EASTERN MEDITERRANEAN UNIVERSITY

FACULTY OF BUSINESS AND ECONOMICS



MGMT 503: Managerial Economics

MIDTERM PROJECT

(SAMPLE)

**Production theory**

*Submitted to:*

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*Submitted by:*

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**OUTLINE**

1. Introduction
2. Literature review: Production Theory
3. The case: China
4. Data, model and methodology
5. Empirical results
6. Conclusion, policy implication and recommendation

**1.Introduction**

The theory of economic growth allows to understand the nature of growth, to find out the factors influencing the growth and determine its character. Well-designed neoclassical growth theory gives us a better understanding of this phenomenon, now researchers economy can rely on the theory of economic growth, explaining the essence of the phenomenon of internal factors.

We can see that there is a trend of growth of the country's income. There are times when it falls (during recessions), but overall the trend in the long term indicating steady growth. It very important to understand the causes of short-term output fluctuations around the trend, i.e. the economic cycles, to determine the reasons for the growth of real output in the long run, to analyze different scenarios of growth, identify indicators that affect growth. These problems are considered in the theory of economic growth.

The modern neoclassical theory of economic growth based on P.M.Romer, R.Lukas, S.Rebelo works, which are considering the results of studies K.Errou, H.Udzavy, E.Sheshinski. The distinguishing feature of these models is allocation of individual research sector R & D (research and development activities) or education sector.

The phrase “endogenous growth” embraces a diverse body of theoretical and empirical work that emerged in the 1980s. This work distinguishes itself from neoclassical growth by emphasizing that economic growth is an endogenous outcome of an economic system not the result of forces that impinge from outside.

Robert Solow started growth theory in the 1950s, and it basically broke the macroeconomy into three drivers: capital, labor, and productivity. It did not explain productivity, but did highlight that this factor seemed to be what really mattered. Romer highlights the fact that technology and human capital are very important and created a model. The aim of this work is to talk about Romer’s endogenous growth theory and implement the model on the example of countries (China and Japan) by using Microfit program.

The rest of the project is organized as follows: Section 2 introduces and describes the literature. In section 3, The case is briefly explained. Section 4 describes data and methodology. The results and their interpretations are presented in section 5 and section 6 concludes important remarks and suggestions.

**2. Literature review**

The first wave of new researchers such as Romer, Lucas, Rebelo (S.Rebelo)
were based on works Arrow Sheshinski and Uzawa. In their models, growth
could be unlimited, because the return on investment in a wide class of capital resources, which include human capital, not necessarily decreases with the development of the economy.
Combining theories of research and development and imperfect competition
of the theory of growth started with Romer. Significant contributions were made by Aghion
(P.Aghion) and Howitt (P.Howitt). They proposed a model of endogenous growth
one which is based on the idea of Schumpeter on the mechanism of creative destruction. The average rate of growth in this model increases with the size of the modeled system (measured by the total number of employees).

A number of ideas about the role of international trade at the present stage of technological development suggested Grossman (G.Grossman) and Helpman (E.Helpman). They consider technological advances as result of target activity in research. This activity is awarded monopoly power in some form. Progress cannot be stopped, so the growth rate remains positive in the long run. The growth rate and the underlying innovation activity is not Pareto optimal because of the distortions associated with the creation of new products and technologies. Long-term growth depends on the actions of the state: taxation, maintaining law and order, provision of economic infrastructure, protection of intellectual property rights, regulation of international trade, financial markets and so forth. Thus, the state has an impact opportunity to influence the long-term growth.

Unlike the previous studying of economist Solow, model of endogenous growth theory attempts to explain the reasons for the growth productivity. In other words, the factor of the production becomes endogenous variable. Endogenous variables determined, unlike exogenous, not outside economic models, but inside them.

The feature of the model of endogenous growth is the inclusion of human capital as a variable factor in the production function. Unlike physical capital, human capital has increasing rates of return. Therefore, overall there are constant returns to capital, and economies never reach a steady state. Growth does not slow as a capital accumulates, but the rate of growth depends on the types of capital a country invests in. Research done in this area has focused on what increases human capital (e.g. education) or technological change (e.g. innovation).

As Romer writes in his 1990 paper, "Endogenous Technological Change "the model of endogenous growth has 4 basic inputs: Capital (K) - measured in units of consumption goods. Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress." According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.

Labor (L) - skills available from a healthy human body. Total labor force comprises people ages 15 and older who meet the International Labour Organization definition of the economically active population: all people who supply labor to produce goods and services during a specified period. It includes both the employed and the unemployed. While national practices vary in the treatment of such groups as the armed forces and seasonal or part-time workers, in general the labor force includes the armed forces, the unemployed and first-time job-seekers, but excludes homemakers and other unpaid caregivers and workers in the informal sector.

Human capital - activities such as formal education and on-the-job training. This is an intensive productive factor of economic development, social development and family, including educated part of the labor force, knowledge, tools and management of intellectual labor, environment and work to ensure the effective and efficient functioning of the human capital as a productive factor of development. An index of the level of the technology (T). It depends on the amount of employees’ knowledge acquired in the process of working on their own experience (learning by doing).

Unlike other models Romer’s model explains the process of growth resulting from invention and consequent technical progress – it is the main aim of it. The model also illustrates the possibility of production growth at a constant rate of growth based on technological progress, which can be reached by the training of workers in the normal course of business. The result of this process is assigned to companies as an external effect. Permanent growth rate depends on (option model) from behavioral parameters: the base case - from the rate of consumer preferences in time (subjective discount rate), it is also possible the introduction of public policy. Consequently, the model shows the possibility of endogenous growth. The model assumes the same assumptions that were made for the basic models of exogenous growth. Standard neoclassical production function has the same properties as the base model, and it included a neutral technical progress.

**3. Brief information on China**

**3.1 China**

China, officially the People's Republic of China (PRC), is a sovereign state located in East Asia. It is the world's most populous country, with a population of over 1.35 billion. Covering approximately 9.6 million square kilometers, China is the world's second-largest country by land area after Russia and Canada.

China had the largest and most complex economy in the world for most of the past two thousand years, during which it has seen cycles of prosperity and decline. Since the introduction of economic reforms in 1978, China has become one of the world's fastest-growing major economies. It is the world's second-largest economy by both nominal total GDP and purchasing power parity (PPP), and is also the world's largest exporter and importer of goods. The GDP level of China is $12.4 trillion (7.8% growth, $9,162 per capita). Unemployment level is4.1% and Inflation level is 2.7%.

**4. DATA, MODEL AND METHODOLOGY**

4.1. The Data

In our project for analyzing we were using yearly data from 1960 to 2003 for specific countries, China. (Appendix1, is provided with data for that period of time). To avoid huge numbers we were transforming data and taking it with sigh of logarithm in the program Microfit. The definition and descriptions of macroeconomic factors used in this project are presented in Table (4.1):

Table 4.1: Definition and description of used data:

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Definition** | **Description** |
| **Y** | Gross Domestic Product | Yt=*f* (a Kb ,Lc , LAd ,)a=technology |
| **K** | Gross capital formation | Gross capital formation consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories |
| **L** | Labour force | Total labor force comprises people ages 15 and older who meet the International Labor Organization definition of the economically active population: all people who supply labor for the production of goods and services during a specified period.  |
| **LD** | Total land | Area km sq  |

All data were taking from official WebPages of World Bank for China between 1960-2003. 44 number of observations will be used.

4.2 Methodology

The regression analysis is used to identify the direction and significance of the macroeconomic factors in Romer’s Growth model. The regressions are performed by utilizing the Ordinary Least Square (OLS) and to estimate the regression coefficients. And according Romer’s Growth Model the level of technology is same important as the other macroeconomics factors.

4.3 Model

Production Theory is presented:

 LY= β0+ β1LK+β2 LL+ β3LD+ e

where,

LY- Gross domestic product;

β0 -constant;

LK- Gross capital formation in percentage of formation;

LL- Total number of labor force in country;

LD- Total Land in country

e- The residual error term for SSE at time t.

**5. EMPIRICAL RESULTS**

The empirical test results have been carried out by using Software-Microfit 4.1. We will conduct *t*- test (i.e. individual significance test of the estimated coefficients), F-test (i.e. overall significance test of the coefficients), and R(i.e. goodness of fit) values. We then analyze the misspecification test results for the serial correlation, autocorrelation, normality and heteroscedasticity.

5. 1 Descriptive Statistics and Correlation Matrix

Table 1 shows the descriptive statistics of the variables employed in this study. Within this Table, the mean value of all variables is positive and the standard deviation values show that spread or dispersion around the mean of the data used in this sample is quite reasonable.

Table 1:

 Sample period : 1960 to 2003

 Variable(s) : LY LK LL LLD

 Maximum : 11.6840 10.5182 10.5140 10.8980

 Minimum : 11.4210 10.1297 9.3315 9.6860

 Mean : 11.5566 10.3155 9.9492 10.1891

 Std. Deviation : .085949 .12562 .36388 .37721

 Skewness : .014928 -.046726 -.29486 .52267

 Kurtosis - 3 : -1.3074 -1.3437 -1.2035 -.97419

 Coef of Variation: .0074372 .012178 .036574 .037021

As it can be illustrated in Table 2, a pair-wise correlation between dependent and independent variables are reasonably high as expected. On the other hand, the correlations between independent variables are as low as possible. Therefore, it can be concluded that multicollinearity as well as autocorrelation problems are not expected.

Table 2

 Estimated Correlation Matrix of Variables

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 LY LK LL LLD

 LY 1.0000

 LK .97607 1.0000

 LL .69805 .20112 1.0000

 LLD .94772 .25882 .24894 1.0000

It is worth emphasizing that we expect to have low correlation between the explanatory variables and high correlation between the dependent (LY) and the explanatory variables (LK, LL and LLD) (Gujarati, 2003, p.372).

5.2 Interpretation of results

Table 3

 Ordinary Least Squares Estimation

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 Dependent variable is LY

 44 observations used for estimation from 1960 to 2003

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 Regressor Coefficient Standard Error T-Ratio[Prob]

 C 6.2549 .77753 8.0446[.000]

 LK .42402 .11587 3.6594[.001]

 LL .023494 .013593 1.7284[.092]

 LLD .068105 .032919 2.0689[.045]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 R-Squared .95761 R-Bar-Squared .95443

 S.E. of Regression .018347 F-stat. F( 3, 40) 301.2305[.000]

 Mean of Dependent Variable 11.5566 S.D. of Dependent Variable .085949

 Residual Sum of Squares .013464 Equation Log-likelihood 115.5888

 Akaike Info. Criterion 111.5888 Schwarz Bayesian Criterion 108.0204

 DW-statistic .75001

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 Diagnostic Tests

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\* Test Statistics \* LM Version \* F Version \*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\* \* \* \*

\* A:Serial Correlation\*CHSQ( 1)= 16.3862[.000]\*F( 1, 39)= 23.1429[.000]\*

\* \* \* \*

\* B:Functional Form \*CHSQ( 1)= 3.7694[.052]\*F( 1, 39)= 3.6541[.063]\*

\* \* \* \*

\* C:Normality \*CHSQ( 2)= 2.2494[.325]\* Not applicable \*

\* \* \* \*

\* D:Heteroscedasticity\*CHSQ( 1)= 13.1178[.000]\*F( 1, 42)= 17.8403[.000]\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 A:Lagrange multiplier test of residual serial correlation

 B:Ramsey's RESET test using the square of the fitted values

 C:Based on a test of skewness and kurtosis of residuals

 D:Based on the regression of squared residuals on squared fitted values

5.2.1 Estimated coefficient

For each percent increase in capital, the estimated average amount of Economic growth is expected to increase by 0.42 percent, holding the rest variable constant. The case for variable labor, Each percent increase in labor, the estimated average amount of Economic growth is expected to increase by 0.02 percent, holding the rest variable constant. And finally land can be inspected as follow: Each percent increase in land, the estimated average amount of Economic growth is expected to increase by 0.06 percent, holding the rest variable constant.

5.2.2 R square and R bar square

R-Square: 95.76% of the total variation in economic growth can be explained by changes in capital, labour and land. And Adj R-Square can be explained as 95.44% of the total variation in economic growth can be explained by changes in capital, labour and land.

5.2.3 Overall Significance-F-test

Shows if *Y* Depends Linearly on All of the *X* Variables Together as a Group. Using F -Test Statistic, we can set up the hypotheses as follows:

* Hypotheses:
	+ H0: *b1 = b2 = … = bk =* 0 (No linear relationship)
	+ H1: At least one *bi* not equal 0 (At least one independent variable affects *Y)*
	+ The Null Hypothesis is a Very Strong Statement
	+ The Null Hypothesis is Almost Always Rejected

There is evidence that at least one independent variable affects Economic growth so the empirical equation is overall statistically significant at least 1% level [F(3, 40) 301.2305(.000)].

 5.2.4 Individual t-test

There is evidence of a significant effect of capital on economic growth holding constant the effect of the other variables such as labour and land. Capital is statistically significant at least 1% significant level [ 3.6594(.001)]. This means that capital has a positive impact on economic growth. Labour is statistically significant at least 10% level [1.7284 (.092)]. This means that labour has a positive impact on economic growth however less effective than capital. Land is statistically significant at least 5% level [2.0689 (.045)]. This means that land also has a positive impact on economic growth however less effective than capital and more effective than labour.

5.2.5 Diagnostic Tests results:

*Multicollinearity: Two or more explanatory variables are highly correlated*

Correlation coefficient is showing and measuring the strength between 2 variables, it may be positive or negative; strong, moderate or weak linear relationship and depends on sign and the size of number represented. By using Microfit program we estimated a correlation matrix. We are confident that our dependent variable is GDP. For China, it is clear that independent variables have high correlation with dependent variable; and have strong positive correlation with each other.

*Autocorrelation: Consecutive error terms are correlated where consecutive errors have the same sign). (time series)*

we reject null hypothesis and accept alternative [CHSQ (1) = 16.3862(.000)] that estimate regression does have serial correlation or autocorrelation so consecutive errors have the same sign.

*Functional form: Misspecified by the omission of a variable.*

we accept the null hypothesis {CHSQ (1) = 3.7694[.052]} that there is no misspecification, so the estimated model accords well with the theory conducted.

*Normality: Residuals are normally distributed or not.*

we accept the null hypothesis {CHSQ (2) = 2.2494[.325]} that residuals are normally distributed so there is no problem stems from distribution of error term.

*Heteroskedasticity: Variance of error term is not independent of the Y variable. (cross-section)*

we cannot accept the null hypothesis {CHSQ (1) = 13.1178[.000]} that error term is not constant for all the independent variables. However, this valid for cross section, so it is not for time series.

We also estimate two stage least square method to confirm the results obtained from OLS method. We realized that the results from 2SLS are consistent with the results estimated by OLS (See Table 4).

Table 4

 Instrumental Variable Estimation

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 Dependent variable is LY

 List of instruments:

 C LK LL LLD

 44 observations used for estimation from 1960 to 2003

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 Regressor Coefficient Standard Error T-Ratio[Prob]

 C 6.2549 .77753 8.0446[.000]

 LK .42402 .11587 3.6594[.001]

 LL .023494 .013593 1.7284[.092]

 LLD .068105 .032919 2.0689[.045]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 R-Squared .95761 R-Bar-Squared .95443

 GR-Squared .95761 GR-Bar-Squared .95443

 S.E. of Regression .018347 F-stat. F( 3, 40) 301.2305[.000]

 Mean of Dependent Variable 11.5566 S.D. of Dependent Variable .085949

 Residual Sum of Squares .013464 Value of IV Minimand .0000

 DW-statistic .75001

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 Diagnostic Tests

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\* Test Statistics \* LM Version \* F Version \*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\* \* \* \*

\* A:Serial Correlation\*CHSQ( 1)= 16.3862[.000]\* Not applicable \*

\* \* \* \*

\* B:Functional Form \*CHSQ( 1)= 3.5624[.059]\* Not applicable \*

\* \* \* \*

\* C:Normality \*CHSQ( 2)= 2.2494[.325]\* Not applicable \*

\* \* \* \*

\* D:Heteroscedasticity\*CHSQ( 1)= 13.1178[.000]\* Not applicable \*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 A:Lagrange multiplier test of residual serial correlation

 B:Ramsey's RESET test using the square of the fitted values

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 D:Based on the regression of squared residuals on squared fitted values

5.3 Short run dynamic (short-run period)

Within the short run period, none of variables has any impact on Economic growth. This also indicates that capital, labour and land are not statistically significant at the conventional levels. The growth model employed in this study is not effective for short run period.

Table 5

 Ordinary Least Squares Estimation

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 Dependent variable is DLY

 43 observations used for estimation from 1961 to 2003

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 Regressor Coefficient Standard Error T-Ratio[Prob]

 C .0045332 .0031408 1.4434[.157]

 DLK .054334 .11317 .48012[.634]

 DLL .0032174 .016110 .19971[.843]

 DLLD .016586 .073317 .22622[.822]

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 R-Squared .0087058 R-Bar-Squared -.067548

 S.E. of Regression .013804 F-stat. F( 3, 39) .11417[.951]

 Mean of Dependent Variable .0055649 S.D. of Dependent Variable .013360

 Residual Sum of Squares .0074315 Equation Log-likelihood 125.2449

 Akaike Info. Criterion 121.2449 Schwarz Bayesian Criterion 117.7225

 DW-statistic 2.1478

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 Diagnostic Tests

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\* Test Statistics \* LM Version \* F Version \*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\* \* \* \*

\* A:Serial Correlation\*CHSQ( 1)= .27355[.601]\*F( 1, 38)= .24329[.625]\*

\* \* \* \*

\* B:Functional Form \*CHSQ( 1)= .26397[.607]\*F( 1, 38)= .23471[.631]\*

\* \* \* \*

\* C:Normality \*CHSQ( 2)= 8.0068[.018]\* Not applicable \*

\* \* \* \*

\* D:Heteroscedasticity\*CHSQ( 1)= .29759[.585]\*F( 1, 41)= .28573[.596]\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

 A:Lagrange multiplier test of residual serial correlation

 B:Ramsey's RESET test using the square of the fitted values

 C:Based on a test of skewness and kurtosis of residuals

 D:Based on the regression of squared residuals on squared fitted values

**6. CONCLUSION, POLICY IMPLICATION AND RECOMMENDATION**

Romer in his model highlights the fact that technology and skillful labor re very important and created a model. This project explains Romer’s endogenous growth theory by implementing the model on the example of country/ China (in period from 1960 to 2003) using Microfit program**.**

In our work we decided to analyze China but while we get results, we were disappointed with findings (technology is assumed as a constant term) and we can say that technology has got a long-term effect rather than a short-term effect. needed choose another country to compare. This might be investigated deeply for further research.

Romer’s growth model theory emphasized the significance of macroeconomic factor as technology and our result for China (data has been taken from 1960 till 2003) showing that technology, capital, labor and land are significant variable in our model for long term period. Unfortunately, this situation is not valid for the short-term period. First, China is not producing any innovations, but imitating and copying them from another countries. China is paying more important role (as we can see from our result) to labor and land because of high population of China and low wage rate (cheap labor), so they may produce more output, In the model, our regression equation is significant at conventional level. And there are strong relationships between dependent and explanatory’s variables.

To sum up we would like to recommend for the chosen country to invest more skillful labor because the future growth and development of country are closely related to young population education and the best investments to the future it’s the investment to the new generation.

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**Appendix**