UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Home exam: ECON5103/9103 – Advanced econometrics – panel data

Handed out: Tuesday, May 11, 2010 Grades will be given: June 16, 2010

To be delivered by: Tuesday, May 25, 2010

Place of delivery: Department office, 12th floor

Further instructions:

- The questions are in English, but you can give your answers in English, Norwegian, Swedish or Danish.
- The home exam will be marked. Students on masters level are awarded on a descending scale using alphabetic grades from A to E for passes and F for fail. Students who would like to have the course approved as a part of our phd-program, must obtain the grade C or better. Students on phd-level are awarded either a passing or failing grade. The pass/fail scale is applied as a separate scale with only two possible results.
- After completion, you must hand in two (2) copies of your written work. Please remember to use the printed cover page. These must not bear your name, but the individual examination number, which you will find in your studentweb.
- In addition, you must fill in the enclosed declaration.
- It is of importance that the home-exam is delivered by the deadline (see above). Papers delivered after the deadline, **will not be corrected*)**.
- All papers must be delivered to the place given above. You must not deliver your paper to the course teacher or send it by e-mail. If you want to hand in your paper **before** the deadline, please contact the department office on 12th floor.

*) Students who due to illness or other valid reason of absence were unable to sit for their final exams may apply for participation in make-up exams. Make-up exams are arranged either later in the same semester or early in the semester following the exam in question. Documentation of valid reasons for absence from the regular exam must be submitted upon application to participate in make-up exams.

ECON 5103/9103 ADVANCED ECONOMETRICS – PANEL DATA.
SPRING 2010

TAKE HOME EXAM

PROBLEM SET

PROBLEM SET IS ANNOUNCED ON WEB: MAY 11, 2010
ESSAYS SHOULD BE RETURNED WITHIN: MAY 25, 2010
THE ESSAYS SHOULD NOT EXCEED 20 PAGES

PROBLEM 1

Consider the following equation for two panel data variables (x_{it}, y_{it}):

$$y_{it} = \alpha_i^* + x_{it}\beta + \varepsilon_{it} \qquad (i = 1, 2, \ldots, N;\ t = 1, 2, \ldots, T), \tag{1}$$

where i indexes individual (group), t indexes period, β is an unknown parameter, α_i^* are individual effects, and ε_{it} are stochastic disturbances.

(a) Explain the assumptions that define the *fixed effects (FE) model* and give a complete econometric specification of the model.

(b) Explain the assumptions that define the *random effects (RE) model* and complete the econometric specification of that model.

(c) Write between 500 and 1000 words about the choice between the FE and RE model when doing applied panel data econometrics. Discuss for example whether the choice should be based on properties of the panel data set, the purpose of the exercise or the outcome of econometric testing.

(d) Show, for example by using the Frisch-Waugh theorem [see, e.g., W.H. Greene: *Econometric Analysis*, 6th ed., section 3.3], that the within estimator of β can be obtained from a regression that contains N (or $N-1$) dummy variables for the individuals.

(e) In accordance with the RE model, assume that

$$\alpha_i^* = \alpha_i + k,$$

where the α_i's are stochastic variables with zero expectation. Assume that the α_i's are correlated with the group means $\bar{x}_i$. Which of the four estimators for β, Pooled, Between, Within and GLS, are consistent under this assumption? Explain by using algebra.

(f) Assume that the explanatory variable in equation (1) is imperfectly measured in the data set. Specifically we assume that x_{it} contains an additive random measurement error. Assume that a fellow student is adamant that in order to achieve consistent estimation of β given this assumption, one must bring in instrumental variables from "outside the model". You want to prove that she is wrong. But how will you do that?

(g) In dynamic panel data models, why is it that the problem of "endogenous regressors" is more severe in the RE case than in the FE case?

(h) Write 500-1000 words about the theoretical and practical advantages and drawbacks of the so called Arellano-Bond estimator for dynamic panel models.

Problem 2

An edited data set with annual data for inflation and potential explanatory variables from 20 OECD countries has been posted on the course web pages in two different formats. The name of the files are: *OECD_inflation.xls* (excel file) and *OECD_inflation.dta* (Stata file). The dataset is taken from: *Bjørnstad, R. & Nymoen, R. The New Keynesian Phillips Curve Tested on OECD Panel Data. Economics The Open-Access, Open Assessment E-Journal, www.economics-ejournal.org, 2008, 2, 1–18.* A short description is given below.

In solving this problem you are give *two options*: [A] Use the OECD inflation data set, denoted as the 'default dataset' below. [B] Use another panel data set of your preference.

If you choose the [A] option, you should use the data to write a report about the determinants of "OECD inflation".

If you choose the [B] option, ensure that your data set contains at least four variables, that at least 20 observation units exist, and that the time series length is at least 10 years for at least some units. The dataset may be balanced or unbalanced. Your report should include a description of this dataset, including source and variable definitions.

Regardless of your choice of option, the report must contain results exemplifying and demonstrating the use of one or more of the estimation methods covered by the course. The relevance of the chosen methods should be explained with reference to the econometric theory of panel data. The model should be motivated by economic theory, and the empirical results should be clearly interpreted.

Short description of the default dataset: The OECD data set consists of annual time series starting as early as 1960 for some countries and ending in 2004 for the 20 OECD countries given in the table below. Some of the variables do not exist for the whole period, and similarly, for some countries certain variables are missing. The variable names and the country codes are:

Country: Country identifier.
Year: Year identifier.
Dpi: *Rate of change in import prices.* The change in the log of the import price deflator.
Dpo : *Rate of change in oil price.* The change in the log of the Brent Blend crude oil measured in USD per barrel.
U : *Rate of unemployment.* The OECD standardized unemployment rates give the number of unemployed persons as a percentage of the civilian labour force.
ulc : Log of unit labour costs (an index, (2000=100).
ulcMcpi: Log of ULC minus log of consumer price index.
Dulc: The change in log of *ULC.*
wshare: log of The wage share (compensation to employees as a share of value added)
infl: The change in the log of the consumer price index
infl_lead: One period lead in *infl.*
YGAP: Ratio of actual GDP to potential GDP.
piMcpi: Log import price minus log consumer price index.
VAT : *Indirect tax rate.* This is standard VAT rates in per cent for the different OECD countries.
EP: Employment protection. The data comprise an index of the degree of employment protection.
CO: Coordination in wage setting. Index for the degree of bargaining coordination.
BBR: Benefit Replacement Ratio. The data comprise an index of unemployment benefits in per cent of the average wage level.

Name of country	Number in database
Australia	1
Austria	2
Belgium	3
Canada	4
Denmark	5
Finland	6
France	7
Germany	8
Ireland	9
Italy	10
Japan	11
Netherlands	12
New Zealand	13
Norway	14
Portugal	15
Spain	16
Sweden	17
Switzerland	18
UK	19
USA	20

Problem 3

Attached is an unpublished (anonymized) discussion paper from 2007, presenting an analysis based on a Chinese macro panel. It has the title:

"New Perspective of the Relation between the Public Expenditure and Economic Growth in China: Evidence from provincial panel data"

Its abstract reads:

ABSTRACT: This paper focuses on the relation between the public expenditures and the economic growth in China's transition economy and builds two econometric models according to a new economic growth theory framework based on the three hypotheses this paper made. Then, with the panel data of 29 provinces (1991–2004) in China, this paper finds that, in China, the total public expenditure and the exhaustive expenditure of the public sector have positive effects on the economic growth. And there is also a positive relationship between the public sector's transfer expenditure and the economic growth, which is much weaker than the previous two.

Read this discussion paper carefully, and write a brief report/essay, in which you evaluate critically the paper. Concentrate your evaluation on:

(a) The way the authors translate the theory model they rely on into panel data models.

(b) Their choice of methods for estimating and testing the models chosen.

(c) The validity of the conclusions they draw.

Ⅰ. Introduction

The past decade have witnessed the great importance of getting the accurate and clear judgement on the relationship between the public expenditure and economic growth in China, which is especially essential for the Macroeconomic Adjustment by Chinese government, accompanied by not only the successful soft landing of Chinese economy in the mid-1990s, but also the continuous and remarkable economic boom with appropriate fiscal policies since the beginning of 21st century.

The research on the relationship between the public expenditure and economic growth might begin by Wagner（1883，1890）since 1880s. Furthermore, Musgrave (1969) offered some deep insights on the model of public expenditure growth. And the original contribution was by Arrow and Kurz (1970) who developed the model where consumers derive utility from private consumption as well as the public capital stock.

However, the economists have not reached the consensus on what is the real relationship between the public expenditure and economic growth. Some economists claim that there are significantly negative relations. Landau (1983) studied on the data of 104 countries from 1960 to 1977, and found significantly negative relations between the growth rate of real GDP per capita and the level of government consumption expenditures as a ratio to GDP. Barro (1990, 1991) considered government consumption purchases, G^c, which entered in to household utility functions, concluded that an increase in G^c/Y (the ratio of government consumption purchases to GDP) can be consistent with an increase in utility that accompanies a decrease in the growth rate. Through the empirical study, he found a significant negative relation between G^c/Y and the growth rate of per capita real GDP and little relation between G^i/Y (the ratio of government investment to GDP) and economic growth. However，other scholars argue that the relationship is positive. Ram (1986) found that the government size has a positive effect on economic performance and growth by using the cross-section and time-series data of 115 countries from 1960 to 1980, especially for the developing countries. While Devarajan, Swaroop, Zou (1996) focused on the relation in the 43 developing countries. With empirical applications, they show that an increase in the share of current expenditure has significantly positive growth effects and the relation between the capital component of public expenditure and per-capita growth is negative. Moreover, some argue that there is no significant relation. Kormendi and Meguire (1985) studied 47 countries in the post –World War Ⅱ period, using data on the government “consumption” expenditures, and found no significant relation between average growth rates of real GDP and average growth rates or levels of the share of government consumption spending in GDP.

As to the issue in China, although the subject is crucial, the theoretical positions are still diverse. Guo, Lv ,Zhang（2003）concentrated on the growth and the structure of public expenditures of China, using the time series data of 1978-2001, concluded that the Chinese total fiscal expenditure correlates negatively to economic growth, the fiscal productive expenditure positively. Zhuang and Zou(2003) offered the definition of adjustment cost，and claimed that the adjustment costs of public expenditure in China resulted in the negative effect on economic growth, according to that the proportion of unbudgeted expenditure which controlled by local governments has increased since 1980. Nevertheless, Liu ,etc.（2004）presented the argument that they found the effects of public expenditure and public

investment are positive, and obvious accumulative effect along with lagged effect, according to their time-series empirical study. And, Gang & Zhang (2003) concluded that government consumptions and government investments have a positive effect on the economic growth by using ADL econometric model. Moreover, Wang（2005）used the VAR model and found that the use of non-tax revenue and the consumption expenditure by the government have a positive long-run effect over the economic growth while public investment does not bear perceivable effect.

More specifically, in the previous literatures about China, although the different theoretical models as well as econometric methodologies and the conflicting empirical results, we found most of researches were conducted without a relevantly completed theoretical framework that explains the economic growth, which mostly concerned only about the relevant variables of public expenditure and GDP.

In our analysis, we focus on the relation between the public expenditure and economic growth in transition economy and builds extended econometric models according to a new economic growth theory framework based on the three hypotheses this paper made. With the panel data of 29 provinces (1991-2004) in China, we endeavor to figure out the appropriate growth and structure of public expenditure of China for the harmonious growth.

This paper is organized as follows: Section 2 presents the theoretical framework, describing the theoretical model based on three hypotheses. Empirical study is given in Section 3, with the panel data of China. Finally, a short conclusion is in Section 4.

Ⅱ. The Theoretical Framework

The institutional reform is always the key word for the transitional economy in China, not only China’s market-oriented reform aimed at opening up the economy since 1978 but also the deep and wide ranging reform process in 1990s including capital market and property right etc. Undoubtedly, the institutional reform has played an essential role in the economic growth of China, which has been growing at an annual rate of nearly 9 percent. Specifically, the reform stimulates the growth of factor endowments, in which the oversea capital attracted by the opening policy and the accumulation in private sector by privatization of China’s economy. On the other hand, the economic reforms, such as the primary establishment of public fiancé institution, improve the economic efficiency, including the allocation of resources and organization efficiency etc.

In summary, compared to the era of planning economy, the China’s transitional economy has three characters. First, the proportion of private sector in economy rises steadily, with the larger contribution to the economic growth of China every year. Second, China’s economic openness is significantly improved, so does China's dependence ratio of economy. Finally, the primarily establishment of public finance system spells the relief of administrative control on economy, while the government’s macroeconomic adjustments are gradually through the market way. In general, this theoretical framework consists of three hypotheses as follows.

Hypothesis 1

The more the private sector economy develops, the rapider the regional economic growth

The high average growth rate enjoyed by China since 1978, accompanied by the process of privatization of economy, which is from self-employed business and collective enterprises to private sector economy which becomes a significant part for China's economy. And the growth of private sector, the marketization process of China economy, not only plays a vital role in economic growth but also accelerates the development of incentive system, while both of the reform of distribution system and property rights system stimulate the pursuit of fortune. Moreover, the development of private sector, the result of resource reallocation, spells that the economic reform is a process of making market mechanism work and developing the China's Comparative advantages. In addition, it promotes the reform of corporate governance in state-owned enterprises (SOEs), which deepens the reform of property rights system in China's economy. To sum up, when the private sector economy develops well, which to some extent promotes the efficiency of regional economy and the organization efficiency of state-owned enterprises, the regional economy will develop more rapidly.

Hypothesis 2

The more the economic openness to external economy, the rapider the regional economic growth

The free capital flow and products are the performances of the economic openness to external economy. The foreign direct investment (FDI) and international trade have a close relationship with the economic openness. The deepening of economic openness would make the regional economy develop with its comparative advantage in global economy, which not only is a efficient allocation of resources but also accelerates the mobility of economic information, technology and capital flow. Furthermore, the neoclassical growth model (Romer, 1986) highlights the endogenous growth by the capital input and the accumulation of knowledge, especially FDI may generate positive externalities for the host country, such as improve the innovation ability and promote the economic growth.

The rapid growth of import and export along with FDI demonstrates the promoted economic openness of China, which brings about the severer market competition, the improved well-being of people and the great economic growth. Significantly, the promoted economic openness gradually clears up the institutional obstacle to marketization and creates an open fair market for the all kinds of enterprises, which has been a solid institutional foundation of long-term economic growth in China.

Hypothesis 3

The regional economy will grow more rapidly, while the public finance system is improved.

The public finance system is one of the preconditions for market economy. From the public economic point of view, the major function of government is to provide the public goods. Nevertheless, if public sector is too active in the economy, the large investment of government would have the "crowding effect" on the private sector, on the other hand, that might affect the allocation of resources and market efficiency, which also could lead to the

rent-seeking.

And in public finance system, in general, the government intervention should exist only when the added welfare of people after the intervention is higher than the social costs of the intervention. So public finance system can to some extent prevent the economy distortion of government policy, promote economic growth and ensure market efficiency along with equality in which public expenditure could play an essential role.

According to *Public Sector Economics* (C.V. Brown & P.M Jackson, 1990, P.119), we define that public expenditures consist of exhaustive public expenditures and transfer expenditures. Exhaustive public expenditures correspond to the government's purchases of current goods and services 9（i.e. labor, consumables etc.）and capital goods and services (i.e. public sector investment in roads, schools, hospitals etc.). And transfer expenditures consist of pensions, subsidies, debt interest, and unemployment benefits etc. In China today, a high-saving economy, the consumption increases slowly since the people are always concerned about problem of the house, aging and education of children. So the exhaustive public expenditures to some extent play an important role in the domestic demand and promote the economic growth. In addition, the public investments such as the infrastructural investment, definitely have a positive externality for the economy, while transfer expenditures might relieve the problem of severe income polarization，ensure sustainable and stable economic growth. Accordingly, the perfection of public finance system might bring about the institutional restrictions on the government behaviors and the efficient results of resource reallocation by market economy, which is the basis of the long-term economic growth.

In sum, now we have formed a relevantly completed theoretical framework that explains the growth of transitional economy. In the empirical application, through the perspectives of private sector economy, economic openness and public finance system (public expenditure), we endeavor to figure out the relationship between the public expenditure (exhaustive public expenditures and transfer expenditures) and the economic growth, according to the econometric model explains economic growth.

Ⅲ. Empirical Study

1. Econometric Model

Based on the neoclassical growth model, we extends the classical production function--Y=F(K，L), and hence

$$Y = F(K_i, L) \qquad \text{i = 1,2,3.} \qquad (1)$$

The neoclassical growth model takes capital and labor as production factors. However, we extends the capital sector into three capital stocks, the first one is the capital of private sector as K_1, the second is the capital inflow from the external economy as K_2 , the third is the capital from public sector as K_3. And the character L denotes the labor supply.

Therefore，

$$Y = AK_1^{\beta_1} K_2^{\beta_2} K_3^{\beta_3} L^{\beta_4} \qquad (2)$$

$$LnY = \beta_0 + \beta_1 LnK_1 + \beta_2 LnK_2 + \beta_3 LnK_3 + \beta_4 LnL \qquad (3)$$

According to the three hypotheses of the theoretical framework in Section 2, we modify Equation (3) and build two econometrics models, which explain the macroeconomic factors' effects on the economic growth, especially the public expenditure including exhaustive public expenditures and transfer expenditures. Model (1) mainly explains the effect of the public expenditure (GE) on gross domestic production (GDP). In Model (2), we divide public expenditure into exhaustive public expenditures (GPE) and transfer expenditures (GTE), and figure out the relationship between the growth of GDP and the previous two. Both of the two models use the log linear model.

$$\text{Model 1: } \ln GDP = \beta_0 + \beta_1 \ln PR + \beta_2 \ln FDI + \beta_3 \ln GE + \beta_4 \ln L + \varepsilon$$

$$\text{Model 2: } \ln GDP = \beta_0 + \beta_1 \ln PR + \beta_2 \ln FDI + \beta_3 \ln GTE + \beta_4 \ln GPE + \beta_5 \ln L + \varepsilon$$

The variables used in the models, where **ln** denotes the natural logarithm of the variable, are the following.

GDP : the real Gross Domestic Production.

PR : the ratio of output of private sector to GDP , and the coefficients is describing the effect of private sector to regional economic growth.

FDI : Foreign Direct Investment, and the coefficients is describing the effect of private sector to regional economic growth.

GE : the public expenditure.

GPE: exhaustive public expenditures

GTE: transfer expenditures

L : the level of employment

ε : the residual term.

2. Data and variable definition

The empirical analysis uses annual data of 29 provinces in China from 1991 through 2004 to examine the link between public expenditures and economic growth in China. The data used in this paper are from *China Statistical Yearbook* 1992-2005, *Finance Yearbook of China* 1992-1996 and *China Compendium of Statistics 1949-2004*. The panel data include Gross Regional Product, Foreign Direct Investment by region, total Government Expenditures by Region with specific items, All State-owned and Non-state-owned above Designated Size Industrial Enterprises' Gross Output Value, Total Employed Persons in the region.

In this empirical study, on time series dimension we use the macroeconomic data from 1991 to 2004 according to the data acquired problem. That is because there are no specific items for provincial government expenditures before 1997 on *China Statistical Yearbook*, which we got from *Finance Yearbook of China* instead. However, *Finance Yearbook of China* was published only since 1992 which provided data of 1991. And on the cross section dimension, China has 34 Provinces/Autonomous Regions/ Municipalities in total by 2005. According to the data source and coherence , we as usual select Beijing, Hebei, Shanxi, Liaoning, Jilin, Shanghai, Jiangsu, Fujian, Shandong, Hubei, Guangdong, Sichuan(including Chongqing), Yunnan, Shanxi., Tianjin, Inner Mongolia, Heirongjing, Zhejiang, Anhui, Jiangxi, Henan, Hunan, Guangxi, Hainan, Guizhou, Gansu, Qinghai, Ningxia, Xinjiang—29 provinces in total, excluding Tibet, HongKong SAR, Macao SAR and Taiwan.

In Model 1 and Model 2, referring to *China Statistical Yearbook*, we define **GDP** as

Gross Regional Product by province, **FDI** as Foreign Direct Investment by province, **L** as Total Employed Persons every year by province. And **PR** is describing the privatization of regional economy and given as [1]

PR = (A－S)/A

Where

A: All State-owned and Non-state-owned above Designated Size Industrial Enterprises' Gross Output Value in the region.

S: State-owned above Designated Size Industrial Enterprises' Gross Output Value in the region.

And **GE** denotes provincial annual total fiscal expenditures. As to exhaustive public expenditures (**GPE**) and transfer expenditures (**GTE**), referring to *China Statistical Yearbook* and the definition of *Public Sector Economics* by C.V. Brown & P.M Jackson, in empirical study we defines provincial annual exhaustive public expenditures (**GPE**) including government consumption which consists of "Expenditure for Government Administration", "Expenditure for Agriculture", "Expenditure for Operating Expenses of Education", "Expenditure for National Defense" etc., and government investment that consists of "Expenditure for Capital Construction", "Expenditure for Innovation Enterprises", "Expenditure for Science and Technology", and so forth. On the other hand, we define provincial annual transfer expenditures (**GTE**) as public expenditures that exclude exhaustive public expenditures (**GPE**), consist of "Expenditure for Pensions and Relief Funds for Social Welfare", "Expenditure for Retired Persons in Administrative Department" , "Expenditure on Subsidies to Social Security Programs", "Expenditure for Undeveloped Areas" , "Expenditure for Price Subsidies" and so on.

Significantly, the provincial annual data of Gross Regional Product (GDP), Public expenditure (GE), exhaustive public expenditures (GPE), and transfer expenditures (GTE) have been deflated by the CPI with base year of 1985 in *China Statistical Yearbook* 2005. At last, the variables are transformed with natural logarithm.

Table-1 Descriptive Statistics for Explanatory Variables

	LNGDP	LNPR	LNFDI	LNGE	LNGPE	LNGTE	LNL
Mean	6.377	-1.091	10.738	13.460	13.303	11.402	7.364
Median	6.452	-1.056	10.914	13.469	13.328	11.393	7.523
Maximum	8.437	-0.135	14.273	15.489	15.376	13.537	8.773
Minimum	3.691	-3.150	2.944	11.224	11.123	8.851	5.355
Std. Dev.	0.971	0.552	1.790	0.813	0.807	0.987	0.871
Skewness	-0.527	-0.431	-0.558	-0.265	-0.228	-0.218	-0.643
Kurtosis	3.110	2.792	3.522	3.089	3.151	2.740	2.610
Observations	406	406	406	406	406	406	406
Cross sections	29	29	29	29	29	29	29

Note: The results on Table-1 are reported by EVIEWS 5.0

[1] We have to point out that, according to the alteration in the definition of "Designated Size" in *China Statistical Yearbook*, "Designated Size" which was defined as townships level before 1998, has been defined as annual sales revenue above 5 million RMB since 1998.

3. Results of empirical study

For the two panel data models, we firstly identify the econometric method. With consideration in choosing between Random Effects Model (REM) and Fixed Effects Model (FEM), the Hausman test is a useful and usual way. Since both the models have more than one parameter, we use an *F* statistic version of the Hasuman test (Wooldridge, 2002, *Econometric Analysis of Cross Section and Panel Data*, P.290). And the *F* statistic of the Hausman Test of Model 1 is 1.5660, which doesn't reject the null hypothesis at the 1% significant level. The *F* statistic of the Hausman Test of Model 2 is 1.7475, which rejects the null hypothesis at the 1% significant level. So, for Model 1, Random Effects Model (REM) is a better method, while Fixed Effects Model (FEM) is a better for Model 2.

In summary, Model 1 estimates with cross-section Random Effects Model using EGLS method. And Model 2 estimates with cross-section Fix Effects Model using LS method. Furthermore, the results of Model 1 and Model 2 are given in Table 2.

Table-2 Summary of Results of Model 1 and Model 2

	Model 1	Model 2
C	-4.9583	-3.4981
	(-16.805)***	(-4.7408)***
LnFDI	0.0742	0.0709
	(9.5705)***	(8.8089)***
LnGE	0.5883	
	(47.152)***	
LnGTE		0.0821
		(5.6072)***
LnGPE		0.5151
		(19.080)***
LnPR	0.1558	0.1593
	(6.2686)***	(6.0589)***
LnL	0.3788	0.2036
	(10.410)***	(2.0172)**
Observations	406	406
Adjusted R^2	0.9320	0.9884
Sum squared resid	4.6688	4.0689
F-statistic	1372.938	1046.677

Note： t-ratio are in parentheses, *** denotes statistical significance at least at the 1% level; ** denotes statistical significance at least at the 5% level. Reported by Eviews 5.0

4. Analysis of results

In the results of Model 1，the Adjusted R-squared is 0.9320, which means a high degree of goodness of fit, and all the coefficients are all statistically significant at the 1% level. While in the results of Model 2，the Adjusted R-squared is 0.9884, all the coefficients are all statistically significant at the 5% level. With the summary of the empirical results, we have

three conclusions as follows.

(1) In the transitional economy in China，public expenditure has a positive effect on the economic growth. Controlling other variables, the economic growth will increase 0.5883%, when Public Expenditure increases 1 %.

(2) In China, exhaustive public expenditures are positively related to the economic growth. The economic growth will rise 0.515%, while the exhaustive public expenditures rises 1%. However, transfer expenditures are slightly positively related to the economic growth The economic growth will rise only 0.082%, while the transfer expenditures rises 1%.

(3) The previous hypotheses in Section 2 are basically not rejected, which testifies that in the transitional economy in China，Private Sector in region economy, Foreign Direct Investment, Public Expenditures and Labor all have positive and essential effects on the economic growth, especially the public expenditures.

Ⅳ. Conclusion

This paper concentrates on the relations between the public expenditures and economic growth in transition economy of China and builds extended econometric models according to a simple economic growth theory framework based on the three hypotheses this paper made. With the panel data of 29 provinces (1991-2004) in China, the empirical results suggest that both the total public expenditure and exhaustive public expenditures have positive effects on the economic growth in China, while transfer expenditures are slightly positively related to the economic growth in China.

Considered with the current economic situation in China, our analysis leads to two important policy implications

According to our analysis, the positive relationship between economic growth and public expenditure still exists in China’s economy, especially the exhaustive public expenditures. It is because nowadays exhaustive public expenditures in China create a strong impetus to the economic growth, since China’s economic growth still mainly depends on the investment while ordinary people in China would like to save rather than to consume facing the pressure of children education, housing, medical treatment and aged-care support due to the imperfection of the public finance system in China. Nevertheless, the government should not ensure a sustainable economic growth only by public expenditures especially exhaustive public expenditures, for public expenditures should be more concerned about the welfare of the society rather than the increase in the figure of GDP.

On the other hand, more attention should be paid to Transfer-Payment System in China. As seen in the empirical results, transfer expenditures are slightly positively related to the economic growth in China. From another perspective, it means that transfer payment has risen little for these years, though China’s economy experiences rapid growth at an annual rate of nearly 9 percent since 1980s. Moreover, transfer expenditures are just the essential means by the government, which testifies the truth of the dramatic rise of the Gini Coefficient and severe income polarization in China.

Through the perspective of welfare economics, society can attain any Pareto-efficient allocation of resources by making a suitable assignment of initial endowments and then letting people freely trade with each other. Accordingly, the government might reallocate resources appropriately rather than the heavy government intervention in economic activity. Compared with developed country, the transfer payment system in China has a long way to go, as the transfer programs in US have Temporary Assistance for Needy Families (TANF), Aid to Families with Dependent Children (AFDC), Medicaid, Supplemental Security Income (SSI) and so forth. In sum, China government should highlight the transfer expenditures that might make great contribution to the distributional fairness in China, which is the foundation of China's sustainable economic growth and harmony society.

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