Drivers of China's Economic Growth in the Late Stage of Industrialization

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I. Introduction

As shown by the experience of various countries, economic growth is not a natural process that takes care of itself. Some economies maintain long-term sustained economic growth and have since a long time ago ranked among high-income societies where residents enjoy quite advanced fruits of civilization; some economies have succeeded in economic take-off and catch-up; but still, more of the economies have gone through a tortuous and slow process for development in which they once achieved rapid growth, but later lost the momentum for further development, and today remain as low-to-middle income countries.Overall, their economic development process reveals maintenance of economic growth momentum and cultivation of new growth engines especially when one development stage transits to another or when the old growth engine loses steam are central to sustained economic growth. China is an economy that witnesses fast economic growth and rapid transformation in the economic structure. In 2014 the Chinese government proposed that "Chinese economy grows more advanced in form, featuring more complicated division of labor and a more reasonable structure. China has entered into a new normal characterized by middle-and-high speed growth rather than break-neck expansion, and the drivers of economic growth turn to be new rather than traditional growth points". Therefore, an accurate analysis of the evolving law about the economic growth drivers in different development stages holds great significance to promoting sustainable growth of Chinese economy.

As economic growth involves a process where various economic entities, markets, systems and mechanisms exert influence upon each other, the economic growth drivers can be approached from multiple perspectives, each leading to a significant finding. The drivers hold different importance and various characteristics in different stages of economic development.

First, economic growth drivers can be approached from the perspective of the aggregate supply and demand balance. Keynes (1936) points out under the combined influence of the law of diminishing marginal propensity to consume, the law of diminishing marginal returns of capital and the law of liquidity preference economies are often faced with insufficient effective demand and less than full employment. The expansion of effective demand, including investment demand and consumption demand, can contribute to macroeconomic stability and development. Mundell (1963) and Fleming (1962) extend the classic Keynesian model in the open economy, illustrating the significant influence of export changes upon the aggregate demand. From this point of view, the growth potential in investment, consumption and export represent crucial drivers of economic growth.

Second, the growth drivers can be analyzed with the economic growth theory. Different from the Keynesian mode on aggregate demand that stresses macroeconomic balance and expansion in the short term, the theory on economic growth, based on the theory of market-clearing and supply creating demand, holds that in the long run the fundamental driver of economic growth is the expansion of production capacity. In the model proposed by Solow (1956) and Swan (1956), the drivers of economic growth consist in capital accumulation, increase of labor force and progress of productivity. Besides, Schumpeter (1934) shares his vision on capitalism: “Innovative entry by entrepreneurs was the force that sustained long-term economic growth”. And the endogenous economic growth theory for which Romer (1986) and Lucas (1988) are representative proponents goes further to point out that besides capital accumulation and labor increase, accumulation of human capital and continuing technological progress brought about by research and development as well as by learning in doing, prove to be drivers of long-term economic growth.

Third, viewed from the angle of development economics, the drivers of economic growth lie in the continuous industrial and technological upgrading. Kuznets (1973, 1981) deems that rapid transformation of industrial structure, as reflected in the change of the mainstay of the economy from agriculture to industry and then to the service sector, and the foreign trade development greatly contributing to economic growth. In addition, the government also plays

an indispensable role to advance economic growth since “the pace of modern economic growth stresses more on the importance of state-owned organizations… As the state and the state-owned organizations are rule makers for economic activities, they are very important in the capacity of a referee or an infrastructure provider…” The structuralists emphasize more on the significance that the transformation of economic structure holds to economic development. However, for transformation of the economic structure, stages of industrialization represent the most important hallmarks and are studied separately. Chenry (1986) sums up the standard modes and influencing factors of industrialization according to the analysis upon major countries in the world from 1950 to 1973. Chenry held that structural transformation closely bore on economic growth; transformation of economic structure and especially that under non-equilibrium conditions would speed up economic growth; and the transformation of economic structure would occur in different stages. The relative importance of the contributions to economic growth made by different factors of different departments also differs. According to Chenry, economic growth can be divided into three major stages, namely, Stage I, Stage II and Stage III. Among them, Stage I corresponds to the agricultural society where agriculture is the mainstay of the economy; Stage II is a stage of industrialization where the economic focus has transferred from production of primary products to manufacturing of industrial products; Stage III is about a developed economy in which the mainstay of the economy has transferred from the manufacturing to the service industry.

China is a late developer that is undergoing marked structural transformation. The modes and drivers of Chinese economic growth show noticeable changes along with changes in the development stage. This article intends to look into the characteristics of the changes in the drivers of economic growth at different stages. Among the numerous indicators about changes in the development stages, the stage of industrialization is indisputably one of the most important. Around 2013 China stepped from the middle stage into the late stage of industrialization. The Report to the 18th National Congress of the Communist Party of China has set forth the goal to basically realize industrialization by 2020, therefore the period from 2013 to 2020 is for China the late stage of industrialization when the drivers of

economic growth are quite difference from those in the middle stage of industrialization and in the post-industrialization society. The structure of this article is as follows: Part II concentrates on theoretical analysis and international experience, focusing on the changes of the economic growth drivers in different development stages of other industrialized countries; Part III analyzes China's major economic growth drivers in the early and middle stages of industrialization as well as the problems encountering the drivers; Part IV identifies, based on the relationship between stages of industrialization and economic growth drivers, the major driving force of the economic growth in the new development stage of China; and a wrap-up follows with major conclusions and policy suggestions.

II. Changes in Growth Drivers at Different Stages of Industrialization and Related International Experience

(I) A Decomposion Model about Structural Changes in the Economic Growth Drivers

The input-output tables give detailed information on production and consumption of various departments of the national economy. They constitute the most important database for research on transformation of the industrial structure. Here we mainly zoom in on the input-output model and decompose the factors bearing on the industrial structure. As the total output equals total demand which is the sum of the intermediate demand, domestic consumption, domestic investment and net export, their relationship can be demonstrated as follows:

$$X = W + D + E - (1)$$

In the above matrix, $X = [x_i]$ indicates the column vector for the total output (the aggregate output of various industries), $i = 1 \cdots J$ denotes various industries of the economy, W indicates the intermediate demand, D indicates ultimate demand for various industries, i.e., the ultimate consumption and investment, $E = [e_i]$ shows the export of various industries, $M = [m_i]$ indicates the import of various industries, and $E - M$ means net export.

In Matrix (1), W refers to the demand deriving from the ultimate output, also the demand for intermediate input prior to production of final products in

various industries. With $A = a_{ij} = [x_{ij} / x_j]$ set as the co-efficient matrix about the intermediate input (or direct consumption), we can use $W = AX$ to denote the intermediate input. Thus, Matrix (1) can be made into

$$X = AX + D + E - M \qquad (2)$$

In light of Chenry(1986)，we suppose all imported commodities are for intermediate input and final demand rather than export, make u_i^w and u_i^f represent the domestic supply ratios of products in the i industry, i.e., make u_i^w denote the ratio of domestically produced intermediate products among all the intermediate products and u_i^f denote the ratio of final demand in the i industry met by production at home. So Matrix (2) can then be made into：

$$X = \hat{u}^w AX + \hat{u}^f D + E \qquad (3)$$

The $\hat{u}^w$ and $\hat{u}^f$ denote the diagonal matrix involving the diagonal elements u_i^w and u_i^f. With $A^d = \hat{u}^w A$ set as a domestic input-ouput matrix, and we can make (3) into

$$X = \left(I - A^d\right)^{-1}\left(\hat{u}^f D + E\right) = R\left(\hat{u}^f D + E\right) \qquad (4)$$

Based on the above matrix, the output change in any department (industry) can be decomposed in terms of the following aspects (See Chenry 1986):

$$\begin{aligned}
\Delta X_i = & \sum_j r_{ij2} u_{j2}^f \Delta D_j && = \text{Domestic Demand Expansion} \\
& + \sum_j r_{ij2} \Delta E_j && = \text{Export Expansion} \\
& + \sum_j r_{ij2} \Delta u_j^f D_{j1} && = \text{Import Substitution for Final Products} \\
& + \sum_j r_{ij2} \Delta u_j^w W_{j1} && = \text{Import Substitution for Intermediate Products} \\
& + \sum_j r_{ij2} u_{j2}^w \sum_k \Delta a_{jk} X_{k1} && = \text{Change in the Input-output Co-efficient}
\end{aligned} \qquad (5)$$

Chenry (1986) adopts (5) to analyze the conditions of quite some countries. The results indicate in different countries at different stages of industrialization, different industries (primary product industry, light industry, heavy industry and service industry) make markedly different contributions to economic growth and show phased characteristics.

(II) Structural Decomposition of Economic Growth: Experience of ROK

ROK has succeeded in catching up with industrialized countries in terms of economic development and achieved industrialization in a relatively short time. It has accumulated the Input and Output Tables during different stages of industrialization, which provide valuable data for us to conduct structural analysis upon the economy. We can draw on the inherent laws about evolution of the ROK industrial structure to develop economic development strategies and industrial policies in China today. Based on the constant-price and the current-price Input and Output Tables from 1975 to 2007, this part conducts an analysis on the phased evolution of the ROK industrial structure in economic development and the contributions various industries make to economic growth.

Measured by the constant-price (USD) in 2010, the GDP per capita in ROK soared from USD1,960 to 24,500 during the years from 1970 to 2014, increasing by 12 folds and registering a yearly increase of 5.9% on average. Along with rapid economic development, the proportions of economic sectors have also undergone changes. Taken in light of Chenery's "General Model of Structural Change", the GDP per capita in ROK in 1970 was USD1,960, indicating the country was in the early stage of industrialization; the figure increased to USD3,169 in 1977, meaning it entered into the middle stage of industrialization; from 1987 to 1995, the GDP per capita in ROK increased from USD6,954 to USD12,234 (more than USD10,000). As thus, it smoothly entered into the late stage of industrialization. Starting from 1996, the GDP per capita in ROK topped USD12,980, signaling it entered into the post-industrialization stage.

Table 1: Ratio of Value Added of Economic Sectors in GDP of ROK (1970-2014)

Unit: %

Year	GDP per capita (USD 2,010)	Stage of Industrialization	Ratio of the Primary Industry	Ratio of the Secondary Industry	Ratio of the Tertiary Industry
1970	1960	Early stage of	29.10	26.6	44.30
1976	3169	Industrializatio	25.50	30.9	43.60

		n			
1977	3488	Middle Stage	24.20	32.1	43.70
1986	6254	of Industrialization	11.70	39.0	49.30
1987	6954	Late Stage of	10.50	40.0	49.50
1995	12234	Industrialization	6.20	39.3	54.60
1996	12991	Post-industriali	5.80	38.5	55.80
2014	24500	zation Stage	2.30	38.6	59.10

Data source: Wind Info.

As the industrialization progresses, the proportions of economic sectors in ROK demonstrate marked changes, as obviously reflected in the increase and then decrease of the ratio of the second industry, and the steady rise in the ratio of the service industry. In 1970, the second industry of ROK accounted for 26.6% of its GDP; in its middle stage of industrialization spanning from 1977 to 1986, the second industry accounted for 36.2% of the GDP on average while the figure throughout the middle stage of industrialization averaged 39.7%; the ratio of the second industry peaked in 1991 and then declined; and the figure through the years from 1996 to 2014 averaged 37.5%. Meanwhile, the ratio of the service industry in the GDP steadily increased from 44.3% in 1970 to 59.1% in 2014. The advancement of industrialization and upgrading of proportions of economic sectors are quite evident.

In view of various industries' contributions to economic growth, it is evident that the industry makes contributions greater than expected regarding its share of the economy. For example, from 1975 to 1980, the industry accounted for 28 to 31% of the economy, but contributed to 43.8% of the economic growth, about 14 percentage points higher than its share; from 2005 to 2007, the industry contributed to 45.3% of the economic growth, far higher than its share of 30%. The only exception was that from 1995 to 2000, the industry contributed to 25.2% of the economic growth, a rate lower than its share in the economy. It is because during that period, specifically, in 1997, ROK suffered Asian financial crisis in which the growth rates of many

industries plummeted. Except for that period, the industry's contribution to economic growth is notably higher than its share of the economy.

Thanks to the faster advances of industrial technology, the industry's contribution to economic growth is greater than its share in the economy. Many researches indicate the TFP growth rate of the industrial sector is far higher than that in the service sector, and the high TFP growth rate leads the industrial sector's contribution to economic growth to be greater than its share in the economy.

Table 2: Contribution to Economic Growth of Various Sectors in ROK

Year	Ratio in GDP (%)				Contribution to Economic Growth (%)			
	Agriculture	Industry	Construction	Service	Agriculture	Industry	Construction	Service
1975	22.7	28.6	5.2	43.5				
1980	14.7	30.7	8.3	46.4	2.6	43.8	9.8	43.9
1985	12.4	34.3	7.8	45.4	9.4	37.3	9.4	43.9
1990	8.1	34.5	11.3	46.1	-0.4	37.4	15.6	47.4
1995	5.6	35.6	9.1	49.8	1.5	47.6	2.8	48.1
2000	4.0	32.2	7.3	56.5	0.2	25.2	-14.5	89.0
2005	2.9	31.0	8.0	58.1	-0.3	43.6	5.3	51.4
2007	2.6	30.5	7.6	59.3	2.2	45.3	-0.2	52.6

Data source: Results calculated from the ROK Input and Output Tables at the constant price

Regarding purposes of the products, the industry can be further divided into the mining industry, consumables, intermediate products, investment products and public utilities. As for their contribution rate to economic growth, the most remarkable law is that the consumables' overall contribution rate to industrial growth is on steady decline, deceasing from 16.33% in 1975 to 2.40% in 2007 while investment products make constantly increasing contribution to industrial growth, growing from 15.12% during the years from 1975 to 1980 to 55.17% in 2007. But the intermediate products' contribution to economic growth first increased and then declined; on the whole, their contribution rate decreased from 37.81% in 1975 to 24.52% in 2007, with the level ever peaking at 39%.

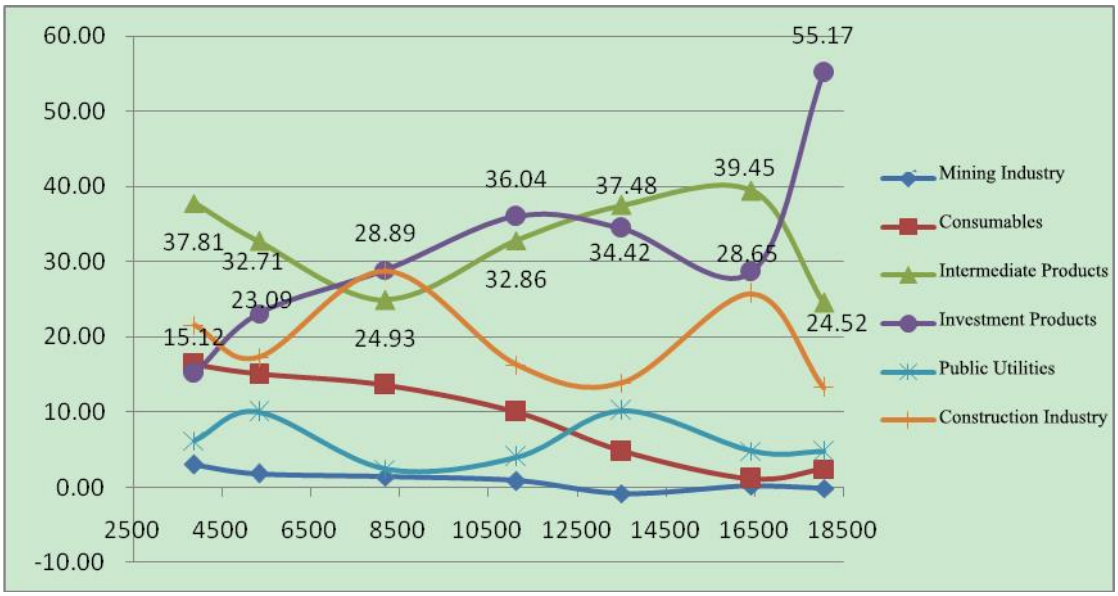

Figure 1. Contribution Rate to Industrial Growth by Various Sectors within the Second Industry of ROK (1975-2007)

Data source: Results calculated from the ROK Input and Output Tables at the constant price

III. China's Industrialization and the Change of the Growth Drivers

(I) Different Stages of China's Industrialization

Industrialization reflects, besides GDP per capita, a country's overall conditions regarding economic and social development, and each country has its own specific national conditions. For example, after the founding in 1949, China's emphasis on heavy industry resulted in a constant high proportion of the industry in economy, exceeding the common level internationally. Therefore, when dividing the industrialization of China into different stages, we should take into consideration multiple indicators and make extensive references to domestic studies (Chen Jiagui, Huang Qunhui, Zhong Hongwu, 2006). The indicators to measure industrialization and define its stages of development should include GDP per capita (reflecting economic development), output shares of primary, secondary, and tertiary industries (reflecting proportions of economic sectors), proportion of value added of manufacturing to the total of goods-producing sectors (reflecting internal structure of the industry, with value added of goods-producing sectors being

roughly the equivalent of value added of the sectors producing materials, i.e., primary and secondary industries), urbanization rate (reflecting spatial structure), proportion of primary industry employment (reflecting employment structure), etc. Each stage has its hallmarks, as shown in Table 3.

Table 3 General Characteristics of Industrial Upgrading during the Industrialization Process

Basic indicators	Pre-industrial times				Post-industrial times
		Early stage of industrialization	Middle stage of industrialization	Late stage of industrialization	
GDP per capita of 2010 (USD)	827 to 1654	1654 to 3308	3308 to 6615	6615 to 12398	Above 12398
Output shares of the agriculture, industry, and services sectors (proportions of economic sectors)	A>I	A>20%, and A<I	A<20%，I>S	A<10% I>S	A<10% I<S
Proportion of value added of manufacturing to the total of goods-producing sectors (industrial structure)	Below 20%	20% to 40%	40% to 50%	50% to 60%	Above 60%
Proportion of primary industry employment (employment structure)	Above 60%	45% to 60%	30% to 45%	10% to 30%	Below 10%
Urbanization rate (Spatial structure)	Below 30%	30% to 50%	50% to 60%	60% to 75%	Above 75%

Data source: Chen Jiagui, Huang Qunhui, Lv Tie, et al., *The Report on China's Industrialization* (2012 edition), China Social Sciences Press

Note: A is for primary industry, I for secondary industry and S for tertiary industry. PPP stands for purchasing power parity. Value added of goods-producing sectors (agriculture, fishery, forestry; mining industry; manufacturing; power industry and other public utilities;

construction industry) is roughly the equivalent of value added of the sectors producing materials, i.e., primary and secondary industries.

Taking into account criteria for dividing the industrialization process, the development stages of China's industrialization can be divided as follows:

The first stage or the pre-industrial times (from 1949 to1969). During this period of time, GDP per capita grew from less than USD100 to USD138 (calculated at constant 2004 prices, measured with the current exchange rate method); urbanization rate was between 15.4% and17.4%; agriculture's share in GDP, dropped from 50% to 35%, greater than the share of the secondary industry (the total output value of agriculture and the secondary industry respectively was RMB73.62 billion and RMB68.91 billion in 1969, compared with RMB79.33 billion and RMB91.22 billion respectively in 1970, indicating the share of the secondary industry started to outpace that of agriculture, not taking into account the Great Famine from 1958 to 1960), and the share of industrial output in GDP was lower than that of agricultural output (except for 1970 and 1971); most of the indicators failed to meet the minimum standards of the early stage of industrialization, therefore this period of time can be seen as the pre-industrialization times.

The second stage or the early stage of industrialization (from 1970 to 2000). This stage saw a significant increase in the share of industrial output, surpassing that of agriculture in GDP, as evidenced by secondary industry's share of GDP reaching 40.4% and agriculture's 35.2% in 1970, while in 2001 the former increased to 45.1% and the latter decreased to 14.4%; urbanization rate grew from 17.4% to 37.7%, and GDP per capita was between USD137 and USD1,150 (calculated at constant 2004 prices, measured with the current exchange rate method). The early stage of urbanization was marked by materials industries such as food, steel and chemicals as the engine of growth, with light industry leading the development of the industry, and manual labor and labor-intensive industries taking the dominant role. Besides the significant rise of light industry, this period of time also witnessed the rapidly advancing of market-oriented economic reform.

The third stage or the middle stage of industrialization (from 2001 to about 2012). This stage was marked by the explosive growth of urbanization and

industrialization, urbanization rate increasing to 45.7% in 2008 from 37.7% in 2001, an average annual increase of one percentage point. The share of industry kept rising, 42.9% in 2008 compared with 39.7% in 2001, while agriculture's share declined to below 14%, but still higher than 10%. GDP per capita grew to USD2,200 in 2008 from USD1,150 in 2001 (applying the current exchange rate method, and it would be higher with the PPP method). During the middle stage of industrialization, the large-scale machine industry gradually matured, and the development of industry started to tilt towards heavy industry with capital-intensive industries such power, steel, chemicals and machine manufacturing leading the economic development. Also, basic industries and infrastructure saw great improvement. During this stage, the structure of economic sectors has seen its focus shifting and higher-value products, and manufacturing was driving economic growth.

The fourth stage or the late stage of industrialization (since 2013)[1]. In 2013, China's GDP per capita reached USD6,560 (calculated at current prices); the share of the service industry has for the first time surpassed that of the secondary industry by 2.2 percentage points; the share of value added of the primary industry stayed at 10% for the fourth year; urbanization rate rose to 53.7%; the proportion of primary industry employment dropped to 33.6% (2012), and the proportion of service industry jobs exceeded that of the primary and secondary industries; the value added of manufacturing accounted for 64% of the total of goods-producing sectors; according to the hallmarks of industrialization process, most indicators showed that China has generally entered the late stage of industrialization.

(II) Drivers of China's Economic Growth Since the Reform and Opening up: Characteristics and Changes

1. From the perspective of aggregate demand, investment is contributing more to economic growth, and export plays an important role.

Prior experience of other countries shows that consumer demand is a major driving force of economic growth. In China, during the nineteen-eighties when the reform and opening up has just started, final consumption accounted

[1] There are opinions that China has entered the late stage of industrialization in 2010, as demonstrated in Zhang Hui, *Industrial Structural Effects and Driver Mechanism of China's Economic Growth*, Pecking University Press; Chen Jiagui, Huang Qunhui, et al., *The Report on China's Industrialization (1995-2010)*.

for about 65% of GDP, contributing a lot to economic growth, or to be specific, 61.5% from 1981 to 1985. In fact, throughout the entire early industrialization stage, final consumption has kept a high contribution rate of about 50%. The middle stage of industrialization saw the decline of final consumption's contribution to economic growth, with the contribution rate dropped to between 30% and 40%. However, it has shown a rebound since the late industrialization, and in 2013 final consumption contributed 46.8% to economic growth.

Table 4 Changing Drivers of China's Economy Reflected by the Composition of Aggregate Demand Unit: %

Year	Stage of industrialization	Contribution of consumption	Contribution of capital formation	Contribution of export
1981-1985	Early stage of industrialization	61.5	35.5	3.1
1986-1990		46.4	24.9	28.6
1991-1995		43.1	40.8	16.0
1996-2000		57.1	23.0	20.0
2001-2005	Middle stage of industrialization	28.1	35.6	36.3
2006-2012		39.4	45.1	15.5
2013-2013	Late stage of industrialization	46.8	50.4	2.7

Data source : calculated with data provided by Wind Datafeed Service

Investment's contribution to economic growth is on the rise. International comparison shows that China's investment rate is significantly higher than that of most countries when they were at the same level of development (measured by GDP per capita), also higher than that of Japan and ROK when they were experiencing economic take-off, as well as other countries that have succeeded in economic catch-up. In particular, the trend of high investment and low consumption has been apparent since the implementation of the 12th Five-Year Plan. The investment rate (ratio of fixed capital formation to GDP) in 2013 was five percentage points higher compared with the period from 2005 to 2008. In terms of the contribution to economic growth, investment hasn't contributed much during the entire early stage of industrialization, with the contribution rate remained at about 30%, while during the late stage of

industrialization it grew to about 40% and reached 50.4% in 2013, the highest so far.

As a manufacturing power, China’s economic growth has been mainly driven by exports which started to develop since the reform and opening up began. In 2004, total exports of China reached USD593.3 billion, exceeding that of Japan (USD565.7 billion that year) for the first time, becoming the world’s third largest exporter after Germany and the US. In 2007, China’s total exports exceeded USD one trillion, overtaking the US (USD1148.2 billion that year) as the second largest exporter in the world. The year 2009 saw China become the world’s largest exporter for the first time with its total exports reaching USD1201.6 billion, accounting for 24.1% of GDP and 9.6% of the world’s total exports. In 2013, China's total exports were up to USD2.2 trillion, amounting to 11.7% of the world’s total exports. From 2012 to 2014, the share of China’s exports in the world’s total has increased respectively by 0.8, 0.5 and 0.5 percentages points, and in 2014 the share reached 12.2%.

The contribution of export growth to economy follows an inverted U-curve that it increased first and then declined. From 1981 to 1985, exports contributed only 3.1% to economic growth, while between 1986 and 1990 the contribution rate was increased to 28.6% rapidly; it reached a record high of 36.3% from 2001 to 2005, but then shown a very clear downward trend. In 2013, exports contributed only 2.7% to China's economic growth.

2. In terms of economic growth, inputs and economic efficiency of factors of production have played important roles.

From the perspective of inputs, the increase in capital input plays an important role in China's economic growth. China's investment rate is much higher than those in other countries. For example, from 1999 to 2011, the average annual growth rate of the stock of fixed assets in China amounted to about 14.8%, about 4.8 percentage points higher than the GDP growth rate over the same period. With respect to contribution made by capital increase to economic growth, the increase in capital input contributed about 55% to economic growth or even higher from 1978 to 2000 except in years when China made economic adjustment (1991-1995), and this trend is more obvious after 2000, especially between 2006-2011, during which period the increase in

capital input contributed 76.9% to the economic growth in China.

The contribution of increase in labor force to economic growth first rose and then dropped. From 1978 to 2013, the number of employees in China grew from 40,152 to 7.6977 trillion, and the number of employees in non-agriculture sectors rose from 118.35 million to 528.06 million, increasing by 3.46 times. However, considering the huge increase in education levels, the growth rate of actual labor input should be much higher. If only considering the increase in the number of persons employed, from 1978 to 1985, i.e., during the first few years after China launched its reform and opening up process, employment growth was not very fast, only contributing13.1% to economic growth; from 1986 to 1990, with the massive labor force transfer, employment growth contributed nearly 18% to economic growth; however, after 2000, the contribution made by employment growth significantly dropped; from 2006 to 2012, the contribution rate of employment growth was only 2.2%; in 2013, the number dropped to only 1.8%.

Table 5 Change in Drivers of Economic Growth Unit (%)

Time period	Stage of industrialization	GDP growth rate	Growth rate of the capital stock	Growth rate of labor force	TFP growth rate	Contribution: capital	Contribution: labor force	Contribution : TFP
1978-1985	Early stage	9.9	7.3	3.3	3.9	55.8	13.1	31.1
1986-1990		7.9	7.0	2.6	2.8	61.0	18.0	21.0
1991-1995		12.3	9.4	1.2	6.2	46.8	3.9	49.3
1996-2000		8.6	10.6	1.1	2.3	68.6	6.0	25.4
2001-200		8.3	10.4	1.2	2.0	70.3	6.2	23.5

5 2006-2012	Middle stage	10.4	12.6	0.6	2.5	76.9	2.2	20.9
2013-2013	Late stage	7.7	13.3	0.4	-0.5	104.7	1.8	-6.5

Data source: calculated based on Penn World Table, version 8.0; data from 2012 to 2013 are calculated by the author.

In addition to capital input and labor input, China's productivity has also greatly improved, contributing greatly to economic growth. According to calculations by the author, from 1978 to 2011, the increase in total factor productivity contributed 20%-49% (more than one fifth) to economic growth. Researchers estimate that China's average TFP growth rate is about 3.6%, higher than the world's average TFP growth rate. However, this estimate is achieved by taking into account the low productivity in the mimic and learning stage of development, the low productivity at the beginning of reform and opening up, and a great increase in productivity brought by a large number of foreign companies and private companies.

3. Changes in contributions of economic sectors to economic growth as observed from the perspective of economic restructuring

As industrialization proceeds, the contribution of economic sectors to the economic growth in China is changing. The contribution of agriculture to economic growth has been slowly decreasing. In 1992, the contribution of agriculture to economic growth was still around 8%. It dropped to about 5% in 2001 and has since then remained at this low level (around 5%).

The contribution of the industry sector to economic growth saw obvious periodic changes. At the early stage of industrialization, the contribution of the industry sector was quite high. From 1992 to 2000, the industry sector contributed 55% -60% to economic growth, but it has been decreasing as industrialization proceeds. From 2001to 2012, the contribution of the industry sector dropped from about 50% to about 40%, and further dropped to about 35% in 2013.

In the service sector, the growth rate of the contribution of the wholesale and retail industry and other services is high. For example, the contribution made by the wholesale and retail industry to economic growth increased from about 4% in 1992 by 9 percentage points to nearly 13% in 2014; the contribution of the financial industry increased from 3.5% by 3.4 percentage points to 6.9% over the same period; no clear trend was observed in the change of contributions made by transport, accommodation & catering and real estate industries.

Table 6: Change in Drivers of Economic Growth as Observed from the Proportions of Economic Sectors

	Stage of industrialization	Agriculture	Industry	Construction	Transport & postal services	Wholesale & retail	Accommodation & catering	Finance	Real estate	Other service industries
1992	Early stage of industrialization	8.4	57.6	6.9	4.5	4.9	3.1	3.5	4.4	6.8
1993		7.9	59.1	6.3	5.5	3.9	1.1	4.6	1.6	9.9
1994		6.6	62.6	5.3	3.9	3.8	3.5	4.1	1.9	8.2
1995		9.1	58.5	5.8	5.8	4.4	1.8	4.3	2.3	7.9
1996		9.6	58.5	4.4	6.4	4.3	1.3	4.1	0.8	10.6
1997		6.7	58.3	1.4	5.8	5.2	2.2	4.8	0.9	14.6
1998		7.6	55.4	5.5	7.9	4.6	2.6	3.3	1.8	11.2
1999		6.0	55.0	2.7	9.6	6.2	2.0	3.2	1.5	13.8
2000		4.4	57.6	3.2	6.4	6.2	2.1	3.8	1.5	14.7
2001	Middle stage of industriali	5.1	42.1	4.5	6.6	9.0	2.0	3.2	5.5	21.9
200		4.6	44.4	5.3	4.9	8.0	2.9	3.1	4.7	22.1

2	zation									
2003		3.4	51.9	6.6	3.7	8.2	2.7	2.8	4.2	16.5
2004		7.8	47.7	4.5	8.5	5.4	2.8	1.4	2.5	19.4
2005		5.6	43.4	7.7	6.1	9.2	2.5	4.4	4.5	16.6
2006		4.8	42.4	7.6	4.5	11.6	2.2	6.7	5.6	14.5
2007		3.0	44.0	6.7	4.7	11.4	1.5	7.2	8.1	13.4
2008		5.7	43.4	5.9	4.2	13.9	2.2	5.7	0.5	18.6
2009		4.5	40.0	11.9	2.4	11.7	1.3	8.4	5.8	13.9
2010		3.8	48.5	8.3	4.8	12.5	2.0	4.4	3.2	12.3
2011		4.6	44.7	6.9	5.1	12.1	1.4	4.0	4.1	17.0
2012		5.7	40.6	8.2	4.2	12.5	2.0	6.9	3.0	17.0
2013	Late stage of industrialization	5.2	37.9	8.5	4.5	12.9	1.4	7.3	4.9	17.3
2014		5.6	35.4	8.4	4.6	12.7	1.8	8.2	1.8	21.5

Data source: calculated based on data from China Statistical Yearbook

IV. Major Changes and Potentials of Drivers of Economic Growth in China after China Enters into the Late Stage of Industrialization

(I) Significant Changes in Drivers of Economic Growth

1. Potential of investment growth has significantly dropped.

In terms of investment in manufacturing, due to the severe overcapacity in China's heavy and chemical industries, including a number of emerging industries, in recent years, the growth rate of investment dropped significantly

from 31.8% in 2011 to 22.0% in 2012, to 18.5% in 2013 and 13.5% in 2014. Currently, it's unlikely that China's economic growth rate will pick up significantly, and it will take a long time to solve the overcapacity issue. Thus, the growth rate of investment in the manufacturing industry is expected to remain at a low level during the period of the13th Five-Year Plan.

In terms of real estate investment, besides first-tier cities, the current housing stock in second-tier, third-tier and fourth-tier cities in China , especially in quite a few of third-tier and fourth-tier cities, is already quite large. The research team of the Development Center estimates the average annual growth rate of real estate investment during the13th Five Year Plan period will be only about 5%.

Table7: Estimates of the Housing Stock and the Growth Rate of Residential Property Investment in Urban Areas

Year	Per capita living space in urban areas	Permanent population in urban areas	Housing stock in urban areas	Completed quantity per year	Actual growth rate of investment in freely tradable residential property	Actual growth rate of investment in residential property
	Square meters	100 million people	100 million square meters	100 million square meters	%	%
2010	26.7	6.7	179.0	8.7		
2011	27.2	6.9	187.6	9.7		
2012	27.6	7.1	196.6	10.2	10.4	6.5
2013	28.1	7.3	205.5	10.2	13.5	11.8
2014	28.7	7.5	215.8	11.8	9.9	6.5
2015	29.3	7.7	226.8	12.6	6.5	4.6
2016	30.0	7.9	237.6	12.7	1.8	-2.8
2017	30.6	8.1	248.7	13.1	1.7	-2.9
2018	31.3	8.3	259.9	13.4	0.8	-0.5
2019	31.9	8.5	271.3	13.8	-0.8	-1.0
2020	32.5	8.7	282.4	13.7	-1.7	-1.7
2021	33.1	8.8	292.9	13.3	-1.7	-1.7

2022	33.7	9.0	303.3	13.3	-1.8	-1.8
2023	34.2	9.2	313.3	13.1	-1.8	-1.8

Data source: Xu Wei (2014)

In terms of infrastructure investment, after years of rapid growth, a lot of infrastructure has reached a very advanced level. For example, the highway density in East China has exceeded those in developed countries that have similar population density. However, the highway density in Midwest China is still relatively low. (In 2010, the highway density in East China was 103.683 km per 100 km^2, compared to the 79.404 km per 100 km^2 in ROK). In terms of railway infrastructure, the railway density in East China was 2.329 km per 100 km^2 in 2010, slightly lower than the 3.15 km per 100 km^2 in ROK).

Overall, the growth rate of infrastructure investment in China will drop to the single-digit level in the future. According to the study conducted by Shao Ting (2014), the capital stock of infrastructure per capita in East China was RMB17,436 (calculated at constant 1993 prices) in 2011. As reversely deducted from international experience, if China's reform efforts can effectively promote infrastructure construction and improve the financing institution in a sustainable manner, the infrastructure stock per capita in East China will reach RMB30,957 per person (calculated at constant 1993 prices) in 2023 and the average annual growth rate from 2012 to 2023 is expected to reach 5.4%. Infrastructure stock per capita in Central China and West China will reach RMB23,813 per person and RMB22,112 per person respectively, with an average annual increase of 6.9% and 6.7% respectively.

Table 8: Infrastructure Stock Per Capita When GDP Per Capita is About 20,000 International Dollars Unit: USD per person

	Infrastructure stock per capita	Year	GDP per capita (international dollars)
United States	7201	1984	20123
Japan	8295	1995	19979
Germany	8125	2004	20041
United Kingdom	4501	2003	20353

Spain	6943	2008	19706
Italy	8131	2007	20100
Average	7199		
East China (Estimates)	7199	2023	20000

Data source: Shao Ting (2013）

Note: Infrastructure stock per capita is in constant 1995 U.S. dollars.

2. As traditional comparative advantages are weakened, the space for rapid export growth has become relatively small.

Since China began to adopt the reform and opening up strategy, especially after joining the WTO, China has achieved rapid growth in exports and contribution made by exports to economic growth has also significantly increased. The average export growth rate of China during 1981-2011 was more than 15%, and the average export dependence increased from 7.9% during 1981-1985 to a record high of 26.6% during 2001-2005. However, due to the weak global economic recovery after the economic crisis, the impact of the weakening of China's traditional comparative advantages, increased international competition and other factors, China's export growth rate has maintained at the single-digit level for three consecutive years since 2012. In particular, the export growth rate in 2014 dropped to only 6.1%. The possibility that the growth rate will pick up is expected to be very low.

According to studies conducted in China, from 2015 to 2020, although favorable factors for exports was more than negative factors, the possibility that China's exports will continue to grow at a high speed is small due to the large growth rate denominator. The growth rate of goods export in China is still expected to be two percentage points higher than the growth rate of international trade, that is, the average annual growth rate will be around 6%. In 2020, the value of goods exported from China may break through USD3 trillion, reaching USD3.3 trillion, and the proportion of China's exports in global trade will continue to slightly rise.

Table 9: China's Export Growth Rate and Export Dependency Unit: %

Year	Stage of Industrialization	Average GDP growth rate	Average export growth rate	Export dependence

		(nominal)	(nominal)	
1981-1985	Early Stage of industrialization	24.4	14.7	7.9
1986-1990		29.8	15.7	12.3
1991-1995		33.1	26.6	18.3
1996-2000		10.6	10.3	18.6
2001-2005	Middle stage of industrialization	24.9	13.3	26.6
2006-2011		10.9	16.3	26.3
2013-2014	Late stage of industrialization	5.5	9.2	24.4

Data source: Wind Info

3. China's labor force is shrinking.

According to the National Bureau of Statistics, the working-age population (15-59 years old) was 937.27 million in 2012, representing a decline of 3.45 million from the end of 2012, and the working-age population further declined by 2.27 million in 2013. According to estimates reached by the human resources model, from 2015 to 2020, China's working-age population (15-59 years old) will decline by two million per year on average, and as more young people will participate in study activities because of the rise in education level, the labor force participation rate will continue to drop. Moreover, the decrease in labor force will be greater than the decline in the working-age population.

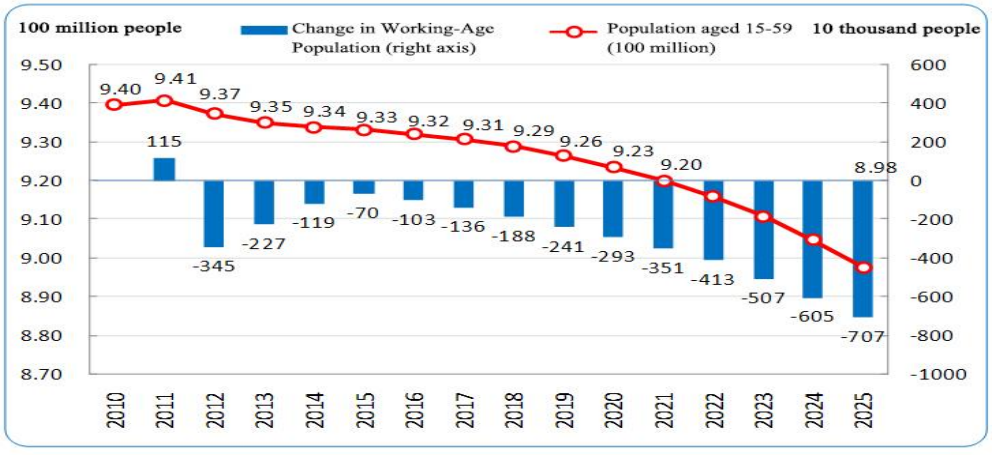

Figure 2: Prediction of China's Working-Age Population and Its Change

(II) Drivers that China may focus its development efforts on in the late stage of industrialization.

After taking into account the characteristics of the new norm, especially the nine major changes of the new norm summarized at the Central Economic Work Conference, we believe that the new drivers of economic growth have the following main features: firstly, domestic demand, especially consumer demand, will play a greater role in economic growth; secondly, improvement of the quality of production factors, especially the improvement of efficiency and optimized allocation of production factors, will become more important; thirdly, innovation will play an increasing important role in spurring economic growth. More specifically, we believe China should focus on development of five new economic drivers:

1. In terms of the aggregate demand, personal consumption, investment and imports and exports have great growth potential.

First of all, personal consumption, including growth of the total value and structural upgrading, is the most important new economic driver. As China grows into an upper-middle-income country, personal consumption is expected to enter a new phase of rapid development. As the structural upgrading of personal consumption becomes increasingly important, population plays a more prominent role in the prosperity of regional economy. There are many factors driving consumer consumption: (a) Income growth. Income is expected to rapidly increase due to the shrinking labor force; (b) Income distribution is expected to be improved as a large number of Chinese will become middle class; (c)As the level of social security increases, households' need to save money for risk prevention purpose is expected to drop; (d) Changes in the age structure. The new-generation consumers are much more willing to spend money. More specifically, currently, demand in health, information and similar industries is expected to rise exponentially. These industrials have great potential for development. In addition, personal consumption in culture, education, tourism and other service industries is also rapidly growing.

Secondly, industrial upgrading, energy conservation and environmental protection are new drivers of investment growth. Currently, China's industry sector is faced with fierce competition among low-end products and a lack of high-end products. Both product quality and branding need to be improved. Especially under the pressure of rising production costs due to shrinking labor

force and rising wages, many companies have to invest to improve product quality by upgrading and cut cost. In the first half of 2014, technological upgrading of enterprises accounted for 39.6% of the total industrial investment, while this ratio reached 50-70% in the developed countries in the 1950s during industrializing. Moreover, China is paying more attention to environmental protection. The new *Environmental Protection Law*, coming into effect in 2015, has greatly raised penalties for environmental violations, which will propel companies to accelerate investment in environmental protection and thus drive the development of the environmental protection industry.

Thirdly, the demand for a number of important commodities in the domestic market also has great potential for growth. Despite being the world's manufacturing powerhouse, China's many products are still heavily dependent on imports. If China makes a breakthrough in production technology in these industries, it will no longer rely on foreign products and market demand will be rising greatly. For example, in 2014, China imported RMB1.34 trillion worth of integrated circuits, close to the imported crude oil (RMB1.4 trillion), more than RMB370 billion worth of cars and RMB159.7 billion worth of aircrafts. Major breakthrough in these areas will possibly lead to new growth points.

2. In terms of factors of production, they also have great potential for quality and efficiency improvement.

Firstly, labor capital has great potential for development. Although China's working-age population has been shrinking since 2012, the average education level in China will continue to grow. According to National *Outline for Medium and Long-term Education* Reform and Development (2010-2020), b**y 2020,** the average years of schooling of China's prime working-age population will rise to 11.2 years from 10.5 years in 2015 and the proportion of workers with high school or higher education in new entrants of labor force will rise to 90% from 87% in 2015. According to the study conducted by Xu Zhao Yuan (2014), China's total labor capital will continue to grow before 2025.

Secondly, the economic efficiency of production factors in China has great potential for growth through optimized allocation. Due to monopolization and weak mobility of production factors in some industries, there is huge difference in productivity of factors of production in different industries in China. For

example, labor productivity and capital productivity in different industries are very different. There is a lot of room for optimization.

Moreover, China still has great potential for innovation by further utilizing late mover advantages. In 2013, China's R&D investment accounted for 2.09% of GDP, while the R&D spending ranked No. 2 in the world, and then accounted for 17.5% of the global R&D spending in 2014. Patents are an important indicator for measuring technological innovation and industrial development. China recorded 928,000 invention patent applications in 2014, representing a year-on-year increase of 12.5%, ranking No.1 in the world for the fourth year in a row.

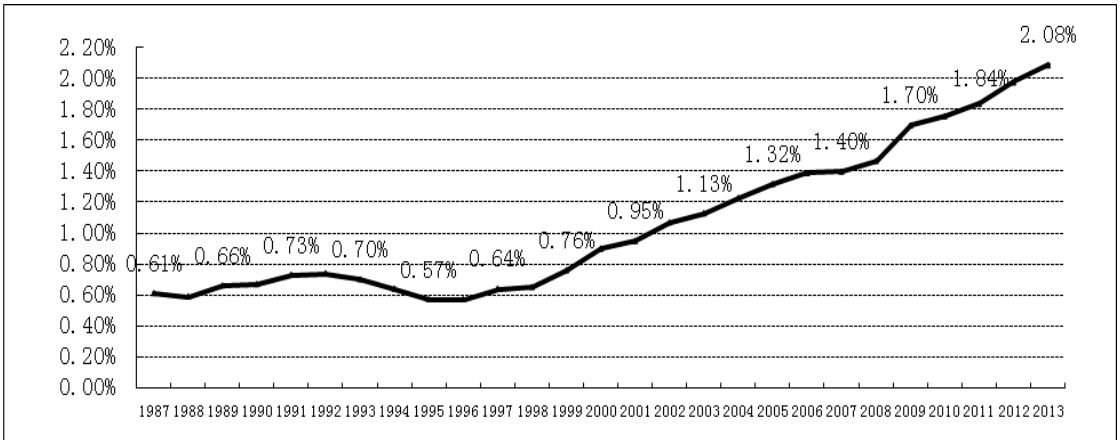

Figure 3 Change in the Proportion of R&D Spending as a Percentage of GDP

Data source: *China Statistical Yearbook* and *Statistical Communique on National Science and Technology Expenditure*

3. Upgrading of traditional industries and the rise of new industries are likely to bring new high-growth points.

In recent years, China's Internet and information technology has entered a stage of rapid development, especially after emergence of e-commerce suppliers, which has greatly stimulated the development of the retail industry. In 2014, the growth rate of e-commerce retail sales in China successfully reached 49.7%, 37.7 percentage points higher than the growth rate of the total retail sales of consumer goods, and drove the sales revenue of the express delivery industry up by 51.9% after an increase of 61.6% in 2013. As the

development of China's Internet industry proceeds, information technology will be further integrated in the industrialization process and many traditional industries are expected to grow.

The new technological revolution currently taking place on a worldwide scale will have a profound impact on the development of China in the future. History has shown that every technological revolution will have an important impact on the production, consumption and even the human development process. Currently, the whole world is undergoing a new technological revolution characterized by digitalization, network, intelligence, personalization, localization, green manufacturing, distributed energy resources and the Internet of Things. The results of this new technological revolution, combined with the results of the last one, will have a profound impact on organization of production, commodity circulation, personal consumption and social interaction.

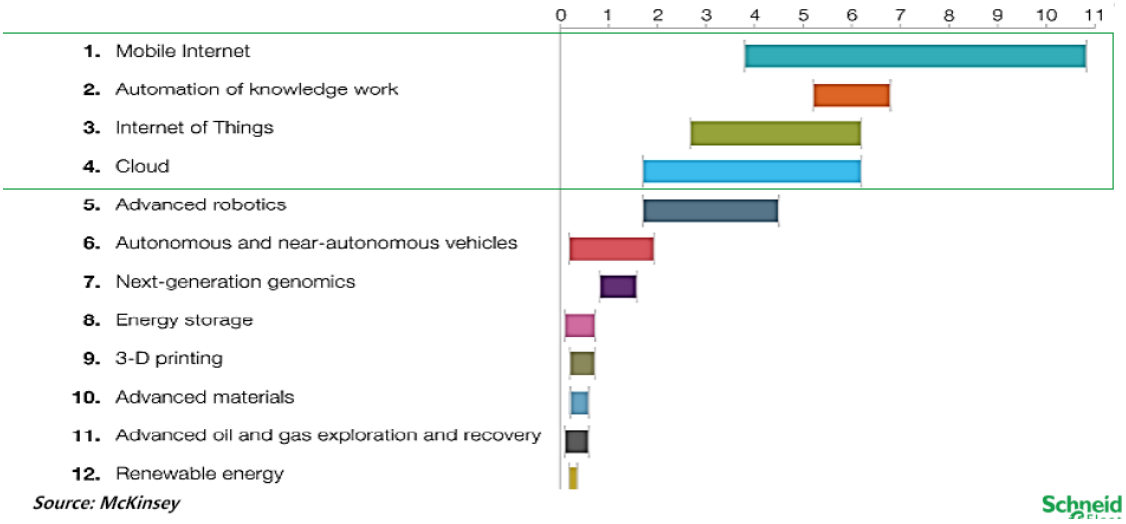

Figure 4 Impact of Disruptive Technology on the Global Economy

According to our research, large economies have some advantages in terms of innovation. Many technologies, before they can become productive forces, need to undergo a cultivation process in the market, and large economies have unique advantages in this regard. For example, it is often very difficult for technologies involving "grassroots innovations" to find consumers that can support industrial development in small economies, which is much easier in big countries.

V. How to Foster New Drivers？

(I) Create a market environment for fair competition

Firstly, we should set up a unified and open market system for orderly competition. To start with, we should lower the threshold for access to most industrial fields and several sectors of some industrial fields, so as to eliminate monopoly and increase efficiency by introducing a more effective mechanism of market competition. Meanwhile, we should introduce the supervision mechanism of monopolized industries, and appropriately increase the applicable scope and enforcement of the Anti-monopoly Law of China governing the enterprise's monopolistic conducts, so as to prevent monopoly enterprises from abusing their market dominance position. In addition, we should break market segmentation and regional protectionism and cancel regional preferential policies that undermine fair competition.

Secondly, we should recreate qualified micro-market entities. On one hand, we should transform government functions, adjust the government-enterprise relationship, effectively reduce administrative intervention of governments at all levels in enterprises' production and management activities and enable enterprises to have more decision-making rights of independent operation. On the other hand, we should deepen the reform of state-owned enterprises, especially, improve corporate governance structure and eliminate soft budget constraint through the reforms of property rights system covering corporatization and equity diversification. Meanwhile, we should strengthen strategic restructuring of state capital.

Finally, we need to optimize the reward structure among different sectors (Baumol, 1990) and guide more innovation elements into productive sectors. Especially, we need to rebalance the reward structure between finance and the real economy. Currently, the financial sector, by relying on its high proportion of profit, high profit margin and high income of its employees, has attracted large quantities of innovation elements. Therefore, we should lower excess earnings by taking financial reform measures including eliminating interest margin through liberating interest rates and creating a unified and open financial market for orderly competition through relaxing control over market access, developing a multi-level capital market and non-banking financial institutions

and promoting reform of policy-based and commercial financial institutions.

(II) Comprehensively implement the strategy of innovation-driven development

Firstly, we should strengthen the principal position of enterprises as innovators and give play to the decisive role of market resources and the guidance and support role of government in a holistic way. We should reform the mechanism of scientific and technological inputs to further improve the efficiency of the funds for research and development, intensify protection of intellectual property rights to effectively protect the legitimate rights and interests of innovators and increase the added value of intellectual property rights, and advance the reform of government administration system and improve the public service system that is conducive to innovation.In terms of innovation investment, incentives like tax preference and subsidies should be given to enterprise R&D spending, more technical and skilled staff should be cultivated, university researchers assessment should be adjusted, and measures should be taken to promote research achievement to use in business. In terms of protecting innovation benefits, it is particularly important to strengthen law enforcement and protection of brands and intellectual property rights, as well as reducing the cost of rights protection.As enterprises are urgent for intellectual property right innovation and brand building, a favorable market environment for outstanding enterprises, well-known brands and high quality products must be established with strengthened law enforcement, the protection of brands and intellectual property rights, and the crack-down of fake and inferior products.

Secondly, we should coordinate and concentrate on some key technologies and generic technologies for industrial development, especially, strengthen the development of basic industrial capacity and research and development of key and generic technologies, that is, the research and development, design and manufacturing of basic materials, basic components and parts, basic technologies and basic manufacturing equipments should be carried out centering around key industries, and a R&D system for key technologies and generic technologies should be established by integrating existing research institutions and enterprises through using fiscal, taxation and financing means.

Finally, we should further improve the mechanism for commercialization of

research and development deliverables of scientific research institutions and institutions of higher learning and promote integration of enterprises, academia and research institutes. We should refer to the Bayh-Dole Act of the United States, remove the institutional barriers to commercialization of research and development deliverables and technology transfer, and give research institutions and researchers more rights to transfer and profit from their scientific and technological deliverables. We should explore to establish a management system for state-owned intangible assets and speed up to improve the incentive fiscal taxation system for transfer and commercialization of technological achievements. We should improve the method for evaluation of research institutions and further enhance original innovation capability and industrialization of research institutions.

（III）Enhance the education and training of labor, improving employment quality and stability

The first recommendation is to strengthen the training of labor and to improve the hiring and the retention of high level professionals. Based on the requirements of industrial upgrading and structural adjustment, we recommend that training funds should be increased and resources more efficiently integrated across universities, governments, and enterprises. State-level mechanisms for attracting outstanding professionals should be further improved. For example, the “Thousand Talents Scheme” promoted by the Central Organization Department works well in many regions. Regions should be encouraged to explore more ways to attract qualified personnel at home and abroad. For instance, to attract overseas professionals, the Management Committee of Zhongguancun and Wuhan East Lake High-Tech Development Zone provide overseas high level professionals with a series of services, including stockholder’s rights drive, property right protection, and Green Card issuance. In the less developed inland areas, the incentives to bring in advanced management and technical personnel should be particularly encouraged.

The second recommendation is to speed up the citizenization of migrant workers and enhance the stability of industrial workers. Helping skilled migrant workers who haven’t settled down to fit in and get settled should be a priority.

By this means, enterprises are provided with an adequate and stable supply of skilled labors, and can cultivate skilled manufacturing work force that has put down roots locally.

(IV) Improve the country's governance system and governance capacity that encourage innovation and green development

Firstly, we should adapt to the dual challenges of changes of the stages of industrialization and the transformation of the governmental administration system. As 18th National Congress of the Communist Party of China proposes, the underlying issue we face in economic structural reform is how to strike a balance between the role of the government and that of the market, and we should follow more closely the rules of the market and better play the role of the government.

Secondly, we should keep up with the times and improve the national governance system, especially, establish a model of economic regulation and control that adapts to the requirements in the new stage. The past rapid development period of industrialization is dominated by large-scale and industrialized industries, and local governments focus on investment promotion for faster development; nevertheless, in the new stage that innovative enterprises are given high priority, the past economic management mode is no longer adapted to the new requirements, and it is inappropriate for the government to continue to achieve industrial development by means of resource allocation and tax preference. However, the entry of the new stage does not mean administrative nonfeasance. On the contrary, the government should make greater efforts in offering public services, protecting fair market competition, protecting intellectual property rights and strengthening supervision, so as to create a new win-win cooperation relationship between government and market as well as government and enterprises.

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