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Will Chinese growth slow after the Lewis turning point?

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The paper argues that China's economic growth will not necessarily slow after China reaches the Lewis turning point (LTP) when wages and subsequently costs of production, as a result of the exhaustion of the unlimited supplies of labor from rural areas, are increasing. Reaching the turning point leads to significant structural change signifying that China enters a new phase of development in which those endogenously determined factors such as human capital, innovation, R&D expenditure and technological progress begin to play more important roles than contributions made simply by inputs of physical capital, labor and resources in enhancing economic growth. To achieve the continual growth, certain conditions are needed in the transition toward and beyond the turning point including among others the institutional reform which enables China to further transform itself in order to embrace a new mode of economic growth driven predominantly by efficient, sustainable and equitable considerations.

Keywords: Lewis turning point (LTP); endogenous growth; institutional reform

Introduction

The Chinese economy grew at an average rate of nearly 10% per annum over the period 1978–2008. It is often argued that the supply of abundant cheap labor from the rural areas to the industrial sector has long been a key source of China's rapid economic growth in the past 30 years (Chan 2009). To show the magnitude of this contribution to growth, the latest Population Census reports that the number of migrant workers in China has now reached 170 million (Song, Wu, and Zhang 2010) rising from 78.5 million in 2000 (Cai, Yang, and Zhao 2007). The contributions to economic growth resulting from the rapid pace of urbanization, which is unprecedented in human history in terms of its scale and speed,¹ are often termed in literature as 'resource shift' effect reflecting the gains in total output resulting from shifting resources from a country's low productivity areas such as agriculture to high productivity areas such as manufacturing.

In the course of economic development, however, a country with a dual economic structure will reach the LTP (Lewis 1954) when the pool of unlimited supplies of labor in the rural areas has been exhausted and started causing the general level of wages to increase as a consequence. While debates are going on with respect to whether China is approaching or will soon reach the turning point (Garnaut and Huang 2006, Cai and Wang 2009), one may wonder whether China's rapid economic growth will slow down after reaching this turning point as by then with the rising wages China will lose the advantage of low-cost labor in production and then the competitiveness of its exports on world markets which have been an engine for growth in the past. This impact of shifting labor structure on growth is even

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more pronounced when one considers that changes in China's demographic structure lead to a fast pace of moving the country into an aging society bringing about a fall not only in the growth of labor supply and saving, but also an increase in the financial burden in looking after the old. In other words, China 'demographic dividend' (output and other economic gains from having a large proportion of working-age group in the total population) will start disappearing (Cai and Wang 2009).

This paper argues that China's economic growth will not necessarily slow after China reaches the LTP when wages and subsequently costs of production are increasing resulting from the exhaustion of the unlimited supplies of labor in the rural areas. This is because that reaching the turning point leads to significant structural changes signifying that China enters a new phase of development in which those endogenously determined factors such as human capital, innovation, R&D expenditure and technological progress will play more important roles than contributions made simply by inputs of physical capital, labor and resources in enhancing economic growth.

This article argues further that to achieve continuing growth after reaching the turning point, certain conditions need to be put in place in the transition toward and beyond the turning point including among others the institutional reform which enables China to further transform itself in order to embrace a new mode of economic growth driven predominantly by efficient, sustainable and equitable considerations. The success of doing so will, to a great extent, offset the negative impact of falling labor supply resulting from the aging of China's population. This suggests that the long-run growth of China's economy at a more reasonable pace will continue until the country eventually reaches the world technological frontier with little room for deepening the scope of specialization further.

The turning point theory and its implications

To make the arguments tenable, it may be useful first of all to briefly clarify whether the theory of the turning point is universally applicable to all countries and all times or whether it is rather specific and applicable to certain kinds of countries and over certain periods of time in the process of development. If, for example, the theory is confined or applicable only to certain periods in the process of development, then the theory may not be relevant in explaining the phenomena including the growth prospects at a more advanced stage of development. In that case, new theories will have to be applied in order for one to be more accurately analyzing those forces which begin to work in determining the economic growth and development in the post-LTP period.

The applicability of the theory of the turning point has been summarized by Minami (1973, 72) in the following ways. First, the theory is applicable only to the unskilled labor force because skilled workers are limited in supply. This suggests that one cannot apply the theory in analyzing the role of human capital and human skill in enhancing growth which becomes important at a more advanced stage of economic development (to be discussed). Second, the theory is not applicable to the 'modern' sector as it depends on the existence of a dual structure in the economy. According to the theory, when a country reaches the turning point, the dual structure will disappear as wages will be equalized between the modern and traditional sectors. This suggests that once the turning point is reached, the theory itself is no longer applicable in analyzing those economic forces working at the new phase of development. Third, the turning point is not a specific point in time as it may extend over a number of years. Fourth, the turning point is a long-term and trend-related economic phenomenon as the transition from the stage of unlimited supplies of labor to that of limited supplies of labor is a structural change in the economy or a trend phenomenon.

This implies that the turning point theory foreshadows the economic structural change resulting from rising wages, but it does not directly answer the question as to whether or to what extent that economic growth will continue after the turning point. This is because shifting from the case of unlimited supplies of labor to the case of limited supplies of labor represents two stages of economic development and the basic mechanisms of economic development are different before and after the turning point (Minami 1973). The approach taken by Lewis (1954) in illustrating the different mechanisms at the different stage of development is to refer to the former as the case for the classical stage, and the latter as the case of neoclassical stage of development in which the marginal productivity theory of production and distribution are dominant. Thus 'a transition from the classical to the neoclassical stages is explained by the theory of the turning point' (Minami 1973, 10).

However, at the same time, some doubt with respect to applicability of the neoclassical theories has been raised because those theories do not explain 'the most urgent problem in the under-development economies, that of attaining the economic take-off or the break through' and 'they are concerned mainly with a proportional growth in the economy: in other words, they tend to overlook structural changes' (Minami 1973, 5). This means that to illustrate the growth prospect resulting from the structural change after a country has reached the turning point, we would need to go beyond the neoclassical growth theories for explanation.

New theories in explaining the growth potential after the turning point

The key in understanding the importance as well as the relevance of applying the new theories in explaining the growth potential at a more advanced stage of development, is first of all to elaborate on how structural changes induced by reaching the turning point will lead to the endogenously determined pattern of economic growth; and then to illustrate how those endogenously determined factors could offset the possible negative impact of the shortage of labor, rising costs of labor and further on the falling return to capital (because of the rising capital/labor ratio) on future growth.

Both capital accumulation and technological progress play important roles in a country's transition from the unlimited to limited supplies of labor in that both are needed in generating an increase in the demand for labor in the modern sector. In the transition from the labor surplus to the labor shortage economy, wages and then costs of production increase pushing firms to substitute labor with capital and thereby raising society's capital/labor ratio. According to the neoclassical growth theories, this rising capital/labor ratio will lead to the diminishing return to capital and as a consequence to slower growth. However, it is well known that in reality those industrialized countries with higher capital/labor ratio experienced on average higher growth of per capita income than those less-developed countries.

The reason why the rising capital/labor ratio did not slow down growth is that there is something happening in the economy which raises the productivity of labor in the same proportion as capital/labor increases keeping the capital/output ratio constant (certainly not raising it). This is where the 'new' models of endogenous growth come to apply. In these theories, 'there are assumed to be positive externalities associated with human capital formation and research and development (R&D) that prevent the marginal product of capital from falling and the capital/output ratio from rising' (Thirlwall 2006, 154). Hence, the production of human capital may be an alternative to improvements in technology as a mechanism to generate long-term growth (Barro and Sala-i-Martin 2004). R&D may improve the productivity of labor or capital, or both leading to new inventions

and then to innovation – either process innovation or product innovation (Thirlwall 2006, 211). These positive externalities can exist resulting from the accumulation of knowledge (Romer 1986); they resided in the effect of human capital on output (Lucas 1988); they can take the form of specialized human capital relating to learning by doing which could become an engine of growth making it possible that the economy grows in the long run even without technological change (Lucas 1988); they can be generated by innovation which becomes an important source of productivity growth (Romer 1990). All these make a country's long-run growth possible as shown by the experiences of the industrialized economies.

Studies are abounding in illustrating the validities of new growth theories. Some of them provided empirical evidence to show how these theories have been applied to illustrate the cases which resemble the post-LTP stage of development. For example, Helpman (2004) reports the case that during the twentieth century about a quarter of the US growth in income per worker was due to the rise in education. Young (1995) points out that the rise in years of schooling played a central role in the growth of the Asian newly industrialized economies (NIEs). Mohnen (1996) attributed between 10% and 50% of output growth in the major Organization for Economic Co-operation and Development (OECD) countries to R&D growth, 40% of US total factor productivity (TFP) growth to R&D spillovers, and 66% of TFP growth in Japan to US R&D growth (Helpman 2004).

The experience of Japan offers an example of how a country's economic growth continues after reaching the LTP. According to Minami (1973),² Japan reached the LTP in the 1950s. However, we know that the growth of the Japanese economy did not slow down afterward. To the contrary, it marked the beginning of Japan's period of nearly 30-year long high economic growth. Japan's average annual growth rate of GNP per capita over the period 1961–1968 is 9.9%, the highest among all the major economies (Table 2 in Meadows et al. 1972). Close to 50% of Japanese output growth during 1960–1995 (the highest among the top seven industrialized economies) is attributed to TFP growth (Helpman 2004).

There are several elements in illustrating the mechanisms through which these endogenously determined factors impact on growth. First, technological change is endogenously determined by the accumulation of human capital, the increase in R&D, the diffusion of knowledge and therefore plays a key role in enhancing growth. Second, technological change drives the pace and direction of the structural change which in turn is accompanied by further specialization. Third, specialization is enhanced by the enlarged domestic and world market. Fourth, specialization affects the return to capital and leads to economies of scale and technological progress which may be endogenous and therefore lead to growth-enhancing effects. Finally, in the new phase of development, the role of physical capital has also changed, namely the scope for capital to permit roundabout methods of production will be widened (Thirlwall 2006).

Applicability of the new growth theories to China

We have made the argument that the new endogenously determined growth theories are more applicable in explaining the growth prospects after a country has reached the LTP, and provided some empirical evidence to show how those endogenously determined factors work in the way that they offset the negative impact on growth resulting from the rising wages and costs of production as well as the diminishing return to capital in the industrialized countries. We have also pointed out that the key to understand the process

(Thirlwall 2006, diffusion of knowledge (Lucas 1988); they are going which could be sustained in the long run by innovation (Romer 1990). All these make the industrialized

theories. Some of them have been applied to illustrate, for example, Helpman's (1997) model of the US growth spillovers. It points out that the rise in productivity in newly industrialized countries (NICs) and output growth in OECD countries are due to technology spillovers, and

economic growth continued to reach the LTP in 1995. The economy did not slow down during this period of nearly 30 years of GNP per capita growth in all economies (Table 2). During 1960–1995, the rate of growth due to TFP growth

which these endogenous factors are endogenously determined. R&D, the diffusion of knowledge, and, second, technological progress. The growth process is accompanied by a large increase in the size of the domestic and foreign markets. This leads to economies of scale and to growth. The physical capital has a constant rate of production will

growth theories are reached the LTP, by determined factors resulting from the transition to capital in the 19th century. To understand the process

of adjustment is the structural change derived in responding to changes in the relative prices, the rising wages, and the altered pattern of factor endowment such as capital/labor ratio.

This structural change has been dictated by two key factors: one is technological progress and the other is the scope of specialization. The questions we need to ask now are two: how relevant these theories and the arguments developed are to China now; and whether it is too early for China to consider adopting a strategy incorporating those endogenously determined factors in sustaining growth at this transition phase toward a more advanced stage of development. The questions can be addressed as follows.

First, it is true that China is still some distance away from reaching the tuning point. It is also true that China is far from reaching the technological frontier (Figure 1). Under these circumstances, it may sound too early for China to do as the new growth theories suggest. It is not. In an earlier work, Minami (1966) put forth three rather than two stages of development, namely the stage of unlimited supplies of labor, the stage of semi-limited supplies of labor and the stage of limited supplies of labor. The final stage is regarded as 'the purely conceptual third stage' with an infinite elasticity of labor supply which comes into existence after a disappearance of the subsistence sector.³ This specification of stages of development seems more pertinent to the case of transition toward the turning point in that the second stage of semi-limited supplies of labor indicates the period in which the elasticity of the labor supply is positive and finite.⁴

This second stage resembles more closely the situation of China now in that with rising wages the labor supply curve has been positively sloping, shifting toward an infinite elasticity of labor supply defined as the turning point. Looking from the perspective that 'the turning point is a long-term and trend-related economic phenomenon' (Minami 1973), it does not matter much as to how long it will take for China to reach that turning point. What matters most is what China will or be compelled to do now in order to achieve the growth potential in the future. That is why it is not too early for China to adopt the strategy aimed

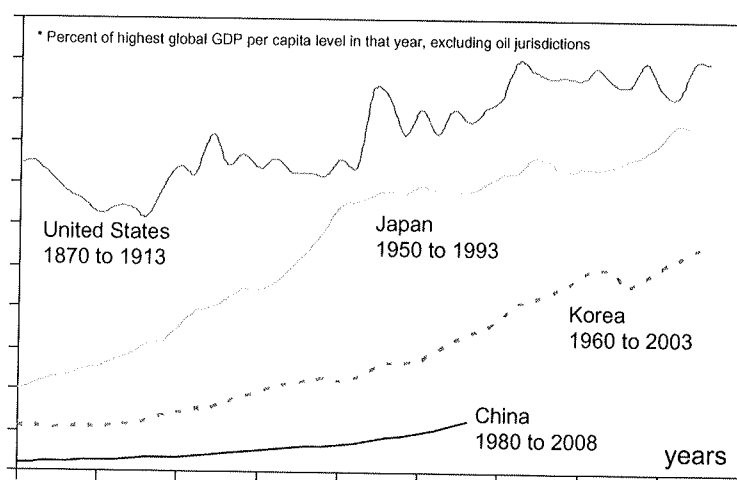


Figure 1. Income per capita relative to the frontier (Years from the start of modern industrial development).

Source: Figure 1 in McKay and Song (2010, 4).

at encouraging the endogenous growth because the mechanisms which determine growth have already started to change. Once again, the observation by Lewis illustrates the point.

There is no doubt that one of the main deficiencies of under-developed countries is their failure to spend adequately upon research and upon the development of new processes and materials appropriate to their circumstances. Part of the reason for this is institutional. (Lewis 1955, 175)

Second, China has also been compelled to be more actively engaged in carrying out structural changes by readjusting its growth strategy. As pointed out by McKay and Song (2010), the cyclical re-emergence of excess capacity in Chinese heavy industry, serious questions about the medium term ability of other major regions to accommodate further large gains in Chinese market share, and the stark conflict between the contemporary style of industrial development and the health of the biosphere all indicate strongly that now is the time for China to catalyze the required adjustment and reform processes that will underpin sustainable long-run growth and prosperity.

Third, McKay and Song (2010) also argue that there are some advantages for China to do so, as there is huge potential for China to narrow its technological gap with mature industrialized economies. This statement holds particularly strongly in the areas of green technologies. If a wholesale effort is launched, China will catch up more quickly and could even rise to leadership in the application of green technologies, given the economies of scale that would be associated with their use in China's projected mega-market, its strong foundation of human capital and, more importantly, the administrative determination to adopt a new model for economic growth. This is because China basically satisfies those conditions that must hold if introduction of a new technology is to lead to a leapfrogging process (Brezis, Krugman, and Tsiddon 1991). In this respect, China is certainly making progress, for example, on R&D, but will need to do more (Table 1).

There are a few other factors which need to be dealt with by way of discussing China's potential for further growth toward and beyond reaching the turning point. They are contributions of labor, physical capital and TFP to economic growth, the rising income inequality and the process of demographic transition.

First, labor as an input of production plays an important role in production. However, labor is only one factor in contributing to economic growth, and that role becomes less important as compared with the role of physical capital, human capital and productivity (TFP) in contributing to growth. For example, the decomposition of contributions by factors of production and TFP during the reform period in China shows that labor contributes least to economic growth and the transition from an inputs-based growth pattern to a

Table 1. Shares of R&D expenditure in total GDP (%): 1990, 2000 and 2007.

Country	1990	2000	2007
China	0.80	0.90	1.49
United States	2.65	2.74	2.67
Japan	2.79	2.99	3.45
United Kingdom	2.15	1.86	1.84
Germany	2.67	2.45	2.55
France	2.33	2.15	2.10
Canada	1.53	1.94	2.03
Italy	1.25	1.05	1.14

Source: OECD Factbook 2007 and the World Development Index, various years.

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TFP-based one become ever urgent as the LTP approaches (Cai and Wang 2009). In developed countries, more than half of the variation in income per capita results from differences in TFP and the same applies to differences in growth rates of income per capita (Helpman 2004, 34).

In comparison with the role of labor, both physical capital and TFP will continue to play an important role in contributing to growth at the more advanced stage of development. More importantly, the function of physical capital has changed, for in the context of the new growth theory, increase in investment is the major determinant of technological change to the extent that the distinction between input-driven and technology-driven economic growth is blurred (Chen 1997).

Second, China's rapid economic growth in the past has been accompanied by rising income inequality. There are many factors which contribute to the rising inequality during the reform period and some of them are clearly due to the nature of economic transition such as privatization of state-owned enterprises or the imperfection of the labor market. While it is debatable as to whether inequality is an inevitable outcome of rapid growth especially at the early phase of development (Kuznets 1955), it is recognized in China that the rising inequality, which is socially undesirable, could hamper long-term economic growth.

With China approaching the turning point, the rising wages propelled by the increasingly limited supplies of labor, the general living standard with rising per capita income could be increased (see Garnaut in this edition). Kindleberger (1967) also observed by studying the turning point in European countries that the relative share of labor in total income would decline or remain constant before the turning point and rise after the turning point. However, there is no guarantee that income will be more equally distributed after a country reaches the LTP. Table 2 shows that a relatively high degree of income inequality is still associated with majority of those most developed countries. This is because that both capital input and technology will play more important roles for an economy at a more advanced stage of development and both of them could impact on the evolution of wage inequality (Helpman 2004). It is therefore important for China to face the challenge of income distribution in the transition toward the turning point in order to achieve more equitable growth in the long run.

Following the logic of the new growth theory, both private and public investment in education will generate higher return, higher income and therefore be more favorable to income distribution and equitable growth. China will need to increase further its share of education expenditure in total GDP (Table 3). The demand for funding education for migrant workers and their families is particularly pronounced. It is well documented that rural migrant workers have had fewer years of education than their urban counterparts and

Table 2. Gini coefficients: China and industrialized countries.

Country	Gini coefficient
China	41.5 (2007)
United States	45.0 (2007)
Japan	38.1 (2002)
United Kingdom	34.0 (2005)
Germany	27.0 (2006)
France	32.7 (2008)
Canada	32.1 (2005)
Italy	32.0 (2005)

Source: The World Factbook, various years.

Table 3. Shares of education expenditure in total GDP (%): 1990, 2000 and 2008.

Country	1990	2000	2008
China	1.79	1.78	1.81
United States	4.72	4.87	4.85
Japan	4.09	3.23	3.28
United Kingdom	4.52	5.24	5.10
Germany	4.38	4.27	4.33
France	5.07	5.17	5.10
Canada	6.63	5.48	4.43
Italy	3.07	4.21	4.42

Source: The World Bank Development Indicators Database, various years.

as a result there have been substantial gaps in educational attainment between migrant workers and urban workers. For example, Wang (2009) shows that only 23% of migrant workers graduated from a senior high school while 76% of urban workers attained the same level of education in 2005.

Finally, demographic transition is defined as 'a dynamic process of changes in fertility and mortality that causes corresponding changes in population quantity and structure' (Wang and Cai 2009, 68). The current demographic transition in China is characterized by its rapid move toward an aging society which is arguably causing the fall in labor supply and saving when the proportion of the economically active population begins to shrink which will have some negative impact on growth (Du 2009). The phenomenon happens in many parts of the world now such as Japan, but what is unique for China is that this kind of demographic transition coincides with the transition toward the turning point. Both have important implications for further growth.

It is difficult to predict whether and to what extent that those endogenously determined factors could offset the negative impact on growth by the transition toward the turning point on the one hand and the demographic transition toward aging on the other. In any case, there is need to offset those negative effects on growth through improvement in efficiency and widening the scope of specialization which can be done by deepening domestic market (especially factor markets) reform, enlarging the domestic and international markets, and deepening institutional reform including the social security system, the regulatory system reform and the governmental reform.

Just to take the size of the market as an example. It is true that a long-run rate of productivity growth is higher in economies with faster population growth (Howitt 1999), but a country's large size of population such as China's means a large market which matters in that there is an inherent link in the new growth theory between market size and the incentive to innovate meaning that larger markets encourage more R&D (Helpman 2004, 50).⁵ One of the pressing issues for China now is to enlarge domestic market consumption in order to address the issue of global imbalances. Song, Wu, and Zhang (2010) show how to boost domestic demand through urbanizing migrant workers which could be accomplished by all the institutional reforms just discussed.

By relying on those endogenously determined factors with the reformed institutional framework which supports the generation of those endogenous factors, a reasonably high economic growth rate can be achieved in the long run until China reaches the international technological frontier, or exhausts the room for further specialization, or simply runs out of ideas for further innovation and technological breakthrough.

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Conditions for further growth in China

Reaching the turning point in the sense that is described in this paper indicates that the changed economic circumstances require that the existing institutions must also change to accommodate the new development. As argued by Helpman (2004) that the ability of a country to grow depends on its ability to accommodate such changes in economic circumstances, and the ability to accommodate changes depends in turn on a country's economic and political institutions. This is because 'institutions affect the incentives to innovate and to develop new technologies, the incentives to reorganize production and distribution in order to exploit new opportunities, and the incentives to accumulate physical and human capital' (Helpman 2004, 139). Therefore, failure to reform and change the institutions in a timely fashion reflecting the rapid change in underlying economic structure, even in the process of the transition toward the turning point, will mean that growth will be compromised.

Key institutions, which need to be reformed to accommodate the rapid technological, structural and distributional changes, include the rule of law, protection of property rights, the market institution, the legal system, the social welfare system, the government system and the political system, as well as the value system including the social norms. Precisely because of the fact that the institutional changes have always been slow in keeping up with the rapid change in economic circumstances, we argue that China has made tremendous progress in reforming its institutions in the first 30 years of reform and transformation. What has been achieved in the past has laid the groundwork for China to deepen the institutional reform at the next stage of its development. In the sense the new institutional reform is more challenging than what has been achieved in the past because the new reform will prepare China to embrace a new mode of economic growth driven predominantly by not only efficient, but also sustainable and equitable considerations. One important lesson we have learned from the past experience of reform is that 'once institutions begin to change, they change in ways which are self-reinforcing' (Lewis 1955, 146). There is reason to be optimistic as far as the future change in institution is concerned as pointed out by Lewis in the same book (1955) that changes reinforces itself cumulatively. 'Once economic growth has begun, institutions change more and more in directions favourable to growth, and so strengthen the forces making for growth' (p. 143). China's economic growth experience in the past 30 years illustrates the point.

Conclusions

Reaching the LTP in economic development has important implications for the long-run economic growth in China. The rising wages with an aging population propels China to embrace a significant structural transformation leading to the altered mode of economic growth toward endogenously determined growth in which new sources for further growth have been generated. The big challenges that China faces now such as global imbalances, aging population and environmental degradation accelerate the pace of adjustment. In this new mode of growth, productivity gains through technological change, enhanced by education, innovation and R&D expenditure, and even the new way of organization of production will play a more important role than the inputs of physical capital and labor in contributing to economic growth. Furthermore, because of the endogenous nature of growth at this more advanced stage of development, an increase in physical capital itself would generate more technological progress in production than what it does in an extensive phase of growth and development.

It is therefore reasonable to expect that China's economic growth will continue after reaching the LTP and beyond. For a smooth transition toward the new and more advanced phase of development, China needs to deepen the reform of its various kinds of institutions including economic, social, legal and political institutions to make them more conducive to market integration, innovation, R&D, protection of intellectual property rights, respectful for knowledge and social justice. All these will increase China's capability of generating endogenous growth which, as demonstrated by the experience of those industrialized economies after reaching that advanced stage of development, can be sustained in the long run.

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Notes

1. China's urbanization ratio, defined as the ratio of urban population to the total population, rose from less than 20% when reform started in the late 1970s to about 45% in 2009 with nearly 300 million people having been urbanized over this period.
2. Minami quoted Lewis (1958) in making this point.
3. See the footnote 30 on page 39 in Minami (1973).
4. In fact, Minami (1973) refers this second stage as the stage of limited supplies of labor in the definition in that volume.
5. China's total population is expected to rise from the current 1.3 billion to 1.5 billion in about 30 years from now.

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