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Abstract

The purpose of this study is to empirically test the validity of Kaldor's laws of economic growth in China between 1978 and 2004 and to provide an alternative explanation of sources of Chinese economic growth in a Kaldorian perspective. First, in a spatial econometrics perspective using a regional data set, the present paper empirically verifies that Kaldorian hypotheses on economic growth hold in China during the sample period. Second, it suggests the empirical findings as proving the validity of a demand-side approach. Third, taking this implication, this study provides a more detailed alternative explanation of the sources and processes of economic growth in China during the sample period. Finally, considering a striking finding of the lack of spatial (regional) dependence among Chinese provinces, it also discusses the role of local governments in the development process in China. This study is expected to contribute to the literature as being one of the first studies that identifies sources of Chinese economic growth in demand side.

JEL Classification: O11, O14, O53, R58

Key words: Economic growth in China, Kaldor's laws, effective demand, Chinese local governments

1. INTRODUCTION

It may be the one of the most serious challenges for development and growth economists to identify and explain the sources of economic growth in China after 1978. Indeed, China has grown on average at a record high of above 9% for a quarter century. The record is higher than even the figures that give rise to the coinage, "Asian Miracle." As a consequence, its impact both on the domestic standard of living and on the world economy is big enough to attract interests of modern economists.

In spite of the various analytical techniques adopted and the rages of analyses, the conventional approaches to the past and sustained economic growth in China during the last three decades could be classified into two approaches. The first group of the studies, which is the most popular approach, takes an institutional approach. Abstracting their details, they share a common conclusion: that is, the phenomenal economic performances of China could be explained by incorporation of market factors into the economy, the core of which are captured by improved incentive system and enhanced efficiency of resource allocation in line with the comparative advantage[1]. In this approach, one of the most frequently cited example would be the successes of the rural reforms including the decollectivization of agriculture (household responsibility contract system, HRCS) and the creation of rural industry (township-village enterprises, TVE). Even though this view may contain some truth of the story, it should be at best partial explanation and is not so much in line with the reality: first, the rapid growth of agricultural output in the early period of reform (1978-1984) had taken off well before decollectivization was virtually complete in 1983.[2] Second, the success story of TVEs in rural China would be better told in terms of the crucial roles that local governments played at various levels than marketization.[3]

The second group of studies on economic growth in China could be got together under the name of growth accounting approach.[4] In essence, the advocates of this growth accounting approach believe that the growth factors are decomposed into two categories of (1) accumulation of factors of production and (2) technical progress and that one could calculate the extent to which each component contributes to economic growth. Regardless of the results of growth accounting exercises, this approach has left much more doubt about its relevance than fruitfulness. First, it has been shown that the technological progress that is supposedly measured by the Solow residual in the growth accounting exercises has very little to do with the underlying technical progress. Instead, it can be shown that it merely measures the labor share-weighted average of the growth rates of wage rate and profit rate. Therefore, the entire results would not be valid unless the marginal productivity theory of distribution is verified, which is far much harder to believe[5]. Second, the growth accounting approach is often criticized for the assumption of exogenous technical progress. The notion of exogenous technical progress lays the foundation of the growth accounting exercises in which, to use conventional textbook terms, a shift of the production function due to technical progress can be distinguishable from a movement along a production function induced by changes in production factors. Third, the fact that the growth accounting approach presumes a single sector prohibits the possibility of dynamic effects on technical progress which may arise from the interactions between various economic activities.

The conventional approaches described above are far from satisfactory accounts for growth phenomena in China which calls for an alternative. In addition to the deficiencies of the conventional approaches, it should be noted as well that they focus exclusively on supply-side, in which the roles that demand side has played are ignored. In response to the shortcomings of the conventional approaches, this study takes up an alternative view laid by Nicholas Kaldor and his followers. When it is contrasted against the conventional approach, as shown in short, the fundamental feature of the Kaldorian approach lies in its demand-side approach.[6] In detail,

this alternative approach is a sectoral approach that views economic growth and development as a process in which the effects of interactions between industrial activities are captured. In practice, the manufacturing sector is hypothesized as the "engine of growth" for two reasons. First, it is in manufacturing that increasing returns prevail, which relies on demand condition. Second, under the assumption of dualistic economies in nature, the growth of manufacturing output is considered as the net increments to an economy as a whole. Furthermore, technical progress in the Kaldorian framework is by and large considered as a result derived by demand, but not a cause stemming from exogenous shocks as in the conventional approach.[7]

The purpose of this study is to empirically test the validity of Kaldor's laws of economic growth in China between 1978 and 2004 and to provide an alternative explanation of sources of Chinese economic growth in a Kaldorian perspective. First, using a regional data set in a spatial econometrics perspective, the present paper empirically finds that Kaldorian hypotheses on economic growth hold in China during the sample period. Second, it interpret the empirical findings as proving the validity of a demand-side approach. Third, taking this implication, this study provides a more detailed alternative explanation of the sources and processes of economic growth in China during the sample period. Finally, considering a striking finding of the lack of spatial (regional) dependence among Chinese provinces, it also discusses the role of local governments in the development process in China. This study is expected to contribute to the literature as being one of the first studies that identifies sources of Chinese economic growth in demand side.

The outline of this paper is as follows. In section 2, Kaldorian hypotheses for economic growth and development are reviewed and appropriate test specifications are suggested. Section 3 estimates and tests the Kaldorian hypotheses using spatial econometric techniques. Section 4 is devoted to providing more detailed inner patterns of effective demand and mechanisms through

which the empirical findings in section 3 could result in a historical perspective. Finally, in section 5, further implications for economic policy are suggested.

2. KALDOR'S LAWS ON ECONOMIC GROWTH

The first law often called "the engine of growth hypothesis" maintains that the growth of GDP is positively associated with the growth of the manufacturing sector of the economy. Formally,

$$q_{GDP} = a_1 + a_2 q_m, \;\; a_2 > 0 \tag{1}$$

where q_{GDP} and q_m are the growth of GDP and of manufacturing, respectively, and $a_i \, (i = 1, 2)$ are regression coefficients. Note that the strong association between GDP growth and expansion of manufacturing is not simply because the manufacturing sector takes an increasingly bigger proportion in an economy as economic development proceeds, which might be called a "share effect". To avoid this share effect, an alternative specification is suggested as:

$$q_{GDP} = a_3 + a_4 (q_m - q_{nm}) \tag{2}$$

where, q_{nm} indicates the rate of growth of non-manufacturing output. A positive sign of the coefficient of the growth of manufacturing implies that fast growth of GDP is associated with excess rate of growth of manufacturing over growth rate of GDP. Alternatively, we may examine the role of manufacturing industry in an equation that incorporate all industries as the regressors. That is,

$$q_{GDP} = a_5 + a_6 q_{primary} + a_7 q_m + a_8 q_{tertiary} \tag{3}$$

This study will utilize equation (1) through (3) as the test specifications for the first law.

If the differences of the rates of economic growth between countries are by and large accounted for by differences of productivity of the economies,[8] there should be some identifiable mechanisms through which fast growing manufacturing sector produces higher productivity of

an economy as a whole. Kaldor and his followers have suggested two transmission channels, which consists of the next two laws.

The second law that have been referred to as "Verdoorn's Law" states that in the manufacturing sector, the growth of productivity is positively associated with the growth of production, which is specified as

$$p_m = b_1 + b_2 q_m \tag{4}$$

where p_m is the growth rate of labor productivity in manufacturing, and $b_i\,(i = 1, 2)$ are regression coefficients. To avoid a possibility of a spurious correlation emerging from definitional identity for the labor productivity $p_m = q_m - e_m$, another specification is preferred.

$$e_m = c_1 + c_2 q_m \tag{5}$$

where e_m is the growth of labor employment in manufacturing, and $c_1 = -b_1$ and $c_2 = 1 - b_2$. A c_2 in equation (5) less than unity is interpreted as the existence of substantial dynamic increasing returns to scale. In general, the sufficient condition for there to be increasing returns to scale is $c_2 = 1 - b_2 < 1$.

The sources of increasing returns to scale are explained in two ways. First, it is suggested that the Verdoorn Law be seen as a technical progress function that is combined with investment and the increase in capital stock.[9] In contrast to the notion of the exogenous technological progress in the conventional approaches, it is assumed that technical progress only takes place through accumulation of capital. Therefore, there is no need to include a variable for capital stock in a test specification.[10] Second, the technical progress relies much more on dynamic, rather than static, relations between output and productivity. The relationship between changes of output and productivity is dynamic, since it is concerned with technical changes that are brought about by induced technical progress, learning by doing, external economies in production, etc.[11]

It is extremely important to note that the growth of output plays the key role as the ultimate driving force leading to fast growth of productivity, that is, the causality runs from the demand to productivity, but not the other way round. This is because, first, according to the notion of dual economy which can be applicable even to advanced economies, there cannot be a supply-side constraint such as labor shortage.[12] Second, the exogeneity of technological progress and productivity as in the conventional approaches are not reconcilable with the notion of dynamic increasing returns which is obviously pervasive in manufacturing. Therefore, the correct specification for the measurement of returns to scale should be equation (5) that has been derived in such a way to incorporate mainly the dynamic aspects of increasing returns while not relying on any type of an alleged aggregate production function.

Kaldor's third law maintains that the growth of productivity of an economy as a whole is positively connected with the growth of output in the manufacturing sector through the labor transfers to the manufacturing sector from the other sectors including agriculture and service. Extending and generalizing the notion of dualism, demand-led growth approaches have identified two main channels through which the positive effects of labor transfers to the manufacturing sector on the overall productivity are supposed to work.[13] First, the productivity of the manufacturing will increase as it absorbs more of labors to produces more of goods; as the production of manufacturing increase, as seen in the above it is likely to result in a higher productivity through the Verdoorn effect. Second, the productivity outside the manufacturing will also increase because evicting the surplus labor prevailing in them will improve the productivity of the remainder of the labor forces.

In practice, it is hard to test directly the relationship between the labor transfer and the growth of productivity of the economy because it is very difficult to measure productivity growth in many

activities outside manufacturing. Following Thirlwall's specification, we estimate the following equation:

$$q_{GDP} = d_5 + d_6 e_m + d_7 e_{nm},\ d_6 > 0,\ d_7 < 0 \tag{6}$$

where e_m and e_{nm} are the growth rates of employment in manufacturing and that of outside manufacturing, respectively, and q_{GDP} and p_{GDP} denote the growth rate of output and productivity, respectively, of an economy.[14] Equation (6) suggests that growth of output of an economy is associated positively with growth of employment in manufacturing and negatively with growth of employment in non-manufacturing.

3. EPIRICAL EXAMINATION

3.1 Data and Methodology

The target time period of the present study is between 1979 when the packet of reform and open policies was launched and 2004. In origin, Kaldor's laws in economic growth were discussed in the context of cross-country. Because of this, cares of appropriate data set and technique to be utilized are to be taken when we apply them to a single economy. One of the most important constraints that should be considered is the fact that the regularities are discussed in terms of long-run perspective in which cyclical effects are removed. For the purpose of the study, an averaged regional cross-section data set which is built by averaging each variable for the sample period, is preferred to other data sets in that the use of averaged data over the sample period could wipe out the cyclical effects and better reveal the long-term relationships between variables under consideration. The observations represent 29 Chinese provinces and municipalities. The regional data set comes from online data service of the *All China Data Center* established and maintained at the University of Michigan that has been authorized by the National Statistics Bureau of China. All output values are real at 1978 price and the deflators are

calculated from the information about retail price indices (RPI), which are the only price index available for entire sample period of 1979-2004.

For a regional (spatial) data set, spatial econometricians have long warned of the presence of spatial autocorrelation could have important adverse consequences to the standard parameter estimations by OLS and their inferences.[15] Spatial autocorrelation in the econometric models can take two forms. The first form of the spatial autocorrelation is called spatial lag model and formulated as in equation (7):

$$y = \rho W y + X\beta + \varepsilon \tag{7}$$

where y is a vector of n observations (regions) on the dependent variable, W is a $n \times n$ spatial weight matrix, X is a vector of explanatory variables, β is a coefficient vector, ρ is the spatial autoregressive coefficient, and ε is a vector of error terms which conform to the standard assumption of white noise. Note that the spatial dependence in this model is similar to having a lagged dependent variable as an explanatory variable. If the model (7) is the correct model, but it is to be estimated without the spatial autoregressive term, the estimated vector of coefficient β should be biased and all inferences based on the omitted variable model are invalid. It is important to understand that the spatial autoregressive coefficient ρ captures the magnitude of effect that dependent variables of neighboring regions make on the dependent variable of one region. In other words, it measures the degree of the substantive dependence of one region's dependent variable upon the dependent variable of the surrounding regions, which may derive from a variety of spill-over effects such as technology diffusion and transfers of factors of production. Therefore, the existence of the spatial lag dependence indicates a structural spatial dependence among regions.[16]

The second form of spatial autocorrelation is the spatial error model and expressed as equation

(8):

$$\begin{aligned} y &= X\beta + \varepsilon \\ \varepsilon &= \lambda W\varepsilon + \xi \end{aligned} \tag{8}$$

where λ is the autoregressive parameter and ξ is a vector of white noise error terms. Compared with model (7), model (8) indicates that spatial dependence is embodied in the error terms. If the spatial autocorrelation in model (8) is ignored and estimated by OLS, the OLS coefficient of β may still be unbiased, but the parameter estimation is inefficient and the associated inferences may be misleading. Note that, in contrast to the structural dependence in the spatial lag model, the spatial error autocorrelation may result from a nuisance such as a mismatch between economic boundaries and administrative boundaries based on which data are collected and organized. In other words, the existence of spatial autocorrelation in error terms may not have significant implications as much as the spatial lag dependence with regard to regional policy implications.

In the rest of this section, we estimate the specifications for Kaldor's laws with a first-order contiguity spatial weight matrix[17]. To consider the possible spatial autocorrelation, we first estimate the models by OLS and calculate Moran's I statistics to test spatial dependence. Although the Moran's I test is probably the most popular test for a spatial autocorrelation, it does not provide any additional information about the form of spatial dependence, spatial lag or spatial error. To distinguish between two patterns of spatial dependence, we utilize Lagrange multiplier tests, using LM(error) for a spatial error model and LM(lag) for spatial lag model. When Moran's I is significant and a form of spatial dependence is identified, we re-estimate that spatial econometric model by maximum likelihood (ML) principle. Finally, likelihood ratio (LR) is used to test for the spatial autoregressive coefficient for either spatial lag or spatial error. In addition, we report some diagnostic test results such as Jarque-Bera normality test and (spatial) Breusch-Pagan heteroscedasticity test. The former is especially important in the sense

that the maximum likelihood estimation of the spatial econometric models is based on the assumption of normal error terms.

3.2 Empirical Results

[Table 1] reports the estimations of the specifications for Kaldor's first law which posits that industry is the engine of economic growth. When equation (1) is estimated by OLS in the second column, the nulls of normality and homoscedasticity are not rejected at the conventional significant level. However, Moran's I test indicates the possibility of spatial dependence. The consequent LM tests, which identify the type of spatial autocorrelation, indicate a spatial error model, implying inefficiency of OLS estimation. In the next column with the heading of S-error, a spatial error model is estimated by means of ML principle. It shows the improvement of estimation efficiency in terms of AIC and LIK, both of which, in contrast to the value of R-squared, are comparable to those for OLS. The LR test for the coefficient of spatial error verifies the existence of spatial autocorrelation in the error terms, while the LM(lag) test at the bottom of the table shows that there is no spatial lag on error terms left. The estimated coefficient of 0.692 means that the growth rate of GDP for a region with a growth rate of the secondary industry higher by 1 percentage point than its overall average across regions has grown faster by 0.692 percentage points than the average growth rate of GDP across regions in China, which may imply the significant role of the secondary industry in the growth of regional GDP. Note also that the absence of spatial lag autocorrelation points out the absence of spatial dependence of the regional economic growth.

[Table 1 Here]

Taking into account the possibility of a spurious relation between the two variables, equation (2) and (3) are also estimated. When equation (2) is estimated by OLS, there is no abnormality in terms of normality and homoscedasticity as well as spatial autocorrelation. The estimation result shows that regional economic growth measured by the growth rate of regional GDP is

associated positively, if only moderately, with the difference between the growth rate of secondary industrial output and that of non-secondary output (p-value=0.088). That is, if one region's secondary industry grows faster than the other industries and the difference is higher than the average difference across regions by 1 percentage point, that region's GDP grows faster by 0.144 percentage points than the average GDP growth rate across regions, which may be taken as evidence for Kaldor's first law. When equation (3), in which the regional GDP growth rate is regressed on all three industrial output growth rates, is estimated by OLS, Moran's I test implies spatial autocorrelation, but two LM tests do not. In order to consider any possibility, we estimate both spatial lag and spatial error models. In the two spatial models, no evidence for spatial dependence is found, as LR tests for the spatial autocorrelation coefficients do not reject the null. Furthermore, the values of AIC and LIK for the spatial lag model turned out even worse than those for OLS estimation. Looking at the coefficients, all three of the estimated equations indicate that the coefficient for primary industry is not significant, while those for secondary and tertiary industry are highly significant.

From these empirical findings, we can draw two conclusions. First, the overall results imply that the secondary industry has played a significant role in regional economic development in the regions of China. Although the coefficient for tertiary industry in equation (3) is significant, the causality should run from growth of the regional GDP to growth of tertiary industry, since the latter is induced by the growing demand for services as the regional economies grow. Second, we find very weak spatial dependence of the growth of regional GDP among the Chinese regions. This may show characteristics of autarky in the Chinese regions, which may in turn reflect the important role of local governments in regional development.

Using equation (5), [Table 2] reports the estimation of Kaldor's second law (or Verdoorn's law) in which the growth rate of secondary employment is regressed on the growth rate of secondary

industrial output. We first estimate equation (5) by OLS and then conduct the normality and homoscedasticity tests. As is shown in [Table 2], no abnormality is found. Furthermore, the tests for spatial dependence find no symptom of spatial autocorrelation. Therefore, the OLS estimation results could be taken without a reference to spatial econometric models.

[Table 2 Here]

The estimated coefficient has the right sign and is highly significant. And, the implied Verdoorn's coefficient of 0.322(=1-0.678) means increasing returns to scale in the secondary industry of the Chinese regions. That is, regarding regional economic growth in China, a region with growth of output in secondary industry higher by 1 percentage point than the average enjoyed greater productivity growth by 0.322 percentage points, relative to other regions.

This finding may well imply the leading role that secondary industry has played in economic development in China. Furthermore, it should be noted that, as is noted in the theoretical discussions, the productivity growth is demand-driven in the sense that increases in demand for industrial goods lead to faster growth of output, which in turn results in higher productivity. As is discussed further in the following, it is also worth noting the absence of regional dependence in productivity growth across the Chinese regions.

[Table 3 Here]

Finally, [Table 3] estimates equation (6) for Kaldor's third law by OLS. It does not reject the null hypothesis of normality and homoskedasticity as Jarque-Bera and Breusch-Pagan tests indicate. Furthermore, there is no symptom of spatial autocorrelation: Moran's I test indicates no spatial autocorrelation and the consequent LM tests indicate neither spatial lag model nor spatial error model. Therefore, it may be safe to take the OLS estimate as being a valid estimation results. It shows that the growth rate of the regional GDP is correlated positively with the growth rate of industrial employment and negatively with that of non-industrial employment, which is also predicted by the third law.

4. EFFECTIVE DEMAND AND ECONOMIC GRWOTH

4.1 The role of the Secondary Industry

According to the empirical evidence, the success story of the Chinese economy between 1979 and 2004 can be best described as followings. The expansion of secondary industry has played the key role in overall growth of GDP of the Chinese economy during the reform period in two ways. First, the secondary industry has been the key industry in the development processes in China during the reform period, since it is the secondary industry that revealed appreciable increasing returns to scale which are assumed to be spread over economy as a whole as depicted by the Kaldor's first Law.

[Figure 1 Here]

Another way to looking at the beneficial roles of the secondary industry in China is to examine the pattern of labor productivity in industry relative to the rest of the economy.[18] [Figure 1] traces out the evolution of the relative labor productivity of Chinese industry, that is the ratio of the output per worker in the secondary industry to that in the rest of the economy, both in terms of nominal and real terms. [Figure 1] detects three patterns. First, the labor productivity of the secondary industry has been well above that of the rest of the economy in terms of both current and constant prices. Second, the relative productivity of the secondary industry deceased during the early period of reform in 1980s, which may be explained by rapid transfer of labor forces from agriculture to industry. Finally, but most importantly, the relative labor productivity of the secondary industry calculated at constant prices has been persistently higher than that with current prices and the gap has been widened continuously as industrialization progress. Seen in terms of Kaldorian development thought, this pattern implies that the gains of productivity improvement in the secondary industry have spread out into the rest of the economy via improvement of terms of trade in favor of the non-industrial goods and services. In another words, the economic growth of Chinese economy has been benefited substantially from the

technological progress in the secondary industry.

The significant increasing returns to scale, in particular, in the secondary industry is sharply contrast to the results of the conventional approach to technological progress in which a constant return to scale is assumed[19] or only a tiny technical progress is detected.[20] As will be revisited in short, it should be important to note that these gains in productivity in the secondary industry are by and large due to the expansion of demands. Therefore, it implies that the demand factors have contributed in a substantial magnitude to the economic success in China in indirect way through improving productivity of the secondary industry.

The second reason for the secondary industry to play the key role in the overall economic growth in China is explained by labor reallocation between industries. When surplus labor forces are assumed, transferences of surplus labor into secondary industry with higher productivity might well result in higher overall productivity of an economy as a whole, since the growth of industrial output is a net increment in resources, but not just a reallocation of resources from one use to another in the sense that they would otherwise have been *de facto* unused.

In the Chinese context, in addition to internal migration from rural to urban area mentioned in the previous section, the most important reallocation of labor forces from agriculture to the secondary industry took place within rural area. As well known, the rapid expansion of industrial output in China during the reform period was mainly due to the meteoric growth of rural industry represented by so called township-village enterprises (TVEs). Between 1978 and mid-1990s, it is TVEs that was the most dynamic part of the Chinese economy. On the one hand, TVEs value added that accounted for less than 6% of GDP in 1978 increased to 26% of GDP in 1996, notwithstanding the fact that GDP itself was growing very rapidly during this period. On

the other hand, the employment of TVEs grew from 28.27 million in 1978 to reach 135.08 million in 1996. After a sharp drop between 1997 and 1998, it resumed absorbing labor and reached its peak of 138.66 million in 2004 (China Statistical Yearbook 2005). Considering the fact that the agricultural employment declined very rapidly from 70.5% of total employment in 1978 to 50.5% in 1996, one would plausibly infer that the transfer of labor from the primary to secondary industry and its productivity benefits were created within Chinese rural area.

4.2 Effective Demand in China

Finally, but not least importantly, the positive empirical evidences in section 3 can be seen as supporting the validity of demand-led growth hypothesis in China as well (see section 2). Increases in demand for manufactured goods pulled the production in industry which in turn, on the one hand, raised its productivity via Verdoorn's Law, the gains of which should spread over the entire economy; on the other hand, the lift of manufacturing production induced by increase in demand for manufactured goods set off labor transfer from agriculture to manufacturing increasing labor productivity of the overall economy. Therefore, the question on the sources of economic growth in China would by and large be answered by looking at details of growth of demand.

[Figure 2 Here]

[Figure 2] charts the evolution of demand components between 1978 and 2004. It identifies a pattern that, at the first stage of development of 1980s, major part of demand was due to increase in household consumption expenditure, while at late 1980s a structural change in demand took place with an upsurges of investment and foreign demand for Chinese goods[21]. By the peak of 1989, household consumptions account for on average more than 55% of GDP and then the proportion keep going down to its lowest level of 39% in 2004. In contrast, both investment net of inventory and total exports take off at the end of 1980s and accelerate to reach their peaks in 2004.

The Early Period of Reform, 1980s: Consumption Demand

The sustained household consumption in the early period of reform could be explained by increase in household incomes.[22] [Table 4] shows massive increase in household income in the early reform period in both rural and urban areas.

[Table 4 Here]

In rural area, three factors played major roles in the increase of income of rural households. First, the reform period has witnessed a sustained increase in prices of agricultural goods. Indeed, at the first of reform of 1979, the average of quota and above prices increased by 22.1% and thereafter by 1989, prices of agricultural products grew on annual average by impressive 8.9%. Furthermore, reflecting the effect of the decision by the state to shift the intersectoral terms of trade in favor of agriculture in 1979, the agricultural terms of trade against industrial products improved from 1:1 in 1978 to 1:1.71 in 1989, which might have increased rural household income leading to consumption demand.[23] The second source of the increase in rural incomes was the considerable spurt of agricultural outputs. Especially, during the first five years of reform between 1979 and 1984, the agricultural output as a whole grew by remarkable 7.7% annually and between 1984 and 1987 by 4.1%, which are compared to the annual growth rate of 2.9% between 1952 and 1978.[24] Third, the rapid growth of TVEs in rural areas provides rural households with another opportunity to increase their income by working in industry with higher wage than that of agriculture workers. As a result, the rural income increased substantially. The per capita annual net income of rural household increased to 398 *yuan* in 1985, almost 3 time bigger than 134 *yuan* in 1978, and it became more than 5 times by 1990 marking 686 *yuan*.

In urban area, the growth of household income may be attributable to following factors. First, when Chinese leaderships embarked on economic reform at late 1970s, they did not destroy the

existing social security system which the state-owned large enterprises (SOEs) had assumed. For example, SOEs have provided their employees with comprehensive welfare packages such as housing, medical services, education, and retirement pensions with low costs and the initial reform package did not contain massive layoffs of workers. Even though the continued existence of the burden of social welfare net deteriorated the financial profitability of SOEs, it made it possible to maintain existing labor incomes.[25] Second, therefore, new entrances of collective and private firms accrued to net increments of urban income. Third, the newly introduced management contract system resulted in more distribution to workers in the form of bonuses from retained profit which was allowed by the state for the above quota profit.

After 1990: Investment and Exports

After the first systemic economic crisis and entrenchment and arrangement period of 1988-1990, the structure of demand began to take a different shape. It should be ironical to see that the Chinese leadership tried to surmount by, instead of policy to stimulate consumptions, policy to increase government investments.[26] The biggest part taken by household consumptions out of total GDP was taken over by investment and exports. By 1991, investment net of change in inventory averaged annually 31.1% of GDP. However, since the beginning of 1990s, China's investment trend, mainly driven by the state or state-related sector, has been accelerated. In 1993 China's new investment as a share of GDP was 40% and it reached it highest level of 42.4% in 2003 averaging almost 37.6% between 1992 and 2004.

On the other hand, sine the mid-1990s, the growth of exports of goods and service has become a major source of economic growth. During the first decade of economic reform by 1989, China accumulated trade deficit with moderate increase in total export and faster imports. But, since the beginning of 1990s except for a single year of 1993, China's foreign trades recorded surplus cumulatively due to rapid expansion of exports faster then the accompanied import increases,

with the trade surplus as a share of GDP being averaged annually more than 2.5%.

It may be argued that the contribution of exports to Chinese economic growth was at best minor, since the net exports have occupied small part relative to GDP. These types of argument are controversial to the viewpoint of demand-led growth theory. In a demand-side point of view, it is exports that could lead to economic growth, because an increase in any demand source could stimulate productivity spurt, which would in turn reinforce the initial demands with better price and non-price competitiveness forming a virtuous circle. After 1993 when Chinese economy embarked on its long path of current account surplus, exports of manufactured goods accounted for 81.8% of total exports and have kept increasing to reach its 2004 peak of 93.2%. In addition, exports from China have grown at a massive rate to register 32.5% of GDP in 2004, as shown in [Figure 2]. Therefore, the considerable rise of Chinese exports must have contributed to the productivity of the secondary industry, the gains of which in turn has spread over the economy as a whole. This implies that the gains from foreign sector inferred from by the relative size of net exports should underestimate the role that it has played in Chinese economic performance. Of course, the economic growth in China should have not been sustainable for that long time period, if the balance of payments constraints were restrictive. Indeed, the author empirically verifies that Chinese economy has not been able to grow faster than the level allowed by the balance of payment constraints.[27] It is in this limited sense that the figures of net exports take on.

5. CONCLUSIONS: POLICY IMPLICATIONS

The current paper demonstrated two hypotheses. First, the rapid and sustained post-1978 economic growth in China was by and large attributable to the key role that the secondary industry has played. Second, it was demand-led growth, although the sources of demands have changed over time. Altogether, the fact that the considerable economic performance of Chinese

economy has owed to effective demand, in particular, household income and consumption at the first decade of reform may imply that a progressive income distribution or a policy package in favor of workers could be one of the most important elements of transition strategy. Chinese transition story is often characterized by politically stable transition or 'reform without losers',[28] which means that, contrary to the reform experiences in Eastern European countries and USSR, the reform package tried to maintain or improve income distribution. The maintained and improved income in turn made it possible for consumption demands to be maintained or even increased, which resulted in satisfactory economic performance. Therefore, it is drawn that a policy for a progressive income distribution may be an essential element for economic development as well as desirable transition strategy.

In addition, the current study verifies that the state has played the key role, at least, in the sense that it was the Chinese government (policies) that provided the required effective demand required for the rapid, stable and sustained economic growth. However, the role of states in China for a successful transition is not confined to maintain effective demand, but it extended to industrial policies favorable to promoting local industries. One of the significant findings in the present study is the absence of spatial autocorrelations for the dependent variables in the various models. This is verified further by examining spatial autocorrelations of all variables involved.

[Table 5 Here]

[Table 5] reports the test results for spatial autocorrelation by Moran's I and Geary's C. It shows that all variables involved in the previous models are not spatially dependent across the Chinese regions, except for the growth rate of employment in secondary industry.

This finding of spatial independence may have conceivable implications for the importance of the roles that Chinese local governments have played in the regional development processes. As

is well known, the rapid expansion of industrial output in China during the reform period was mainly due to the meteoric growth of rural industry represented by so called township-village enterprises (TVEs). Between 1978 and the mid-1990s, it is TVEs that were the most dynamic part of the Chinese economy (see section 4 above). It is crucial to understand that the Chinese local governments actually run by themselves and/or support the business of TVEs from their establishment to their management.[29] Although the conventional approaches have treated them as being a private sector, majority of them were actually collective firms which were owned by the public locally and managed by public offices, otherwise they were under the control of local governments that have orchestrated industries in terms of local development goals. They did not work like counterpart private enterprises in an advanced capitalist economy in which their decision makings are very sensitive to their own profit opportunity. For example, the major resource of capital for TVEs was local branches of state-owned banks which loaned to them upon request of local government offices, and the local governments' decision was made by public needs in the regions such as employment and regional economic development, but not by private profit motivations. It has also been noticed by many field studies that local governments even acted as a long-run regional planner, establishing a long-term development plan and adjusting long-run industrial structures through rationing financial resources, which is much similar to the role played by the Ministry of International Trade and Industry (MITI) in Japan during its economic development. Furthermore, the Chinese local governments supported industrial development in their areas by providing massive infrastructure, which might not have been built if tasks had otherwise been left to the private sector or market processes.

To sum, the key element of economic growth in China centered around the role of local governments in terms of both demand-side through managing effective demand and supply side through industrial policies.

[Table 1] Kaldor's First Law

Equation	(1)		(2)	(3)		
	OLS	S-Error	OLS	OLS	S-Error	S-Lag
constant	3.215	2.986	10.099	-0.122	0.043	-0.062
	(0.000)	(0.000)	(0.000)	(0.845)	(0.934)	(0.950)
q_primary				0.097	0.069	0.095
				(0.156)	(0.260)	(0.161)
q_m	0.662	0.692		0.397	0.469	0.397
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
q_tertiary				0.422	0.366	0.423
				(0.000)	(0.000)	(0.000)
(q_m)-(q_nm)			0.144			
			(0.088)			
Lambda (error)		0.550			0.533	
		(0.002)			(0.003)	
LR (error)		5.862			3.606	
		(0.015)			(0.058)	
Rho (lag)						-0.006
						(0.940)
LR (lag)						0.006
						(0.938)
AIC	57.812	51.949	106.112	28.765	25.158	30.759
LIK	-26.906	-23.975	-51.056	-10.382	-8.579	-10.379
Jarque-Bera	0.681		1.412	2.241		
	(0.711)		(0.494)	(0.326)		
Breusch-Pagan	2.871	2.305	0.010	0.086	0.533	0.081
	(0.090)	(0.129)	(0.919)	(0.993)	(0.912)	(0.994)
Moran's I	3.024		0.949	2.222		
	(0.002)		(0.342)	(0.026)		
LM (error)	5.827		0.374	2.013		2.356
	(0.016)		(0.541)	(0.156)		(0.125)
LM (lag)	1.070	0.493	0.566	0.007	0.980	
	(0.301)	(0.482)	(0.452)	(0.936)	(0.322)	

(Figures in parentheses are p-vlaues for the associated coefficient and statistics)

[Table 2] Verdoorn's Law

	OLS
constant	-3.632
	(0.022864)
q_m	0.678
	(0.000)
R-sqr.	0.452
AIC	110.811
LIK	-53.405
Jarque-Bera	4.133
	(0.127)
Breusch-Pagan	0.609
	(0.435)
Moran's I	-0.132
	(0.895)
LM (error)	0.182
	(0.670)
LM (lag)	0.751
	(0.386)

(Figures in parentheses are p-vlaues for the associated coefficient and statistics)

[Table 3] Kaldor's Third Law

	OLS
constant	10.080
	(0.000)
e_m	0.349
	(0.005)
e_nm	-0.610
	(0.044)
R-sqr.	0.366
AIC	98.071
LIK	-46.035
Jarque-Bera	0.594
	(0.743)
Breusch-Pagan	2.834
	(0.242)
Moran's I	-0.587
	(0.557)
LM (error)	0.810
	(0.368)
LM (lag)	0.231
	(0.631)

(Figures in parentheses are p-vlaues for the associated coefficient and statistics)

[Table 4] Per Capita Income, Rural and Urban

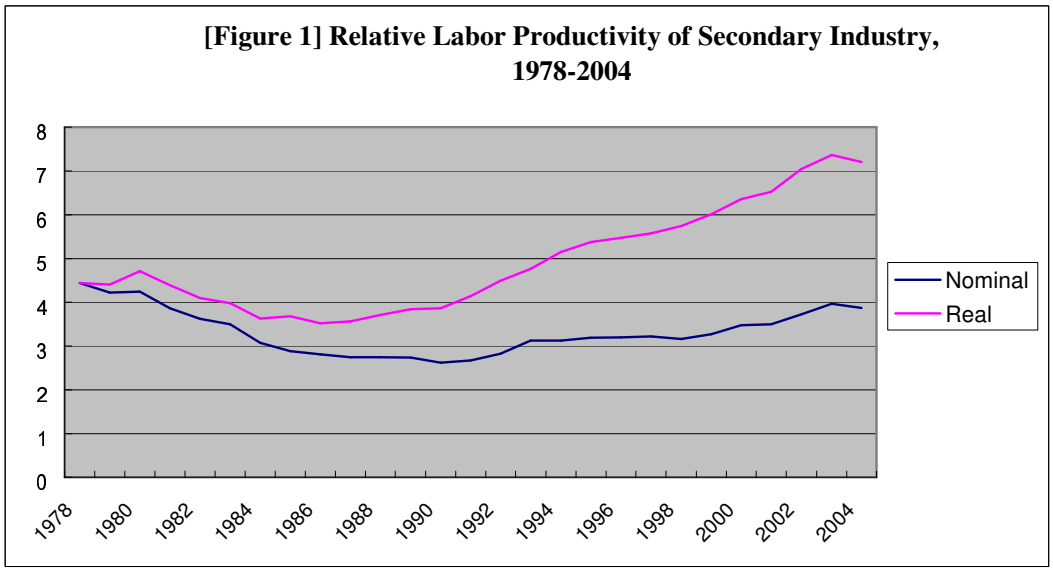
Year	Per Capita Annual Net Income of Rural Households		Per Capita Annual Disposable Income of Urban Households	
	Value (yuan)	Index	Value (yuan)	Index
1978	134	100	343	100
1980	191	139	478	127
1985	398	269	739	160
1989	602	306	1374	183
1990	686	311	1510	198
1991	709	317	1701	212
1992	784	336	2027	233
1993	922	347	2577	255

Source: China Statistical Yearbook 2005, CD version

[Table 5] Spatial Autocorrelations

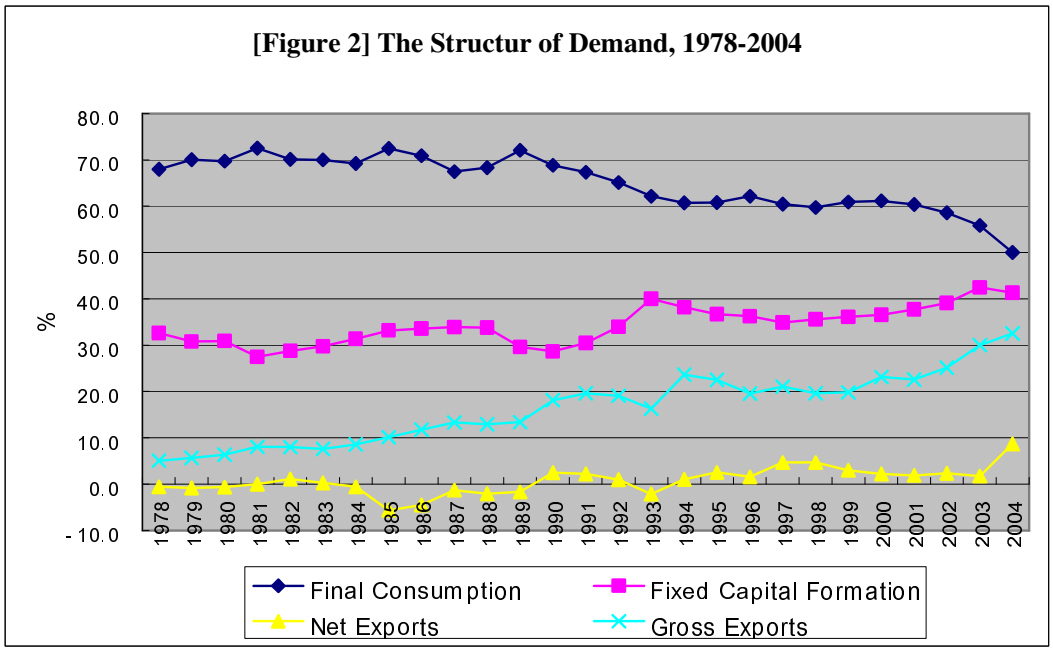
	Moran's I Test		Geary's C Test	
	I	p-value	C	p-value
q_GDP	0.086	0.318	0.872	0.341
q_m	0.106	0.248	0.806	0.147
q_nm	-0.074	0.753	1.201	0.133
q_m – q_nm	-0.069	0.788	1.135	0.313
e_primary	-0.067	0.800	0.913	0.518
e_m	0.265	0.014	0.698	0.024
e_nm	0.074	0.368	0.868	0.325
p_GDP	0.091	0.301	0.861	0.299
p_m	-0.213	0.148	1.250	0.062

[Figure 1] Relative Labor Productivity of Secondary Industry, 1978-2004



Source: China Statistical Yearbook 2005, CD Rom

[Figure 2] The Structur of Demand, 1978-2004



Source: China Statistical Yearbook 2005, CD Rom

End Notes

[1] For good examples, among many, see Nicholas Lardy, *China's Unfinished Economic Revolution*, (Washington: Brookings Institution Press, 1998); Justin Y. Lin, Fang Cai, and Zhou Li, *The China Miracle: Development Strategy and Economic Reform*, (Hong Kong: Chinese University Press, 2003). There have long been intensive debates over the characteristics of institutional change in the Chinese case between "gradualist" and "big-bang" approach (For an excellent survey on the vast literature on the debates, see Hongyi Lai, "Economic Transition and the Case of China", *Reform and the Non-State Economy in China: The Political Economy of Liberalization Strategies,* New York: Palgrave McMillan, 2006, pp.1-30). But, the debates can be views as more converging rather than diverging in the sense that both camps of school share the notion that market mechanisms are always better than any other institutional arrangement for an economic performance. Therefore, for the both schools, economic reforms in China will never end until an ideal market economy such as one described in textbooks is established.

[2] Chris Bramall, "Origins of the Agricultural "Miracle": Some Evidence from Sichuan", *The China Quarterly*, No. 143, (1995), pp.731-55; Chris Bramall, *Sources of Chinese Economic Growth, 1978-1996,* (Oxford: Oxford University Press, 2000), pp. 324-47

[3] Jean C. Oi, *Rural China Takes Off: Institutional Foundations of Economic Reform*, (Berkeley: University of California Press, 1999); Alvin Y. So (ed.), *China's Developmental Miracle: Origins, Transformations, and Challenges*, (New York: M. E. Sharpe, 2003); Jonathan Unger, *The Transformation of Rural China*, (New York: M.E. Sharpe, 2002), pp. 147-70; Ming Xia, (2000), *The Dual Development State: Development Strategy and Institutional Arrangements for China's Transition*, (Aldershot: Ashgate, 2000)

[4] Juliu Hu and Mohsin S. Khan, "Why is Chian Growing So Fast?," *IMF Staff Papers*, Vol. 44, No. 1 (1997), pp.103-31; World Bank, *The Chinese Economy*, (Washington: World Bank, 1996); World Bank, *China 2020,* (Washington: World Bank, 1997); Wing Thye Woo, "Chinese Economic Growth: Sources and Prospects", in Michel Fouquin, (eds.), *The Chinese Economy: Highlights and Opportunities*, (London: Economica, 1998); Alwyn Young, "Gold into Base Metals: Productivity Growth in the People's Republic of China During the Reform Period," *Journal of Political Economy*, Vol. 111, No. 6 (2003), pp. 1220-61

[5] For more details, see Yongbok Jeon, *Total Factor Productivity and Income Distribution: A Critical Review*, Department of Economics Working Paper, 2007-04 (2007), University of Utah; Jesus Felipe, "Total Factor Productivity Growth In East Asia: A Critical Survey," *Journal of Development Studies*, Vol. 34, No. 5 (1999) , pp. 1-41; Jesus Felipe and John S. L. McCombie, 'Some Methodological Problems with the Neoclassical Analysis of the East Asian Miracle', *Cambridge Journal of Economics*, Vo. 27, No.

5 (2003), pp.695-721; Anwar Shaihk, "Laws of Production and Lows of Algebra: the Humburg II," in Edward J. Nell (ed.), *Growth, Profits and Property: Essays in the Revival of Political Economy*, (Cambridge: Cambridge University Press, 1980). In particularly, Felipe and McCombie (Jesus Felipe and John S. L. McCombie, "Productivity in China Before and After 1978: Revisited," *Zagreb International Review of Economics and Business*, Vol. 5, No. 1 (2002), pp. 17-43) provides a thorough up-to-date review of available growth accounting practices for the Chinese economy and criticizes them in this vein.

[6] For a survey of demand-led growth models against the supply-side approach, containing both Kaldorian and Kaleckian growth models as well as general issues in the demand-led theory, see John S. L. McCombie and Anthony P. Thirlwall, *Economic Growth and the Balance-of-Payments Constraint*, (New York: St. Martin's Press, 1994) and Mark Setterfield (ed.), *The Economics of Demand-led Growth: Challenging the Supply-side Vision of the Long Run*, (Northampton: Edward Elgar, 2002).

[7] This viewpoint could be applicable even to the cases of innovation that are regarded as a representative example of exogenous technological development, since the innovations as such are not independent of the economic situation. It is worth mentioning that it has been observed that major technological innovations that have a significant effect on the status of technical progress are likely to be a result of massive R&D investment, the decision on which is usually made in response of a profit expectation which is in turn determined by the demand condition: in this sense, at least, innovations are not exogenous.

[8] This may require the assumption of a constant participation rate of labor force. The assumption could be justified by the stylized fact of a co-movement of disparity in per capita income and labor productivity (Xiujuan Yu, *Source of Regional Growth Difference and Income Disparity during the Reform Period in China: An Empirical Analysis*, unpublished PHD dissertation (2004), von der Carl von Ossietzky Universitat Oldenburg). Therefore, the factors and sources that explain vicissitude of labor productivity in China could also account for that of output.

[9] Erkin Bairam, "The Verdoorn Law, Returns to Scale and Industrial Growth: A Review of the Literature," *Australian Economic Papers*, Vol. 26 (1987), pp. 20-42; Robert Dixon and Anthony P. Thirlwall, "A Model of Regional Growth Rate Differences on Kaldorian Lines," *Oxford Economic Papers*, Vol. 27, No. 2 (1975), pp. 201-214. For Kaldor's notion of technical progress function, see Nicholas Kaldor, "A Model of Economic Growth," *Economic Journal*, Vol. 67, No. 268 (1957), pp.591-624

[10] Many authors testing the Verdoorn's law argue that a variable for capital stock should be included in order to capture the contribution of capital accumulation to productivity growth, and its rationale is the belief that faster capital accumulation may have positive effects on the labor productivity. However, to

include the capital variable in the specification for a test of Verdoorn's law is not consistent with the implicit criticism of neoclassical notion of technological progress. For the derivation of the Verdoorn's law in this vein instead of from a neoclassical aggregate production function, see Dixon and Thirlwall, "A Model of Regional Growth Rate Differences", and Ferdinando Targetti, *Nicholas Kaldor: The Economics and Politics of Capitalism as a Dynamic System*, (Oxford: Clarendon Press, 1992), pp. 168-9

[11] McCombie and Thirlwall, *Economic Growth and the Balance-of-Payments Constraint*, p. 174

[12] John Cornwall, "Diffusion, Convergence and Kaldor's Laws," *Economic Journal*, Vol. 86, No. 342 (1976), pp.307-14; Nicholas Kaldor, "Economic Growth and the Verdoorn's law: A Comment on Mr. Rowthorn's Article", *Economic Journal*, Vol. 85, No. 340 (1975), pp.891-96

[13] T.F. Cripps and R. J. Tarling, *Growth in Advanced Capitalist Economies, 1950-1970*, (Cambridge: Cambridge University Press, 1973); Nicholas Kaldor, "Productivity and Growth in Manufacturing Industry: a Reply," *Economica*, Vol. 35, (November 1968), pp. 385-91; Anthony P. Thirlwall, "A Plain Man's Guide to Kaldor's Growth Laws", *Journal of Post-Keynesian Economics*, Vol. 5, No. 3 (1983), pp. 345-58

[14] Some authors (Cripps and Tarling, *Growth in Advanced Capitalist Economies*, pp. 24-30) suggests, instead, $p_{GDP} = d_8 + d_9 q_m + d_{10} e_{nm},\ d_9 > 0,\ d_{10} < 0$, where p_{GDP} denote the growth rate of output. McCombie (John S. L. McCombie, "What Still Remains of Kaldor's Laws?," *Economic Journal*, Vol. 91, No. 361, (1981), pp.206-161981), however, demonstrates that it derives from the definitional identity for the growth rate of overall productivity, implying that the coefficients in this equation may merely proportion parameters for manufacturing and non-manufacturing output out of total GDP, but not behavioral implication.

[15] Luc Anselin, *Spatial Econometrics: Methods and models*, (Dordrecht: Kluewer Academic Publishers, 1988); Luc Anselin and David A. Griffith, "Do spatial effects really matter?", *Papers in Regional Science*, Vol. 65 (1988), pp.11-34; John S. L. McCombie and Mark Roberts, "Returns to Scale and Regional Growth: The Static-Dynamic Verdoorn Law Paradox Revisited," *Journal of Regional Science*, Vol. 27, No. 2 (2007), pp. 179-208

[16] Sergion J. Rey and Brett D. Montouri , "US regional income convergence: A spatial econometric perspective", *Regional Studies,* Vol. 33, No. 2 (1999), pp.143–56

[17] There is no obvious criterion for the best weight matrix. Although the study reports only the estimation results drawn with contiguity weight matrix, the author experimented with squared and simple distance inverse weight matrices as well as distance band weight matrices with various critical bands. But, the experiments show very similar patterns to those reported here, except for the case of an extremely large

distance band weight matrix. However, this case is not usual in an economic sense.

[18] Dic Lo and Li Guicai, *China's Economic Growth, 1978-2005: Structural Change and Institutional Attributes*, Department of Economics Working Paper, No.150 (2006), SOAS, University of London

[19] Gregory Chow, "Capital Formation and Economic Growth in China," *Quarterly Journal of Economics*, Vol. 108 (August 1993), pp.809-42

[20] For example, see World Bank, *The Chinese Economy*; World Bank, *China 2020*; Wing Thye Woo, "Chinese Economic Growth"; Alwyn Young, "Gold into Base Metals".

[21] In interpreting the chart, it should be important to note that the figures are the proportions against GDP which was growing rapidly. Therefore, for instance, the relatively stable curve for a component can imply increase in the component of demand at the same rate of growth as that of GDP. Furthermore, even decreasing trend does not necessary imply a decrease in the component, but it would only imply slower growth than growth of GDP.

[22] Using cointegration analysis, Qin (Duo Quin, "Aggregate Consumption and Income in China: An Econometric Study," *Journal of Comparative Economics*, Vol. 15, No. 1 (1991), pp.132-41) found a reasonably constant relationship between China's aggregate household consumption and income between 1952 and 1988, implying that change in household income can explain the fluctuation of household consumption demand. Recently, Aziz and Cui (Jahangir Aziz and Li Cui, *Explaining China's Low Consumption: The Neglected Role of Household Income*, IMF Working Paper, WP/07/181, 2007) confirms the importance of household income in determining household consumption in China between 1985 and 2005.

[23] The price figures was calculated from Table 13.8 in Chris Bramall, *Sources of Chinese Economic Growth,* p.315.

[24] Justin Y. Lin, "Rural Reforms and Agricultural Growth in China," *American Economic Review*, Vol. 82, No. 1 (1992), p. 35, Table 1.

[25] More often than not, the bad financial performance of SOEs is cited as an evidence for the inferiority of state sector in China requiring further reform (say, privatization). However, lower "financial" profitability of SOEs does not necessarily imply their lower "economic" performance or efficiency. There are many evidences that, for instance, economic performance of SOEs including productivity growth and before tax profitability was even better than that of private counterparts. See, Dic Lo, "Reappraising the Performance of China's State-owned Industrial Enterprises," *Cambridge Journal of Economics*, Vol. 23 (1999), pp.693-718; Yuk-Shing Cheng and Dic Lo, *Firm Size, Technical Efficiency and Productivity*

Growth in Chinese Industry, Department of Economics Working Paper, No.144 (2004), SOAS, University of London. The reasons for the paradox of coexistence of high efficiency and low financial profitability of SOEs may be found in policy concerns. First, in order to promote growth of the economy as a whole, the prices of products produced by SOEs were under control to keep them lower than its reasonable levels. This was because the SOEs usually produced goods that have bigger linkage effects. Second, SOEs paid extra costs to assume social burdens mentioned in the text (e.g., James Laurenceson and Joseph C. H. Chai, *Financial Reform and Economic Development in China*, (Northampton: Edward Elgar, 2003); Donal D. Tong, *The Heart of Economic Reform: China's Banking Reform and State Enterprise Restructuring*, (Burlingto: Ashgate Publishing Company, 2002)).

[26] It could be shown that the crisis in the late 1980s was attributable to the lack of effective demand from household. See Dic Lo, *Market and Institutional Regulation in Chinese Industrialization, 1978-94*, (New York: St. Martin's Press, 1997)

[27] Yongbok Jeon, "Balance-of-Payment-Constrained Growth: The Case of China, 1979-2002," *International Review of Applied Economics*, (forthcoming) Vol. 23, No. 2 (2008)

[28] Lawrence J. Lau, Yingyi Qian, and Gerard Roland, "Reform without Losers: An Interpretation of China's Dual-Track Approach to Transition," *Journal of Political Economy*, Vol. 108, No. 1 (2000), pp. 120-143

[29] Jean C. Oi, *Rural China Takes Off*; "The Role of the Local State in China's Transitional Economy," *The China Quarterly*, No. 144 (1995); A. Y. So (ed.), *China's Developmental Miracle*, pp. 3-26; J. Unger, *The Transformation of Rural China*, pp. 147-70