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Bachelor Thesis

Challenges for the Chinese economy: Limits of Growth

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Declaration

I hereby declare that I have worked on my bachelor thesis titled “Challenges for the Chinese economy” completely on my own and that I have marked all quotations in the text and I have also mentioned all sources I have used in the Literature at the end of the thesis.

In Prague on November 23rd, 2014

Signature.....

Kamen Kamenov

Acknowledgement

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Challenges for the Chinese economy: Limits of Growth

Výzvy Čínské ekonomiky: Limity růstu

Summary

In this bachelor thesis I am evaluating the economic situation in China in the past years. This work focuses on the Chinese development through the past years as well as the reforms made in order to stabilize the Chinese position in the economic world. The thesis is divided into two main parts, theoretical and practical part. The theoretical part focuses on the Chinese economic situation of the past years and defines few of the Chinese limits of growth. The practical part compares the Chinese and USA economy and evaluates what would the Chinese economy look like without some of its limits of growth.

Key words: China, USA, production, analysis, limits of growth

Souhrn

V bakalářské práci vyhodnocuji ekonomickou situaci v Číně za poslední roky. Samotná práce se zaměřuje na vývoj čínské ekonomiky v posledních letech a reformy, které ji pomohly se dostat na dnešní pozici ve světě. Práce je rozdělená na dvě hlavní části, teoretickou a praktickou. V teoretické části se zaměřuji na čínskou ekonomickou situaci posledních let a na definování limit jejího růstu. Praktická část porovnává ekonomickou situaci USA a Číny a analyzuje jak by vypadala Čína bez těchto limit růstu.

Klíčová slova: Čína, USA, produkce, limity růstu, analýza

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1. Introduction

China is the largest country in Asia and one of the largest in the world. China always had strong position in the world and contributed to many branches such as medicine, weaponry, clothing, architecture, philosophy, dishes (famous Chinese porcelain). The famous Chinese inventions are for example silk, compass, gunpowder, typography (since 300 A.D.), paper etc.

Nowadays Chinese economy is one of the largest leading economies in the world. It has developed a strong position in the past 20 years and holds second place by nominal GDP (after the USA). It is worth to mention that China had the world's fastest growing economies with growth rates of approximately 10% in the past 30 years.

The thesis is divided into two main parts, theoretical framework and practical part. The first part of the thesis focuses on the theoretical aspects including China's development in the past 60 years until nowadays, limits of growth, production and import/export, exchange rates etc. In the second part the author concentrates on practical examples and forming predictions for the future of China's economy.

2. Objectives of the thesis and methodology

2.2 Objectives

The objective of the thesis is to evaluate the Chinese economy in the past and nowadays, to compare its growth to other leading economies in the world and to form predictions about its growth in the future. Also evaluation of the limits of growth and in China.

2.3 Methodology

Mathematical and statistical methods of empirical research are used for the computations of the predictions for the future. Programs Microsoft Word and Excel are being used, as well as Gretl which is used for the arima prediction computations.

The predictions are evaluated based on trend analysis and eventual forecast.

3. Theoretical framework

3.2 Economic growth

An increase in the capacity of an economy to produce goods and services, compared from one period of time to another. Economic growth can be measured in nominal terms, which include inflation, or in real terms, which are adjusted for inflation. For comparing one country's economic growth to another, GDP or GNP per capita should be used as these take into account population differences between countries.

3.3 Factors contributing to economic growth

Economic growth is the growth of a potential product. The factors contributing to the altitude of the product are also the factor contributing to the overall economic growth. The economic growth can be affected by 2 factors: either increasment in the amount of the production entries (more work, more physical capital, more natural resources) or by improving the productivity of the production entries.

The first entry is the work (workforce). It is important to note that not all inhabitants are considered as a work entries. Only a part of the population is „economically active“. Among the inactive inhabitants belong children, pensioners, permanently ill/disabled people. The other thing worth mentioning is the amount of hours that these workers work off.

In terms of physical capital we mean the overall physical amount of single forms of capital (machines, buildings, infrastructure) to certain amount of time. These capital reserves are increased by investments. In a reversed situation however this capital is being depreciated.

The other production entry are the natural resources. The supply of land/soil is fixed. In terms of resources we often distinguish renewable and non-renewable resources. With a very high usage of non-renewable resources (oil, coal, natural gas) and subsequent depletion may lead to suspension of the economic growth. Decreasing supplies of non-renewable resources leads to increasment in their price. This causes either opening of new deposits and/or optimization in the usage of these resources and substitution with less valuable resources.

The last source of economic growth is the productivity of the production factors/entries. Numbers of workers, amount of hours worked off, amounts of new machinery, buildings, infrastructure and stature of natural resources can be computed easily (with small exceptions). However with the productivity thigs are more complicated. In general we can say that the productivity are all factors influencing the growth with the exception of physical amount of work, capital and natural resources. The two most important are: human capital (improvement of workforce – trought education, expierience etc.) and technology (production procedure, knowledge etc.). This was a theoretical definition of the economic growth, the practical real life economic growth is identified with the GDP anual growth displayed in percentages. The equation is as follows:

$$GDPrate = [(Real\ GDP\ in\ year\ n) - (Real\ GDP\ in\ year\ n - 1)] / (Real\ GDP\ in\ year\ n - 1)$$

To describe the growth rate in % we simply multiply the rate by 100.

3.4 China's economy before the millenium

China always belong to the economically well developed countries. Until the end of 17th century almost 25% of the world's GDP was from China. It reached its peak in the 1830s where nearly 32% of the world's GDP was Chinese. However ensued a collapse and by the end of 1950 these numbers declined to only 4.5-5%.

The biggest attempt for an economic developement since the commencement of the Communist Party was the year 1978 and the initiation of economic reforms. At this time

(1979) China's GDP was \$177 billion and the GDP per capita was \$183 (counting 2002 USD inflation). The main aim of the economic reforms was an overall improvement of quality of life and disappearance of economic instabilities in the country. The fact that the Chinese economy began to noticeably lag behind the other Asian countries was a pretense for the Chinese government to no longer ignore its development.

3.4.1 Single sectors of the Chinese economy

3.4.2 Agricultural sector

The agricultural growth in the „reform era“ ranged from 9% to 9.5% annually. China became one of the biggest direct foreign investment countries in the world and the 6th largest economy by nominal GDP (before the admission to the WTO).

In 1980 the agricultural sector employed more than 65% of the workforce and GDP share was about 30%. Despite the fact that the integration of the agricultural sector with the other aspects of the economy was limited, this sector played major role in the raise of the Chinese economy in the reform era. The first break point were the changes in the politics in the agricultural sector and the second major break point was the development of the industry in the countryside areas (TVE – Town and Village enterprises).

3.4.3 Industrial sector

The industrial sector played also a major role in the transformation of the Chinese economy especially after 1984 when the reform started in the urban city areas. The industrial growth from 1979 to 2000 was 11.8% while the HDP between 1979 and 2000 grew in average

of 9.6%. Chinese industry became base of production for multinational companies with significant impact on direct foreign investments.

The industrial growth in the reform era was led primarily by the supply – industrial production. By the 1978 China focused mainly on the development of the primary sector. However the development of this sector is heavy on capital and the focus had to be transformed to the sectors heavy on workforce (where China had always big advantage). This led to reforms in areas: reform of the market, company reform and reform of the trade and foreign investments.

3.4.4 Financial market

Since the beginning of the reforms in 1978 China created a financial system in which the central bank is independent and operates the monetary politics and macroeconomics adaptation. The state owned banks with other financial institutions are the pillar of the financial sector. A capital market developed and for the regulations of the individual areas of the financial sector are responsible corresponding authorities.

The bank system transformed during the reforms from monobank system to a system with one central bank and many other domestic and foreign banks. The role of the central bank belongs since 1995 to the People's Bank of China (POBC) with a law published in 1995 - Law of the People's Republic of China on the POBC . The domestic banks could be divided into 3 categories: the four largest state commercial banks (SOCBs), 12 other commercial banks (joint-stock banks, JSBs) and city commercial banks – CCBs. There are also 4 „policy banks“ which substituted SOCBs in non-commercial activities.

The SOCBs were created in the initial phase of the reforms and by the end of 1999 these banks held in actives more than 1.3 billion USD, 150 000 subsidiaries and employed more than 1.6 million people. The share of the whole bank system exceeded 70%. These banks are due to historical and mainly political reasons tied to the state sector and have mostly monopoly in the providing of services.

JSBs and CCBs are followed up with the local governments and despite the fact that are located mostly on the east coast, during the reforms their activity had been allowed in the whole China. The biggest representatives from this group are the „Bank of Communications“ and „Everbright Bank of China“. The only private bank from this group is the „China Mingshen Banking Corporation“. They have a lot smaller structure of subsidiaries and they focus on secondary and smaller SOEs.

The foreign banks before the WTO admittance shared only 2% of the whole bank market. In 1999 there were 69 foreign banks from 16 countries and 6 banks which were 100% foreign owned, the most notable were „Bank of East Asia“, „HSBC“ and „Standart Chartered Bank“. In terms of taxes the foreign banks have noticeable advantage – they have 15% tax from their profit (comparing to the 33% for the local banks).

3.4.5 Insurance

The insurance has a long time tradition in China. Its roots extend to the half of the 19th century when European, American and Japanese insurance companies started to do bussiness. Until 1949 only foreign insurance companies preveiled in China. In the late 1949 „People’s Insurance Company of China“ was established as a monopoly insurance company and all other had to abandon the Chinese market. In 1985 the government allowed the building of other homeland insurance companies. In 1988 was established „Ping An Insurance Company“ and on 1991 „China Pacific Insurance Company“. Until the end of 1996 China already had 11 homeland insurance companies.

The foreign insurance companies were able to operate again in 1992 and the first licence receive the „American International Group“ (AIG). In the next 10 years another 16 foreign insurance companies got their licences to operate in China, however their activities were limited. They were able to operate only in the areas of Shanghai and Guangzhou and to offer only life insurance.

In 1996 arrived the next phase of recontruction the insurance system when the PICC was divided into 3 partitions: PICC Life Insurance, PICC Property Insurance and PICC Reinsurance Company. This was the outcome of the new Insurance Law from 1995. Since

1999 was the division of the individual insurance departments obliged. By the end of 2001 in China operated 20 life insurance companies and 17 non-life insurance companies (17 out of 37 were foreign companies).

3.4.6 Services (distribution)

The services became a significant part of the Chinese economy during the reform era and their share in the total GDP grew from 21% in 1980 to 33% in 1998. Despite this fact, in terms of international comparison this share was about 20% lower than in countries with similar GDP per capita. In general this sector was unapproachable for foreign investors and the Chinese government loosened it gradually.

The distribution sector is the key factor of the operation of the market economy – it is the main connecting line between the manufacturer and the customer. During the transformation before 2001 the distribution sector converted from monopoly to a condition where every single material is transported based on the demand and supply. The share of non-state distributors grew from 1% in 1979 to almost 80% in 2002 before the entrance to the WTO. With the exception of several key products such as cotton, cereals, automobiles and coal, all products were allocated by the market and the prices of 95% of the consumer goods were determined by the market. From 1979 to 1999 the distribution sector grew annually about 9.4%, similar to the annual GDP growth for that time (9.5%). Also the employment rate in that sector grew annually about 6.5% in the period from 1980-1999. The distribution sector produced 8.5% of the Chinese GDP in 1999 and was one of the largest contributors to the whole GDP. 60% of the new 14 mil. work places were created by private businesses or sole traders.

3.4.7 Direct foreign investments (DFI)

One of the key roles in the development of the Chinese economy played the DFI thanks to the improved investment environment after 1979. The foreign companies were

mainly attracted by the large homeland market and by the cheap and relatively educated work force. From 1993 China became the world's second largest DFI beneficiary and world's largest DFI beneficiary from the developing countries. From 1979 to 2000 the DFI flow reached \$347 bil. The flow grew from \$11 bil. in 1992 to \$45.5 mil. in 1998.

While in the 80's 60% of the foreign capital in China was contributed by foreign loans, in the 90's the main source of capital were the DFI's. Since 2000 the share of the direct foreign investments on the whole foreign capital was more than 95%.

The influence of DFI's

The impact of the DFI on the growth of China's trade can be tracked from the trade productivity of the foreign businesses whose turnover grew from \$43 mil. (1980) to \$174,5 mil. (1999). Taking into consideration that the government politics focused the flow of DFI into the export sectors, the foreign enterprises soon became the largest exporters. In 1999 their exporting reached \$89 bil. (almost 50% of the all exports). In general the flow of DFI positively contributed to not only the shortages of the foreign enterprises but also improved the payment balance of China and contributed to the large increase of the foreign exchange reserves.

The DFI focused mainly in the production sector and the foreign enterprises became significant representatives. In 1995 FEE (foreign enterprise exporters) created 11% of the manufacture enterprises and 20% of their overall assets. In 1995 more than 50% of the assets were concentrated in sectors heavy on work force, 23% heavy on capital and 27% in technology-demanding sectors. In 1999 finally more of the assets were in capital-demanding and technology-demanding sectors.

The DFI have both direct and indirect impact on the employment. The foreign enterprises created new work places and at the same time they contribute to formation of work places by suppliers, customers and competition. While in 1991 the foreign companies employed 1.6 mil people in city areas (1% of the all city areas employees), in 1999 the employment in the city areas reached 6.1 workers (or 2.9%).

In terms of sources, the largest direct foreign investors were matter of Asian economies. The four largest investors were: Hong Kong, Tchaj-wan, USA and Japan. From 1983 to 1999 Hong Kong invested approximately 51% of the all investments, 15% the other

NIE's (the rest of the Four Asian Tigers: Singapore, South Korea and Tchaj-wan), the USA share was about 9%, western Europe about 8% and the rest of the world with about 19%. After 1997 the contribution from asian economies declined because of the asian financial crisis and the contribution from USA, Europe and Japan rose rapidly.

3.5 The outcome of the reforms

The outcome of the reforms after more than 20 years showed significant transformation of the Chinese economy. The average income rose 8 times and despite the still growing difference between the city and the country population, the income of the poorest people significantly rose. In 2003 only 3% lived under the state bounds of poverty, the average survival age rose, and the illiteracy declined by significant numbers.

As mentioned before, the process of the reforms was a continual, long term and moved from the agricultural sector to other ones. In the beginning of the 90's were almost half of the prices decontrolled, while right before the WTO admittance 86% of the prices in the production, 95% in retail and 83% in the branche of agricultural products went along with the market. The role of the private sector significantly increased and the gaps in the bank and financial system were filled.

China was admitted to the WTO in December 2001. From 1980 China liberated its trade and investment politics and by 2000 was more open and dependent on the foreign trade more than many other WTO members. The import and export shared 55% of the whole GDP in 2002 – more than in many other developed countries. The import rates were lowered and in 1994 China installed convertibility on a regular account level.

3.6 China's economy from the millenium till nowadays

3.7 General economic situation

In the first 5 years of the WTO membership China's economy positively changed in many aspects. The idea of the market economy and liberalization of the trade has become a public interest as well as the population understood the main principles of the WTO – responsible management and national treatment. Private homeland enterprices enforcet the goverment to change the constitution which since 2004 contains concepts of proprietary and human rights.

China's entrance to WTO changed the world's economic arangment in many aspects. China grew economicly in the past 5 years and in 2005 overtook Great Britain in terms of overall GDP. It became the fourth largest economy in the world. China ranked among USA and Germany as the three largest trading countries. From 2002 to 2006 China collected about 230 bil. USD in DFI. The integration of China into the world's economy helped the country to become the world's main manufacture centre – world's consumers benefit from the low price products manufactured in China. In march 2006 China overtook Japan in terms of of foreign exchange reserves – more than \$875 bil., and until the end of 2006 – \$1000 bil.

Chinese government supported also investments to foreign coutries – in order to stabilize access to energy, raw materials and foreign markets. The imports since the WTO admittance grew by 27% anually.

3.8 Macroeconomical developement

Since the WTO admittance the Chinese economy grew anually about 8-10%. Despite the fact that China's economy was heavily damaged by the SARS epidemy in 2003, this was the best years since 1997.

In 2005 the GDP growth reached 10.4% and in 2006 11.1%. As well as in the previous years, the growth was led by investments, export and the inflation remained low. Its worth to mention that the productivity of the labour played also a big role in the overall GDP growth. The national savings reached almost half of the GDP and the bussiness sector evinced large incomes. The state enterprices represented half of the bussiness and the fact that they don't have to pay dividents to the state means they have more to invest.

Chinese households consumed in 2005 less than 40% of the GDP (comparing to 1980 when this was 51%). The average wage grew rapidly however lagged behind the growth of the productivity of the labour.

The inflation grew a bit however the government approached to few administrative actions to reduce the expenses. In 2005 banks were forced to limit the credits and loans in purchasing properties.

3.9 Exchange rate mode

In July 2005 the Chinese government undertook some actions in order to stabilize the functioning with the market with foreign currencies. The initial currency revaluation of RMB in July 2005 was 2.1% and by the half of 2006 the exchange rate of the RMB towards to USD dropped only by 1.6%. The average day fluctuation of the RMB towards the USD was in 2006 below 0.3%.

Table 1 Developement of RMB 2001-2006

	2001	2002	2003	2004	2005	2006
RBM/USD	8.28	8.28	8.28	8.28	8.7	7.8

Source: <http://www.imf.org/external/pubs/ft/scr/2006/cr06394.pdf>

Trade partners of China along with the USA accused China of undervaluation of the RMB – favouring the cheap Chinese exports in the world market. The Chinese government declared that they are trying to install a controlled floating, however in a long term process.

The government was afraid of a negative impact in terms of macroeconomic situation and stability of the financial sector. Possible evaluation of the RMB would influence the exporters of goods with low added value which would have impact on the employment and the income of countryside population.

3.10 Information of GDP growth

Considering the statistical survey of entrepreneurship from 2005, China's GDP grew in 2004 about 17%. On the basis of the 2004 data, calculations for the years from 1993 were made. The real GDP growth from 1993 – 2004 grew to 9.5%.

3.10.1 Agriculture

In 2000 started a new phase in the Chinese agriculture development. On the most agricultural markets arised large supplies and the prices went down. The GDP share of the agricultural sector declined and went down from 14.5% in 2001 to 12.5% in 2005. The agriculture contribution to the overall employment and the low share of GDP indicated low productivity in the agricultural sector – about 70% lesser than in the other sectors.

Until 2003 was China pure exporter, however thanks to the large imports became in 2004 mostly importer. The import of cereals (wheat, corn), rise, cotton and soyabeans recorded highest values. The share of agriculture in overall trade dropped a lot – import from 8.7% to 7.4% and export from 6.6% to 4.1%.

The Gross Agricultural Output increased by 90% from 1990-2003, however the rate of growth reduced from 6.2% anually to 3.6%. The agricultural production overall changed. The growing of crops transformed to breeding of cattle and fishery. The share of cereals in the agriculture dropped from 65% in 1990 to 50% in 2003 and the breeding of cattle and fishes grew from 26% to 32% and 5% to 14% respectively. Forestry assiciated with about 4%. China became marketplace for many of the Asian countries such as Japan, Singapore and Hong

Kong. The WTO estimated that China will need about 10 years to adapt to the WTO requirements and its production to be comparable with the USA. For example in the 1980 USA was the worlds largest producer of apples, however in 2004 China managed to produce 4 times larger amount. In Singapore the American import dropped by 50% in 5 years and China acquired 60% of its market. Chinese grower produce 50% of the world's vegetables and melons. After the China's WTO admittance actions were made:

- Prices determined by the state (before that prices were determined by the market)
- Since 2002 farmers receive subsidies
- Loans for purchases of key materials were cancelled
- In 1999 ecologically sensitive lands were not allowed to being cultivated
- Import duties on crops were reduced from 45% to 15%

3.10.2 Industry

The industrial sector went trough many changes in the past 5 years. The private sector dominates the branches and creates the most work places. There were a few branches which slowed the growth of the private sector and in the state sector exceed nonprofit enterprices that needed restructurization.

3.10.3 Continious reform of the state enterprices

The growing competition, the strong macroeconomics environment and the continious reforms in the state sector contributed to the overall improvement of the capital structure and the productivity. Approximately one fifth of the state enterprices had payback at about 10%.

The number of the state enterprises distinctively dropped. From 300 000 in 1995 to 150 000 in 2005. The employment dropped from 1998 to 2003 about 40% - about 16 mil. workers were released. Despite the fact that the state controlled enterprises had about 50% lower productivity than the private enterprises, there was a slight improvement.

3.11 Limits of growth in China

In 2013-2014 the Chinese economy slowed down its growth to about 8%. Nevertheless another slowdown is in range. One of the causes is the so called „one child policy“ from 1979.

The economical and political power of China had a parabolical output in the history, however in the past two decades it upswings. The growth of the Chinese economy expressed by GDP has no competition nowadays and along with USA outdoes every other single country. Of course China has seen a reduction in the rate of growth due to financial crisis. Since 2008 the world economy faces a financial and subsequent debt crisis which severely hit especially Europe. And the old continent is China's largest trading partner – the largest volume of Chinese exports are directed here.

The Eurozone debt crisis caused the loss in the Chinese industry and exports with slipped investments. It is therefore not surprising that politicians talk more and more about a reconstructing of the Chinese economy towards diversion from domestic investment and exports to stronger increases in consumption and services. Of course this happens due to the increasing wealth of the Chinese population gradually, but still the domestic demand is not strong enough to cover the loss of exports due to problems in target export markets.

With the decline in China's exports and growth rate of the industry also decreases the Chinese GDP , up to around 8 %. The 8% GDP growth seems fantastic, however for China this number is rather low. The decline of the China's GDP impacts the growth of the world's economy.

The Chinese economic growth relied heavily on branches intensely exploiting energy sources. However except the high energy demand this relying has heavy impact also to the

environment. Orientation on export pulled by industry extensively using sources begins to achieve the limits when the the amount of the negative impacts become larger than the benefit. Even the Chinese government itself feels the need to transfer the core of the Chinese economy somewhere else. The fact that the Chinese population is growing richer only provides space for that idea. The homeland demand has the smallest contribution to the Chinese GDP.

Even it does not look so, its limits reaches also the so called „state capitalism“ – enterprices controlled by the state. These companies product more than 50% of all Chinese goods and employes more than half of the Chinese workers – so they are the largest segment of the economy. The government via those state enterprices controlles the strategic branches – energetics industry, grids and oil extraction.

The state enterprices also easier achieve some investment incentives which is an advantage over the smaller private companies. However the exploiting of these incentives causes the classic „abuses“ of the state enterprices – corruption and economic inefficiency (non effective projects are being invested, etc.)

The extensive government supported investments were the engine of the Chinese economy. In addition to that, the producing of the same amount of products the Chinese economy requires more and more debts. The expansive fiscal and monetary politics drifts towards a civil „leap“ of the inflation. This has an impact on the growing prices of the groceries.

Another limiting factor is the declining Chinese rely on the export, because the homeland currency renminbi (RMB; jüan) evaluated by 10% since the leaving of the fixed rate towards the USD.

Taking into consideration the stated limits of the Chinese economy its recontruction is inevitable. However everything has its difficulties. Such a recontruction of the economy demands services which together with the demestic consumption need to contribute to the GDP growth. However the demand on the educated workforce still might be a problem even for China. Partly it is due to the one child policy. The world has to prepare to smaller numbers of the Chinese growth, therefore to smaller growth of the world's economy. Nevertheless China will still grow along with other leading economies and its significance on the financial market will continiue to rise.

4. Practical part

The limits of growth may differ from state to state (one child policy for example) but also can be identical for many states. Among the most common limits of growth belong the pollution, not educated workforce, not satisfying weather conditions etc.

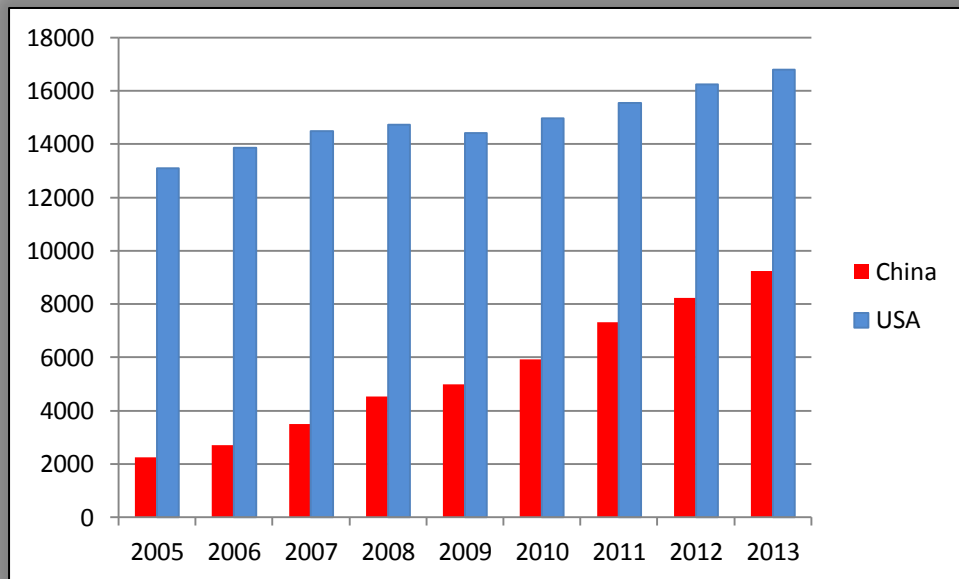
The practical part of this thesis focuses on comparing the economies of the USA and China and on forming predictions about the China's GDP development in the future, as well as comparing what would China's GDP look like without the limits of growth such as the one child policy, environmental pollution and energy management.

The methods for computations used are trend analysis and forecast as well as arima predictions.

The programs used are Microsoft Excel, Office, Gretl.

4.2 USA and China – comparison

Chart 1 – Nominal GDP in bill. USD



Source: <http://data.worldbank.org/>

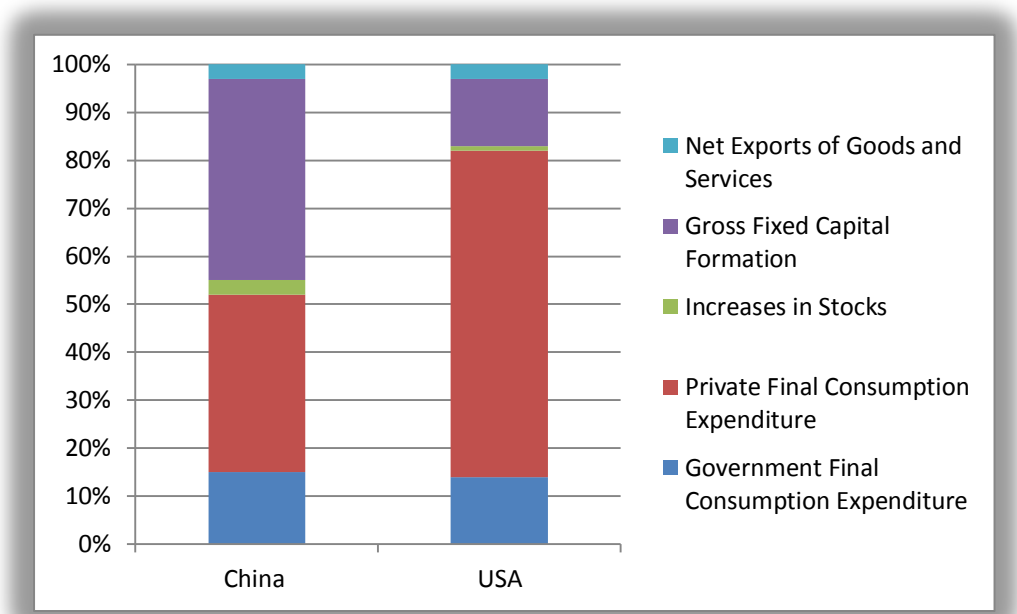
In the chart above we can see that in terms of nominal GDP the USA still surpasses China. However the growth in China is much more significant and in the next 10-15 years China might overcome the USA.

In terms of GDP PPP (purchasing power parity) the GDP's of the both countries are equivalent and some sources estimate a slight dominance of the USA and some tend to estimate that China's GDP PPP is larger.

In the past years the structure of the USA economy and the one of China is very different. In 2013 – 2014, the private consumption contributes to the GDP with more than 68% while in China its just about 37%. The growth in China is powered by investment while in the USA the private consumption plays the most significant role. We need to take into consideration that both economies are open to risk. Large emphasize on the consumption may lead to pressure on the trade balance and inflationary threats. On the other hand, if the

investments are not directed where really needed they could be wasted and also might cause inflation.

Chart 2 – GDP by usage in China and USA in 2013

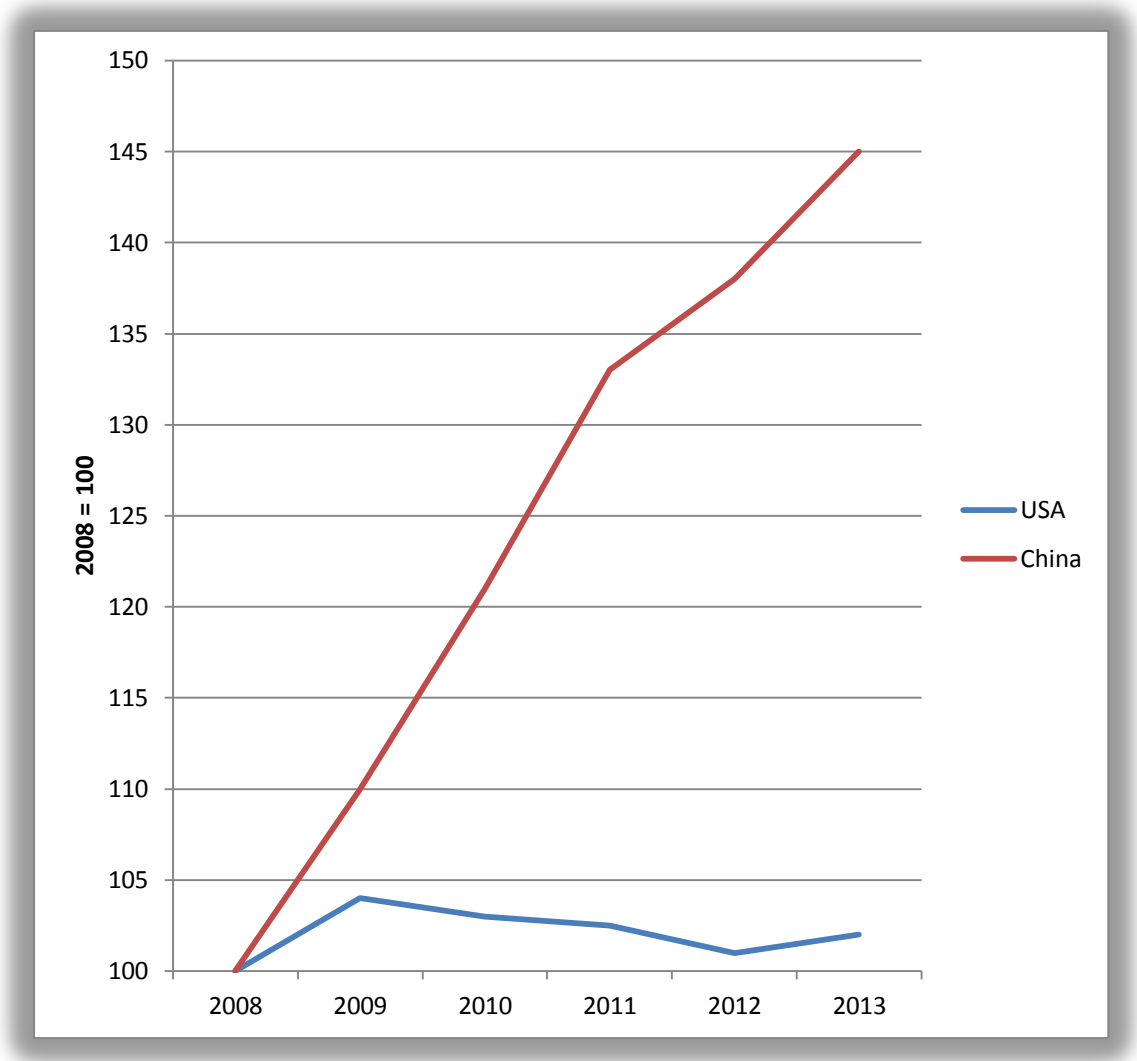


Source: Euromonitor International from national statistics/Eurostat/OECD/UN/IMF

In terms of agriculture, it is still an important sector to China – with 10% of the total GDP share, while the USA agriculture contributes with only 1%. The USA has higher production, however only 1.5% of its population is employed in the agriculture (32% in China). Another difference in the agriculture is that most of the USA farms are business large scale farms, while in China there are still small scale. However the Chinese government fights for modernizing the agricultural and farming system in order to quell potential unrest.

The other difference is in the manufacture. In China, manufacture accounts for a big proportion of the economy – 30%, where in the USA it is approximately 13%. However the fact that in China the manufacturing is declining and in USA is the other way around needs to be taken into consideration.

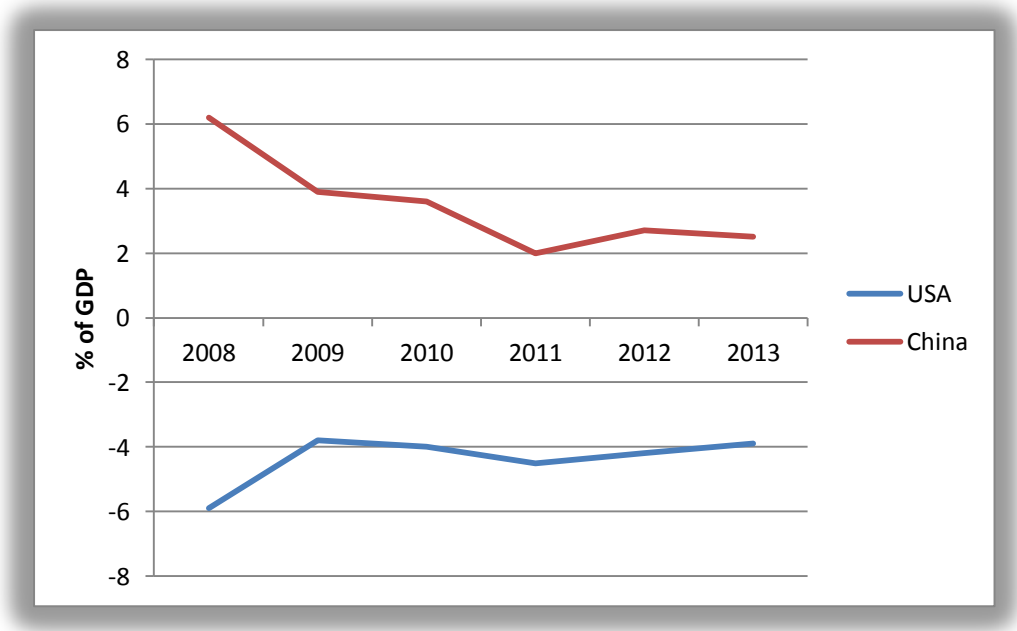
Chart 3 - Real Growth in Wages in Manufacturing in China and the USA



Source: Euromonitor International from International Labour Organisation (ILO)/Eurostat/national statistics

Another difference worth to mention is the balance trade. China's balance trade is positive since 1994, while the USA has deficit since the late 70's (1976-1977). However the trade deficit in the USA decreases slowly while China's trade surplus also decreases, making the both lines most likely meet in the near future.

Chart 4: Trade Balance in China and USA

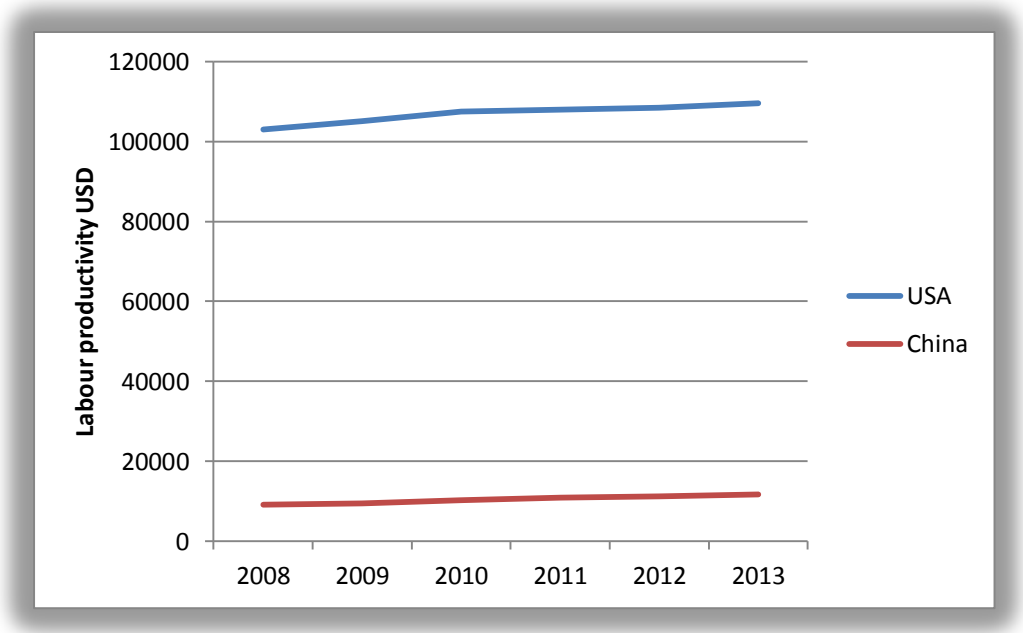


Source: Euromonitor International from national statistics/OECD/IMF

As mentioned above, the productivity of China's labour is not sufficient. It has to transform the low cost manufacture into more skilled work – the labour productivity will raise (measured as GDP per person employed). The current productivity of China is approximately \$11.753 while the USA is \$109.115 – we can spot a huge difference, mainly due to the fact

that 32% of the China’s workforce is employed in labour intensive, low productivity sectors of agriculture, hunting, forestry and fishing.

Chart 4 - Labour Productivity in China and the USA



Source: Euromonitor International from International Labour Organisation (ILO)/Eurostat/national statistics

The graph above enlightens the large labour productivity difference between the USA and China. It shows the value of goods and services produced in a period of time, divided by the hours of labour needed to produce them.

4.3 Gretl arima predictions about Chinese GDP

Table 2 – Gretl Arima output

Model 1: ARIMA, using observations 2000-2014 (T = 15)
 Dependent variable: (1-L) v1
 Standard errors based on Hessian

	<i>Coefficient</i>	<i>Std. Error</i>	<i>z</i>	<i>p-value</i>	
const	496.151	70.7341	7.0143	<0.00001	***
phi_1	0.5644	0.249506	2.2621	0.02369	**
theta_1	-0.999999	0.186948	-5.3491	<0.00001	***
Mean dependent var	513.3333	S.D. dependent var		833.2609	
Mean of innovations	-61.78656	S.D. of innovations		706.0252	
Log-likelihood	-120.5009	Akaike criterion		249.0018	
Schwarz criterion	251.8340	Hannan-Quinn		248.9717	

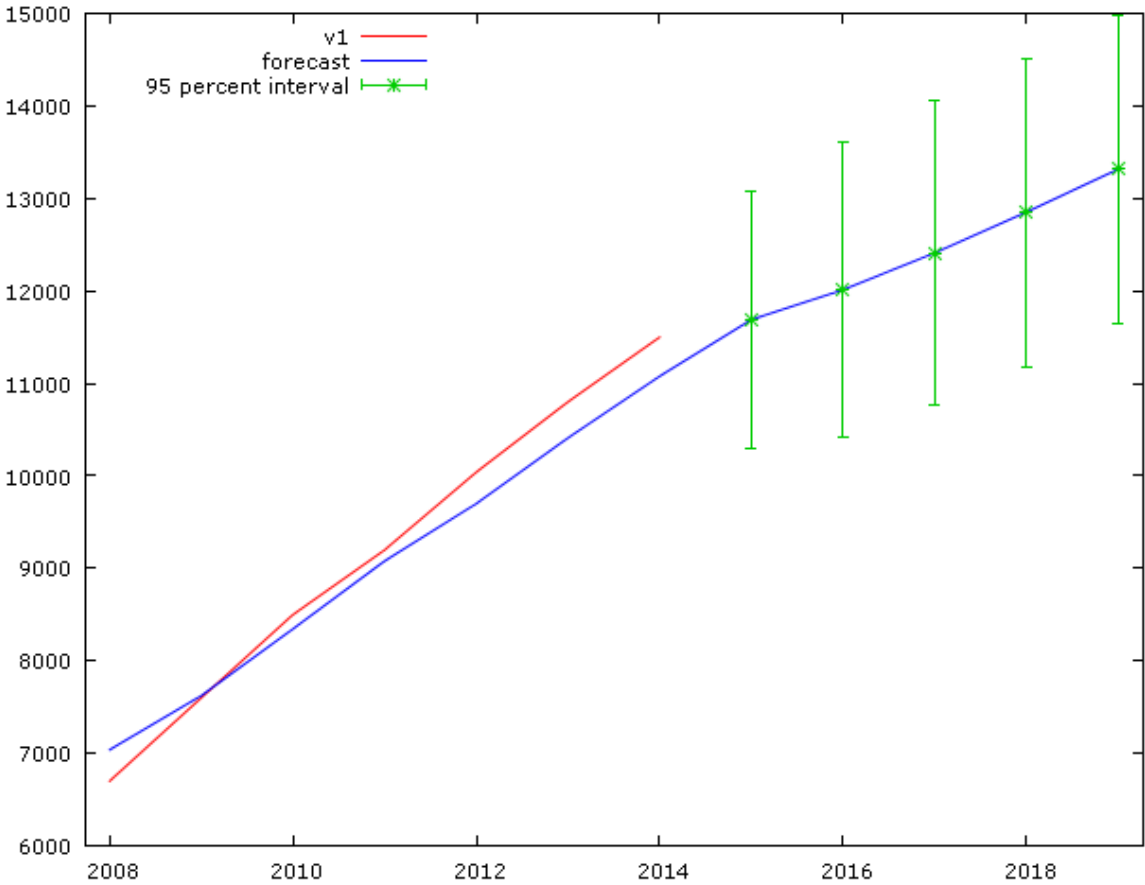
	<i>Real</i>	<i>Imaginary</i>	<i>Modulus</i>	<i>Frequency</i>
AR				
Root 1	1.7718	0.0000	1.7718	0.0000
MA				
Root 1	1.0000	0.0000	1.0000	0.0000

Table 3: Arima predictions

For 95% confidence intervals, $z(0.025) = 1.96$

Obs	v1	prediction	std. error	95% interval
2015	undefined	11688.6	706.025	(10304.8, 13072.4)
2016	undefined	12011.2	810.715	(10422.2, 13600.2)
2017	undefined	12409.4	841.332	(10760.4, 14058.3)
2018	undefined	12850.2	850.854	(11182.6, 14517.9)
2019	undefined	13315.2	853.865	(11641.6, 14988.7)

Chart 6: Arima output chart



In the tables and in the chart above we can observe the prediction made in Gretl for the years 2016 – 2020 for the Chinese GDP with 95% confidence interval. The GDP is expected to grow, however not that rapidly as it was in the previous years.

4.4 Limits of growth – estimation of without the limits

In this part of the thesis several limits of growth are evaluated and estimation has been made for every single one of them. The limits are choosed based on the significance of their impact on the Chinese GDP/GDP growth.

4.4.1 One child policy

The one child policy was introduced in 1979 in order to supervise and manage the growing Chinese population. In 2007, 36% of the Chinese population was a subject to the one child restriction. Renmin University's School of Sociology and Population in Beijing estimates that 400 million births were prevented as of 2011. Since the GDP growth is driven mainly by labor, capital and total factor productivity, the one child policy directly impacts on the labor and decreases the ratio of working-age population. The estimated population of China is as of 2013 1,357,380,000. In 2012, 75% of the population was considered working(age 15-64). If we take into consideration the not-introduction of the one child policy, there would be approximately 30% more workers. Due to estimations of the Renmin University's School of Sociology and Population, the GDP growth would be 5% higher.

Chart 6: comparing of the growth in % with and without the one child policy

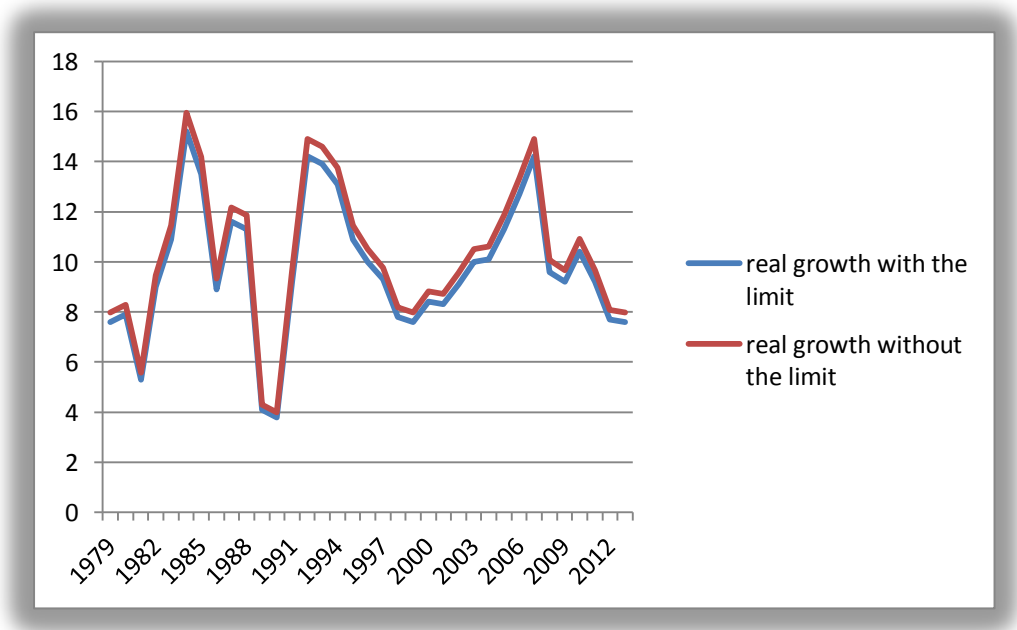
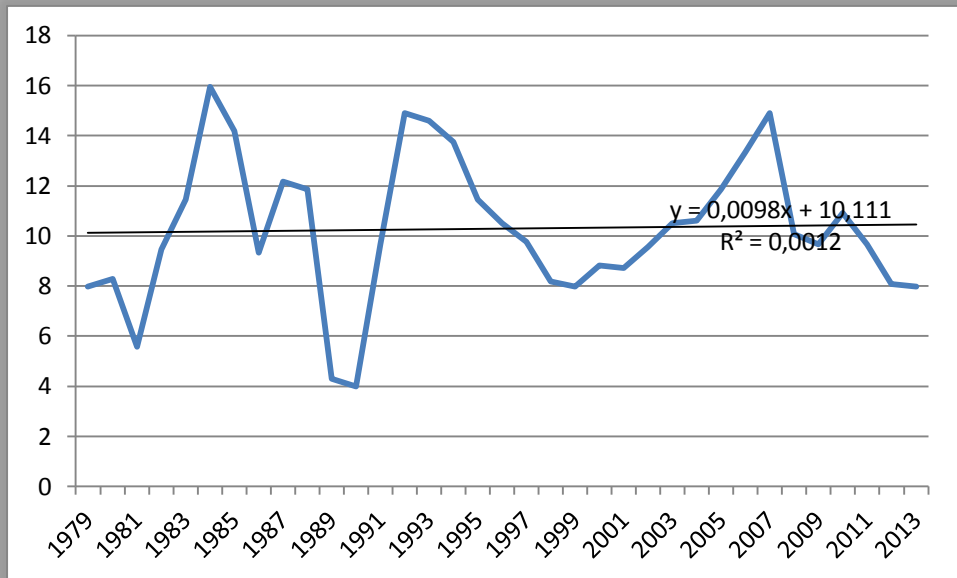
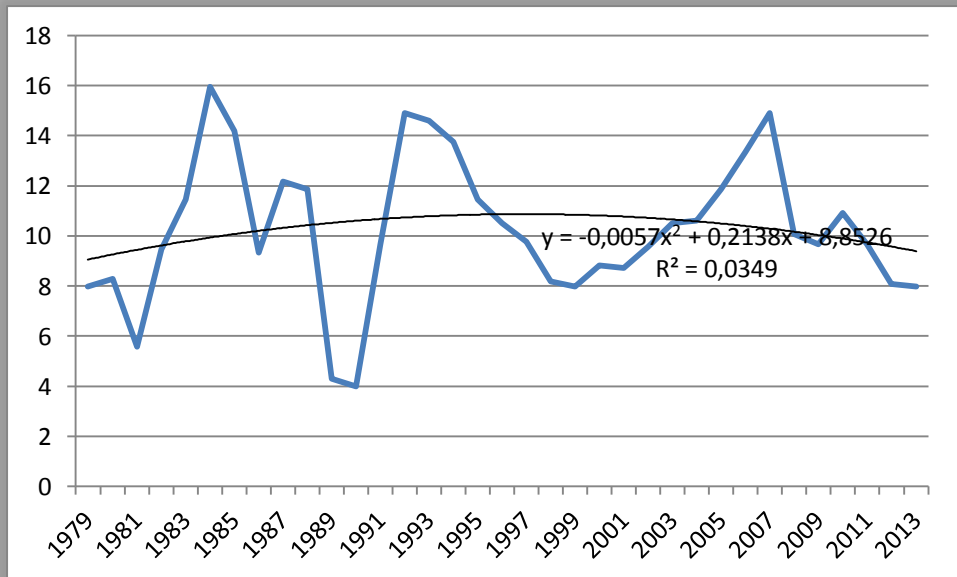


Chart 5: linear trendline to the real gdp growth in % (without one child policy)



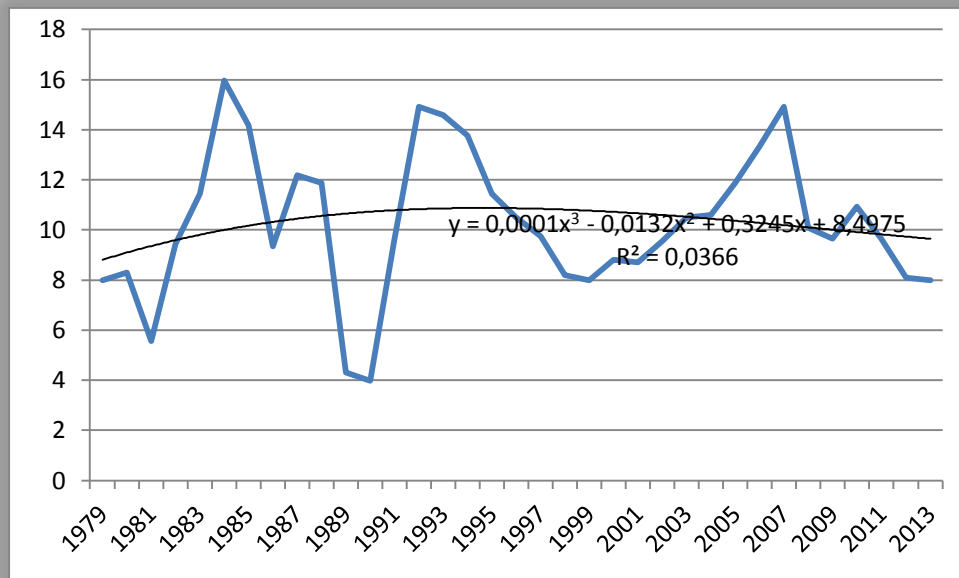
Programs used: Microsoft Excel

Chart 6: quadratic trendline to the real gdp growth in % (without one child policy)



Programs used: Microsoft Excel

Chart 9: cubic trendline to the real gdp growth in % (without one child policy)



Programs used: Microsoft Excel

Table 2: Adjusted R-squared computation

	R-squared	n	p	n-1	n-p	Ad. R-squared
Linear function	0,0012	34	1	33	33	-0,0300125
Quadratic function	0,0349	34	2	33	32	-0,027364516
Cubic function	0,0366	34	3	33	31	-0,05974

The largest value of the adjusted R-squared indicates that we will use the cubic function for our predictions.

Table 3: Predictions about the future growth (in %)

considering the one child policy has never been introduced

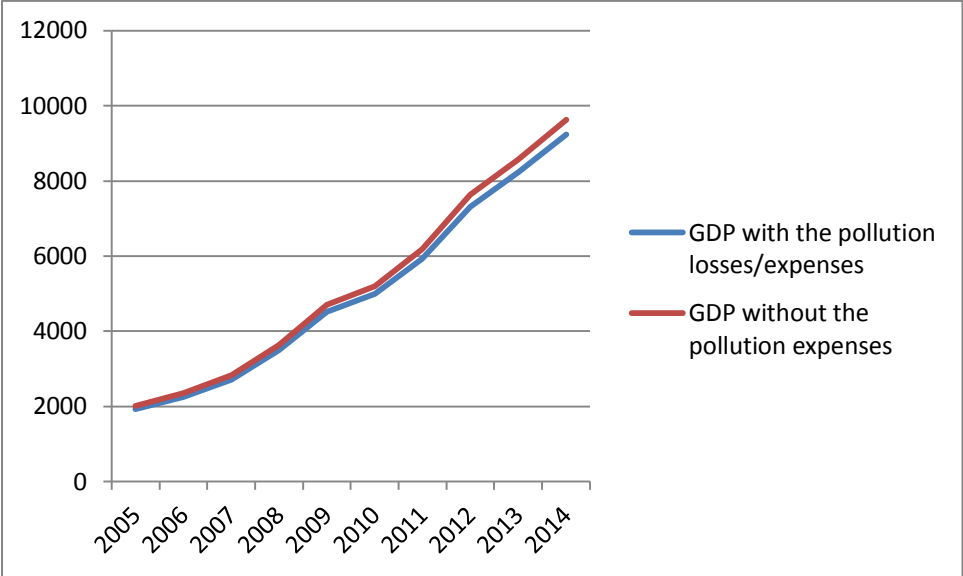
year	predictions
2014	7,7379
2015	7,4985
2016	7,2549
2017	7,0077
2018	6,7575

Considering the calculations above, if this limit of growth would not be introduced the Chinese GDP growth would still decrease, however it would reach slightly larger values. We can certainly say that the one-child policy is a significant limit of growth and the possibility of the Chinese to have only one child has not unlocked the full potential of the economic growth of China. However the one child policy has produced more consequences beyond the goal of reducing population. The overall sex ration has become skewed toward males. Another consequence has been the growing proportion of older people, or many unreported kids (born as a second kid) which are hard to educate and eventually employ.

4.4.2 Environmental pollution

The pollution in city or country areas has always been a limit of growth. Pollution in areas with high industry activity may lead to diseases and eventually to loss of labor. According to the Chinese Ministry of Health, the industrial pollution has made cancer China's leading cause of death. Almost 30% of the Chinese population has not access to safe and clean drinking water. The pollution has also destroyed (and continues to destroy) cultivated land. In total, one ninth of the cultivatable land has been affected by pollution and subsequently can not be cultivated. The world bank and SEPA estimated that the overall air and water pollution costs annually from 2.7% to 5.7% of the country's nominal GDP (from 2005-2014).

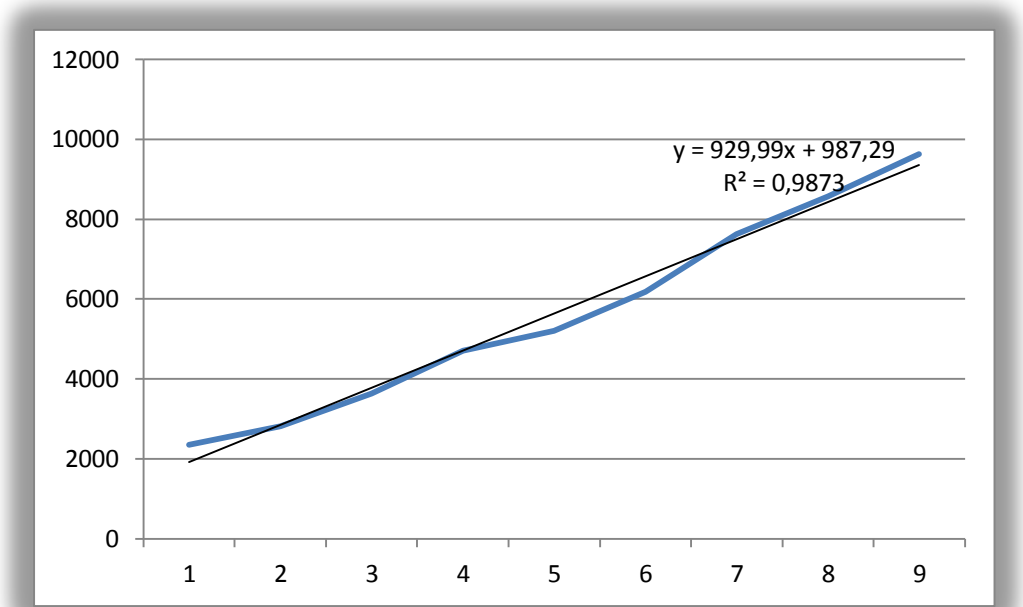
Chart 10: nominal GDP in billions USD with and without the losses suffered from the air and water pollution



Programs used: Microsoft Excel, source: <http://www.tradingeconomics.com/china/gdp>

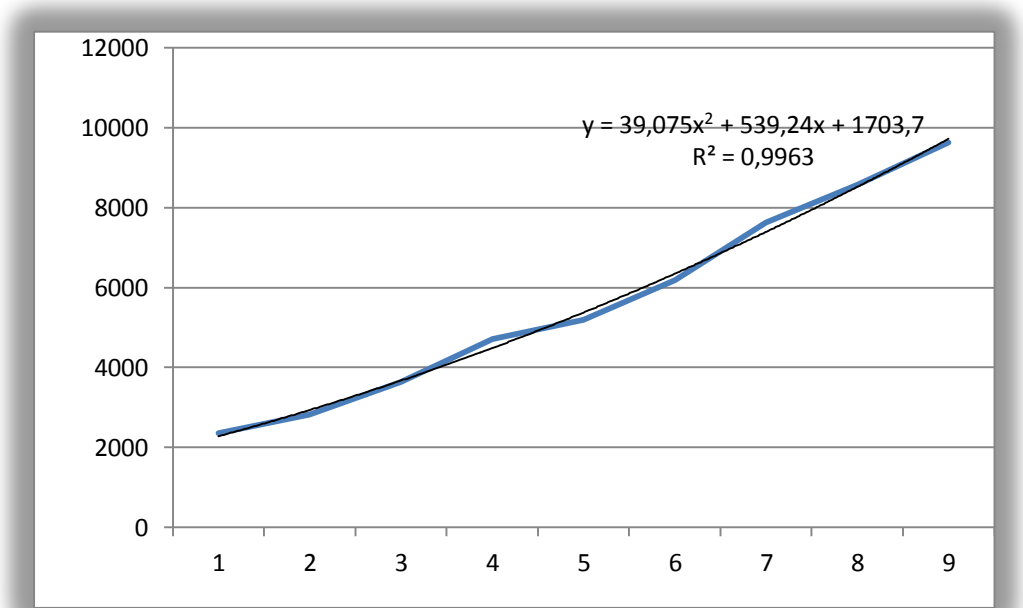
As the graph indicates, the nominal GDP of China for the year 2014 would be approximately \$9628 bill. (instead of the current \$9240 bill.). There is a large difference – money, that could be spent in a different way. The pollution is a significant limit of growth.

Chart 11: the linear trendline in the China's nominal GDP not considering the pollution losses



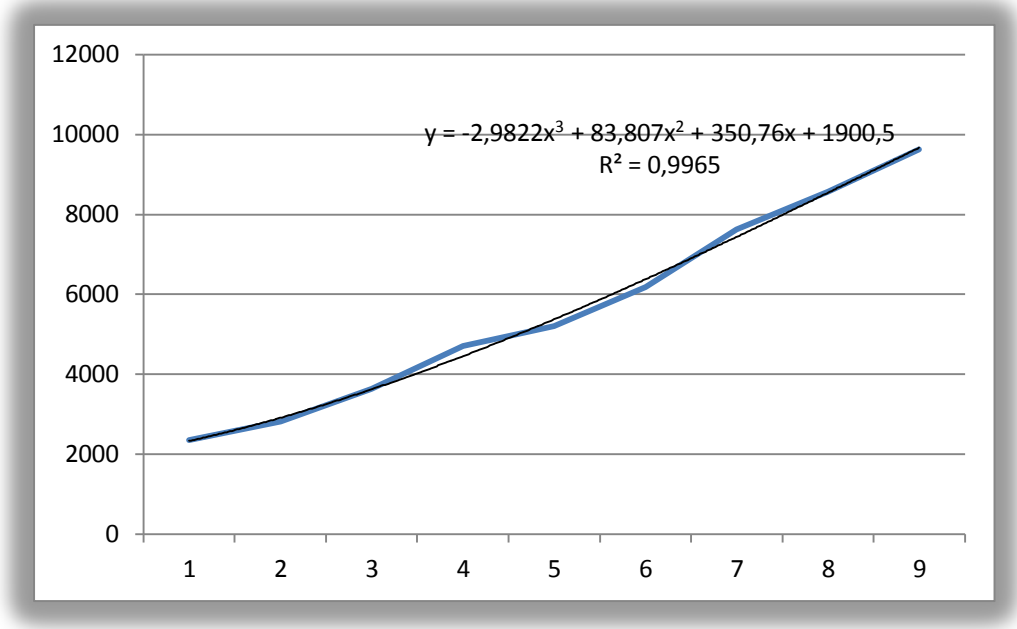
Programs used: Microsoft Excel

Chart 12: the quadratic trendline in the China's nominal GDP not considering the pollution losses



Programs used: Microsoft Excel

Chart 13: the cubic trendline in the China’s nominal GDP not considering the pollution losses



Programs used: Microsoft Excel

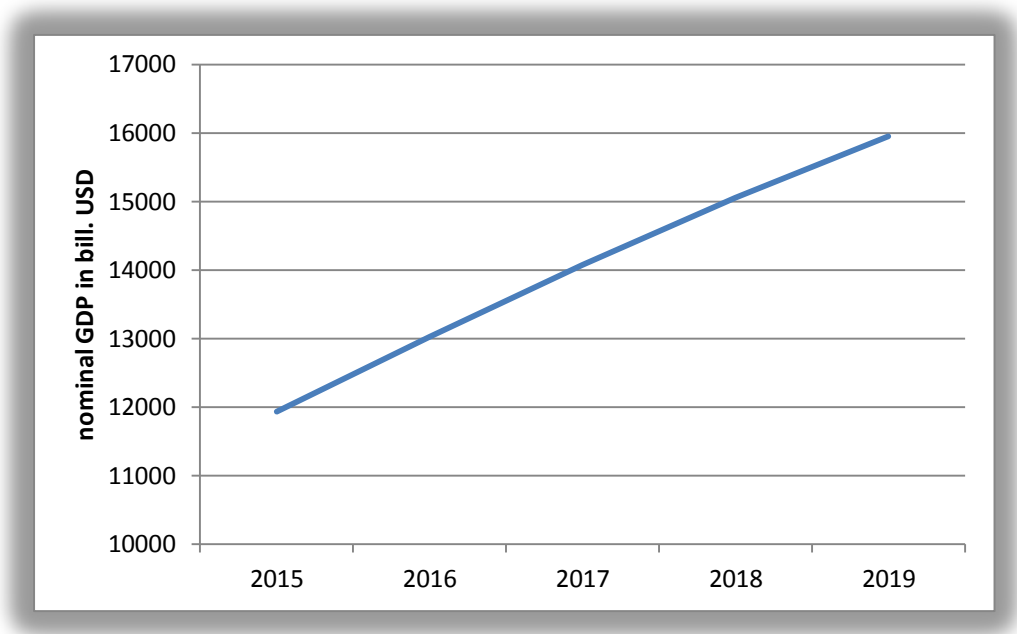
The adjusted R-squared is highest in the cubic function, that is why we used it.

Table 4: The predictions of the nominal GDP in bill of USD without the pollution costs/expenses

2015	11930,2
2016	13024,59
2017	14071,87
2018	15054,16
2019	15953,55

In the table above we can see what would the estimated values of the nominal GDP of China look like without the damages suffered from the pollution (mostly air and water). There is a safe deduction that the pollution is a significant limit of growth and China’s government should act to prevent at least some of it.

Chart 14: Predictions of the nominal GDP without the limit of growth



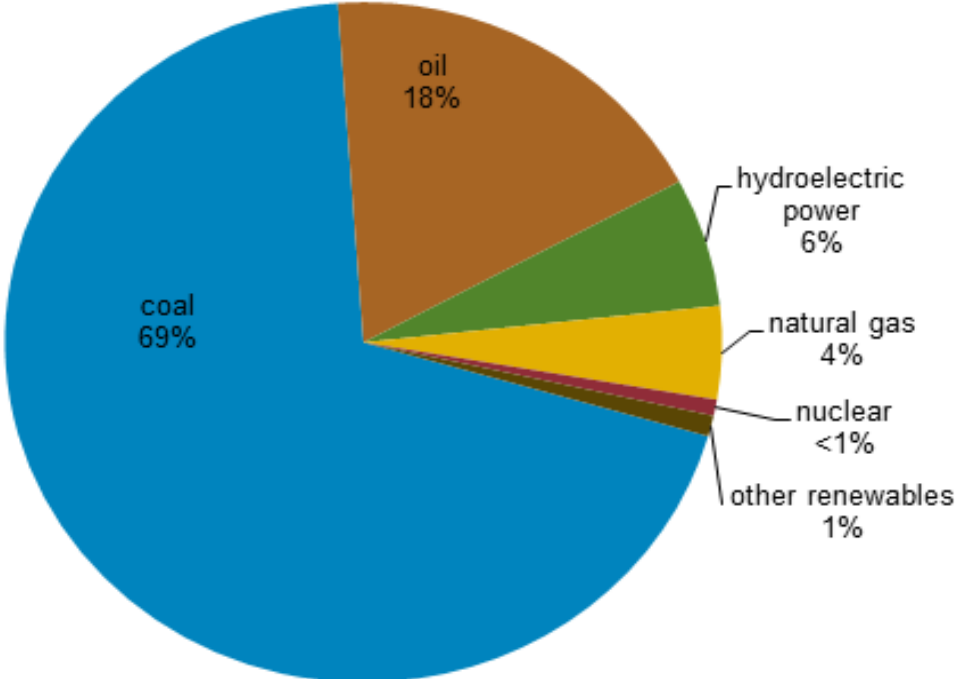
Program used: Microsoft Excel


4.4.3 Energy management

Over 50% of the China’s power is used for industrial production. That means that is heavily dependent on a good energy/power management in order to achieve the best growth. Renewable energy such as wind power instalations remains the best choice. In 2006 has installed 42 gigawatts of wind power and holds the place for world’s largest wind energy market it terms of cumulative capacity. However the wind generated energy is still insignificant in comparison to the other electricity generating power stations – less than 2% of the overall energy generated in China has wind generated origin. The overall energy

management is important, it is connected with one of the limits mentioned before – the environmental pollution. If at least 20%-25% of the energy would be generated in wind power station, a lot of money will be saved from the toxic waste management and environmental purification. In 2013 China decided to spend over \$330 billion to fight water pollution, caused mainly by disposal of power plants. The energy management in China is a significant limit of growth and some actions should be done.

Total energy consumption in China by type, 2011



 Note: Numbers may not add due to rounding. Source: U.S. Energy Information Administration *International Energy Statistics*.

5. Conclusion

To sum up, the Chinese economy is one of the two strongest economies in the world. China has always maintained a strong position in the economic layout, from medieval ages until modern days, and is expected to rise and continue to lead many of the world's economic aspects.

Big role in the Chinese economic development have played the economic reforms from the 1980's. Many branches of the economy have developed and upgraded and since then China has begun its economic rise. After the WTO admittance China has strengthened its position and finally in the past year it reached USA's GDP.

The economies of the USA and China are quite different and in the past years have been compared many times. The chapter dedicated in the practical part enlightens the the reader about the differences and similarities as well as shows GDP usage etc. These 2 states will be compared many times not only in terms of economy but also warfare, culture, politics so we will have the chance to learn more about them.

The limits of growth in China are as important as are in the other countries. The practical part of the thesis evaluated what would the China's economy look like without some of the limits such as the one-child policy or the huge problem of environmental pollution. China would have much more larger growth/GDP if the one-child policy have never been introduced, however it is hard to forecast how would the country deal with the overpopulation.

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