

# The determinant of economics growth in the emerging markets

[Finance](#), [Market](#)



MSc BUSINESS ECONOMIC AND FINANCE  
Title of Project The determinant of economic growth in emerging markets: A case study of China. Tarik TOUAT  
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Abstract China has enjoyed a very rapid economic growth over the past decades. The impressive growth was driven by several factors. This study aims to determine those factors which contributed to unprecedented economic growth of China and show the relationship with the economic growth by an empirically investigation.

The Ordinary Least Squares (OLS) method is applied in order to estimate a growth model using a time series data from 1984 to 2009. The results show that trade openness, government size and inflation have a significant effect on economic growth. On the other hand, foreign direct investments, the level of human capital and return on investment have minor impact on economic growth in China. The relationship is established through the vector error correction model (VECM), the finding is that trade openness, government size and inflation had a positive impact on gross domestic product of China in the long-run.

Similar essay: Why Nations Fail Summary Chapter 5

Word account: 13. 112 words. Acknowledgements Allow me to pay tribute to my supervisor, Dr. Solomon for kindly supervising this study and giving her time and her knowledge to the success of this project. I take this opportunity to thank my elder brother Arezki TOUAT who was a model of success and constant source of motivation; I'm here to express my sincere gratitude and I wish him all the best for his wedding day. Dedication I dedicated this work to

my parents Mouloud and Saliha TOUAT, who have contributed in an extraordinary way to my studies.

To my younger sister Louiza TOUAT who is very special for me.

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63 LIST OF ACCRONYMS GDP: Gross Domestic Product.

GNP: Gross National Product. FDI: Foreign Direct Investment. ROI: Return On Investment. BRIC: Brazil, Russia, India and China. WTO: World trade Organization. OECD: Organisation for Economic Co-operation and Development US\$: United State Dollar CIA : Central Intelligence Agency ADF: Augmented Dickey-Fuller. OLS: Ordinary Least Square. VAR: Vector Autoregression Model VECM: Vector Error Correction Model. NLLS: Non-linear least squares AR: Auto Regressive Models H0: Null hypothesis H1: The alternative hypothesis I (0): Integrated of order 0 (stationary).

I (1): Integrated of order 1 (stationary). TFP: Total Factor Productivity.

CHAPTER 1 INTRODUCTION In last decades, we have seen new economic power emerge from low level economic development to relatively high level of economic growth. Among these emerging economies are Brazil, Russia, India and China (the BRIC). Over the past two decades, developing countries have posted high rates of economic growth. This has transformed them into emerging economies. There are many factors that acted as determinants of this high GDP growth rate of the erstwhile slow growing developing countries.

Chinese economy is the largest of the emerging economies. Actually, China passed Japan and become the second largest economy in the world after United States of America. Subhash Chandra Jain (2006) defines emerging economy as nations with social or business activity in the process of rapid growth and industrialization. Based on data from Dow Jones classification

(2010) there are around 35 emerging markets in the world with the economies of China and India considered to be the largest. China is leading the pack of emerging economies. Their economic growth has been propelled by many factors.

The economic importance of China and its continued success in posting high economic growth rates makes it an ideal case for studying the determinants of economic growth in emerging economies. China has all the characteristics of an emerging economy. It faces the many challenges that all the emerging economies continuously face and which act as the biggest barriers to their economic growth. It is in this spirit we have undertaken this study to determine whether there is evidence of relationship between some factors and economic growth in china.

This dissertation presents the knowledge gap to be filled, research questions and objectives alongside the hypotheses of the study. Furthermore, it also shows to what extent the study is relevant for China, highlights the scope and the organization of the study. More specifically, the study aims to: - Review the literature on the theoretical foundation of growth: examining the different model of economic growth. - Review and describing some previous studies on some determinants and the relationship with economic growth.

#### Main objective

The key objective of the research is to assess the impact of different factors that contributed to the unprecedented economic growth of China over the past few decades and determine whether those factors can be viewed as a determinant of economic growth. Organization of the study This study is

organized as follows: Chapter two will give an overview of the Chinese economic and list of the major waves of reforms. The third chapter will be in two sections, the first section deals with the definition of growth and provides a review of the growth theories by illustrating patterns of some leading economists on the issue of growth.

Among the models studied, we have those Harrod-Domar, Solow, and Mankin. The second section of chapter tree deals with selected reviews on some indicators that have likely slowed or promoted growth. In chapter four presents the data and describes the method of analysis adopted to estimate the determinants of growth in China. The presentation and interpretation of the results are presented in Chapter five. This is followed by Chapter six, the conclusion. CHAPTER 2 OVERVIEW OF THE CHINESE ECONOMY According to central Intelligence agency (CIA), China is the second largest economy after the United States.

The country has experienced a particularly strong economic growth since the 1980s. However, the population remains relatively poor: in purchasing power parity, an estimated per capita GDP IN 2010 TO 7, 400 \$ per capita. Led by the Communist Party since 1949, China has led since the late 1970s the power to call a " socialist market economy". The public sector continues to hold an important place in economic life but private companies are playing an increasing role and the country is highly integrated into the global economic system. Since 2001, China is a member of the World Trade Organization.

While agriculture still occupies much of the labor force (in 2010, 39.5% of Chinese labor), it contributed only 9.6% of GDP in 2010. Industry, however, takes a prominent place, employing about 27% of the working population and is the area's most prolific in China with a production of almost half of national GDP. According to the state administration of foreign exchanges, nearly 47% of GDP come from a huge surplus caused by industrial exports. This has allowed the country to build up foreign exchange reserves that reached approximately 2,450 billion in June 2010.

According to some analysts, China will by 2020 be the second largest industrial and commercial in the world, just behind the United States, ahead of Japan and the richest states in Europe. Geopolitical characteristics of China China is located in eastern Asia, west of the East China Sea, Korea Bay, Yellow Sea, and South China Sea. The country is bordered by fourteen other nations. With a total area of about 9,596,960 square kilometers (3,705,407 square miles), the country is slightly smaller than the United States. China is administratively divided into twenty-three provinces, five autonomous (self-governing) regions, and four municipalities.

Population Since the proclamation of the People's Republic, the country experienced three censuses of population and there were 582.6 million people in 1953, 1 billion in 1982 and 1.14 billion in 1990. According to China demographics web site (2001), in 2005, estimated population is 1.31 billion people (about 21% of the world population). Since the early 1970s, the Chinese authorities launched a policy of birth control, with the aim of



stabilizing the population at 1.2 billion people in 2000. Since the 1982 census, the rate of population growth has decreased dramatically.

The Chinese population reached in July 2011, 1.4 Billion. According to China's official statistics, the rate of growth increase of about 2 to 3% per year during the first phase of demographic transition (2.6% in 1969), fell to 1.1% per year between 1990 and 1995. It is estimated at 1.02% for 1995-2000 and 0.7% for the period 2002-2020. The birth rate fell from 45‰ in 1953 to 21‰ in 1990, reaching 13.10‰ in 2005. At the same time, the mortality rate was reduced from 22.5‰ to 6.90‰. This low mortality is due to the current youth population. In 2005, 25% of China's populations were under 15 years, 67.6% between 15 and 65 and 7.6% (2005), alone, more than 65 years. The male population is 51.50%. Economic reforms in China

The economic reform called "Socialism with Chinese characteristics" started in 1978 by reformists within the Communist Party of China led by Deng Xiaoping. 1978-1984 The reform has started with the improvement of the micro-economic management (agriculture and urban industry), these reforms were implanted by Deng Xiaoping. The main objective was to encourage farmers, business leaders and employees to increase economic productivity.

Effective action has been taken, by allowing farmers to keep the land's output after paying a share to the state. This move increased agricultural production, increased the living standards of hundreds of millions of farmers (Brandt 2008). In rural areas, the system of collective ownership has been replaced by the household responsibility. In cities, the main objective of the

reform was to increase the autonomy of enterprises. To this end, a number of experiments to improve the management system were conducted. Some of them, after the initial demonstration of their success, have extended to the whole country.

The creation of joint enterprises with foreign capital is now possible. Deng Xiaoping launched the reform of the so-called "open door", opening China to the outside. Foreign investment is now desired, and their home is concentrated to a set of areas open to foreign trade. Five special economic zones are for foreign companies from 1979 (including the cities of Guangzhou and Shanghai as well as the zone of Shenzhen, near Hong Kong), and free zones. These special economic zones were experimental laboratories for China, allowing it to gradually open up to foreign trade techniques. 1984-1991

The key point of the second period was the decentralization of state control also impended by Deng Xiaoping, leaving local provincial leaders to experiment with ways to increase economic growth and privatize the state sector (Brandt 2008). The reform has created favorable conditions for enterprise with a partial autonomy of management, which had the effect of creating a supply and demand of resources of goods and services. That have achieved positive results such as foreign trade and the financing system were introduced to create favorable conditions for enterprise reform. 1993-2005

After the death of Deng Xiaoping in 1997, the radical reforms were continued by the Prime Minister Zhu Ronji who came to power in 1998. He had a goal to

integrate his country in the World Trade Organization (WTO), hence the importance that preceded the entry into WTO. Zhu Rongji has introduced a new program, including the reform of state enterprises, privatization of public housing, the legitimation and expansion of the private sector, reform of relations with foreign investors, reducing by half the bureaucracy, the acceleration of the fight against corruption and the creation of a viable unemployment insurance scheme and pension.

The reform of state enterprises is central to these policies whose characteristic is to be highly interdependent. Indeed, the Chinese government has helped them to escape their social welfare function, to observe the principles of the market, to increase the competitiveness by upgrading their management system. After accession to the WTO, China has continued this wave of reforms to modernize its economy and metamorphosed with the rules of the WTO.

### CHAPTER 3 REVIEW OF LITERATURE

Growth models Explanatory theories of growth are relatively recent in the history of economic thought.

These theories have led to highlight the role of technical progress in growth. In the long run, only the technical progress leads to a more productive economy. However, each of these growth theories have weaknesses because they are not able to fully explain the determinants of growth in any given economy. With this in mind that many economists have given their vision of growth.

#### Basic Economic Growth Model

The main factors of production under a basic economic growth model are the stock of capital and labor force. The

output is a function of capital and labor. At national level, an aggregate production function can be represented by the formula:

$Y = F(K, L) \dots (1)$  Where  $Y$  is output,  $K$  is capital and  $L$  is labor. Increased production ( $Y$ ) depends on the increase in capital stock ( $K$ ) through investment and depreciation, and increased labor supply ( $L$ ) by the population growth. The amount of capital investment depends on savings and is calculated by multiplying the average savings rate in a country by domestic production. Labor supply is based on demographics. The Harrod-Domar model The Harrod-Domar model is the first formal economic model of growth. This model has opened the way for modern models of growth, particularly in the Solow model.

The Harrod-Domar model is intended to extend over a long period of Keynes' General Theory, which covered only the short term. As the General Theory, the Harrod-Domar model aims to highlight the unstable nature of economic growth and the need for state intervention. In the Harrod-Domar model, there is no guarantee that an economy is on a stable growth path. This model was presented by Roy Forbes Harrod (1939) in the book "Toward a dynamic economics" and Evsey Domar in 1947 in an article entitled "Expansion and Employment" published in American Economic Review.

The model focuses on two critical aspects of the growth process: saving and the efficiency with which capital is used in investment. This model can provide accurate short term predictions of growth and has been used extensively in developing countries to determine the "required" investment rate or "financing gap" to be covered in order to achieve a target growth

rate. The Harrod-Domar model is simple with relatively small data requirements and the equation is easy to use. However, the model only remains in equilibrium with full employment of both labor force and capital stock causing inaccurate longer term economic predictions and fails to account for technological change and productivity gains considered essential for long-term growth and development. The equation in the Harrod-Domar model is:  $Y = K/v$  (2) Where  $v$  is a constant found by dividing capital ( $K$ ) by investment ( $Y$ ),  $v$  is the capital-output ratio. This ratio is primarily a measure of the productivity of capital or investment. Exogenous growth Solow model

The Solow model is one of the main models of the theory of economic growth.

Developed by Robert Solow (1956), it is a model of neoclassical economics. The model is based on a production function with two factors: labor and capital. Production thus results solely from the combination of setting a certain amount of capital (means of production) and work (labor). The Solow model is based on the assumption that production function with the property of diminishing returns where each additional increment in capital per worker results in less output. It is also assumed that the factors of production are used effectively by all countries.

By assuming that the population has a growth rate that Solow called "natural" (not influenced by the economy), the model derived three predictions: 1. Increase the amount of capital (i. e. investing) increases growth: with more capital, labor productivity increases (Called apparent). 2. Poor countries have a growth rate higher than rich countries. Indeed, they

have accumulated less capital, and therefore they knew of diminishing returns lower. 3. Due to diminishing returns of inputs, economies will reach a point where any increase in factors of production no longer results in increased production. This corresponds to the steady state.

Solow noted, however, that this third prediction is unrealistic: in fact, the savings never reach this stage because of technical progress which increases the productivity of factors. In other words, long-term growth comes from technological progress. However, this technological progress is exogenous to the model. The model implies " that the growth of income per capita cannot be sustained without continued technological progress. Whereas, Harrod-Domar model have identified capital accumulation as major source of development. Clearly the difference stems from different assumptions of the production function.

In the Solow model, over time poor and rich countries incomes should converge. The Solow growth model takes the rate of saving; population growth and technological e. g, improved machinery, computers etc progresses are exogenous. There are two inputs capital and labor, which are paid their marginal products. By assuming a Cobb-Douglas production functional which is generally used to represent the relationship of an output to inputs, the model is as follow:  $Y(t) = K(t)^\alpha [A(t)L(t)]^{1-\alpha}$  (3)  $0 < \alpha < 1$  Y is output, K is capital, L is labor, and A is a parameter which might influence growth.

The augmented Solow-MRW This model was introduced by Mankiw et al (1992), in their article " A Contribution to the Empiric of Economic Growth",

Mankiw, Romer, and Weil (1992), have augmented the standard Solow model by adding Human capital to the production function. Therefore, the inputs of the model would include a function of stocks of capital, labour, human capital and productivity. According to Cobb-Douglas production function in (4), production at time  $t$  in country  $i$  is given by  $Y_i(t) = K_i(t)^\alpha H_i(t)^\beta [A_i(t)L_i(t)]^{1-\alpha-\beta}$  (4) Where  $\alpha, \beta \in [0, 1]$  and  $\alpha + \beta \leq 1$ , and  $t$  denotes time.

This implies that the production function exhibits constant returns to scale in its three factors: physical capital ( $K$ ), human capital ( $H$ ), and productivity-augmented labor ( $AL$ ). Specifically, it is a Cobb-Douglas production function. All markets (both input and output markets) are assumed to be perfectly competitive. All firms are assumed to be identical. The economy can then be described by a representative agent. The growth accounting model The theoretical framework of the Solow growth model describes the sources of economic growth, and the consequences for long-run growth of changes in the economic environment and in economic policy.

However, some economists have built up an alternative framework which examines economic growth in freer framework without necessarily being bound to adopt in advance the conclusions of our economic theories. This framework is called growth accounting which gives us a different perspective on the sources of economic growth. The model starts with a production function which shows that output  $Y$  is as a some particular time  $t$  as a function of the economy's stock of capital  $K_t$ , its labour force  $L_t$ , and the economy's total factor productivity  $A_t$ . The Cobb-Douglas form of the production function is:  $Y = F(A, K, L)$  (5)

Since A captures not only efficiency gains but also the net effect of errors and omissions from economic data, the residual A is sometimes referred to as a measure of our ignorance about the growth process. The determinants of growth To study the impact of determinants on economic growth in China, it is necessary to present the theoretical foundations underlying the role of each determinant is expected to play in an economy, especially in the early stages of growth. We can distinguish several types of determinants for growth: natural resources, external environment, population, innovation, investment, knowledge, consistency of development.

In this section, we will see a wide range of studies done to investigate the relationship between the different determinant and growth. Foreign direct investment According to the IMF and OECD definitions, direct investment reflects the aim of obtaining a lasting interest by a resident entity of one economy (direct investor) in an enterprise that is resident in another economy (the direct investment enterprise). The “lasting interest” implies the existence of a long-term relationship between the direct investor and the direct investment enterprise and a significant degree of influence on the management of the latter.

Direct investment involves both the initial transaction establishing the relationship between the investor and the enterprise and all subsequent capital transactions between them and among affiliated enterprises, both incorporated and unincorporated. It should be noted that capital transactions which do not give rise to any settlement, e. g. an interchange of shares. FDI is expected to increase employment, enhancing labor productivity, exports,



lowers rental rate of capital and thus be a source of growth and productivity gains.

It is also a vehicle for technology transfer, which is crucial for take-off and recovery pathways to production to more high-tech. In contrast, it can also discourage competition and even corrupt the development path of a country. Numerous empirical studies have analyzed the impact of FDI on economic growth with divergent results. While some studies argue that FDI has a positive effects on economic growth in host countries, others against thinking that FDI is not a necessary condition or sufficient for growth. The following table provides some empirical studies on the impact of FDI on economic growth.

Attention will be drawn to the latest studies. Table 1: Literature review on foreign direct investment

Author	Sample Size and Time Period	Econometric Method and Tests	Empirical Evidences
Basu & Guariglia(2007).	119 developing countries 1970 - 1999.	Generalized Methods of Moments (GMM)	FDI enhances both educational inequalities and economic growth in developing countries. However, it reduces the share of agriculture sector in GDP.
Johnson(2006).	90 developed and developing countries 1980 - 2002.	OLS regression	FDI inflows accelerate economic growth in developing countries. But it is not valid for developed countries.
Hyun(2006).	59 developing countries 1984 - 1995.	OLS regression	FDI has positive effect on economic growth but lagged FDI values have no positive effects on current economic growth.
Durham(2004).	80 countries 1979 - 1998.	Extreme Bound Analysis (Sensitivity Analysis)	There is no direct positive effect of

current and lagged values of FDI and portfolio investment on economic growth. | Carkovic & Levine(2002). | 72 developed and developing countries 1960 - 1995. | OLS regression and GMM| FDI alone has no statistically significant affect on economic growth. | Obwona(2001)| Uganda 1975 - 1991. 2 Stage Least Squares| FDI has a positive effect on economic growth in Uganda. | Berthelemy & Demurger(2000). | 24 Chinese provinces 1985 - 1996. | GMM| FDI plays an important role in the economic growth of Chinese provinces. | Source: Endogenous Determination of FDI Growth and Economic Growth: The OECD Case (2008). The latest empirical literature has provided more-or-less consistent findings affirming a significant positive link between FDI and GDP. Trade Openness Another major determinant of growth is trade openness; it has been used in the empirical literature to investigate the relationship between openness and growth.

First, the most basic measure of openness is the simple trade shares, which is exports plus imports divided by GDP. A large number of studies used trade shares in GDP and have provided that open economies increased their GDP faster than closed economies. This has led to the conclusion that trade openness has a positive relationship with Growth as reviewed in Dollar (1992), Sachs and Warner (1995), Edwards, (1998), Dollar and Kraay (2000). On the other hand, Levine and Renelt (1992); Rodriguez and Rodrik (1999); Vamvakidis (2002) have criticized the robustness of these findings especially on methodological and measurement grounds.

Openness affects economic growth through several channels such as exploitation of comparative advantage, technology transfer and diffusion of knowledge, increasing scale economies and exposure to competition. However, a recent study from Halit Yanikkaya (2002) in his paper "Trade openness and economic growth a cross-country empirical investigation", have investigates the relationship between a wide variety of trade openness measures and growth. He used two types of openness measures. The first group was various measures of trade volumes (except population densities).

Trade shares, export shares, and import shares in GDP were found to be significantly and positively correlated with growth. Another key finding in his study was that the growth effects of trade with developed countries are not considerably different from trade with developing countries. Furthermore, population densities also positively affect growth through increasing trade volumes. Hence, the regression results for trade volumes provide substantial support for the hypothesis that trade promotes growth through channels such as technology transfers, scale economies. Human capital

The role of Human capital for economic growth has been well documented in the economic literature which has long recognized that the quality of labor factor plays an essential role in the growth process. Indeed, the classical economist Adam Smith has highlighted the importance of the quality of the workforce in the competitiveness and economic growth in the long term. Adam Smith (1776) also showed that the wealth of individuals and nations depends on the skills levels of workers. The specialization of labor implies that there are different types of tasks that each individual does what he is

alcified. The notion of "division of labor" also highlights the growth potential of the product linked to the improvement of the organization or production method. This improvement is made ?? possible by dynamic entrepreneurs and skilled workers and the ability or qualification to perform specific tasks. The major recent contributions to the empirical, show that the growth of human capital was an important component of economic growth, therefore, it had a legitimate place in the aggregate production function Solow (1956) et Swan (1956), Mankiw, Romer & Weil(1 992).

Furthermore, a large number of other studies have found evidence suggesting that educated population is key determinant of economic growth (see Barro, 1991; Mankiw et al, 1992; Barro and Sala-i-Marin, 1995; Brunetti et al, 1998, Hanushek and Kimko, 2000). Government size The size of the government can affect the economic growth through many channels, such as expenditure, the efficiency of resource allocation, taxation and the budget balance on several economic issues.

The recent economic literature seems to point a negative relationship between government size (General government final consumption expenditure) and economic growth (Guseh, 1997; Dalagamas, 2000). In the empirical study of Yesim (2005), relatively small sizes of government are detrimental to economic growth, while medium sized government affects it positively. According to Barro (1991), government size may have a negative impact on economic growth due to government inefficiencies, excess burden of taxation and distortion of the incentives systems.

However, according to Ghali (1998), it may also have positive effects on growth due to beneficial externalities such as the development of a legal, administrative and economic infrastructure and interventions to offset market failures. Inflation Mankiw (2002) defined inflation as “ a rise in the general level of prices of goods and services in an economy over a period of time”. Inflation reflects an erosion in the purchasing power of money. A chief measure of price inflation is the inflation rate, the annualized percentage change in a general price index (normally the Consumer Price Index) over time.

A number of empirical studies have been devoted to the link between economic growth and inflation. These studies have objective to determine the empirical relationship between growth and inflation, the following table provide some empirical studies on the impact of Inflation on economic growth. Attention will be drawn to the latest studies. Table 2: Literature review on inflation Author| Sample Size and Time Period| Econometric Method and Tests| Empirical Evidences| Khan & Senhadji (2001). | 140 developed and developing countries during the period 1960-98. Non-linear least squares (NLLS). | Inflation has a negative effect on growth. The threshold is lower for industrialized countries than it is for developing countries. | Atish & Phillips (1998). | 145 countries during the period 1960-96. | Multivariate regression analysis. | Negative relationship between inflation and growth that is statistically significant. | Michael Sarel (1995)| 87 countries, during the period 1970 - 90. | OLS regression| A specific numerical target for policy: keep inflation below the structural break. | Joao Ricardo Faria and Francisco Galrao Carneiro (2001). Monthly inflation rate of Brazil and real output for the

period 1980 -95. | The Blanchard and Quay (1989) decomposition. | The results indicated that in the short-run, there is a negative impact of inflation on output. | Robert J. Barro (1995). | 100 countries from 1960 to 1990| Based on an extended view of the neoclassical growth model. | The impact effects from an increase in average inflation by 10 percentage points per year are a reduction of the growth rate of real per capita GDP by 0.2-0.3% points per year. | Ghosh and Phillips (1998). | 145 countries, over the 1960-96 period. Panel regression. | At very low rates of inflation (around 2 -3 percent a year or lower), inflation and growth are positively correlated. | From the table 2, we can conclude that most of the findings of the empirical studies have provided an evidence of a negative relationship between inflation and growth. However, Tobin (1972) suggests that inflation can have a positive relationship to economic growth. This is because inflation can cause individuals to substitute out of money and into interest earning assets, which leads to greater capital intensity and promotes economic growth.

In other words, an increase in inflation can result in higher output; this effect is known as the Tobin effect. Infrastructure In a broad sense, the concept of infrastructure services closely associated with roads, highways, railways, ports and airports, telecommunications networks, the national distribution networks of gas, electricity and water, i. e. all investments that develop and facilitate the movement of people, goods and production (Barro, 1990). A large empirical literature to examine the effects of public infrastructure on the growth of nations but also on local growth, especially scale of American States.

Beyond the pioneering work of Ratner (1983) on the productive infrastructure, has been the work of Ashauer (1989) which showed a positive effect of public capital on output or productivity companies. Although recently confirmed by Munnell (1990), this proposal continues to generate various methodological criticisms mainly because many economists believe that the marginal productivity of infrastructure implied by the estimates is excessively high. Return on investment (Portfolio investment)

The definition of portfolio investment is the acquisition of financial assets (which includes stock, bonds, deposits, and currencies) from one country in another country. In contrast to foreign direct investment, which is the acquisition of controlling interest in foreign firms and businesses, portfolio investment is foreign investment into the stock markets. Most economists consider foreign direct investment more useful than portfolio investment since this last one is generally regarded as temporal and can leave the foreign country at the first sign of trouble

The table below shows some empirical studies on the impact of portfolio investment on Economic Growth in Developing and Developed Economies and their findings. Table 3: Literature review on return on investment Author| Sample Size and Time Period| Empirical Evidences| Butkiewicz and Yanikkaya (2008). | 114 developed and developing countries over the period going from 1970 to 1997. | The study reveals that the countries which receive important volumes of direct investment flowing and portfolio investment will carry out a rapid growth. | Rodrik (1998) and Klein and Olivei (2008). 100 developed and developing countries 1975-89 and 1986-95. | The study reveals that

country which does not impose a restriction on capital flows is lucky more to carry out a rapid growth than that closed. | Chambet and Gibson (2008). | 25 emerging markets from 1995 to 2004. | Portfolio equity flows have positive effects on output growth. | The literature contains a large number of variables, other than the variables we have listed in this chapter, which might have a significant impact on economic growth. CHAPTER 4 DATA AND METHODOLOGY

Presentation of the data and statistical analysis Measuring the impact of several aggregates on economic growth in China will be done using an econometric model estimated in the section methodology. It will also test the veracity of the assumptions made in the literature review. The general idea is that from the data on the various activities in China over a short and a long period, it is highlighted, through statistical and econometric techniques the relationship between economic performances achieved in the last decades and performance the overall economy in China.

Before evaluating the regression results, the the variables will be used in the econometric model to determine the sources of economic growth in China will be explained. The variable used to measure economic performance is Gross Domestic Product (GDP) per capita. GDP per capita it represents all the wealth created in an economy during a year. It gives the best measure of activity level. Therefore, the dependent variables used in the model is GDP per capita (current US \$). There are seven independent variables used in the model: \* Foreign direct investment, net inflows (% of GDP). \* Trade openness (% of GDP). School enrollment, tertiary (% gross). \* General government final



consumption expenditure (% of GDP). \* Inflation, GDP deflator (annual %). \* Portfolio investment, bonds (PPG + PNG) (NFL, current US\$). The data used for this study is annual data from 1984 to 2009 and was obtained from the World Bank. This relatively long period has the advantage of lending itself to a range of econometric tests yielding robust results. It also allows us to show the effects of new reforms to the Chinese economy that have introduced a new management system to help increase the productivity in the 80's.

The raw data table is presented in Annex 1 and the Log form in Annex 2, more detailed description of these data will be done in the next section 4. 2. Description of the variable The explanatory variables were selected from theory outlined in literature review. We grouped the variables that are likely to have a material effect on the endogenous variable. GDP per Capita: The World Bank national accounts data (2011)" define the gross domestic product as the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products".

GDP per capita is gross domestic product divided by midyear population. 0 500 1, 000 1, 500 2, 000 2, 500 3, 000 3, 500 4, 000 84 86 88 90 92 94 96 98 00 02 04 06 08 Figure 1: China nominal GDP per capita Since the introduction of the economic reforms, the GDP has experienced significant growth since the 1980s, it has hit a record almost USD 4000 Trillion in the year 2009, providing further evidence of the growth potential of the Chinese market. This growth continued despite the many attempts by the central

government to cool down the economy after pressure from the international community.

Foreign Direct Investment Net Inflows (% of GDP) According to the World Bank, "foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments" Figure 2: China- Foreign direct investment The Foreign direct investment; net inflows (% of GDP) in China was reported at 3.42 in 2008.

This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP. China's economy is the second largest in the world after that of the United States. Trade openness 20 30 40 50 60 70 80 84 86 88 90 92 94 96 98 00 02 04 06 08 Figure 3: China -Trade openness. As can be seen in the graph, the trade openness in China is more open than it was 20 years ago, and that was due to the economic openness which increases in trade (as part of the reforms). The trade openness (% of GDP) in China was reported at 59.0 in 2008, according to the World Bank" Merchandise trade as a share of GDP is the sum of merchandise exports and imports divided by the value of GDP, all in current U. S. dollars. China's economy is the second largest in the world after that of the United States". School enrolment, tertiary 0 5 10 15 20 25 84 86 88 90 92 94 96 98 00 02 04 06 08 Figure 4: China- School enrolment, tertiary The school enrolment, tertiary, have known an import increase since the

reform, Between 1996 and 2009, enrollment in higher education increased from approximate 5% to almost 25% of GDP per capita.

Chinese universities form more and more engineers and scientists each year. This shows that China is on the road to a knowledge-based economy. The Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.

General government final consumption expenditure 13.0 13.5 14.0 14.5 15.0 15.5 16.0 84 86 88 90 92 94 96 8 00 02 04 06 08

Figure 5: China government final consumption expenditure. The General government final consumption expenditure (% of GDP) in China was reported at 13.5 % in 2007, it has hit almost 16% in the year 2001. According to the World Bank. General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defense and security, but excludes government military expenditures that are part of government capital formation.

Inflation Inflation rate refers to a general rise in prices measured against a standard level of purchasing power. The most well known measures of Inflation are the CPI which measures consumer prices, and the GDP deflator, which measures inflation in the whole of the domestic economy. -4 0 4 8 12

16 20 24 84 86 88 90 92 94 96 98 00 02 04 06 08 Figure 6: Inflation in China  
 China's average inflation rate of 2% over the past ten years has been unusually low for a developing country. The inflation rate in China was last reported at 5.5% in 2011 and its highest historical rate of 22% in 1994 and a low record of -2.0% in 1999.

Portfolio investment, bonds -3,000,000,000 -2,000,000,000 -1,000,000,000 0 1,000,000,000 2,000,000,000 3,000,000,000 4,000,000,000 5,000,000,000 84 86 88 90 92 94 96 98 00 02 04 06 08 Figure 7: Portfolio investment  
 The Portfolio investment; bonds (PPG + PNG) (NFL; US dollar) in China was reported at approximate -2 billion in 2008, its highest hit was reported almost 5 billion in the years 2005. According to the World Bank, bonds are securities issued with a fixed rate of interest for a period of more than one year.

They include net flows through cross-border public and publicly guaranteed and private nonguaranteed bond issues. Data are in current U. S. dollars.  
 Electric power consumption 0 400 800 1,200 1,600 2,000 2,400 2,800 84 86 88 90 92 94 96 98 00 02 04 06 08 Figure 8: Infrastructure  
 China has been spending heavily in physical Infrastructure since the 90's and that due to economic policy to improve the economic growth owing to its economic expansion. Figure 8 shows that the consumption of electricity has increased during the last 20 years. In 2009, it has hit a record of electric power consumption of 2400 kWh per capita.

We measure infrastructure by looking at the Electric power consumption (kWh per capita) which measures the production of power plants and combined heat and power plants less transmission, distribution, and

transformation losses and own use by heat and power plants. Descriptive Statistics The table below shows a summary statistic for the dataset used, the means differ significantly across the variable. The skewness coefficient is close to 0 for most values. The null hypothesis of the Jarque Bera normality test is that the residuals are normally distributed.

The decision rule is to accept this hypothesis if the statistic of Jarque Bera (JB) is less than 5.99. Here, the JB statistic is less than 5.99 for all the series which means we cannot reject the null; there is no evidence of non-normally distributed residuals, except for Foreign direct investment which shows JB higher than 5.99.

Table 4: Descriptive statistic | ForeignDirectInvestmentNet inflows| GrowthDomesticProduct| Government Final Consumption | The level of human capital| Inflation| Infrastructure| Trade openness| Return on investment| Mean| 0.020258| 0.047137| -0.0028| 0.04396| -0.01937| 0.03529| 0.1491| -0.62059| Median| -0.0042| 0.041494| -0.00224| 0.037303| -0.0022| 0.033887| 0.01207| 0.108995| Maximum| 0.374106| 0.109831| 0.037975| 0.108951| 0.650219| 0.065986| 0.108611| 18.08911| Minimum| -0.31887| -0.04897| -0.04678| -0.01321| -0.68278| 0.00866| -0.10326| -18.5564| Std. Dev. | 0.138935| 0.038244| 0.019386| 0.038065| 0.338516| 0.014811| 0.045317| 10.35226| Skewness| 0.67502| -0.30828| -0.19908| 0.194607| -0.13538| 0.431179| -0.24933| -0.07282| Kurtosis| 5.047| 3.28519| 2.723548| 1.917252| 2.50906| 2.477846| 3.399615| 2.832023| Jarque-Bera| 6.63353| 0.480719| 0.244745| 1.378992| 0.327435| 1.058651| 0.425367| 0.051484| Probability| 0.043645| 0.786345| 0.884819| 0.501829| 0.848982| 0.589002| 0.808412| 0.974587| Sum| 0.506443| 1.17842| -0.06988| 1.098993| -0.4842| 0.882238| 0.372743| -

15. 5147| Sum Sq. Dev. | 0. 463268| 0. 035102| 0. 00902| 0. 034775| 2. 750233| 0. 005265| 0. 049286| 2572. 062| Observations| 25| 25| 25| 25| 25| 25| 25| 25| Methodology The objective of this study is to determine the impact of different factors that contributed to the unprecedented economic growth of China over the past few decades.

In order to control for the problems of misspecification caused by the application of classical linear regression methods, recent developments in time series econometrics will be used such as the Error Correction Models and Johansen co-integration test. In this section, we explain the methodology that is the basis for estimating the appropriate model for the Chinese economy. The impact of different factors that contributed to the unprecedented economic growth of China over the past few decades and determine whether those factors can be viewed as a determinant of economic growth.

Estimation of the general model The literature review has identified some models and we chose a variant of the model presented by Robert Solow (1957). Indeed, the standard growth accounting approach seems appropriate which is decomposed into stocks of capital, labor, human capital and productivity. The model that we suggest to use is based on a functional form of Cobb Douglas:  $GDP = F(FDI, OPEN, HUMCAP, GOVSIZE, INFL, ROI) \dots (5)$  The dependent variable is the growth rate of real gross domestic product per capita.

All the independents variables are derived from the neoclassical theory of growth mentioned in the literature reviews in chapter tree. The empirical

model used to examine the determinants of growth in China is shown in equation (6) below:  $\ln LGDP = \alpha + \beta_1 \ln LFDI + \beta_2 \ln LOPEN + \beta_3 \ln LHUMCAP + \beta_5 \ln LGOVSIZE + \beta_7 \ln LINFL + \beta_4 \ln LROI + \epsilon_t$ . ... (6) Where: The  $\alpha$  is the intercept and  $\epsilon_t$  the error term. The variables used for the construction of the models are: LGDP = Log of real gross domestic product per capita. LFDI = Log of foreign direct investment, net inflows (% of GDP). LOPEN = Log of trade openness (% of GDP).

LHUMCAP = Log of the level of human capital (School enrolment, tertiary (% gross)). LGOVSIZE = Log of general government final consumption expenditure (% of GDP). LINFL = Log of inflation, GDP deflator (annual %). LROI = Log of return on investment (long-term US interest rate): Portfolio investment, bonds). We have taken the logs of the variables in order to linearise the model. Furthermore the variables are tested for unit roots and are differenced accordingly to achieve stationarity. The results showed that most of the variables were I (1). The hypothesized relationships between GDP and its determinant:

In the following table, we present the relationship between GDP and some of its determinant according to the literature reviews. Determinant of growth | Relation with Growth Domestic Product| Foreign direct investment| +| Trade openness| +| The level of human capital| +| General government final consumption| +/-| Inflation| -| Return on investment| +| CHAPTER 5 MODEL ESTIMATION AND FINDING This chapter presents the methods and estimation techniques used to determine the long-run and short-run growth for China. The empirical testing of this estimation will be done by following these tests:

Determine whether the series are stationary or not by using the ADF test. \* Estimating the OLS model with general equation. \* Testing for Co integration using Engle and Granger technique and the Johansen cointegration test to see if the determinants of growth apply in the long run. \* Estimating a VECM to examine the dynamics in the short-run and the adjustment of co-integration error term.

1. 1 Testing For Stationary using the Augmented Dickey Fuller Test: To avoid spurious regressions, it is necessary to study the characteristics of the series to see if they are stationary or not.

Equation tests for unit roots using the Simple Dickey-Fuller test.  $Y_t = \rho Y_{t-1} + u_t$  (7)  $Y_t$  will be stationary if the estimated value of  $\rho$  is less than 1.  $Y_t$  will not be stationary if the estimated value of  $\rho$  is more or equal to 1. Therefore, we check for  $H_0: \rho = 1$  ( $Y_t$  is not stationary)  $H_1: \rho < 1$  ( $Y_t$  is stationary) A more convenient version of this test is to transform the model (by subtracting  $Y_{t-1}$  on both sides) and obtain the following:  $Y_t - Y_{t-1} = \rho Y_{t-1} + u_t - Y_{t-1}$  (7) Where  $\alpha = \rho - 1$ . We can hence estimate equation (7) and test for  $\alpha$  as follows:  $H_0: \alpha = 0$  ( $Y_t$  is not stationary)  $H_1: \alpha < 0$  ( $Y_t$  is stationary) In equation (7) which is derived from equation (6), we are assuming that there are no constant and time trend (deterministic trend). There are 2 more versions of the Dickey-Fuller tests for unit roots shown in equations (8) and (9): In testing for unit roots, equation (8) includes a constant and equation (9) includes both a constant and a time trend.  $Y_t = \alpha + \rho Y_{t-1} + u_t$  ... (8)  $Y_t = \alpha + \beta_2 t + \rho Y_{t-1} + u_t$  ... (9) In equations (8) and (9), the DF test is still testing whether  $\alpha = 0$ . Generally, we look at the plot of the variable and decide which of equations to use.



However, equations (7), (8) and (9) may suffer from autocorrelation and the test-statistics may be invalid. To solve the autocorrelation problem, we keep adding lags of the dependent variables ( $Y_t$ ) until the problem disappears. The optimal number of lags are given by the SIC or AIC, but EViews will determine that automatically. This is called the Augmented Dickey Fuller (ADF) test. Using model (4), for example, the ADF model:  $Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \dots + u_t$  (10) If the variables are found to be non-stationary, we transform them by differencing the variables to make them stationary

For instance, let denote  $Y_t = D_t$ . If  $Y_t$  is not stationary, we take the first difference of  $Y_t$  ( $\Delta Y_t$ ), and if we find that  $\Delta Y_t$  is stationary, we say that  $Y_t$  is integrated of order 1. However, if it's not the case, we take the first difference of  $D_t$  ( $\Delta D_t$ ), , If  $\Delta D_t$  is stationary, we say that  $Y_t$  is integrated or order 2 or  $I(2)$ . First all, before we undertake the test for stationary it's useful to visualize the variables on a graph to see whether we need a constant or time trend or both in the ADF test. (See groupe figures 9. ). We have found that all the variables need a constant.

Results of the stationarity test. The decision is made by comparing " ADF" to " critical value: If  $ADF > CV$ , then we accept the null hypothesis of non-stationarity of the variable and whether ADF

The variables were differenced because of unit roots. We find the following results: Estimation of a Short-Run Growth Model for China This section presents results from estimating a general growth model using ordinary least squares regression. The model is estimated using variables drawn from a

combination of fundamental and new growth theories respectively. As the variables contained unit roots, they were differenced to achieve stationarity. In the absence of differencing, results would lead to biased and inconsistent results. However with differencing we lose valuable information.

We begin our estimating by taking first differences of the variables in order to examine determinants of growth in the short-run in China. Next we explore the fact that the variables are I(1) by testing for the presence of a long-run equilibrium relationship in sections 5. 4 and 5. 5. Table 7: Estimation of the general growth model by OLS

Variable	Coefficient	Std. Error	t-Statistic	Prob. >  C
DLFDI	0.026499	0.020172	1.313708	0.2064
DLOPEN	-0.650450	0.207112	-3.140573	0.0060
DLINFLA	0.051337	0.026900	1.908400	0.0734
DLGOVSIZE	-0.11040	0.385635	-1.065880	0.3014
DLROI	-0.000546	0.000716	-0.762049	0.4565
DLINFRAC	0.718813	0.534644	1.344470	0.1965
DLHUMCAP	0.098897	0.196579	0.503091	0.6214

R-squared| 0.526263| Mean dependent var| 0.047137| Adjusted R-squared| 0.331195| S. D. dependent var| 0.038244| S. E. of regression| 0.031276| Akaike info criterion| -3.837585| Sum squared resid| 0.016629| Schwarz criterion| -3.447545| Log likelihood| 55.96982| Hannan-Quinn criter. | -3.729405| F-statistic| 2.697844| Durbin-Watson stat| 1.667292| Prob(F-statistic)| 0.044806|

We observe from this table that our endogenous variables have a good enough explanatory power of the exogenous variable, adjusted R2 = 53%. The results show, that foreign direct investment (DLFDI) has a positive

relationship with gross domestic product (DLGDP), which is consistent with the growth theory; however, the t-statistic is not significant, which is indication a low reliability of the predictive power of the coefficient. Trade openness (DLOPEN) has a negative relationship with gross domestic product (DLGDP), which is not consistent with the growth theory; furthermore, the coefficient is statistically significant at 5%.

In the growth theory we expect a negative relationship between Inflation (DLINFLA) and gross domestic product (DLGDP), the signs is not consistent with this theories. The t-statistic is significant at 5%. Government final consumption (DLGOVSISE) shows a negative relationship with the gross domestic product, which could be consistent with the growth theory, as we have mentioned in the literature review that government final consumption can have a positive or negative impact on GDP.

Return on investment (DLROI) has a negative relationship with (DLGDP), which is not consistent with the growth theory and the coefficient is not statistically significant at 5%. Infrastructure (DLINFRAC) and the level of human capital (DLHUMCAP) have a positive relationship with DLGDP, and these signs are consistent with the growth theory, however, both them are not significant at 5%. The results of this regression appear to be unsatisfactory for most of the parameters; they are statistically insignificant. Only, DLFDI and DLINFL succeed to be significant.

Therefore, to determine an appropriate model specification, we apply the method of general to specific modeling. This method involves eliminating the insignificant variables until we arrive at an appropriate specification that

describes growth in the short-term. Table 8 summarizes the results of the above exercise. The most parsimonious model is summarized by Model 5. The results show that inflation, openness to trade and the size of government are key factors that explain growth in the short-run. Table 8: Estimation of the parsimonious model

Variable	Model 2	Model 3	Model 4	Model 5
C	0.027847 (1.14144)*	0.029771 (2.014407)	0.026469 (1.674366)	0.054882 (8.728596)
DLFDI	-	-	-	-
DLOPEN	-0.645213 (-2.83569)	-0.644060 (-2.822853)	-0.670046 (-3.561684)	-0.567988 (-2.457270)
DLINFLA	0.043197 (1.738068)	0.042026 (1.720850)	0.049525 (2.035755)	0.051270 (1.994672)
DLGOVSIZE	-0.475086 (-1.205956)	-0.519744 (-1.589777)	-0.613915 (-2.093058)	-
DLROI	-	-	-	-
DLINFRAC	0.727862 (1.803804)	0.746098 (1.803475)	0.895928 (2.314649)	-
DLHUMCAP	0.062171 (0.333578)	-	-	-
R-squared	0.509231	0.505955	0.445153	0.451097

\*-10% sig. level, \*\*-5% sig. level, \*\*\*-1% sig. level

Following the estimation above, we proceed to carry out the following robustness tests on the residuals: These are Breusch Godfrey Tests for autocorrelation, the Breusch Pagan test for heteroskedasticity and the Ramsey test for omitted variables and incorrect model specification. These are described in section 5.3 below:

### 1.1 Results of Robustness Tests

Testing for autocorrelation: Time series are often carriers of autocorrelation of errors, then we use Breusch-Godfrey test to detect the risk of autocorrelation.

The Breusch-Godfrey statistic:  $LMA(p) = nR^2$  where  $n$  and  $R^2$  refer to the auxiliary regression on the residuals. Decision rule: If  $LMA(p) > [\chi^2(p)]$  one rejects the null hypothesis of no autocorrelation of order  $p$ . If  $LMA(p) < [\chi^2(p)]$

2(p)] one cannot reject the null hypothesis of no autocorrelation of order p. Or equivalently,  $H_0 = 0$  there is no autocorrelation.  $H_1 =$  different from 0, then the autocorrelation The statistic is distributed chi-squared, with p degrees of freedom. Accept  $H_0$  if the p-value of the Breusch-Godfrey statistic is greater than 0.05.

Table 9: Summary of the results from test for autocorrelation Models| Obs. \*  
 R-squared| Prob. Chi-Squared| Observation| Model 2| 0.189117| | 0.9098| |  
 Autocorrelation is insignificant at the 5% level. | Model 3| 0.267317| | 0.  
 8749| | Autocorrelation is insignificant at the 5% level. | Model 4| 0.308434| |  
 0.8571| | Autocorrelation is insignificant at the 5% level. | Model 5| 2.  
 285405| | 0.3190| | Autocorrelation is insignifican