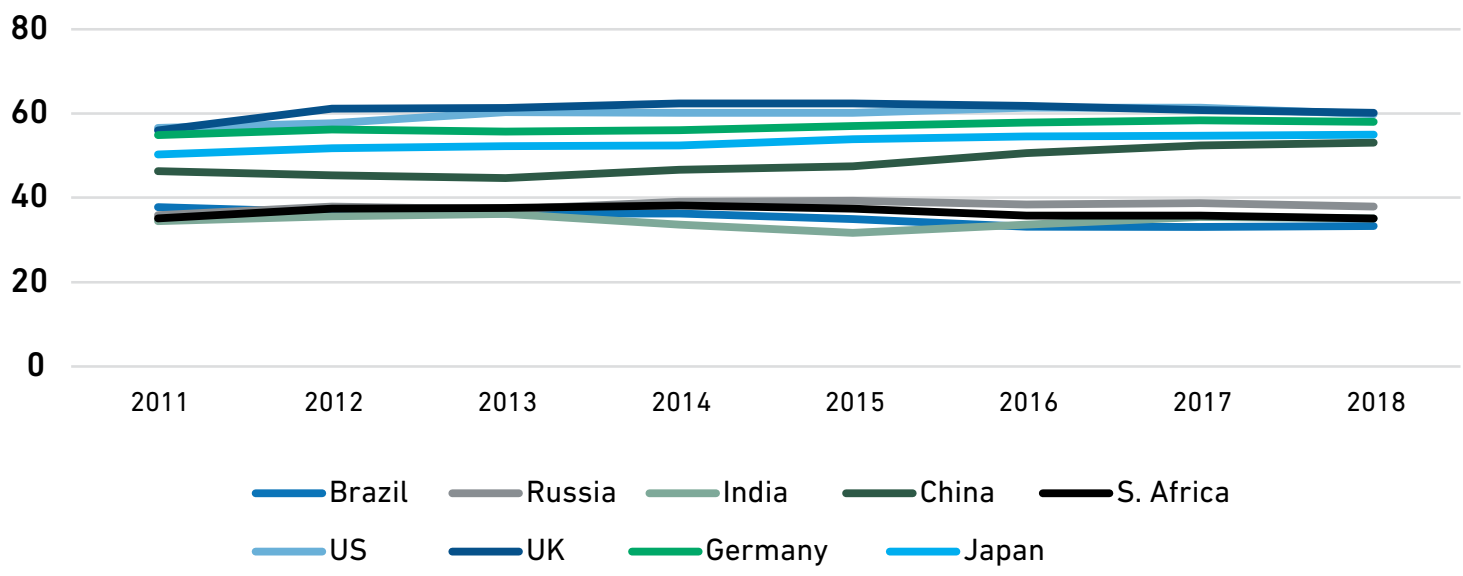


Source: The GlobalEconomy and authors' calculations

Important notice

While for developed countries, the R&D expenditure rates are declining over time, for some of the BRICS they are increasing. The data in the above three graphs show the evolution of the BRICS in terms of technological progress which is a key component of sustainable development, and reveal that the BRICS are on a positive development path in this sector , but they must be interpreted in comparison with the developed economies and in no way outperform the developed countries. The superiority of developed economies in the field of innovation is described by the Global Innovation Index (GII) which , by construction is more sophisticated (chart 19). GII , includes two sub-indices: the Innovation Input Sub-Index and the Innovation Output Sub-Index. The first sub-index is based on five pillars: Institutions, Human capital and research, Infrastructure, Market sophistication, and Business sophistication. The second sub-index is based on two pillars: Knowledge and technology outputs and Creative outputs. Each pillar is divided into sub-pillars and each sub-pillar is composed of individual indicators. From the above chart, it is obvious the leading of developed economies in innovation sector as well as China's upward trend, which has the lead, by far, among the BRICS.

Chart 19. Global Innovation - Index Selected Economies (values 0-100)



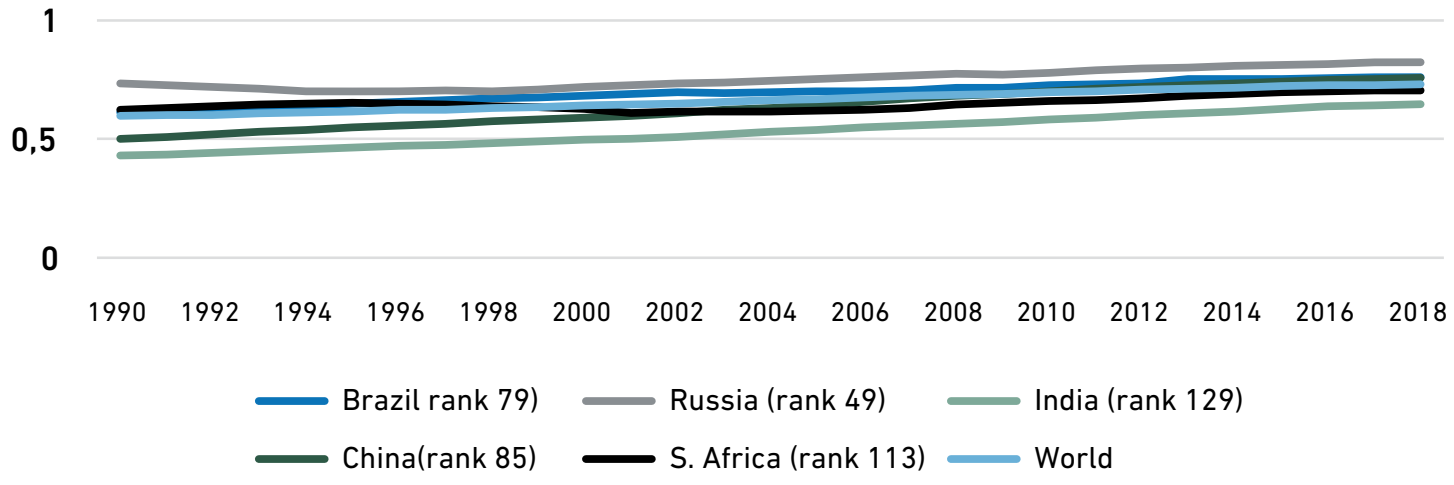
Source: The GlobalEconomy and authors' calculations

2.5. Other indicators

2.5. a) Human Development index (HDI)

This index, published by the UN is a composite measure that accounts for a broader set of development factors. The HDI considers changes in three domains: economics, education, and health. The higher the index the more developed the country. The highest score on the HDI is 1.0. The numbers in parentheses are the rank according to the index value. The highest the index value the smaller the rank value. The usual criticism of this index is that it's changes may come from changes in one or all of its individual elements and thus create ambiguities. In the following chart 20 , we present the trend in HDI , in the BRICS. India has lowest index (rank 129), S Africa follows (rank 113), Brazil (rank 79), China (rank 85 and Russia (rank 49). The trend shows that these indices have been improved , but, compared to the developed economies, the BRICS remain very unequal, if we take into consideration that Germany is ranked 4th , UK and US are ranked 15th and Japan is ranked 19th (UN -HDI -data).

Chart 20. Human development index - trend 1990 2018



Source : United Nations -Human Development Report

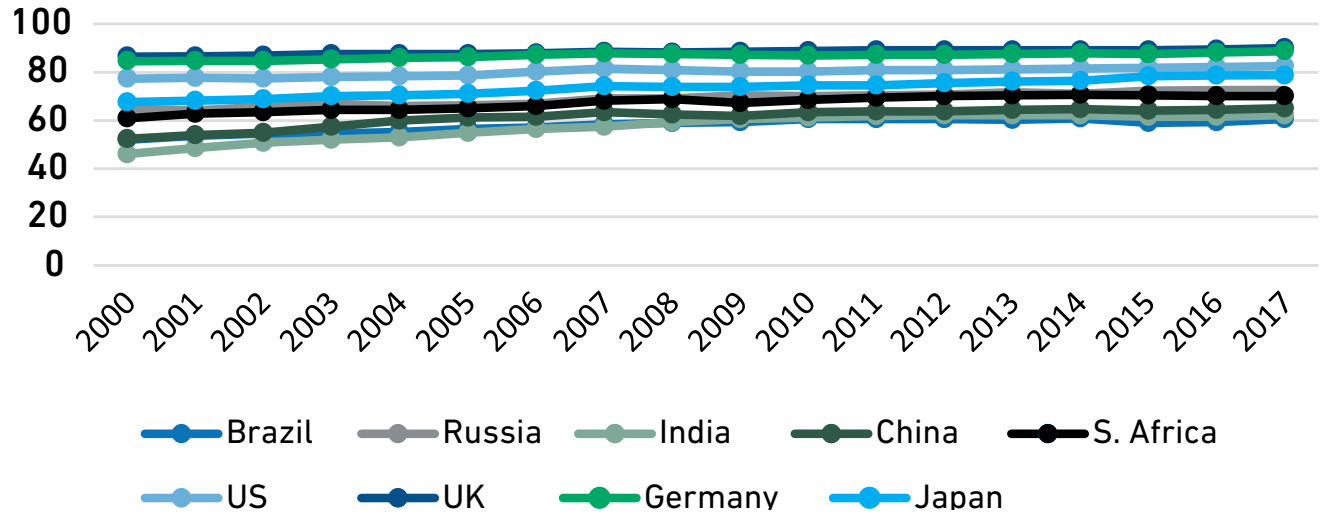
2.5. b) Globalization Index

Although the opinions and results of empirical research on the subject are contradictory, globalization aims to benefit individual economies around the world by making markets more efficient, increasing competition, limiting military conflicts, and spreading wealth more equally. The globalization index consists of three separate indicators (economic, political and social globalization). Each index reflects the degree of integration of a country with the rest of the world.

For BRICS, it seems to be an upward trend in the evolution of the index, although they remain in a lower position compared to the equivalent of selected developed countries. Looking at the particular indicators, which make up the overall globalization indicator , this difference between BRICS and developed economies should be attributed to the lower values of economic and social globalization indicators for the BRICS , and this affects downwards their overall index (chart 21).

Regarding the economic globalisation index of individual BRICS , the low values could be attributed to the economic restrictions such as capital controls and trade barriers while the low values of the social globalization indices should be attributed to sociopolitical system of these countries. We think that BRICS should done more on this direction.

Chart 21. Globalisation Index (values 0-100) - Selected Economies 2000 2017

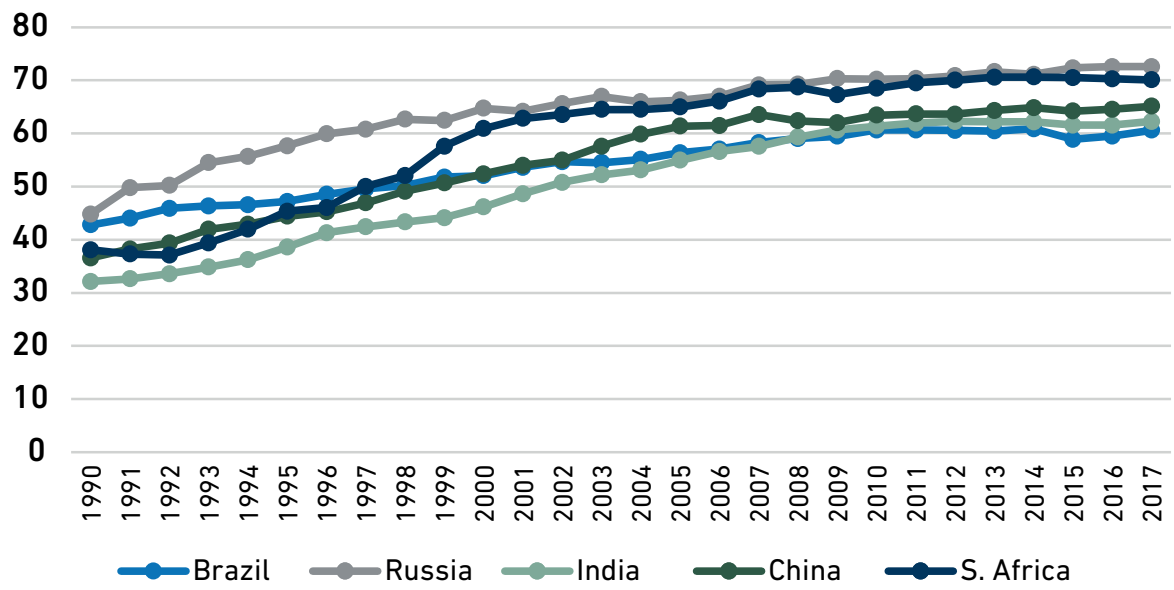


Source: KOF and authors' calculations

In order to have a more complete picture of the evolution of the globalization index for BRICS , we present the group in a separate chart (22).

We notice that , among BRICS countries, higher ratios show Russia and S. Africa This is due to the fact that these countries show higher (than the rest BRICS) values in the social globalization index, and this affects the price of the overall index upwards.

Chart 22. BRICS - Globalisation Index (values 0 100)



Source: KOF and authors' calculations

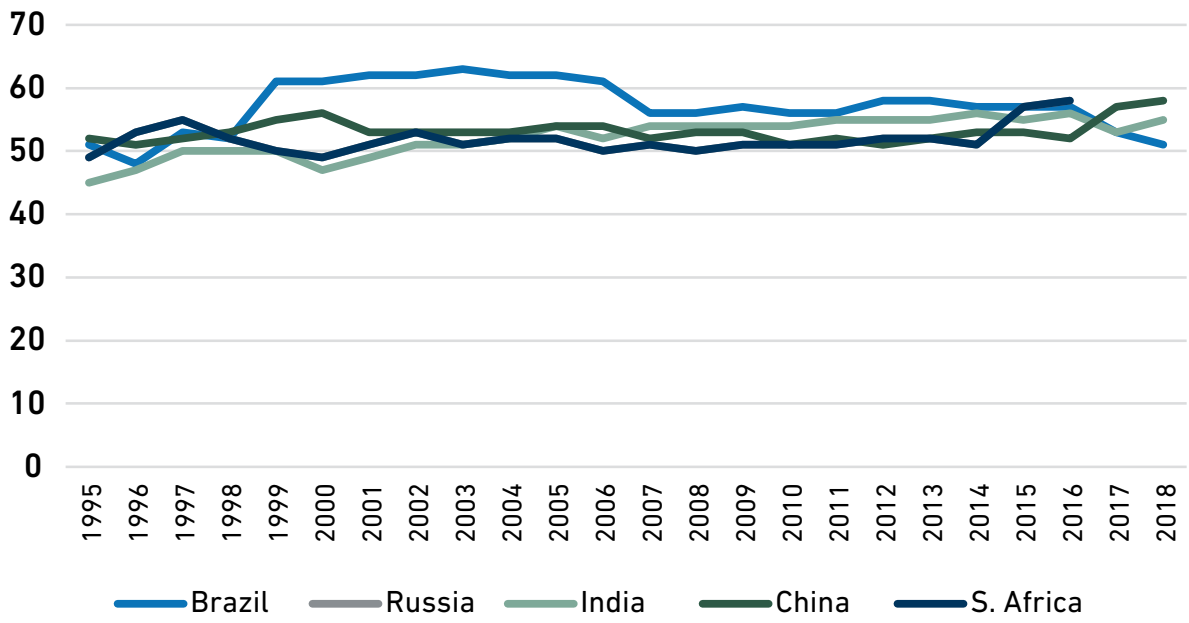
2.5. c) Economic Freedom Indicator (EFI)

We consider it important to present and analyze the Economic Freedom Indicator, because it substantiate the positive relationship between economic freedom and a variety of positive social and economic goals. The ideals of economic freedom are strongly associated with healthier societies, cleaner environments, greater per capita wealth, human development, democracy, and poverty elimination.

EFI , is based on 12 quantitative and qualitative factors, grouped into four broad categories, of economic freedom: Government Size (government spending, tax burden, fiscal health) Regulatory Efficiency (business freedom, labor freedom, monetary freedom) Open Markets (trade freedom, investment freedom, financial freedom). Each of the twelve economic freedoms within these categories is graded on a scale of 0 to 100. A country's overall score is derived by averaging these twelve economic freedoms, with equal weight being given to each. Since this indicator is calculated through many sub- indicators, it is a general indicator that shows the trend of economic freedom, indicatively, without dividing it into its individual elements. . The Index is an excellent objective tool for analyzing a country's political and economic developments.(The GobalEconomy) .

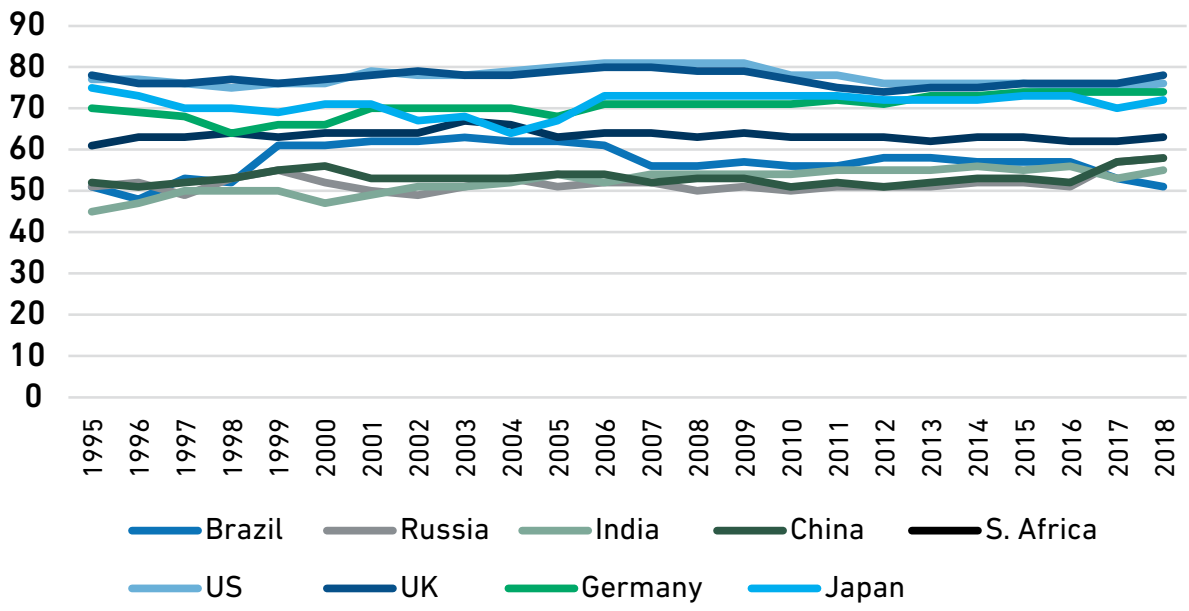
The evolution of the index, for all BRICS (chart 23), ends up being constant for all BRICS and does not exceed the value of 60 (with the highest value being 100). Comparing to developed economies (chart 24) , BRICS are moving at clearly lower levels.

Chart 23. Economic Freedom Indicator (values 0 100)



Source: The GlobalEconomy and authors' calculations

Chart 24. EconomicFreedom Index, Selected Economies (values 0-100)



Source: The GlobalEconomy and authors' calculations

In this chapter, we tried to analyse many aspects of BRICS national and global activities through various indicators. Through this analysis we tried to reveal the position of BRICS compared to developed countries, and, at the same time to reveal differences and similarities within the group. For this purpose we used interactive charts , which illustrate tables-data from international databases.

As far as growth is concerned, the growth rates for the BRICS, except Russia, are positive, and especially for China and India extremely high. China, shows higher growth rates even than the most developed economies in the world. Looking at the economics structure of BRICS , comparing the value-added percentages to GDP , we can say that the service sector is the most important for all BRICS while the manufacturing sector is bigger in China's case. In this sense, we can say that the economic structure of BRICS approaches that of developed countries, although in the latter the added value of the services sector accounts for more than 70% of GDP and also the type and quality of services differs.

Looking at the innovation performance of BRICS we analysed three different versions of innovation indicators: Research and development (R&D) expenditures expressed as of GDP, High_tech exports as percentage of total exports and Information and Communication Technology goods' exports (ITC). We observed that the BRICS are on a positive development path in this sector , but in no way outperform the developed countries of the sample. Another important indicator we choose to analyse is Economic Freedom Indicator. We consider it important to present and analyze it because this Index documents the positive relationship between economic freedom and a variety of positive social and economic goals. The ideals of economic freedom are strongly associated with healthier societies, cleaner environments, greater per capita wealth, human development, democracy, and poverty elimination. Comparing to developed economies , BRICS are moving at clearly lower levels.

Then we procced to analysis of some indicators that help capture the quality of people's lives and provide a multidimensional portrait of the progress of societies. In this context , we analysed the government health and education expenditure.

Regarding the goverment spending on health in relation to developed countries, BRICS spend less percentage of their GDP. This percentage at best does not exceed 11% of GDP (in the case of Brazil, South Africa) while at worst it did not exceed 5% of GDP (other BRICS).

On the other hand , the government spending on education as percentage to GDP has been rising in recent years (2005- 2016) , for all BRICS. It is noteworthy that for Brazil and South Africa this percentage is higher even from the equivalent of developed economies and the world average, while Russia and India are moving at lower rates . However, as a percentage of expenditure on GDP, it remains low and does not exceed 6% of GDP. It should be noted here that the levels of education spending between BRICS and developed economies are obviously not comparable, because developed countries start from a different level of income and quality of education as well.

Finally regarding Inequality we observed a remarkably high income inequality ratios for all BRICS, with South Africa and China to exhibit the highest. Here we have to comment that , while growth rates are satisfactory, approaching or exceeding those of developed countries in some cases (i.e China), the income inequality in BRICS is at extremely high levels.

3. Inequality and growth. Literature Review

According to the research questions, the literature review in this paper will be conducted in two directions. The first concerns the issue of relationship between inequality and growth and the second concerns the research on BRICS.

3.1. Inequality and Growth

Much of the research on this issue concerns the impact of inequality on economic growth. Although much has been written, a major disagreement remains. Existing research finds a positive or a negative relationship. Both are possible. (Shin 2012) . The positive impact is usually observed in developed econo-

mies, where the rich save more than the poor. So if we reduce inequality by redistributing income in favor of the poor, savings will also decrease, so investment and eventually growth.

The negative relationship is observed in developing countries, where the poor are under credit constraint and even they don't have access to labor market . That provokes political and social instability which could lead to an economic growth decline.

Below we will briefly present the main findings of the research on this topic

Fawaz, F et all (2014) using a sample of low income (LIDC) and high income (HIDC) developing countries, found strong evidence of a negative relationship between income inequality and economic growth in LIDC which was in stark contrast with a positive inequality-growth relationship for HIDC.

Pieters J., (2010), examines how the sectoral structure of growth contributes to household income inequality in India. The results show that only agricultural growth reduces inequality, while growth in heavy manufacturing and services sectors raises inequality. That is, given India's current growth pattern, inequality is likely to increase further.

Items B., et all (2014) using annual data for the 48 states of the US examine the effect of inequality on per capita income distribution and found a negative and statistically significant relationship among them.

Shin I., (2012) examined theoretically the relationship between income inequality and economic growth, found that higher inequality can retard growth in the early stage,, of economic development, that is, negative relationship, and can encourage growth in a near steady state (the opposite could also happen). In short, the relationship between inequality and economic growth depends on the development level of the economy.

Malinen T., (2013), using Penn World data for the period1965-2000 found that the effect of income inequality on economic growth is statistically significant and negative.

Herzer D., et all (2012) using a sample of 46 developed and developing countries, for the period 1970-1995 found that inequality has a negative long-run effect on income both, for the sample as a whole and for important sub-groups within the sample (developed countries, developing countries, democracies, and non-democracies).

Henderson D.,J., et all (2015), through the results from the data analysis for 82 countries it leads to interesting observations, through which the inconsistency of the results of the research on the sign of the inequality effect of inequality on growth is explained. That is there is negative relationship between inequality and growth. But reducing inequality doesn't lead to faster economic growth, that is, not all polices that reduce inequality will lead to faster economic growth. Instead, only those that greatly reduce inequality will

Winters et al. (2004) demonstrated that trade liberalization in developing countries necessarily implies distributional changes which may contribute to poverty reduction, but not unconditionally. The ultimate outcome depends on many factors related to trade reform measures, institutions and other country specific characteristics.

Kratou and Goaied (2016), in their study of 66 developing economies spanning East Europe, Central Asia, Latin America, Asia, MENA countries, observe that trade openness reduces income inequality.

Kose et al. (2006) provide a thorough analysis on the potential benefits and costs for developing countries that arise from financial globalization.

IMF, World Economic Outlook, 2007a,b) by analyzing a panel of 51 developed and developing countries over the period 1981–2003, gives evidence that trade openness was associated with a reduction in inequality.

3.2. Inequality - The case of BRICS

Regarding the research and empirical evidence on inequalities in the BRICS, a mainly socio-political analysis was performed.

Gu J., et all (2016) explores the patterns of inequality in each BRICS and concludes that, even though in recent years, the BRICS have reduced inequality among nations by driving economic growth through trade and investment in poorer regions of the world, the patterns of domestic inequality persist within the BRICS.

Anikin N., et all (2016) using Inequality-Adjusted Human Development Index, drow the conclusion, that poverty and inequality have different natures in different BRICS countries: preindustrial poverty in modern societies (India, South Africa), early industrial poverty of the lumpen urban poor (Brazil), industrial poverty (China, Russia), and late industrial poverty (Russia). Finally, they note the particular relevance of investment, employment, migration, and tax policies to combating poverty “in a way appropriate to the Russian context.”

Krozer A., (2016) makes an comparison of inequality levels among BRICSAMIT Brazil, Russia, India, China, S Africa, Indonesia, Mexico, Turkey). The author finds out large inequalities which are due to misleading governmental economic and social policies.

Rewizorski M., (2017) provides an assessment of the relation between the increasing inequality and rising political instability in BRICS countries. The author considers that inequality exacerbated because of “3w” Weak markets, Weak goverments, Weak institutions. Concludes that governments have to figure out how to overcome these 3W obstacles in these countries.

Ware N., D., (2018), studying the various inequality patterns idenitifies different causes of inequality across BRICS countries. Racism in South Africa even today, the deep rooted caste system in India, the regional disparity among the oil producing and oil non-producing regions in Russia and finally in case of China the elites which are very dominant and have monopolized a huge part of the produced wealth. As remedy measures, the author suggests more government spending on education, health and pension services, and remodelling of tax-structure in favour of the economically weaker population.

Fabisiak J., et all (2012) reviewing the main research of the inequality issue for BRIIC emerging economies (Brazil, India, Indonesia, Russia, China) conclude that the lesson from the BRIIC countries, especially from China, is that rising inequalities is the inevitable result of higher growth and less poverty. Moreover, they found that BRIIC have reduce the level of inequality inside their economies through trade libreralization and that reducing inequality improves growth by creating incentives to the poor for more social mobility. However, in order for the growth to be sustainable, for those economies, a more educated labor force

should be developed.

Younsi M., (2018), emphasizing on the role of financial sector development for economic growth of the BRICS countries, using panel data for the period 1995-2005 found that financial development index has a positive and statistically significant impact on income inequality. The political implications of these findings suggest that to reduce income inequality, policy makers need to implement progressive fiscal policy measures. The results also, indicate public spending especially on education is more effective than taxation policies in addressing inequality.

Qin D., et all (2009), study the issue of how income inequality affects growth in the case of China, using macroeconometric model and a panel of provincial urban and rural household income data. The results show that income inequality is a strong explanatory variable of consumption and that the way inequality is developed has negative implications for GDP and sectoral development. The policy implications that come out of these findings are implementation of policies that fostering economic growth in the rural areas, augmented by rural social welfare provision (such as on education and health care) and facilitating greater labour mobility for further utilizing the agricultural labour surplus.

Berisha E., et all (2019) examine how the macroeconomic variables of income growth, interest rate, and inflation have driven inequality for the period span 2001-2015, focusing on BRICS. They found positive relationship between the three macroeconomic variables and income inequality for the BRICS economies, which is stronger during the post-2008 period. They suggest that when central banks of the BRICS economies use monetary policy for macroeconomic stabilization, they need to consider the impact monetary policy changes have on the distribution of income in their nations.

Goh C., C., et all (2009) examine the growth performance and income inequality in eight Chinese provinces during the period of 1989–2004. They found that income grew for all segments of the population, and as a result, poverty incidence has fallen. However, income growth has been uneven, most rapidly in coastal areas, and among the educated working population.

Fleisher B., et all (2010) studing the relationship of regional inequality and growth for China, which is one of the highest regional income inequality countries in the world, found that China´s continued economic transformation has not been equally beneficial across its major regions. In accordance with the results of Goh et all 2009, they found that the interior region (near west) and far western regions lag far behind the coastal and northeast regions in economic progress.

BRICS Think Tanks Council (BTTC)-Study: National Systems of innovation (2014), this study links the issue of innovation to inequality and examines how the various elements of innovation relate and interact with inequality.

4. Empirical results

4.1. The Variables

The peculiarity of BRICS countries lies in huge economic and socio-political inequalities (historical and "traditional" such as dictatorships Brazil until 1985, authoritarian governments in China and Russia, colonialism in South Africa and India. Inequalities in access to education and health services, use of technology, racial discrimination, gender discrimination, lack of democratic institutions, etc., all of which create tendencies for internal destabilization of these economies. So we need to include in the sample variables , that approach these peculiarities

Table 4.1 Data set- definition and sources

Variables	Definition and Justification	Database
Dependent variable		
GDP per capita growth % annual	Measure of the country's economic development	World Bank -World Development Indicators (WDI)
Explanatory Variables		
Gini coefficient	Gini coefficient is defined as the relationship of cumulative shares of the population arranged according to the level of equivalized disposable income, to the cumulative share of the equivalized total disposable income received by them.	World Bank -World Development Indicators (WDI)
Trade openness	Exports plus imports % of GDP, as trade is the main driver of growth for emerging economies	The GlobalEconomy
Foreign Direct Investment	FDI inward-stock % of GDP, is included for the same reason as trade, glaring is the example of China	UNCTAD
Financial Development Variables , M1_ and M_2, their use is justified because BRICS is a group of emerging economies, where the financial sector plays an important role in their development.		
M_1	Domestic credit to the private sector, % GDP This ratio refers to the reachable opportunities to provide financial resources for private sector to support businesses.	World Bank -World Development Indicators (WDI)
M_2	Broad money to total reserves	World Bank -World Development Indicators (WDI)
M_3	Broad money (% of GDP) This ratio represents the money's flow in the economy	World Bank -World Development Indicators (WDI)

	Social inequality variables: The selection of these variables was based on data availability for the period 1990-2018. Uunfortunately we were not able to select data related to health and education access which we consider very important measures of social inequalities, because the series on the BRICS were incomplete. We selected as proxies to social inequality EMPL_1 and EMPL_2 which are proxies for employment opportunities, and TECH_1 and TECH_2 which are proxies for countries access to technology. Employment ratios are important because they capture the activeness of the economy, especially in this case for females because gender disparities in labour force participation rates exist in every country in the world. The access to technology, measured by mobile cellular subscriptions and internet is indicative of the ability to access information (via mobile or internet)	
EMPL_1,	Vulnerable employment total (% of total employment), modeled ILO estimate as a proxy for inequality in employment for the most vulnerable groups	World Bank -World Development Indicators (WDI)
EMPL_2	Labor force participation rate female (% of female population ages 15+ modeled ILO estimate) as a proxy of gender inequality	World Bank -World Development Indicators (WDI)
TECH_1	Indviduals using internet % of total population	World Bank -World Development Indicators (WDI
TECH_2	Mobile cellular subscriptions per 1000 people, the last two are used as proxies to technology access	World Bank -World Development Indicators (WDI

4.2. Descriptive Statistics

Table 4.2.1 below presents the descriptive statistics of our main variables for BRICS countries between 1990 and 2018. We observe wide gap among the group regarding all variables

On average, the highest level of Gini coefficient (55.85) has Brazil while the lowest has Russia (39.59) The highest level of GDP per capita growth (8.608) has China, while the lowest has S. Africa (0.637).The highest mean of foreign trade as percentage to GDP has Russia (22.978) and the lowest is for India. Regarding FDI the highest mean of inward FDI stock as percentage to GDP is in S. Africa and the lowest in India (35.166). Regarding vulnerable employment (Empl_1) as percentage of total employment the highest mean is for India (81.846) and the lowest for Russia (4.683) while for employment participation rate of females (Empl_2) the highest mean is for S. Africa (11.229) and the lowest for Russia (1.833). For the financial development measures, the highest means of M_1 (domestic credit to the private sector, % GDP) is for India (81.846) and the lowest for Russia (4.683). The highest mean of M_2 (broad money to total reserves) is for S. Africa (11.229) and the lowest for Russia (1.833) The highest mean of M_3 (broad money % of GDP), is for China (67.713) and the lowest for India (28.387).

Finally, regarding the access to technology Tech_1 (indviduals using internet % of total population) Russia has the higher mean (25.555) and India the lowest while for access to information Tech_2 (mobile cellular subscriptions per 1000 people) Russia has the higher mean (72.062) and India the lowest (27.679)

Table 4.2.1 Descriptive Statistics

	gdpgrowth	trade	FDI	Gini	empl_1	empl_2	M1_1	M_2	M-3	tech_1	tech_2
Brazil											
Mean	0.984	22.978	19.364	55.855	30.595	50.795	30.595	7.497	50.795	24.293	52.519
Std. Dev.	2.731	4.373	7.817	3.027	2.669	3.954	2.669	3.700	3.954	24.092	50.501
Russia											

Mean	0.804	54.169	15.438	39.593	4.683	55.257	4.683	1.833	55.257	25.555	72.062
Std. Dev.	6.463	13.863	11.150	2.991	2.157	1.657	2.157	0.433	1.657	29.190	70.604
India											
Mean	4.669	35.166	6.912	45.076	81.846	28.387	81.846	6.413	28.387	6.888	27.679
Std. Dev.	1.995	13.006	4.914	4.118	2.319	3.243	2.319	4.287	3.243	9.931	33.862
China											
Mean	8.608	42.731	11.669	42.941	54.847	67.713	54.847	7.081	67.713	18.300	37.790
Std. Dev.	2.426	10.858	3.090	5.506	7.289	4.188	7.289	3.128	4.188	20.649	38.469
S Africa											
Mean	0.637	53.422	29.222	44.045	10.635	46.696	10.635	11.229	46.696	17.198	64.190
Std. Dev.	2.187	9.040	14.446	9.616	1.032	1.805	1.032	6.872	1.805	20.354	59.264

Then we checked for multicollinearity in our data. As it is shown in the table 4.2.2 below, the financial variables M1 and M3 are highly correlated so they can not be used together in a regression (multicollinearity problem). The same is true for technology access variables TECH_1 and TECH_2. They cannot either be used together in a regression.

Table 4.2.2 Correlation Matrix

	GINI	GDP_PC	GDP_ GRO	TRADE_ OPEN	M_1	M_2	M_3	EMPL_1	EMPL_2	TECH_1	TECH_2	FDI
GINI	1											
GDP_PC	-0.0799	1										
GDP_ GRO	-0.2109	-0.3013	1									
TRADE_ OPEN	-0.5427	0.1147	0.1958	1								
M_1	0.0098	-0.0026	0.2808	-0.0263	1							
M_2	0.3169	-0.3883	-0.2141	-0.2966	0.0372	1						
M_3	-0.1792	-0.0129	0.4907	0.1897	0.9056	-0.1288	1					
EMPL_1	0.0467	-0.4856	0.4419	-0.3813	0.1519	-0.0025	0.2344	1				
EMPL_2	-0.1146	0.0336	0.3135	0.1177	0.4572	-0.0609	0.5088	-0.3518	1			
TECH_1	-0.2306	0.834	-0.2155	0.2103	0.2325	-0.429	0.2568	-0.4205	0.2257	1		
TECH_2	-0.3407	0.85	-0.2302	0.422	0.0612	-0.4965	0.1234	-0.501	0.12	0.898	1	
FDI	0.103	0.0559	-0.1548	0.2082	-0.1121	-0.0244	-0.042	-0.2453	0.0372	0.0763	0.09	1

4.3. The methodology

We estimate an econometric model using appropriate panel data techniques for the BRICS countries over the period 1990-2018. Since BRICS are a sample of countries with rather heterogeneous characteristics we applied the a) the fixed and b) the random effect estimation methods, which are the most appropriate in this case.

In order to explain the relationship between inequality and growth, we run two different regression equations applying different specializations.

With the first equation we examine how inequality (among other expalanatory variables) affects economic growth. Depended variable is GDP per capita growth (%)

With the second equation we try to explain inequality as a function of economic growth, financial growth and social inequality variables

4.3.1 Growth Equation

We start the estimation by inserting in the model the basic variables that affect growth (GINI, FDI, Trade openness, Employment) and then we inserted in the model the rest explanatory variables (financial development and access to technology variables) one by one. Dependent variable is growth rate. The results are given on the tables below:

Table 4.3.A. Effects on GDP growth (Fixed Effects)

VARIABLES	(1) GDP_GRO	(2) GDP_GRO	(3) GDP_GRO	(4) GDP_GRO	(5) GDP_GRO
GINI	-0.022	-0.010	**0.064***	0.058	0.043
	(0.058)	(0.046)	(0.035)	(0.046)	(0.040)
EMPL_1R	**-0.379*****	**-0.131*****	**-0.121*****	**-0.109**	**0.247***
	(0.112)	(0.013)	(0.010)	(0.075)	(0.130)
EMPL_2	-0.129	0.163***	0.188***	0.132	0.177**
	(0.113)	(0.024)	(0.021)	(0.087)	(0.082)
TRADE_OPEN	**0.065****	**0.063*****	**0.145*****	**0.143*****	**0.163*****
	(0.029)	(0.024)	(0.020)	(0.032)	(0.026)
FDI	0.009	0.012	-0.011*	-0.006	-0.006
	(0.008)	(0.007)	(0.006)	(0.006)	(0.006)
TECH_1	0.028				
	(0.017)				
TECH_2		0.009			
		(0.006)			
M_1			**-0.014****		
			(0.007)		
M_2				0.011	
				(0.074)	
M_3					**-0.070*****

					(0.021)
Constant	30.748***	-0.119	-5.035**	-4.261	-22.718**
	(11.395)	(2.899)	(2.235)	(8.545)	(9.723)
Observations	145	145	132	134	134
R-squared	0.113			0.204	0.268
Number of COUNTRY_NO	5	5	5	5	5
Standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Table 4.3.B. Effects on GDP growth (Fixed Effects)

	(1)	(2)	(3)	(4)	(5)
VARIABLES	GDP_GRO	GDP_GRO	GDP_GRO	GDP_GRO	GDP_GRO
GINI	-0.021	-0.010	0.064*	0.056	0.052
	(0.046)	(0.046)	(0.035)	(0.035)	(0.035)
EMPL_1R	**-0.127*** **	**-0.131*** **	**-0.121*** **	**-0.113*** **	**-0.127*** **
	(0.013)	(0.013)	(0.010)	(0.009)	(0.012)
EMPL_2	**0.159*** **	**0.163*** **	**0.188*** **	**0.161*** **	**0.191*** **
	(0.024)	(0.024)	(0.021)	(0.017)	(0.024)
TRADE_OPEN	**0.065*** **	**0.063*** **	**0.145*** **	**0.134*** **	**0.153*** **
	(0.024)	(0.024)	(0.020)	(0.020)	(0.022)
FDI	0.013*	0.012	-0.011*	-0.010*	-0.010*
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
TECH_1	0.008				
	(0.014)				
TECH_2		0.009			
		(0.006)			
M_1			**-0.014** **		
			(0.007)		
M_2				-0.064	
				(0.045)	
M_3					**-0.013***
					(0.008)
Constant	0.522	-0.119	-5.035**	-4.178*	-4.878**
	(2.897)	(2.899)	(2.235)	(2.225)	(2.235)

Observations	145	145	132	134	134
Number of COUNTRY_NO	5	5	5	5	5
Standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

The results with both methods are quite similar. However the Hausman test for fixed versus random effect model, indicates random effect as more appropriate.

Gini coefficient is not statistically significant in most equations. This means that inequality does not affect growth.

Trade openness coefficient is statistically significant in all specifications and has the expected sign, that is, trade has a positive effect on growth.

The FDI coefficient is statistically significant and in most case has negative sign, indicating that FDI affects negatively growth.

Vulnerable employment coeff (EMPL_1) is significant and negative, which is expected by definition of the variable. (Vulnerable employment is often characterized by inadequate earnings, low productivity and difficult conditions of work). On the contrary the coefficient of EMP_2 (e (participation rate female % of female population) is significant and positive which means that the participation of women employment affects positively the growth.

The finacial variables (M_1 and M_3) have significnt and negative coefficients which means that the development of financial sector affects negativelly the growth. Finally the variables of technology access (Tech_1 and Tech_2) have insignificant coefficients which means that these variables do not affect growth.

4.3.2. Inequality - Equation

With this equation we examine how economic growth (among other expalanatory variables) affects inequality.. Again, we start the equation estimation by inserting in the model the basic variables that affect inequality (Growth, FDI, Trade_openess, Employment) and then we inserted in the model the rest explanatory variables (financial development and access to technology variables one by one. Dependet variable is GINI coefficient. The results are given on the tables below.

Table 4.3.2.A. Effects on Inequality (Fixed Effects)

	(1)	(2)	(3)	(4)	(5)
VARIABLES	GINI	GINI	GINI	GINI	GINI
GDP_GRO	-0.050	-0.006	0.205	0.224	0.213
	(0.128)	(0.129)	(0.188)	(0.176)	(0.200)
EMPL_1R	0.067	0.012	0.027	-0.103	0.007
	(0.173)	(0.161)	(0.189)	(0.148)	(0.295)
EMPL_2	**-0.357****	**-0.385****	**-0.665*****	**-0.360****	**-0.602*****
	(0.166)	(0.161)	(0.168)	(0.169)	(0.179)
TRADE_OPEN	**-0.045**	**-0.020**	**-0.102***	**0.052**	**-0.106**
	(0.044)	(0.043)	(0.058)	(0.067)	(0.066)
FDI	**0.038*****	**0.036*****	**0.030****	**0.053*****	**0.041*****
	(0.012)	(0.011)	(0.012)	(0.012)	(0.012)
TECH_1	-0.092***				
	(0.025)				
TECH_2		**-0.040*****			
		(0.010)			
M_1			**-0.079****		
			(0.030)		
M_2				**0.669*****	
				(0.133)	
M_3					-0.058
					(0.049)
Constant	60.136***	64.335***	84.811***	58.366***	80.349***
	(16.613)	(15.716)	(14.886)	(15.932)	(20.979)
Observations	145	145	132	134	134
R-squared	0.206	0.221	0.215	0.328	0.198
Number of COUNTRY_NO	5	5	5	5	5
Standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Table 4.3.2.B Effects on Inequality (Random Effects)

	(1)	(2)	(3)	(4)	(5)
VARIABLES	GINI	GINI	GINI	GINI	GINI
GDP_GRO	-0.073	-0.034	0.395*	0.342	0.332
	(0.157)	(0.157)	(0.220)	(0.218)	(0.222)
EMPL_1R	0.044	0.054*	0.113***	0.086***	0.119***
	(0.030)	(0.031)	(0.035)	(0.033)	(0.039)
EMPL_2	-0.050	-0.072	-0.184***	-0.118**	-0.184**
	(0.051)	(0.051)	(0.065)	(0.055)	(0.072)
TRADE_OPEN	-0.274***	-0.259***	-0.392***	-0.352***	-0.412***
	(0.039)	(0.039)	(0.048)	(0.049)	(0.054)
FDI	0.038***	0.038***	0.042***	0.042***	0.043***
	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)
TECH_1	-0.059**				
	(0.025)				
TECH_2		-0.030***			
		(0.011)			
M_1			0.033*		
			(0.017)		
M_2				0.270**	
				(0.111)	
M_3					0.027
					(0.019)
Constant	55.262***	55.450***	56.686***	54.557***	58.004***
	(2.547)	(2.526)	(2.554)	(2.796)	(2.554)
Observations	145	145	132	134	134
Number of COUNTRY_NO	5	5	5	5	5
Standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Again, the results with both methods are quite similar. Also, in this case too, the Hausman test for fixed versus random effect model, indicates random effect as more appropriate.

Starting with growth coefficients, the results, in all methods and specifications, indicate that they are not significant. That means, growth does not affect inequality. Trade openness coefficients are statistically significant and negative, implying that an increase in trade openness reduces inequality, that is trade asserts a positive impact on inequality. The FDI coefficient is statistically significant and in 3 out of 4 cases has positive

sign, indicating that an increase in FDI increases inequality. Vulnerable employment (EMPL_1) does not affect inequality while female employment (EMPL_2) has significant and positive coefficient indicating that the increase of female participation in the labor market reduces inequality. The finacial variables (M_1 and M_2) have significnt and positive coefficients which means that the growth of financial sector increase inequality.

Finally, the technology access variables (Tech_1 and Tech_2) have significant and negative coefficients which means that an increase in access of the population to technology reduces inequality.

5. Summary of results and Discussion

From the analysis of the Indicators for the comparison of the performance of BRICS both among themselves and with the developed economies we reached the following.

As far as Growth is concerned, the growth rates for the BRICS, except Russia, are positive, and especially for China and India extremely high. China, shows higher growth rates even than the most developed economies in the world. Looking at the economics structure of BRICS , comparing the value-added percentages to GDP , we can say that BRICS approaches that of developed countries, although in the latter the added value of the services sector accounts for more than 70% of GDP and also the type and quality of services differs. The Government Spending on Education, as percentage to GDP has been rising in recent years (2005- 2016) , for all BRICS. However, as a percentage of GDP, it remains low and does not exceed 6% of GDP. Regarding the Economic Freedom Indicator which documents the positive relationship between economic freedom and a variety of positive social and economic goals, BRICS, comparing to developed economies , are moving at clearly lower levels. Finally we observed remarkably high inequality ratios (in terms of income distribution, health, education, economic freedom) for all BRICS. With South Africa and China to exhibit the highest.

On the other hand, the results of empirical analysis indicate that the relationship between inequality and growth, is not statistically significant (inequality does not affect growth and vice versa). Regarding the other factors that affect inequality and growth, International Trade asserts a positive effect on both , growth and inequality (in the sense that it reduces inequality while FDI asserts a negative effect. Financial sector affect negatively inequality since it increases inequality in BRICS countries. Finally , the social variables of female employment and technology access assert positive impact (reduce) on inequality.

Discussion

The empirical evidence on inequality and growth regarding developed and developing economies finds a positive or a negative relationship (*Fawaz, F et all (2014, Pieters J., (2010), Items B., et all (2014), Shin I., (2012), Malinen T., (2013*), *Herzer D., et all (2012) Henderson D.,J., et all (2015* Both are possible.(Shin 2012)

As far as BRICS are concerned, there are studies on individual member states, rather than on the whole group. (*Gu J., et all 2016, Anikin N., et all 2016 Ware N., D., 2018, Krozer A., 2016 Qin D., et all 2009, Goh C., C., et all (2009, Fleisher B., et all 2010, Younsi M., 2018).*Most of them explore the patterns of inequality within countries, make comparisons of inequality between BRICS members, analyzing regional inequality (differences in rural and urban areas)

In our research we tried to explain the relationship between inequality and growth by combining economic and social variables using panel data on BRICS countries for the period 1990-2018.

International evidence on the impact of trade on inequality indicates, that it varies considerably across countries, and that country specific factors can affect the direction significantly. In the case of BRICS the evidence indicates that trade openness reduces inequality. A possible explanation is that BRICS countries by integrated rapidly into world markets mainly through trade, have achieved such growth rates as to allow them to reduce overall inequality. However, we must emphasize here that our results do not refer to inequality within BRICS. Regional analyses on this issue reveal that there is big income inequality within each BRICS country. So, for trade to contribute in reducing income inequality within BRICS, trade policies must be implemented to reduce between and within inequalities i.e export promotion programmes that target to support smaller firms to enter in the world markets. By doing so they provide equal opportunities to both unskilled-intensive small firms and skilled-intensive large firms in global markets, which then contributes to reducing income inequality.

FDI has a negative impact on income inequality for BRICS countries.A possible explanation is that FDI raises the relative demand for higher-skilled labor, which in turn leads to an increase in both the wages and employment levels of high-skilled workers relative to those of low-skilled workers. Policy implicated measures to reverse this negative effect should be the raise of human capital level which means, more government spending on education and health services which promote the labor productivity and the living standards.

Financial sector-growth increases inequality in BRICS countries. This could be an indication for policy makers to reduce income inequality by directing financial sector to provide access to financial resources of poor individuals at cheaper cost.

Finally, the positive impact of social variables (women's employment and access to technology) on inequality is an indication that governments need to create opportunities for women to participate in the labor market and enhance the access of the population to access.

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