# Challenges for China's Sustainable Growth

**Laura Diaconu (Maxim)**[*] , **Cristian Constantin Popescu**[**] , **Andrei Maxim**[***]

**Abstract**

For more than a quarter of a century, China has experienced a significant economic growth. Yet, this rapid growth has brought on many economic, social and environmental challenges, which might negatively influence the future development of the country. The objective of this paper is to analyse the Chinese economic evolution in order to determine if its growth model is sustainable over time. The research methods consisted in an investigation of the specialized literature, which helped us formulate four research hypotheses, and in a statistical analysis of secondary data, which allowed us develop four models, in order to test the hypotheses. The conclusions show that, to sustain the growth rate, China needs to increase its human capital stock, to keep the pace of attracting the foreign investments, to reduce the size of the government, to diminish the public consumption and to invest in the renewable energy, for increasing the energy efficiency.

**Keywords:** economic growth; education; environment; social climate; foreign investments.

**JEL classification:** Q01; I25; F21; Q56.

## 1. INTRODUCTION

China's modern history began sixty years ago with a grand experiment aimed at achieving economic development through a state planned system. After a tragic failure of this system, a significant change took place almost four decades ago, consisting in a reform that developed a model which allowed the presence of a free market within a communist regime.

In 1978, China was one of the poorest countries in the world. According to the Word Bank statistics, in 1978 China's GDP was 149.5 billion USD compared to Japan's GDP of 996.7 billion USD or to USA's GDP of 2.357 trillion USD (World Bank, 1978). Since then,

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[*] Department of Economics and International Relations, "Alexandru Ioan Cuza" University of Iasi, Romania; e-mail: *dlaura_es@yahoo.com* (corresponding author).

[**] Department of Economics and International Relations, "Alexandru Ioan Cuza" University of Iasi, Romania; e-mail: *popescu@uaic.com*.

[***] Department of Management, Marketing and Business Administration, "Alexandru Ioan Cuza" University of Iasi, Romania; e-mail: *andrei.maxim@feaa.uaic.ro*.

China's GDP has shown a positive trend, with growth rates that exceeded by far those registered in the USA.

After 1996, with the death of Deng Xiaoping, the creator of the *Market Socialism*, the road for capitalism was opened. At the 14th congress of the Chinese Communist Party, it has been agreed that it was necessary to make important steps towards capitalist market model. Most obviously, China joined the World Trade Organization in 2001, it cut the taxes and tariffs, it created a modern and extended trade legal system, it has privatized many of its state owned enterprises and township and village enterprises and it no longer controlled the internal labour migration. To facilitate the emergence of new companies, China modified the legal system, eliminating many of the obstacles. Privatization and trade liberalization reduced the entry and exit barriers and increased competition, which, in turn, led to rapid productivity growth in the manufacturing sector by raising within-firm productivity and through reallocation along both the extensive and intensive margins.

Since the 2008 global crisis, China has been the largest contributor to the world growth, becoming the second-largest economy in the world. This rapid economic growth has also led to improvements in the average living standard. Actually, between 1978 and 2002, China's income per capita grew much faster than that of any other region in the world (Angang *et al.*, 2003). As a result, until 2013, it was estimated that more than 600 million people have escaped from poverty (Purdy, 2013). However, according to China's current poverty standard (per capita rural net income of RMB 2,300 per year in 2010 constant prices), in 2015 there were 55 million poor people in rural areas (World Bank, 2017a).

China's rapid growth has brought on many economic, social and environmental challenges such as high inequality, rapid urbanization, environment degradation and external imbalances. Moreover, the country faces a demographic pressure coming from the aging population and the internal migration of the labour force. Taking into account all these aspects and in the context in which China is an emerging economy where the market reforms are still incomplete, the economists started to wonder if its growth can be sustained in the next decades.

The purpose of the present paper is to analyse, based on theoretical and empirical evidences, the Chinese economic evolution in order to identify if its growth model is sustainable over time. To achieve this objective, the research methods we used consisted in an investigation of the specialized literature and a statistical analysis based on secondary data included in different reports and databases. The literature review helped us develop the four main research hypotheses, presented in the beginning of the Methodology part. The statistical data, processed with the SPSS program, helped us develop four models which allowed us to test the research hypotheses.

## 2. LITERATURE REVIEW

In order to fully understand the Chinese Economic System, we have to understand the changes this vast country underwent in the modern times, which transformed it from an Empire into the biggest communist country that exist today.

### 2.1 From an Empire to People's Republic of China under Mao

In the 16th Century, the Chinese economy was considered to be the most productive and developed in the world, providing the population with a living standard that was the

highest in that times. Nowadays, that period is considered as *unparalleled in history,* a time when all cultural aspects flourished, in a state that had abundant natural resources, a huge population with decent living standards and a ruling imperial house that had a good image within and outside its borders (Guanglin Liu, 2016).

After the instauration of the Qing dynasty, in 1911, which led to a conflicts' period, with many internal wars, the beginning of the 20th century was marked by the formation of the Chinese Communist Party, in 1921. Under Mao Zedong's leadership, this Party established rural bases and began mobilizing farmers (Zarrow, 2005).

Maoism was an essential element in the creation of modern China and of its economic system. As a consequence of Mao's reforms, the economy started to show slights signs of recovery, until 1950, when China decided to help the North Korean regime, defeated in its attack on South Korea. Meanwhile, the ideological conflict between the Chinese and Soviet communist schools determined Mao to make a substantial reform of the Chinese economic system, entitled *The Great Leap Forward* (Palese, 2009). Industry had evolved according to the Communist principles, meaning that arbitrary goals led to useless production (Riskin, 1987). The result of this program was a severe economic crisis, marked by a massive drop in grain production which led to famine in the period 1959-1961. It was estimated that during this crisis about 30 million people died and about 33 million lost or postponed births (Yifu Lin and Tao Yang, 1998).

After Mao Zedong's death in 1976, Deng Xiaoping came to power and he consolidated his position at the 11th National Party Congress in December 1978. That was the moment when new fundamental reforms needed to be implemented, since the centrally planned economy has placed China not only behind the Western industrialized nations, but also behind the new industrial powers of Asia – Japan, South Korea, Taiwan, Singapore and Hong Kong (Naughton, 1996). The purpose of these reforms was not to give up to communism, but to lead to a better functioning of the economy through the substantial increase of the market economy's mechanisms.

### 2.2 China after 1978's reforms

The economic reforms, started in late 1978 and aimed at introducing the market economy's principles, could be grouped in two main phases (Naughton, 2007). The first phase, which lasted until 1992, included gradualist, dual-track and decentralizing reforms that developed directly out of the rural successes. During this phase, the focus was on developing the agriculture and the foreign economic relations. A major change consisted in the replacement of the Commune system with the household responsibility system. As a consequence, the agricultural output increased rapidly in China and the farmers became richer. An important aspect that has to be mentioned is that, during this period of agricultural prosperity, there was no obvious increase in regional inequality (Jian *et al.*, 1996).

The success of the reform in agriculture served as the foundation of reform in other sectors, not only by increasing the supply of food but also by changing the ideological thinking of Communist Party members to support the market economy (Chow, 2004). In the middle of the 1980's, based on the success of the rural transformations, Beijing reformed the urban industries, dominated by monolithic and inefficient state enterprises (Jaggi *et al.*, 1996). The restrictions on trade fairs were relaxed and preferential policies were created for the so-called special economic zones, in order to attract foreign investments and technology

and to promote exports (Bell *et al.*, 1993). Moreover, several coastal provinces, including Guangdong and Fujian, established export-processing zones, in which no import duties were applied on materials processed for exports. Therefore, the foreign investors were encouraged to set up factories to process imported or locally produced materials, necessary for the export production (Park, 1997). The purposes of these areas were to absorb the Chinese labour force and to attract capital and technological know-how. To reduce the market entry barriers, China eliminated a tariff that applied on most commodities, entitled 'import adjustment tax', in the beginning of 1992 (Central Intelligence, 1993).

According to the statistics, if in 1978 the total volume of the Chinese foreign trade amounted to only 7% of its national income, the open-door policy, which encouraged the imports and the exports, raised the volume of foreign trade up to almost 30% of the GDP in 1990 (Chow, 2004). Meanwhile, foreign investments increased from an annual rate of less than half a billion US dollars in 1978 to more than 11 billion USD in 1992 (World Bank, 2017d).

The reform of the price system was started in the early 1980's, in order to allow prices to be determined by the market forces. However, in the 1980's the 'two-tier price system' was practiced. This system involved that one set of prices remained the same as before while a second set of prices for the same goods can be determined by the market. Gradual decontrol of consumer goods prices has progressively brought most consumer goods under market-price regimes. However, as the inflation reached double-digits in 1988 and social dislocations from reforms multiplied, new price reforms were delayed (Jaggi *et al.*, 1996).

In 1987, a further step was undertaken in order to reform the state enterprises under the 'contract responsibility system'. According to this new system, the companies were required to pay a set amount of profits to the government but they could retain the profits above the contract requirement.

In the banking system, the reforms started only in the late 1980's and continued with significant changes during the 1990's.

The educational system has also been reformed after 1978, the universities being reopened after the interruptions of the *Cultural Revolution*. The Ministry of Education has sponsored various programs aimed at enlarging the cooperating with foreign educational institutions, in order to improve the education level in China. Moreover, privately funded educational institutions were also encouraged and flourished after 1980. In this context, in the urban areas, various educators and entrepreneurs have established professional schools and colleges (Pepper, 1990).

The second phase of the Chinese economic reforms started in 1993. During this phase, further steps were made to open up the economy, to create a market oriented legal and regulatory framework and to redefine the role and functions of government.

The 1992 reform of the banking system was aimed at transforming the specialized banks into competitive, accountable commercial entities (Bell *et al.*, 1993). Furthermore, in 1993, the authorities announced their intention to create three banks to support industrial, agricultural and infrastructure projects, all of which being very important for the economic development.

The main results of this second phase, which many economists consider to be still ongoing, consisted in the transformations occurred in the institutional framework, to make it compatible with a market economy, in the dramatic shrinkage of the state sector and in the creation of conditions enabling fair competition among all market participants (Naughton, 2007). Apart from these positive consequences, China has also experienced an increase of

trade and of the foreign direct investment (FDI) inflows, especially in the beginning of the 21st century, after the adhesion to World Trade Organization. Actually, FDI inflows have been a key pillar of China's opening-up policies and have significantly contributed to the country's exceptional growth performance (Wei, 1995). According to the statistics, between 1994 and 2004, the production's increase had a contribution of 60% to the China's economic growth (Campbell *et al.*, 2004), also generating a significant augmentation in the exports' amount. Yet, after 1992, the distribution of the FDI among the Chinese regions was uneven, an overwhelming portion of the foreign capital going to the coastal regions, because of the advantages in location and of the transportation convenience (Bao *et al.*, 2002).

While most analysts consider that both phases of the reforms have led to substantial economic successes, it has to be mentioned that the Chinese policymakers still struggle to improve the functioning of the market economy, while coping with the social problems created by the transition (Naughton, 2007).

### 2.3 Overview of the pillars of sustainable development in China

From the economic point of view, China showed a remarkable evolution during the past four decades. Therefore, if in 1978 China's exports amounted 6.8 billion USD, meaning 4.6% of the GDP, in 2015 they totalled 2.4 trillion USD (World Bank, 2017c), representing 22% of the GDP (World Bank, 2017b). This huge exports' increase is closely correlated to the increase in the number of the FDI made by the multinational companies in the Chinese market, since these corporations are the main exporters of the country. According to the statistics, the FDI has increased more than 250 times between 1978 and 2015, when they totalled 249.86 billion USD (World Bank, 2017d). This very large value was mainly a consequence of the fact that the world-wide producers understood that one of the most efficient ways of facing the competition is to relocate their production factories in China. They did not only increase China's exports, but they also positively changed the whole export structure (Zhang, 2001).

The positive evolution of the FDI helped China register, during 1978-2015, an annual average GDP growth of 9.5%, reaching the amount of 11.1 trillion USD in 2015 (World Bank, 2017e). Actually, it is considered that the FDI inflows have contributed to China's economic growth both directly and indirectly. Apart from the taxation revenues, the investors enhanced the capital formation and represented an important part of the capital accumulation, especially in that provinces which received high FDI inflows, where the effect is estimated to be around 4 percentage points of growth (Tseng and Zebregs, 2002). It is known that FDI generates spill-over effects on the local businesses and, in this way, it can augment the total factor productivity of the host country. As Whalley and Xin (2006) noticed, in China, the foreign companies have the labour productivity 9 times higher than the domestic firms. Meanwhile, the FDI inflows can positively influence the number of jobs in the host economy and the skills of the local workers, both directly and indirectly, through the linkages with local suppliers or subcontractors. Karlsson *et al.* (2009) have conducted a study on the multinationals' manufacturing subsidiaries from China, between 1998 and 2004, and concluded that the FDI can positively influence the emergence of new jobs in the analysed Chinese industry. Moreover, due to the FDI, China's domestic and international competitiveness has improved, by breaking the oligopolistic structures or state monopolies, and a highly competitive manufacturing sector has emerged (Ali and Guo, 2005).

According to a report of Word Bank, in 2010, the foreign companies accounted for over half of China's exports and imports. Meanwhile, they provided 30% of the Chinese industrial output and generated 22% of the industrial profits (World Bank, 2010). However, because of their high productivity, they employed only 10% of the labour force.

Despite all these positive effects that FDI has in China, these investments are uneven distributed both in terms of regions and sectors. Specifically, FDI is mainly concentrated in the Eastern regions (particularly in the south-eastern part of China) and in the manufacturing sector.

Until the beginning of the 21st century, over 80% of FDI were concentrated in the eastern coastal areas to the detriment of the vast central and western regions (National Bureau of Statistics, 2003). According to the Chinese statistics, out of China's 30 provinces and cities, the two major FDI recipients, accounting for over 40% of the country's total FDI, were Guangdong and Jiangsu. Moreover, about 98% of FDI were concentrated in the urban industries and services and less than 2% in agricultural sector from the rural areas (Huang *et al.*, 2004). This uneven distribution of the FDI may be a result of several factors that favoured the coastal areas, such as better infrastructure and preferential policies in offering the incentives (Cheng and Kwan, 2000), advantages in location and transportation (Bao *et al.*, 2002), higher level of economic development and better qualified human resources (Hsiao and Gastanaga, 2001).

This uneven distribution of FDI in China has been closely associated with the uneven regional economic growth and income (Fu, 2004). An empirical analysis conducted by Huang *et al.* (2004) concludes that the regions with the largest FDI inflows, which are geographically close to each other and clustered along the coastal regions, tend to grow faster and are more prosperous than those attracting the smallest amount of FDI, clustered in the western part of the country. Therefore, the interior regions, especially the western ones, lagged further behind in terms of economic prosperity, thus resulting in a divergent growth in China, during the 1990's. Meanwhile, a study conducted by Bao *et al.* (2002) points out that, in the beginning of the 21st century, the wage rate in the coastal areas was higher than that in the interior regions, due to the uneven distribution of the FDI inflows. It was estimated that this higher wage rate and more job opportunities in the coastal regions attracted more than 60 million migrant labourers from the surroundings, until 2001 (Zhang, 2001). While Shanghai, a city that had in the beginning of 2000's about 16 million local residents, received 3 million migrant workers and professionals from outside, Guangdong registered an influx of 15 million migrant workers until 2001.

In the early 2000's, the statistics showed that approximately 90% of the people who lived in absolute poverty were located in the central and western provinces (Jones *et al.*, 2003). Moreover, the analysts estimated that these statistics would get worse because the income disparities may increase, as the Chinese economy would continue to grow. Therefore, to avoid a further increase in the incomes' inter-regional disparities, which can cause serious social and political instability and negatively affect the future development of the economy, in October 2005, the Economic Program for creating a Harmonious Socialist Society was approved (Commission of China, 2006). The purpose of this program was to ensure a more balanced wealth distribution, improved educational, health care and social security systems.

According to the data offered by the National Bureau of Statistics of China, since 2006 the investments in the Central and Western parts have slightly increased, but the Eastern part still attracts more than 80%. Meanwhile, the investments in the manufacturing sector had slightly decreased, in favour of the service sector, but they still account for over 43% of the

total FDI inflows (National Bureau of Statistics, 2016). However, the income inequality still persists. According to a study conducted by the Institute of Social Science Survey (2016) in 2015 the poorest 25% of the Chinese households owned just 1% of the country's total wealth. The Gini coefficient, despite a slight decrease between 2012 and 2015, from 0.49 to 0.469, places China among the most unequal countries in Asia and even the world, next to several high-inequality Latin American states (Sicular, 2013). Meanwhile, the income gap between urban and rural households in China became one of the largest in the world, increasing more over 12 percentage points during the period 1995-2010 (Li and Zhao, 2011).

Education plays an important role in explaining income distribution and widening income gaps between individuals with different educational backgrounds. Indeed, it is noticeable that the returns to education have been increasing in China in the beginning of the 21st century. Thus, if in 1998, the graduates from senior high school, technical school and college earned 4%, 7% and 14%, respectively, more than those with lower levels of education (Li and Zhao, 2011), in 2009 these differences increased to 18%, 32 % and 61%, respectively (Meng et al., 2013).

In 2012, Wu and Xie conducted a national survey in order to underline the opinion of the ordinary Chinese people regarding the high inequalities that exist in the country. According to the results, all of the respondents considered that the economic inequality is a social problem that needs to be addressed by authorities. Actually, from several social issues that were mentioned in the questionnaire, the respondents rated the 'rich-poor gap' as the most severe problem, above corruption and unemployment (Xie et al., 2013).

All these social problems indicate the fact that the government has failed to institutionalize open environments that promote suitable improvements in the well-being of the entire Chinese society. These aspects add to other structural problems, such as the state-controlled financial sector, the regulatory inefficiency or the legal system's vulnerability to political influence, which keep China among the "mostly unfree" states in the world (Heritage Foundation, 2017). However, according to the latest report published by Heritage Foundation, China showed advances in economic freedom over the past year, achieving in 2017 the highest Economic Freedom Index ever. Despite the fact that the government has increased expansionary fiscal and monetary interventions, in the context of the recent economic slowdown, China has made significant improvements in several aspects, such as property rights or labour, monetary and trade freedom.

Apart from these problems, another main aspect discussed today, concerning Chinas' economic growth, is the environmental issue. Its environmental crisis is probably the most persistent problem that emerged from its unprecedented industrialization. Using a panel of data from China's 29 provinces, He (2006) finds out that with a 1% increase in FDI, the industrial emissions will increase by 0.099%. Similar results were found by Baek and Koo (2009). Based on the example of China and India, they concluded that the foreign investors choose the low-regulation countries and, therefore, in those economies the scale of the heavy industrial production increases. In the specialized literature this is called a 'pollution haven effect' (Copeland and Taylor, 2004). The presence of the intra-county pollution haven effect in China has also been demonstrated by Zhang and Fu (2008), with the help of a five-year panel dataset for 30 provinces.

Until 1972, China did not have any environmental institution to prevent ecological disasters. Therefore, the economic growth that followed the market liberalization only aggravated these issues. Nowadays, it is considered that China is the world's largest emitter

of greenhouse gases, having overtaken the United States in 2007, and, in 2014, it was responsible for 30% of the global emissions (Boden *et al.*, 2017).

China's energy consumption is continuously and fast growing, mostly by using coal. Actually, it was statistically demonstrated that there is a positive correlation between economic growth, urbanization and energy consumption. As a major issue in China's economic development, urbanization creates increasing pressure on the energy supply and on the natural environment. Using a time-series analysis, Wang (2014) showed that, in China, there is a positive relationship between urbanization, which increased in the context of the economic growth, and the energy consumption. Moreover, Shahbaz *et al.* (2013) have demonstrated that there is bidirectional causality between the international trade and investments, on one hand, and the energy use, on the other hand.

A study conducted by Wang *et al.* (2014) investigated the relationship between urbanization, energy consumption, and $CO_2$ emissions over the period 1995–2011, by using a panel data model based on the data for 30 Chinese provinces. The results of their study indicated two significant aspects. First of all, they showed that between urbanization, energy consumption and $CO_2$ emissions there is a long term bi-directional positive relationship. Secondly, their results indicated that per capita $CO_2$ emissions decrease gradually from the eastern coastal regions to the central ones and then to the western regions. This results, to which adds the fact that, in China, the carbon emissions mostly arise from industry (Xu *et al.*, 2014), allow us to strengthen the idea that the air pollution in China is closely related to the presence of the multinational companies (mainly located in the coastal regions), which took advantage of the weak regulation.

China is among the countries with the biggest rises in mortality rates from air pollution because, due to the rising populations and congested cities, more people are exposed to power plant emissions and traffic exhaust. Premature death rates in China are forecast to be up to three times higher in 2060 than in 2010 (OECD, 2016).

The pollution in China does not only affect the air and the land, but also the waters. Most of the industries are placed nearby water courses, severely polluting them. In 2014, the groundwater supplies of more than half of the cities was labelled as *bad and very bad*, and more de ¼ rivers had waters 'unfit for human contact' (Ministry of Environmental Protection, 2015). Moreover, water contamination and its overuse have produced severe shortages. In 2016, 440 cities, out of 663, suffered from clean water shortage and 110 faced severe water shortages (Loong, 2016).

The economic impact of the pollution is reflected in the GDP loss. If in 2003 a report conducted by World Bank estimated that the damages associated with air pollution represented 3.8% of the GDP (World Bank, 2007), another study stated that, in 2016, China lost nearly 10% of its GDP due to air pollution (World Bank, 2016). Actually, China is considered the country with the highest GDP loss due to pollution, as the health costs and the lower labour productivity hit harder its output (OECD, 2016). According to the reports, in China, factories are closed in bad-air days to diminish the consequences on health. Meanwhile, as stated by OECD and World Bank in 2016, the health system is pushed to its limits since the costs were estimated to around $100 billion a year.

A possible solution for the serious problems caused by pollution could be the adoption of policies directed to financial openness and liberalization to attract higher levels of R&D-related foreign direct investment, which might reduce the environmental degradation (Tamazian *et al.*, 2009). By analysing a large number of high-technology firms, Ang *et al.*

(2014) concluded that effective enforcement of intellectual property rights is critical in encouraging financing and investing in R&D in China. They argue this idea through the fact that the better intellectual property rights will help firms receive greater protection from patent infringement and thus they will generate more patents and will apply to register them.

A study conducted by Tamazian *et al.* (2009) found out that both economic and financial development are major determinants of the environmental quality in China, as well as in the other BRICS economies. Meanwhile, the implementation of some environmental pollution control policies seems to have substantially limited the pollution loads, particularly in certain targeted industrial sectors (World Bank, 2007). According to Sheehan *et al.* (2014), China is aggressively reshaping its energy system, registering remarkable progress with renewable energy. This should fight against the global warming and provide new impetus to climate change negotiations.

## 3. METHODOLOGY

### 3.1 Research hypotheses

Based on the literature review, we assume that the sustainable development of China is based on four major pillars, hence the major threats are related to them: education, environment, foreign investments and improving the social climate by strengthening freedom. Therefore, our research hypotheses are:

**H1**: *Raising the level of education leads to an improvement in the living standard, which will support growth.*

**H2**: *Improving the democratic environment, increasing the main freedoms and market liberalization will have a positive impact on growth.*

**H3**: *Continuing to attract foreign investments will have positive effects on the Chinese economy.*

**H4**: *The emphasis on renewable energies and increasing energy efficiency will combat the negative effects of pollution and sustain growth.*

### 3.2 Models

a. In our model, we have taken the GDP per capita as growth indicator, assuming that it reflects both the economic performance and the well-being. According to the human capital theories, there is a close link between the education level and the economic growth, both quantitatively and qualitatively. There are some studies which use the school enrolment ratios to measure the human capital stock which, in its turn, is an input in the production function (Barro, 1991; Mankiw *et al.*, 1992; Romer, 1990). Even if, subsequently, Barro and Lee (2013) believe that other indicators could be used, with better results, in China's case, the data are almost completely missing. This determined us to use the enrolment rates. Therefore, our first model is:

$$GDPpcconst = \beta_0 + \beta_1 \sum SEP\_1 + \beta_2 \sum SES\_1 + \beta_3 \sum SET\_1,$$

where GDPpcconst is the per capita gross domestic product (constant 2010 US\$), SEP represents school enrolment primary (% gross), SES – school enrolment secondary (% gross), SET – school enrolment tertiary (% gross).

b. To test the relationship between the democratic environment and the economic growth, we considered, as independent variables, the main components of the Economic Freedom Index.

The regression model is:

$$GDPpc = \chi_0 + \chi_i \sum_{i=1}^{12} FreeIdxi,$$

where GDPpc is the GDP per capita growth and $FreeIdx_i$  $i\epsilon(1,12)$ are the twelve indicators composing the Index of Economic Freedom (Property rights, Judicial effectiveness, Government integrity, Tax burden, Government spending, Fiscal health, Business freedom, Labor freedom, Monetary freedom, Trade freedom, Investment freedom, Financial freedom).

c. To test the influence of foreign investments on economic growth we have chosen a simple linear regression model, in which the dependent variable is GDP per capita growth (GDPpc) and the independent variable is the foreign direct investment, in net inflows (% of GDP)

$$GDPpc = \beta_0 + \beta_1 \sum FDI$$

d. To test the impact of the renewable energies and of the efficient use of energy on the economic growth, we used a linear regression model, with the help of the method Backward

$$GDPpcconst = \alpha_0 + \alpha_1 Rfwat + \alpha_3 CO_2ind + \alpha_3 CO_2electric$$

in which the dependent variable is  GDPpcconst - GDP per capita (constant 2010 US$) and the independent variables are Rfwat - Renewable internal freshwater resources per capita (cubic meters), $CO_2$ind - $CO_2$ emissions from manufacturing industries and construction (% of total fuel combustion) and $CO_2$electric - $CO_2$ emissions from electricity and heat production, total (% of total fuel combustion).

### 3.3 Data

When analysing China's situation, the available data should be viewed with some reserve. China's statistical reports are often vitiated by the political decision and, therefore, the results are often not very relevant. Even if all the statistical information we used comes from the World Bank database, we have to consider the possibility of rough approximations. The Freedom Index used by us is the one calculated by Heritage Foundation, being one of the most often used in the evaluations of the political and democratic developments. The analysed period was 1995-2018. We have encountered difficulties in collecting data for education. The only indicators available for long period were those referring to the enrolment rates on education cycles. The analysed period for education and environment sustainability was 1971-2018, and for foreign investments it was 1982-2017. The data regarding the GDP per capita growth (GDPpc) and the GDP per capita in constant 2010 US$ (GDPpcconst) were available for the period 1971-2018.

### 4. RESULTS AND DISCUSSIONS

a. To test the first hypothesis (H1), the data was stationarized. The period of time was 1971-2018.

**Table no. 1 – Statistics**

| | | GDPpcc_1 DIFF(GDPpcconst,1) | SET_1 DIFF(SET,1) | SES_1 DIFF(SES,1) | SEP_1 DIFF(SEP,1) |
|---|---|---|---|---|---|
| N | Valid | 47 | 47 | 47 | 47 |
| | Missing | 1 | 1 | 1 | 1 |
| Mean | | 150,87820129 | 1,02620258 | 1,20334278 | -,11418996 |
| Median | | 103,92386600 | ,41738009 | 1,40019989 | ,00000000 |
| Std. Deviation | | 149,703839138 | 1,695541767 | 3,220593251 | 3,470324563 |
| Skewness | | ,792 | 3,389 | -,111 | -1,002 |
| Std. Error of Skewness | | ,347 | ,347 | ,347 | ,347 |
| Kurtosis | | -,958 | 15,262 | ,420 | 3,652 |
| Std. Error of Kurtosis | | ,681 | ,681 | ,681 | ,681 |
| Minimum | | -8,368854 | -,081470 | -6,540859 | -13,474152 |
| Maximum | | 434,624777 | 9,817869 | 8,168938 | 7,044281 |

*Source: Authors' calculations*

The ANOVA test revealed that the SEP variable is not significant for the chosen model and the Granger test showed that there was no causal relationship between SEP and GDPpcconst. Therefore, the primary school enrolment was excluded, being irrelevant. The degree of correlation between variables is 0.644 and the degree of determination of 0.415, which shows that the remaining variables secondary and tertiary school enrolment explains the evolution of GDP per capita to a large extent.

**Table no. 2 – Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,636[a] | ,404 | ,377 | 118,136037277 |

*Note: a. Predictors: (Constant), SET_1 DIFF(SET,1), SES_1 DIFF(SES,1)*
*Source: Authors' calculations*

From Table no. 3 it can be observed that an increase with one percent in the enrolment rate difference in tertiary education, the GDP per capita difference by the previous year increases with 52.095 USD, which shows an important influence. At the same time, an increase of one percent of enrolment rate in secondary education leads to an increase of 12.104 USD in the dependent variable.

**Table no. 3 – Coefficients**

| | Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 82,853 | 21,350 | | 3,881 | ,000 |
| | SET_1 DIFF(SET,1) | 52,095 | 10,280 | ,590 | 5,068 | ,000 |
| | SES_1 DIFF(SES,1) | 12,104 | 5,412 | ,260 | 2,236 | ,030 |

*Note: a. Dependent Variable: GDPpcc_1 DIFF(GDPpcconst,1)*
*Source: Authors' calculations*

Normally, for developing countries, secondary education has the most important influence, because it leads to the creation of a medium trained workforce, capable of increasing the productivity, by using knowledge, and of using the technology (Sianesi and Van Reenen, 2000). However, as shown by our results, in the case of China, the tertiary education has the major influence. One possible explanation is related to the Chinese growth pattern, based on attracting investments in high-tech industries and on forced industrialization. To support this process, a highly skilled workforce is needed. Indirectly, the production and the usage of this type of human capital also have beneficial effects on the sustainability of growth. This happens because in the production process, the innovation abilities and the know-how are transmitted to highly qualified workers (Liu, 2002). Subsequently, they will be able to autonomously develop new, innovative enterprises and to generate the creation of creative clusters (Benhabib and Spiegel, 2005).

b. Although all 12 sub-indices (composing the Index of Economic Freedom) were considered to test the second hypothesis (H2), the Granger causality test showed that only three of them significantly influence the economic growth: fiscal freedom (FisF), business freedom (BusF) and trade freedom (TrdF).

**Table no. 4 – Statistics**

|  |  | GDPpc | BusF Business freedom (mark) | TrdF Trade freedom (mark) | FisF Fiscal freedom (mark) |
|---|---|---|---|---|---|
| N | Valid | 24 | 24 | 24 | 24 |
|  | Missing | 0 | 0 | 0 | 0 |
| Mean |  | 8,43957514 | 52,3167 | 56,8333 | 69,5583 |
| Median |  | 8,26023159 | 54,5500 | 68,0000 | 70,2500 |
| Std. Deviation |  | 1,916543967 | 3,51712 | 18,12811 | 1,47115 |
| Skewness |  | 1,019 | -1,144 | -,805 | -1,524 |
| Std. Error of Skewness |  | ,472 | ,472 | ,472 | ,472 |
| Kurtosis |  | 1,024 | ,415 | -,674 | ,691 |
| Std. Error of Kurtosis |  | ,918 | ,918 | ,918 | ,918 |
| Minimum |  | 6,123804 | 43,10 | 20,00 | 66,40 |
| Maximum |  | 13,636345 | 55,00 | 73,60 | 70,70 |

*Source: Authors' calculations*

The degree of correlation between variables is 0.722 and the degree of determination is 0.535.

**Table no. 5 – Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,772[a] | ,596 | ,535 | 1,306302711 |

*Note: a. Predictors: (Constant), FisF Fiscal freedom (mark), BusF Business freedom (mark), TrdF Trade freedom (mark)*
*Source: Authors' calculations*

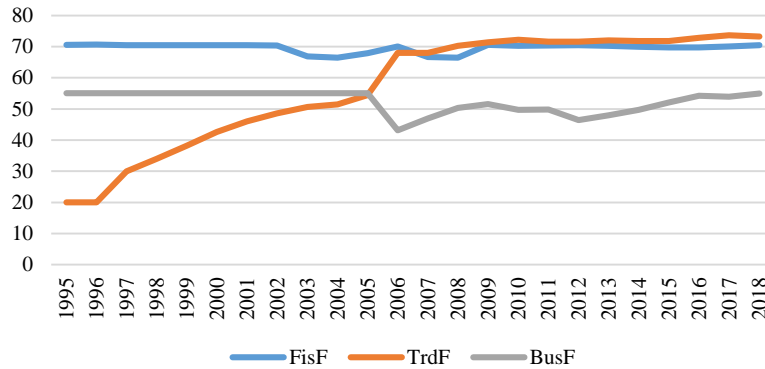The evolution trend of the three indices is presented in the Figure no. 1.



**Figure no. 1 – The evolution of the three analysed indices of the Economic Freedom Index between 1995 and 2017**
*Source: Authors' calculations*

The values of the three indices do not show any significant variations, except for Trade freedom, which had a spectacular increase until 2006, largely justified by China's WTO accession conditions.

**Table no. 6 – Coefficients[a]**

| Model | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|
| | **B** | **Std. Error** | **Beta** | | |
| 1  (Constant) | 82,543 | 14,774 | | 5,587 | ,000 |
| FisF Fiscal freedom (mark) | -,719 | ,189 | -,552 | -3,810 | ,001 |
| BusF Business freedom (mark) | -,395 | ,097 | -,724 | -4,064 | ,001 |
| TrdF Trade freedom (mark) | -,061 | ,019 | -,575 | -3,180 | ,005 |

*Note: a. Dependent Variable: GDPpc*
*Source: Authors' calculations*

The direction of the relationship is very interesting for our analysis. Although, generally, we are tempted to believe that the free market and liberalization positively influence the well-being, for China things seem to be different. As the coefficients' analysis from the regression model shows, increasing these indices would lead to a decrease in GDP per capita, which reinforces the belief that China's growth model is based on a centralized economy where the decisions, including those related to the private sector, are strongly influenced by the political factor. The links inside the economy have been conceived so that each decision goes through a centralized filter and must be part of a government-designed plan. Markets are free only as long as this unique plan allows.

c. Because the data regarding the foreign investment is available since 1982, we restricted the analysis for the period 1982 – 2017 to test the third hypothesis (H3).

**Table no. 7 – Statistics**

|  |  | GDPpc GDP per capita growth (annual %) | FDI Foreign direct investment, net inflows (% of GDP) |
|---|---|---|---|
| N | Valid | 37 | 37 |
|  | Missing | 0 | 0 |
| Mean |  | 8,68555702 | 2,80318157 |
| Median |  | 8,78218488 | 3,02822560 |
| Std. Deviation |  | 2,614396909 | 1,669961660 |
| Skewness |  | -,123 | ,056 |
| Std. Error of Skewness |  | ,388 | ,388 |
| Kurtosis |  | ,398 | -,997 |
| Std. Error of Kurtosis |  | ,759 | ,759 |
| Minimum |  | 2,393612 | ,209664 |
| Maximum |  | 13,638334 | 6,186882 |

*Source: Authors' calculations*

The model is statistically significant, the degree of correlation between the variables being medium (R = 0.344), while the degree of determination is also medium to low ($R^2 = 0.119$).

**Table no. 8 – Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,344[a] | ,119 | ,093 | 2,495574195 |

*Note: a. Predictors: (Constant), FDI Foreign direct investment, net inflows (% of GDP)*
*Source: Authors' calculations*

The dependency relationship between the two variables results from the equation:

$$GDPpc = 7.221 + 0{,}538 * FDI$$

**Table no. 9 – Coefficients**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
|  | B | Std. Error | Beta |  |  |
| 1 (Constant) | 7,221 | ,828 |  | 8,725 | ,000 |
| FDI Foreign direct investment, net inflows (% of GDP) | ,538 | ,252 | ,344 | 2,139 | ,040 |

*Note: Dependent Variable: GDPpc GDP per capita growth (annual %)*
*Source: Authors' calculations*

However, due to the very low level of determination of the FDI on the dependent variable - GDP growth per capita, we reduced the sample only for the period 1993-2017.

If we narrow down the analysed period between 1993 and 2017, option justified by the increase in investments' inflows since 1993, the results become more relevant.

**Table no. 10 – Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | ,750[a] | ,563 | ,544 | 1,408838941 |

*Note: a. Predictors: (Constant), FDI Foreign direct investment, net inflows (% of GDP)*
*Source: Authors' calculations*

The table of coefficients also shows a more significant influence of the increase of foreign investment inflows on the GDP growth per capita.

**Table no. 11 – Coefficients**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| 1   (Constant) | 3,884 | ,951 | | 4,086 | ,000 |
| FDI Foreign direct investment, net inflows (% of GDP) | 1,333 | ,245 | ,750 | 5,442 | ,000 |

*Note: a. Dependent Variable: GDPpc GDP per capita growth (annual %)*
*Source: Authors' calculations*

d. The considered variables for the period 1971-2017 are relevant for the chosen model tested in the fourth hypothesis (H4).

**Table no. 12 – Statistics**

| | | GDPpcconst GDP per capita (constant 2010 US$) | Rfwat Renewable internal freshwater resources per capita (cubic meters) | $CO_2$ind $CO_2$ emissions from manufacturing industries and construction (% of total fuel combustion) | $CO_2$electric $CO_2$ emissions from electricity and heat production, total (% of total fuel combustion) |
|---|---|---|---|---|---|
| N | Valid | 48 | 48 | 48 | 48 |
| | Missing | 0 | 0 | 0 | 0 |
| Mean | | 2120,51158582 | 2521,79706419 | 37,28675478 | 38,63964004 |
| Median | | 1173,02799200 | 2414,65445500 | 34,79654817 | 41,47173510 |
| Std. Deviation | | 2195,274673994 | 407,200564869 | 6,653436910 | 13,341179661 |
| Skewness | | 1,181 | ,605 | ,552 | -,343 |
| Std. Error of Skewness | | ,343 | ,343 | ,343 | ,343 |
| Kurtosis | | ,134 | -,964 | -1,076 | -1,545 |
| Std. Error of Kurtosis | | ,674 | ,674 | ,674 | ,674 |
| Minimum | | 237,813838 | 2061,908566 | 27,719599 | 17,371855 |
| Maximum | | 7329,089299 | 3263,227498 | 49,153255 | 53,758309 |

*Source: Authors' calculations*

The linear regression model shows that the degree of determination is 0.759 and the degree of correlation is 0.871.

**Table no. 13 - Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|---|----------|-------------------|----------------------------|
| 1 | ,871[a] | ,759 | ,743 | 1054,460 |

*Note: a. Predictors: (Constant), CO2electric CO₂ emissions from electricity and heat production, total*
*(% of total fuel combustion), CO2ind CO₂ emissions from manufacturing industries and construction*
*(% of total fuel combustion), Rfwat Renewable internal freshwater resources per capita (cubic meters)*
*Source: Authors' calculations*

Table no. 14 shows that there is a positive relationship between the economic growth measured through GDP per capita (constant US\$ 2010) and CO2 emissions and a negative one between the economic growth and the renewable water resources per capita.

**Table no. 14 – Coefficients**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|-------|------|-----------|------|------|------|
| | B | Std. Error | Beta | | |
| 1 (Constant) | -17672,694 | 7701,942 | | -2,295 | ,027 |
| Rfwat | -3,311 | 1,682 | -,646 | -1,968 | ,055 |
| CO₂ind | 486,199 | 92,898 | 1,561 | 5,234 | ,000 |
| CO₂electric | 257,590 | 65,003 | 1,652 | 3,963 | ,000 |

*Note: a. Dependent Variable: GDPpcconst GDP per capita (constant 2010 US\$)*
*Source: Authors' calculations*

Under these circumstances, it is obvious that the forced economic growth process is not sustainable from the point of view of the environmental resources. On one hand, there is a reverse link between China's limited water resources and its growth potential. As an internal resource, the link illustrated by the regression equation is relevant and shows that China will have to take drastic measures in this respect if it wants to be able to continue the intensive growth model, in the future. On the other hand, it is apparently not logical that carbon emissions sustain economic growth. However, there is a coherent explanation. The atmosphere is not an internal resource; it is a public good of the entire international community that China can afford to consume without incurring costs. As it is well known, China has not ratified most of the environmental agreements, continuous discussions taking place on this issue, with the US and the EU. Therefore, as long as China is not forced to bear its pollution-related costs, it can sustain its growth by emitting more and more carbon.

## 5. CONCLUSIONS AND RECOMMENDATIONS

For more than a quarter of a century, China has experienced significant economic growth. As shown before, the opinions regarding the future of this economy are divergent. While a large part of the analysts consider that China will become the future world leader, others believe that the intense growth pace will deplete the resources and the history of Japan, which has reached its limits before making the major step towards dethroning the US economy, will occur again.

Our study has focused on the main pillars of the growth of any economy: education, foreign investments, democratic values and the environment. Although we have little data,

especially in the case of education, due to the China's lack of transparency in offering certain information, we have been able to draw some interesting conclusions.

Thus, in the case of education, it is well-known that over the last ten years, China has been making intense efforts in surpassing the education gaps that exist between this country and the developed states. Massive investments took place, especially in the tertiary level, and, as a consequence, the Chinese universities and research centres became more often included in the international rankings. Our study shows that if the country continues to prepare specialists at the same level, this will represent a major advantage in sustaining growth on medium and long term. The period of extensive development has passed for China and its leaders seem to have understood this. Thus, in the context in which the developed countries have shifted their economies towards high-tech industries and to services that embrace a high degree of innovation, China's only chance of convergence is to follow the same path. Testing our first hypothesis *(H1) supports the idea that the best solution for China in the field of education is to attract more and more students to university and postgraduate studies*.

One of the main threats, when talking about developing countries, is that this highly trained workforce does not find an optimal national allocation and, as a result, they migrate. In the case of China, this phenomenon is not worrying because it manages to attract, at a very high pace, foreign investments in competitive and high-tech industries, where productivity is very high and labour incomes are on an ascending trend. Moreover, it is clear from our analysis that if the *FDI absorption rate is maintained, it will have a significant positive effect on the GDP growth. Therefore, our third hypothesis (H3) is accepted.*

China has understood very early that, in order to align itself with the big economies in terms of competitiveness, it cannot rely only on reduced costs but also on increasing technical capital. Since the internal resources were insufficient, it has opened its borders to foreign investors, by selecting those who have brought not only the financial resources, but also the technology and know-how.

Generally, the theories related to the connection between prosperity, democracy and free market conclude that the three aspects are directly related. In the case of China, there are some doubts. The development model adopted by this country is based on the free market only at a minimal level. In general, the decision is centralized and focused on creating step-by-step advantages without losing control over the main actions that take place in the economy. As shown by the results obtained by testing the H2 hypothesis, a possible greater liberalization of the business environment would lead to an important loss in boosting growth. Therefore, the second hypothesis – *H2: Improving the democratic environment, increasing the main freedoms and market liberalization will have a positive impact on growth* – was not validated. Controlling the functioning of the business environment through proper regulations and the limitation of the size of private property, the direct influence of international trade through very strict exchange rate management, extremely protective customs policies and a system of political favouritism are at the basis of the relative efficiency of the functioning of the Chinese economy.

The regulatory capacity is based on an oversized state, which needs financial resources to operate. Therefore, a well-advised fiscal policy, which would allow collecting significant budgetary revenues but would not inhibit the foreign investment, is absolutely necessary. A possible liberalization of the tax sector would negatively influence the growth model, diminishing the available government's resources.

All the expectations regarding China's future development are related to the sustainability of its growth model. Industrial activity has risen in stunning pace, which has led to over-use of the environmental resources. Pollution has become a growing problem for China. However, our fourth hypothesis – *H4: The emphasis on renewable energies and increasing energy efficiency will combat the negative effects of pollution and sustain growth* – was only partly confirmed. Apparently surprising, the economic growth goes hand in hand with the atmospheric pollution and there is even a significant determination between these variables. In fact, China pollutes an atmosphere that is a public good of the entire planet, without directly bearing the costs, only receiving the benefits. Therefore, as long as China's pollution costs are not internalized, its low-cost growth model with atmospheric pollution will generate significant domestic benefits. Not the same thing can be said about the internal environmental resources. Our model has shown that the water pollution is already affecting the results of economic activity, China being forced to take measures in this regard.

In conclusion, in order to sustain the growth rate, China needs to increase its human capital stock, especially that related to the tertiary education, in order to keep the pace of attracting the foreign investments. The political stability seems essential to maintaining the growth model. As long as China will resist the internal and external pressure to expand liberties and implement the democratic model, the risk that this model will fail in the coming period does not exist. Particular care must be taken to protect the environment and the rapid depletion of the natural resources. In the event that China will be forced to adhere to international treaties on environmental protection, this will generate significant additional costs and will reduce the competitiveness of the Chinese economy.

It is possible that the results obtained by us might offer a different perspective if the analysis period would be extended. Unfortunately, the fact that we have been able to access data for a period of only 22 years in the case of the freedom indices is a limit of our research. However, it would be interesting to look at the interdependence between the analysed factors and not just at their influence on growth, because there might be a very likely link between FDI and education, between education and freedom, between taxation and investments and between investments and environment.

### ORCID

Laura Diaconu (Maxim) https://orcid.org/0000-0001-5745-3850
Cristian Constantin Popescu https://orcid.org/0000-0002-0424-8754
Andrei Maxim https://orcid.org/0000-0002-1578-3699

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