

TRANSITION WITH GROWTH:  
THE CHINESE EXPERIENCE  
IN THE WORLD ECONOMY

by

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## **Abstract**

This paper analyzes the Chinese experience of *gradual transition with rapid growth* (1978-1993) in the world economy. The rapid growth is decomposed into four sources: population/labor-led growth, privatization-led growth, industrialization-led growth and trade/leader-led growth. The growth of China's economy in the 1990s would be at least as fast as in the 1980s, provided there were no political/military turmoil. These results are based on the combination of historical, statistical and theoretical approaches, and on our theoretical analyses of the relationships among transition, industrialization, growth and development. We present stylized facts on transition and growth, and construct conceptual frameworks to match these facts. In particular, we show that a gradualism (big bang) transition may result in growth and inflation (depression and hyperinflation), and a follower with sufficient (insufficient) social capability would catch up to (fall behind) the leader.

Union of historical and theoretical-statistical research should contribute . . . to a much better understanding of current problems by economists, and to a more valid appraisal by them of the changes that take place under their very eyes.

— Simon Kuznets

The whole of science is nothing more than a refinement of everyday thinking.  
Build different models to study the same problem.

— Albert Einstein

## 1. Introduction

Today more than twenty countries with about one third of the population in the world are in the process of transition from planned economies to market economies. Two drastically different approaches were adopted which resulted in two drastically different outcomes. For most countries in Eastern and Central Europe (ECE) and in former Soviet Union (FSU), a "big bang" approach was followed by a sharp decline of production and a continuous acceleration of price indexes. While in China, a "gradualism" approach based on experimentation doubled per capita income in the last decade. Why have different countries adopted different approaches? Why do different approaches result in different outcomes? What policy implications for further reforms and what challenges to existing theories can we draw?

Economists in general are not well prepared to answer such important and challenging questions. Such a large scale and unprecedented transition is in fact a shock to economics. As a result perhaps economics itself is in transition. Economics of market competition mechanism is fairly mature. Whereas economics of development is still in the early stage of development and growth theory is growing to a new stage to incorporate human capital and international trade to answer the questions of economic development. (See Backus, Kehoe and Kehoe (1992), Lucas (1988), Parente and Prescott (1993), and Romer (1986) among others.) Economics of transition (from planned economies to market economies) is yet to be born.

And yet the literature of transition has accumulated quite a bit and is growing very rapidly. Among other contributions <sup>1</sup>the works of the World Bank and IMF have increased the stock of our knowledge about transition. To a large degree one common feature of the existing literature is that a different paper adopts a different methodology to study a different problem. This approach is very important and necessary in deepening our understanding of certain aspects of the big picture. On the other hand, this approach is limited in seeing the big picture as a whole.

To avoid the limited feeling of a blind person using a single finger to touch an elephant, we will pursue a different strategy which complements the approach discussed above. We will focus on the Chinese experience since its transition is relatively long,

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<sup>1</sup>For a sample, see Fischer (1992), Gordan and Li (1991), Green (1993), Lin (1992), Lipton and Sachs (1990), Murrell and Wang (1993), Naughton (1991), Summers (1992), Weitzman and Xu (1993), and Zhang (1993).

continuous and successful, since its economy is imperative to itself as well as to the world in the 1990s, and since we have long living and working experience there. The Chinese experience is rich and complex since it involves transition, industrialization and growth. We will attack a comprehensive problem--the relationships among transition, development and growth, by employing a comprehensive methodology—the combination of historical, statistical and theoretical approaches.

The Chinese experience is unique in adopting an effective gradualism transition based on experiments, in creating Town & Village Enterprises (TVEs) to remarkably facilitate industrialization, and in achieving a much higher growth rate as a follower than the leading developed economies. Our task is to put this unique experience into the perspectives of development history and the current world economy, and provide some policy implications for China as well as for other countries and make some theoretical contributions to the problem of economic transition, industrialization, growth and development in general.<sup>2</sup>

The history of development and growth witnessed the changes of economic leadership and the acceleration of top growth rates. In the middle ages, China was the economic leader in the world. Around 1500 Western Europe began to edge ahead of the Chinese performance. Although the failure of China to sustain its economic supremacy is a great enigma, we think that the closed door policy was the main cause. From about 1700 to the 1780s, the Netherlands was the leader. The British led from 1780s to around 1890. The USA has been the leader from around 1890 to the present. Who will the next leader? Does China have the potential?

The UK took 58 years (1780-1838) to double her output per capita, the US took 47 years (1839-1886), Japan 34 years (1885-1919), Turkey 20 years (1857-1877), Brazil 18 years (1961-1979), Rep. of Korea 11 years (1966-1977), and China 10 years (1977-1987).<sup>3</sup> Why could some followers grow faster than the leader?

The history also witnessed some followers falling behind. The growth rate of Sub-Saharan Africa was lower (1950-1989 and perhaps 1913-1950 also) and will possibly continue to be lower than the OECD in the 1990s. Latin America once had a higher growth rate (1913-1950) but fell behind thereafter and will probably continue to fall behind the OECD in the 1990s. So does Eastern Europe.<sup>4</sup>

The poor performance of Sub-Saharan Africa is largely due to natural disasters and military conflicts. The failure of Latin America to continue to catch up is clearly related to the fact that many countries there adopted import substitution policy in the 1960s and 1970s. This is in sharp contrast with the growth miracles of the Eastern Asian NIEs who adopted export promotion policy in the same period. Today history brings us another sharp contrast: the gradualism transition adopted in Eastern and Southeastern Asian formerly planned economies (FPEs)—China and Vietnam vs. the big bang transition adopted in most countries of ECE and FSU. The impact of gradualism vs. big

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<sup>2</sup>We put China into the perspectives of transitional economies, Great China and the world economy to focus on the studies of transition, trade and growth/development respectively.

<sup>3</sup>This is based on World Development Report, World Bank, 1991, p.12.

<sup>4</sup>This is based on World Development Report, World Bank, 1991, p.14;1990, p.16.

bang on growth and development will probably be at least as profound as that of export promotion vs. import substitution.

No single existing model could satisfactorily explain the Chinese experience from the perspective of development history. In our view nor could a unified framework be built to do the job in the near future. We follow the philosophy of Einstein—to build different models to attack the same problem.

The rest of the paper is organized as follows. Section 2 provides a set of stylized facts of transitional economies to date and focuses on the contrast of the Chinese performance with that of ECE and FSU. Major facts of China's economic growth and structure change with emphasis on the sources of growth (1978-1991) are presented in Section 3. Conceptual frameworks are constructed in Sections 4, 5 and 6 to match the stylized facts, which focus on transition, industrialization and growth respectively.

In Section 4, we present the economics of transition from a planned economy to a market economy and discuss the dual system, transition approaches, the behavior of state owned enterprises (SOEs)—overproduction and losses, and price liberalization-led inflation. Section 5 is about economics of industrialization. The dual economy model is reconsidered. The classification of three modes of industrialization is proposed. And a formula for computing structure change-led growth is given. In Section 6, a set of stylized facts of the world economic growth is presented, and a leader-follower model is constructed to match these facts and to show how a follower could catch up to or fall behind the leader.

Based on the facts and theories presented in the previous sections, Section 7 analyzes China's economy in transition: initial conditions, boundary conditions, transitional dynamics (policy as inputs), regional coordination problem and business cycles. Finally, based on the analysis of scale and scope, a development index is proposed to compare development levels of different countries in Section 8. In conclusion, policy implications in general and in particular for China and theory implications are made in Section 9.

## **2. A Set of Stylized Facts of Transitional Economies To Date**

The following stylized facts are based on China (1978-1993) and most countries in ECE and FSU (mostly 1990-1993):

1. In a transitional economy, there exists a dual system in which the state sector and the private sector (or nonstate sector) coexist nontrivially. The private sector consists of agriculture and small industrial firms, while large industrial enterprises are in the state sector.
2. Small firms grow faster than large firms.
3. A significant proportion of SOEs operate with losses.
4. Government runs with deficits.
5. Direct foreign investment (DFI) rises.
6. Production rises in China, and it declines in ECE and FSU.
7. The urban unemployment rate declines in China, and it rises in ECE and FSU.

8. Inflation prevails in China, hyperinflation prevails in ECE and FSU.
9. The real wage rises in China, and it declines in ECE and FSU.
10. The export-GDP ratio rises in China, and it declines in ECE and FSU.

In ECE and FSU, the end of the Council for Mutual Economic Assistance (CMEA) as well as USSR is an important factor for the declines of exports, while the beginning of openness to the West contributes to the rise of DFI. The rationale of other facts will be given in the subsequent sectors.

Table 2.1 Annual Growth Rate of Real GDP (%)

	1990	1991	1992
ECE	-7.4	-13.5	-7.5
FSU	-2.2	-9.0	-18.5
China	5.2	7.0	12.8

Sources: World Economic Outlook, May 1993, IMF; People's Daily, Overseas Edition, February 20, 1993.

Table 2.2 Annual Percent Change of Consumer Prices

	1990	1991	1992
ECE	158.8	119.4	196.6
FSU	5.4	94.7	1,201.8
China	1.6	2.9	5.6

Sources: World Economic Outlook, May 1993, IMF; People's Daily, Overseas Edition, February 20, 1993.

### 3. Major Facts of China's Economic Growth and Structure Change since 1978

The following facts are based on the data provided by the Statistical Bureau of China. The economic statistical approach is in transition from MPS (material product system) to SNA (system of national accounts) in China. Because of this and the fact that the price system has not yet been fully liberalized, we should be cautious about the data. Nevertheless, our major qualitative conclusions would not be affected by this factor.

Table 3.1  
Growth of Output, Labor and Productivity  
by Sector, 1978-1991 (1978 Price)

	Total	Primary Industry	Secondary Industry	Tertiary Industry
Real GNP	8.6	5.3	9.9	9.9
Labor	2.9	1.6	4.6	6.5
Output Per Worker	5.6	3.6	5.1	3.2

Source of basic data: Statistical Yearbook of China, 1992

Table 3.2  
Share of Output (GNP) by Sector (At Current Price)

	1978	1985	1991
Primary Industry	28.4	29.7	26.6
Secondary Industry	48.6	45.2	46.1
Tertiary Industry	23.0	24.8	27.2

Source: Statistical Yearbook of China, 1992

Table 3.3  
Share of Labor by Sector

	1978	1985	1991
Primary Industry	70.5	62.4	59.8
Secondary Industry	17.4	20.9	21.4
Tertiary Industry	12.1	16.7	18.9

Source: Statistical Yearbook of China, 1992

From 1978 to 1991, GNP grew 8.6% annually, about two thirds of which were due to labor productivity growth (about one third due to labor force growth). Industry sector product and service sector product grew almost twice as fast as agriculture. More than two thirds of agriculture output growth, half of industry output growth and one third of service output growth came from labor productivity growth. The growth of labor productivity was highest in industry sector, and lowest in the service sector. In 1991, about three fifths of the total labor force were in agriculture, who produced about one quarter of GNP. This implies that the (average) labor productivity in nonagricultural sector was 4.5 times as high as that in agricultural sector. The nonagriculture-agriculture labor productivity gap was unusually high, which is a reflection of the anti-migration

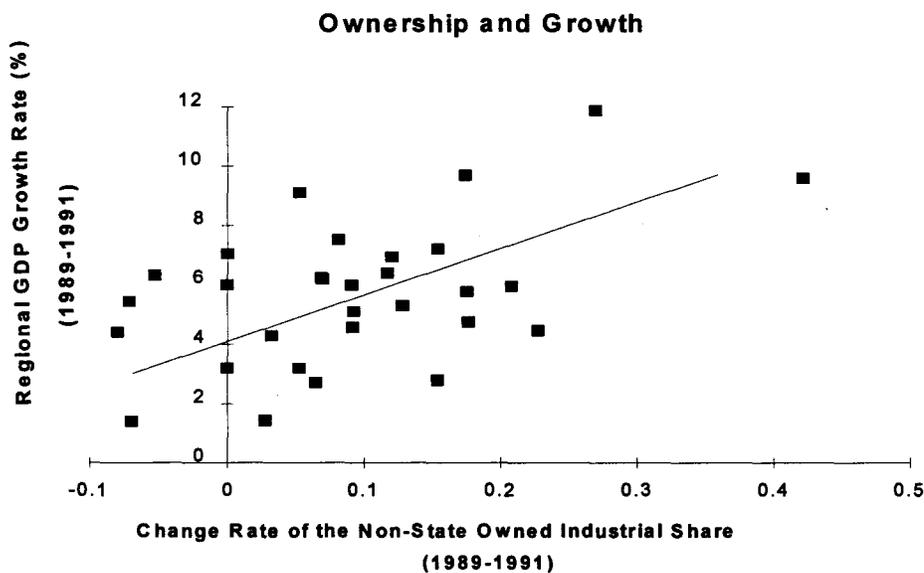
policy. This implies that the effect of structural change on growth would be unusually high (this will be explained in detail in Section 5.3).

From 1978 to 1991, population grew 1.4% annually, while labor force grew 2.9% that is more than twice of the former. This is due to the high birth rate in the 1960s. The annual growth rate of GNP per capita was 7.1%, of which one fifth came from labor-population ratio growth (1.5% annually), four fifths came from the growth of labor productivity (5.6% annually).

The total growth is decomposed into four sources:

1. Population/labor-led growth
2. Privatization-led growth<sup>5</sup>
3. Industrialization-led growth
4. Export-led growth.

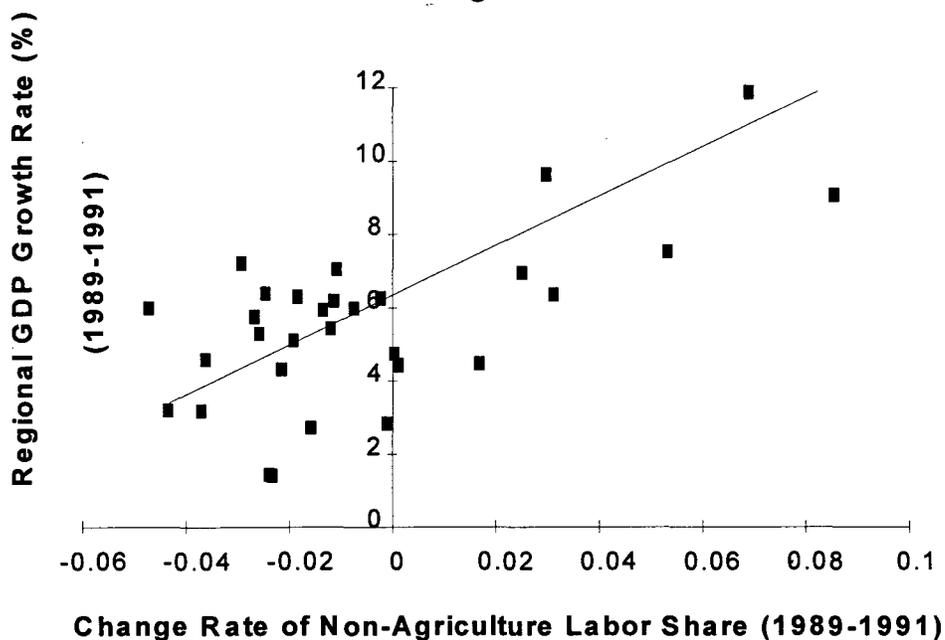
Source 1 is analyzed in the discussion above. Sources 2, 3 and 4 are captured well in the following figures in order. Due to the shortness of the time span of transition to date (1978-1993), statistics based on time series are quite limited. Fortunately, there are about 30 provinces in China, which makes cross-region analysis very attractive. The three figures show that the growth rate of output is positively correlated with the speeds of privatization, industrialization and (to a less degree) export-promotion. The rationale of causality will be given in the next three sections in order.



Source of basic data: Statistical Yearbook of China, 1990-1992

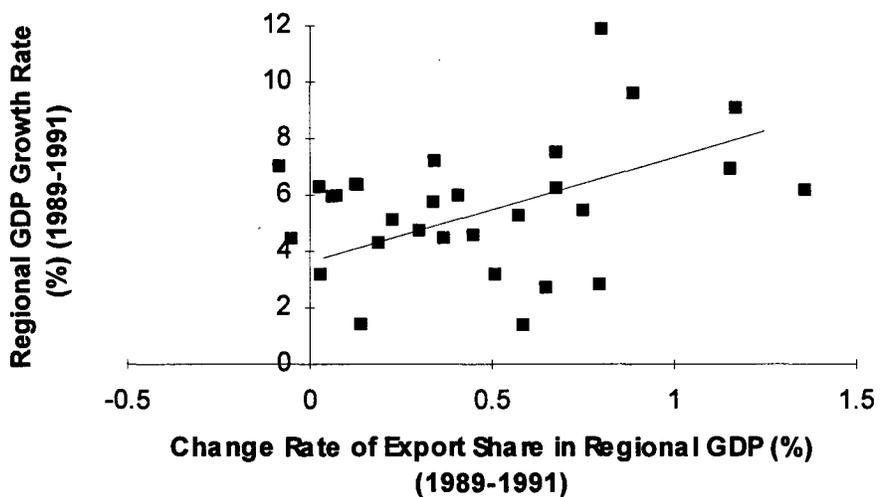
<sup>5</sup>By privatization we mean the expansion of the private sector, including both creation from scratch and transition from the state sector.

### Structural Change and Growth



Source of basic data: Statistical Yearbook of China, 1990-1992.

### Export and Growth



Sources of basic data: Statistical Yearbook of China, 1990-1992; Almanac of China's Foreign Trade, 1990-1992.

## 4. The Economics of Transition: From A Planned Economy to A Market Economy

### 4.1 A Model of A Dual System and Gradualism vs. Big Bang

Technically here we borrow the Harris-Todaro model and follow the nice exposition of Basu (1984). There are two sectors: the state sector (S) and the private sector (P) (rather than a rural sector and an urban sector). They produce  $X_s$  and  $X_p$  units of a homogeneous product and employ  $L_s$  and  $L_p$  units of labor. First, consider the short run and assume that the capital endowment is fixed in each sector. Hence, output in each sector is supposed to be a function of labor:

$$\begin{aligned} X_s &= f_s(L_s), \quad f'_s > 0, \quad f''_s < 0, \\ X_p &= f_p(L_p), \quad f'_p > 0, \quad f''_p < 0. \end{aligned}$$

The total labor units available in the economy is fixed at  $L$ . By capital here we mean both physical capital and *organizational capital* which includes management, marketing and government regulations among other nonphysical factors.<sup>6</sup>

Assume that (i) the state sector can adjust (real) wages both upward and downward, but it cannot lay off workers, which ensures that there is no state unemployment; (ii) the private sector can lay off workers, but it cannot adjust wage downward below certain level. The presence of labor unions or efficiency wages may prevent a private sector firm from adjusting its wage downward.<sup>7</sup> A private sector worker may be laid off with probability  $1 - L_p / (L - L_s)$ . Suppose that both sectors maximize profits. This implies that the wages in the two sectors are  $w_p = f'_p(L_p)$ ,  $w_s = f'_s(L_s)$ . The expected wage of a private sector worker equals  $f'_p(L_p)L_p/(L - L_s)$ . In equilibrium where migration across sectors stops, we have

$$f'_p(L_p)L_p/(L - L_s) = f'_s(L_s) \quad (1)$$

Suppose

$$w_p \geq \bar{w}_p \quad \text{for some } \bar{w}_p.$$

It is assumed that  $\bar{w}_p$  is above the wage that would prevail if wages were flexible. This ensures that, for wages  $\bar{w}_p$  and above, there is an excess supply of labor in the private sector which implies that competition will drive  $w_p$  to  $\bar{w}_p$ . Hence the profit-maximizing condition may be written as

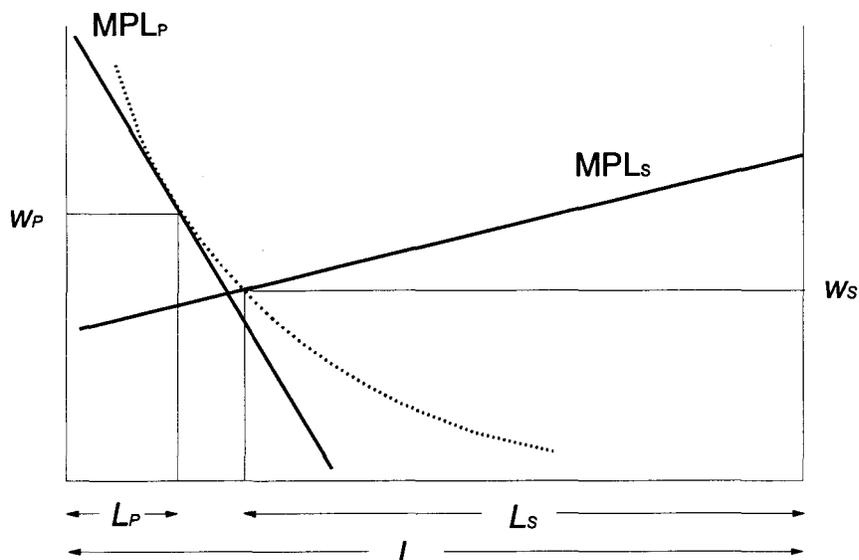
$$f'_p(L_p) = \bar{w}_p \quad (2)$$

By solving (1) and (2), we can determine the equilibrium employment and wage in each sector. Geometrically, we have<sup>8</sup>

<sup>6</sup>Prescott and Visscher (1980) referred the notion organization capital as the information accumulated in the firm.

<sup>7</sup>These assumptions are consistent with the report by Craig and Pencavel (1992) on manufacturing plywood industry of the Pacific Northwest. They found that when falling output prices call for cuts in costs, cooperatives (similar to the state sector) tend to adjust wages (rather than employment) while private firms are more inclined to reduce employment and hours of work (rather than wages).

<sup>8</sup>Straight lines are only for simplicity of illustration.



where the dotted curve is a hyperbola defined in (1), and MPL is marginal physical product of labor.

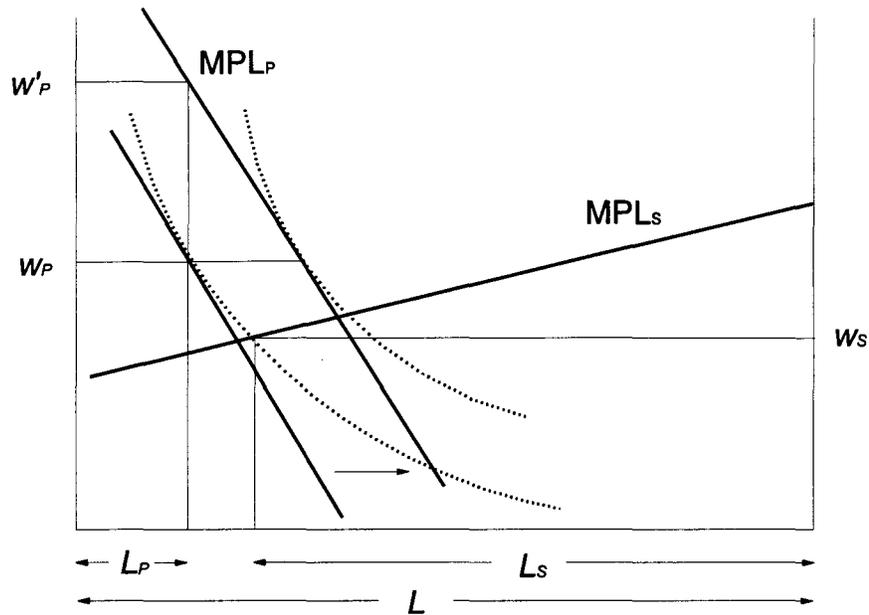
The following analysis is based on three assumptions:

- (i) Physical capital and organizational capital are complementary.
- (ii) Physical capital can be transferred from the state sector to the private sector, while organizational capital cannot.<sup>9</sup>
- (iii) It takes time to accumulate organizational capital.

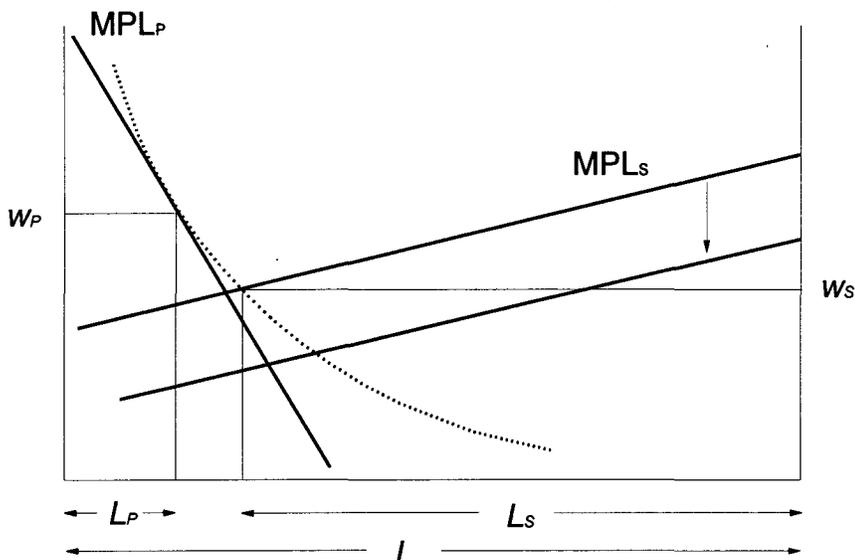
If a gradualism transition approach (in its pure form: encouraging the development of the private sector, but not dismantling the state sector) is adopted, then the capital endowment in the state sector remains unchanged, while the capital endowment in the private sector expands. It is important that there is enough time for both physical and organizational capital to be accumulated in the private sector. The  $MPL_p$  will shift rightward while  $MPL_s$  will stay in the same place. Now the wage gap will attract some workers out of the state sector. Then state employment will shrink, the state wage will rise, private employment will rise and private wage will decline from  $w'_p$  to  $\bar{w}_p$  due to unemployment pressure and institutional rigidities. The average wage will rise and unemployment rate in the private sector will fall. These results are consistent

<sup>9</sup>For example, a truck can be used in either the state sector or the private sector. But the knowledge of central planning cannot be used in the private sector.

with the Chinese experience. The private sector will continue to expand until the turning point is reached---where the wage gap disappears and the transition process ends.



On the other hand, if a big bang approach is adopted, then physical capital expands in the private sector, and shrinks in the state sector. While organizational capital remains the same in both sectors, since state organizational capital cannot be transferred to the private sector and private organizational capital cannot be expanded overnight. As a result,  $MPL_p$  will remain in the same place (or shift rightward slightly), while  $MPL_s$  will shift downward. The unemployment rate will go up and the average wage will go down. These results are consistent with the ECE and FSU experiences.



Since it takes less time to accumulate organizational capital for traditional agriculture and smaller industrial firms than for large industrial firms, the transition of the former is easier and faster than the latter. This implies that small firms may grow faster than large ones in the process of transition, which is in contrast with Gibrat's law—the growth rates of firms are independent of firms' sizes. These results seem consistent with the transitional experience.

#### 4.2 A Model of State Owned Enterprises' Behavior: Overproduction and Losses

The assumption that state sector maximizes profit is only a rough approximation which does not harm our purpose in Section 4.1. To explain the common losses of SOEs (see Table 4.1), we need to scrutinize the behavior of SOEs in detail. Under strict planning, SOEs have little freedom to make decisions. Under market competition, private firms maximize profits. In the process of transition, a SOE makes decisions to maximize an objective which may be an increasing function with respect to both profit and output. This is because the manager of a SOE is usually nominated by and responsible to his upper level organization which assigns profit as well as output related quotas, and his salary and promotion depend on the implementation of the quotas; or because he is elected by workers in the firm and he then has the incentive to increase the workers' wages which may depend on both profit and total revenue hence output.

Let  $g(z,y)$  be a SOE's objective function, where  $z$  denotes profit,  $y$  output, and  $z = h(y)$ . Assume

$$g'_z > 0, g'_y > 0, h'' < 0,$$

$$h'(y^*) = 0, h(y^*) = 0.$$

A profit maximization firm will produce  $y^*$  units, and earn zero profit in the long run competitive equilibrium. On the other hand, for a firm to maximize  $g(z,y)$  subject to  $z = h(y)$ , the necessary condition is

$$g'_z h' + g'_y = 0$$

which implies the optimizer  $\tilde{y}$  satisfies

$$h'(\tilde{y}) < 0.$$

It follows that  $\tilde{y} > y^*$ ,  $h(\tilde{y}) < 0$ . That is, SOEs tend to overproduce and operate with losses. This result depends on the assumption  $h(y^*) = 0$  which holds on average.

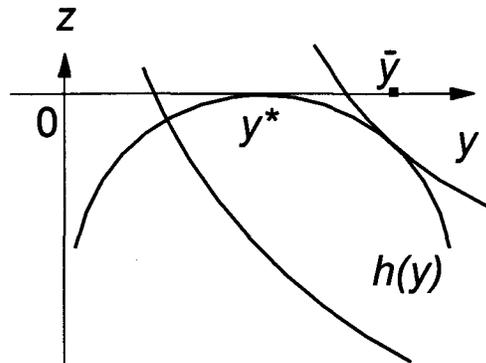


Table 4.1 Losses of Money-Losing SOEs in China

	Total Losses as % of GNP	Total Subsidies as % of GNP	# of Money- Losing Industrial SOEs in %
1978	3.2	NA	NA
1979	2.9	NA	NA
1980	3.1	NA	NA
1981	2.8	NA	NA
1982	3.8	NA	NA
1983	4.1	NA	NA
1984	2.9	NA	NA
1985	3.0	NA	9.5
1986	4.3	3.3	13.1
1987	4.3	3.3	13.0
1988	3.7	3.2	10.9
1989	NA	3.7	16.0
1990	NA	3.2	27.6
1991	NA	2.6	NA

Sources of basic data: Tables 13 and 14 of Sicular (1992), Statistical Yearbook of China, 1992

#### 4.3 A Model of Price Liberalization Led-Inflation

Inflation is associated with transition in every formerly planned economy. And a big bang approach usually results in hyperinflation (such as in Poland, Ukraine and Russia), while a gradualism approach typically involves a much lower inflation rate (such as in China and to a certain degree in Hungary). Overproduction and losses of SOEs are important causes of the continuous government deficits and the rise of the general price level. But the sharp and continuous rise of the consumer price index in every transitional economy was a consequence of other more important factors.

A stylized fact in every FPE is that the consumer necessities were significantly underpriced. Price liberalization of consumer necessities inevitably involves an immediate, sharp rise of these prices. But why is the CPI continuously rising? A nontrivial proportion of consumers (the poor group) in a transitional economy live on or near the "subsistence level" and a sharp price rise of consumer necessities would push them below the "survival line". Thus subsistence subsidies are inevitable. Practically personal wealth is private information and everyone has incentives to underreport his true wealth for price subsidies. Even if the government were able to identify the poor group, the relative rich would argue that it is fair to offer everyone an equal subsidy. Therefore,

practically the government subsidizes everyone equally.<sup>10</sup> A model based on the above argument is constructed as follows.

Let  $\alpha$  be the proportion of the poor who each lives on or near subsistence level and has wealth  $w_{10}$ . Suppose the relative rich each has wealth  $w_{20}$  and  $w_{20} = rw_{10}$ ,  $r > 1$ . The initial price level of consumer necessities is  $P_0$ . Suppose immediately after price liberalization,  $P_0$  goes up by  $\pi_0$ . The subsidies will be made the same to everyone in such a way that the (real) wealth of the poor after subsidies will not be lowered. This means that the government will subsidize  $w_{10}\pi_0$  to everyone. It is easy to check that after the subsidies the total nominal wealth will grow by

$$\pi_1 \equiv \frac{\pi_0}{\alpha + r(1 - \alpha)}.$$

For simplicity, suppose the increase of nominal wealth has full effect on the price level.<sup>11</sup> This means that in the next period ( $t = 1$ ), price will rise by  $\pi_1$ . Then the government will need to subsidize everyone further by  $w_{10}(1 + \pi_0)\pi_1$ . Then the nominal wealth and hence price (in period two) will increase by

$$\pi_2 \equiv \frac{(1 + \pi_0)\pi_1}{\alpha(1 + \pi_0) + (1 - \alpha)(r + \pi_0)}.$$

In general, we have

$$\pi_{t+1} \equiv \frac{A_{t-1}\pi_t}{\alpha A_{t-1} + (1 - \alpha)(r - 1 + A_{t-1})},$$

$$A_{t-1} = (1 + \pi_0)(1 + \pi_1) \cdots (1 + \pi_{t-1})$$

for  $t \geq 1$ , where  $A_t$  is the cumulative inflation rate at date  $t$ . It can be shown that for all  $t$

$$\pi_{t+1} < \pi_t,$$

$$A_t \rightarrow A^* \equiv \pi_0 \left(1 - \frac{1 + \pi_0}{\alpha + (1 - \alpha)r}\right)^{-1}.$$

Notice that  $A^*$  increases with both  $\pi_0$  and  $\alpha$ , decreases with  $r$ . In fact,  $A^*$  satisfies

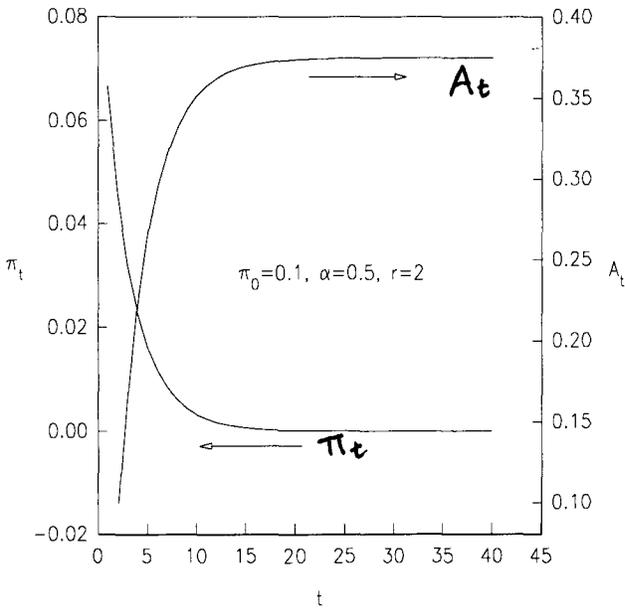
$$1 + A^* = (1 + \pi_0) \left(1 + \frac{A^*}{\alpha + (1 - \alpha)r}\right).$$

Thus  $A^*$  is the total cumulative inflation rate; it is also the one step equivalent inflation rate.

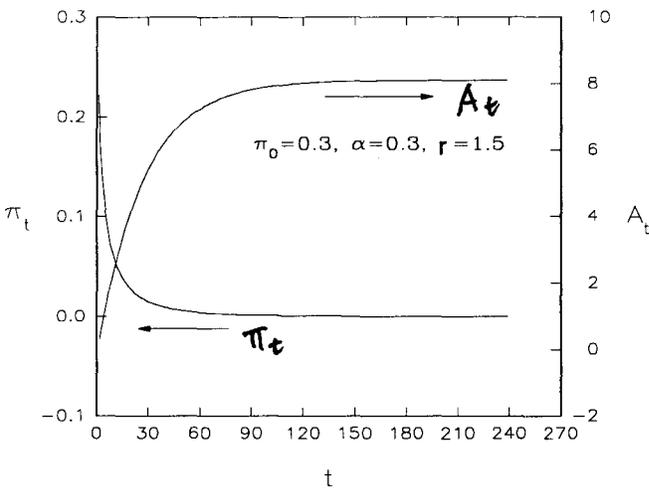
*Example 1* Let  $\pi_0 = 10\%$ ,  $\alpha = 0.5$ ,  $r = 2$ . Then  $A^* = 37.5\%$ .

<sup>10</sup>It indeed happened in China in 1979-80, 1984-85, 1988-89, 1992-93, and perhaps in ECE and FSU too.

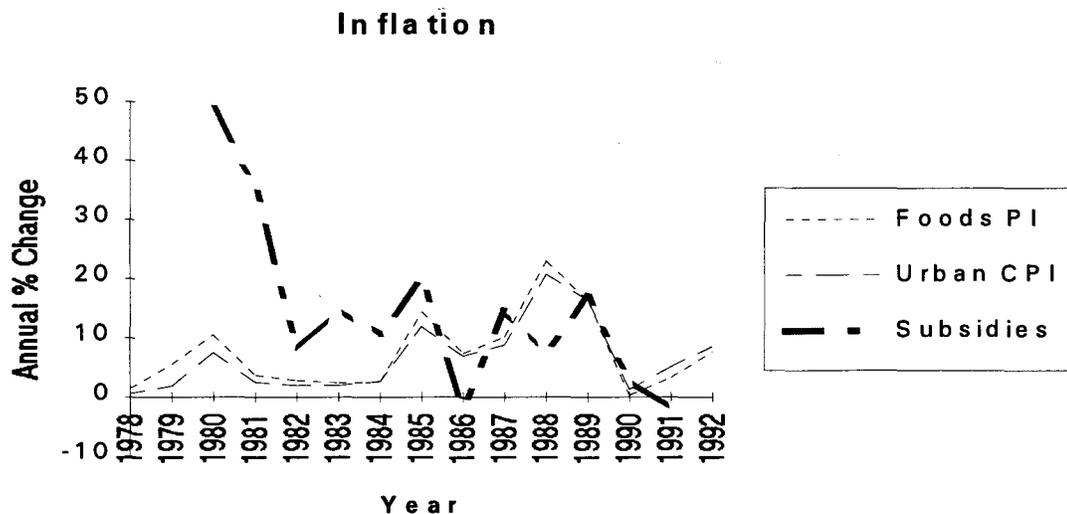
<sup>11</sup>In reality, on one hand, the proportion of spending on necessities is less than one. On the other hand, the velocity of money is larger than one. These two factors tend to offset the effects of nominal wealth increase on the price level of necessities.



*Example 2* Let  $\pi_0 = 30\%$ ,  $\alpha = 0.3$ ,  $r = 1.5$ . Then  $A^* = 810\%$ .



Example 2 appears similar to the Russian experience. While Example 1 seems like the Chinese experience (for details, see Section 7.3). Since 1978 there were four incidents of relatively high inflation in China: 1980, 1985, 1988-89 and perhaps 1993. In each occurrence the prices of some foods were liberalized or partially liberalized, then price increased and price subsidies followed. In addition during each of the first three episodes, after the initial inflationary surge, the inflation rate decreased. This matches the model very well. The only exception is the decline of growth rate of price subsidies in the 1988 price hike, which triggered the demonstration in the following spring. The annual budgetary price subsidies were about 2 to 3 percent of GNP, and this ratio reached its peak (3.4%) in 1983 and has been declining ever since then (see Table 4.2).



Source of basic data: Statistical Yearbook of China, 1992; People's Daily, Overseas Edition, February 20, 1993.

Table 4.2 Budgetary Price Subsidies  
as Percentage of GNP in China (1978-91)

Year	78	79	80	81	82	83	84	85	86	87	88	89	90	91
%	0.3	2.0	2.6	3.3	3.3	3.4	3.1	3.1	2.7	2.6	2.3	2.3	2.2	1.9

Source of basic data: Statistical Yearbook of China, 1992

## 5. The Economics of Industrialization: The Dual Economy, Modes and Growth

### 5.1 A Model of a Dual Economy Reconsidered

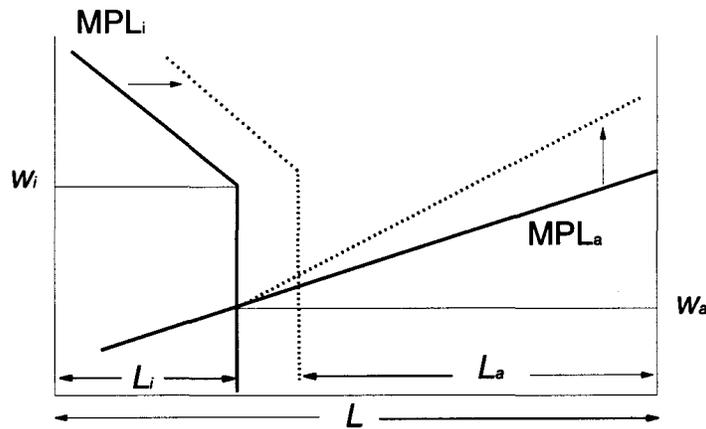
Consider a model with two sectors: agriculture and industry. Strong evidence suggests that the surplus labor with zero MPL in the agriculture sector suggested by Lewis and others does not exist (see Hagen (1986), pp.182-184). In our view, this is expected from the following logic: If there exists surplus labor with zero MPL in the agricultural sector, and at the same time MPL in the industrial sector is consistently positive, then the surplus labor in the agricultural sector should have moved to the industrial sector.<sup>12</sup> Even if there is zero MPL region in the industrial sector, it is not necessary that there exists surplus labor with zero MPL in the agricultural sector as the following analysis suggests.

In fact, we do conjecture that there may be a zero (or very low) MPL region in the industry sector due to the existence of some bottlenecks in developing countries. First of

<sup>12</sup>Here we ignore migration cost.

all, in some industrial sectors labor and other inputs (machinery and raw materials) may be more complementary than in the agricultural sector.<sup>13</sup> More importantly, for developing countries the technology adopted in the industrial sector comes mainly from developed countries which created the technology for labor saving purpose. Third, in developing countries financial markets are usually not complete hence the bottleneck problem is not unusual. Finally, the bottleneck problem may be even more grave in developing planned economies due to distortionary price controls.<sup>14</sup>

The hypothesis of the existence of a zero  $MPL_i$  region naturally implies that there may be wage gap between the two sectors (see the following figure).<sup>15</sup>



This result is similar to that based on efficiency wages hypothesis. Also recall that Lewis attributed the wage gap to the stylized fact, higher urban living cost and migration cost, Harris and Todaro attributed it to urban unemployment, and Stiglitz to training cost (or labor turnover cost) in the industrial sector.

Historically, both industrial labor productivity and agricultural labor productivity have been continually rising. In most OECD countries, industrial labor productivity grew faster than agricultural labor productivity prior to the 1950s. Since then agricultural labor

<sup>13</sup>In fact, Arrow, Chenery, Minhas and Solow (1961) found that the elasticity of substitution of labor and capital is higher in the agriculture sector than in the industry and service sector.

<sup>14</sup>Rusek (1988) reported that the elasticity of substitution of labor and capital may be as low as 0.1 in the industry sector in Czechoslovakia from 1971 to 1985.

<sup>15</sup>The actual wage in the industrial sector may lie anywhere between  $W_a$  and  $W_i$ , depending on many factors such as the bargaining power of the industrial workers. Notice that the figure suggests that there is no surplus labor with zero MPL in the agricultural sector.

productivity has grown faster than industrial labor productivity. This is mainly due to the Green Revolution in the late 1960s and 1970s. In agriculture, land is fixed, while capital input can be increased. Hence  $MPL_a$  can be increased but it can only be increased asymmetrically, that is, the less labor input, the more the  $MPL_a$  can be increased. Geometrically, as capital input increases,  $MPL_a$  will rotate upward while  $MPL_i$  will shift rightward entirely (see the above figure).

An important implication of the above hypothesis is that after reaching the turning point where wage gap disappears, the industrial sector continues to expand, while the agricultural sector continues to shrink. In reality, the urban-rural wage gap persists due to urban-rural human capital gap as well as other reasons.

In China, the last decade witnessed a urban-rural wage ratio of about 2 and  $MPL_i$ - $MPL_a$  growth rate ratio of approximately 2. Transportation, energy and raw materials have been being bottlenecks for several decades.

## 5.2 The Modes of Industrialization and TVEs in China

In the above analysis, we did not consider population change. A stylized fact is that in the early stage of industrialization, the population growth rate is significantly higher in the rural sector than in the urban sector. As a result in the rural sector there usually exists "surplus labor" with very low MPL (not necessarily with zero MPL). In addition, historically the labor productivity in the industrial sector hence wage is consistently higher than that in the agricultural sector. It follows that the surplus labor in agricultural sector moves consistently to the rural nonagricultural sector, the urban sector or foreign countries. We classify three modes of industrialization according to the main destination of the surplus labor:

*External Migration.* The domestic population density is high, while the population density abroad is low. So the surplus labor could migrate abroad. The industrialization in Western Europe from 1770 to 1913 belongs to this mode. The surplus labor migrated to their offshoots: US, Canada, Australia and New Zealand.

*Internal Migration.* The domestic population density is low. So either there is no surplus labor or the surplus labor from the rural sector could migrate to the urban sector. The industrialization in Western European offshoots belongs to this mode.

*Post Migration.* The domestic population density is high and the population density abroad is also high. So there is little chance for surplus labor to migrate abroad. And it is not easy for surplus labor to migrate from the rural sector to the urban sector or to foreign countries. Two results are followed in the early stage of industrialization: a significant proportion of rural surplus labor is transferred to the rural, nonagricultural sector, and a labor intensive export sector develops. At the same time, capital may flow from the urban to the rural sector and foreign capital may flow into the country. Some people may go abroad to advanced countries to acquire advanced human capital and return afterwards. The industrialization of the Eastern Asian NIEs and now China belongs to this mode, so will the industrialization of other countries in the future.

China's rural surplus labor has very limited chance to migrate to the urban sector, not only because she has a large and high proportion of rural population, but also because of her planning system which blocks free migration. As a result, most of these workers

went to the rural nonagricultural sector; at the same time capital and technology (such as via the Spark Plan) was transferred from the urban sector to the rural sector. Then TVEs were born and grew spectacularly. The TVEs now (1991-1993) employ more than 100 million workers, their industrial product is about one third of the national industrial product, and more than one fifth of the national export comes from these enterprises.

### 5.3 A Model of Industrialization-Led Growth

Next we construct a formula to compute industrialization-led (also called structural change-led) growth. Suppose the total employment is fixed at  $L$ , of which  $L_a$  is agricultural employment,  $L_i$  is industrial (or nonagricultural) employment. Denote the average labor productivity in the agriculture and industry sectors by  $W_a$ ,  $W_i$  respectively. Let  $y$  be the total product of the two sectors.<sup>16</sup> Then

$$y = L_a W_a + L_i W_i = (L - L_i) W_a + L_i W_i = L W_a + L_i (W_i - W_a),$$

$$y - L W_a = L_i (W_i - W_a),$$

$$\ln(y - L W_a) = \ln L_i + \ln(W_i - W_a),$$

$$\frac{dy - L dW_a}{y - L W_a} = \frac{dL_i}{L_i} + \frac{d(W_i - W_a)}{W_i - W_a}.$$

$$\text{Let } \frac{dx}{x} = \dot{x}, W_{i-a} = W_i - W_a, f = \frac{L W_a}{y}. \text{ Then}$$

$$\dot{y} = f \dot{W}_a + (1 - f)(\dot{L}_i + \dot{W}_{i-a}).$$

Denote  $l_i = \frac{L_i}{L}$ . Then  $\dot{l}_i = \dot{L}_i$ . Notice that

$$f = \frac{L W_a}{L_a W_a + L_i W_i} = \frac{1}{1 + l_i \left( \frac{W_i}{W_a} - 1 \right)}.$$

We then have

$$\dot{y} = f \dot{W}_a + (1 - f)(\dot{l}_i + \dot{W}_{i-a})$$

where  $\dot{l}_i$  is the percentage change of industrial labor share, and  $f$  measures the relative efficiency of agriculture labor force. Let us call  $f$  *agriculture efficiency coefficient*. In the early stage of industrialization,  $f$  is well below one (for China,  $f$  is about 5/12 in 1991); in the process of industrialization,  $f$  may decline, but eventually  $f$  will converge to 1.

Since the industrial labor productivity is higher than agricultural labor productivity, the shift in the labor force from the agriculture to industry sector will contribute to the growth rate of total product. Let us call this structural effect

<sup>16</sup>For simplicity, we ignore the relative price effect. One way is to redefine units.

*industrialization-led growth* which is captured in the second part of the above equation. It is important to notice that in the early stage of industrialization, this structural effect is significant (due to a high  $\dot{l}_i$  and  $\dot{W}_{i-a}$  and a low  $f$ ); it will decrease as the industrialization process continues (due to the decrease in  $\dot{l}_i$  and  $\dot{W}_{i-a}$  and the rise of  $f$ ). (For empirical evidence, see Kuznets (1971) and Maddison (1990).) Eventually this effect will be zero or even negative as the labor force shifts largely to the service sector where labor productivity is relatively low and cannot be improved significantly. These results are consistent with the high growth rates in the NIEs during the last three decades and the slowdown of the growth of the OECD since 1973.

Since China is in the early stage of industrialization and labor migration from the agriculture to the nonagriculture sector is limited, the nonagriculture-agriculture labor productivity ratio is unprecedentedly high. Thus industrialization-led growth was great in the 1980s and will continue to be great in 1990s. (See the figure relating structural change and regional GDP growth in Section 3.)

## 6. A Leader-Follower Model: Catching Up and Falling Behind

### 6.1 A Set of Stylized Facts of the World Economic Growth

1. In each time, there exists an economic leader whose labor productivity and technology top the rest—followers.
2. Some followers grow consistently faster than and eventually may catch up to the leader. One of such followers may become the next leader.
3. Some followers grow faster than the leader for sometime and then fall behind.
4. Some followers grow consistently no faster than and fall significantly behind the leader.
5. Top growth rates accelerate.
6. Knowledge capital stock grows exponentially, and it grows faster than physical production.
7. World exports grow faster than world production.

Facts 1-5 were discussed in the introduction. For Fact 7, Maddison (1989) reported that for his 32 countries per capita GDP and per capita export grew 1.7% and 2.3% annually respectively from 1900 to 1986-87. Fact 6 is based on Tables 6.1 and 6.2 below.

Table 6.1 Comparisons of Long-term Growth Rates of Selected Fields and GDP

	Range of data	Annual growth rates %
Biology	1927-1964	4.4
Economics	1886-1959	5.5
Electrical engr.	1903-1962	3.5
Physics	1903-1964	3.7

Computer Science <sup>a</sup>	1954-1991	9.0
GDP <sup>b</sup>	1900-1987	3.0

Sources: a. Reiter (1992). This is based on the number of articles published annually in a sample of Computer Science journals. b. Maddison (1989). The growth rate of GDP is for 32 countries. The rest are from Holt and Schrank (1968). They are the growth rates of the cumulative numbers of articles published.

Table 6.2 Comparisons of Growth Rates of R&D Workforce and GDP by Selected Countries

	A	B	C
US.	74.9	4.3	3.4
Japan	68.5	4.7	4.1
W. Germany	56.4	4.3	2.1
France	45.4	5.2	2.2
Canada	45.0	9.3	3.4
UK.	36.2	1.2	3.1
S. Korea	30.1	14.4	9.7
Italy	29.4	5.2	2.4
Taiwan	28.8	18.2	7.7
India	3.0	5.0	5.3

Notes: Table represents all scientists and engineers engaged in R&D on a full-time equivalent basis. A = all R&D scientists and engineers per 10,000 labor force in 1987, B = % annual change of all R&D scientists and engineers from 1980-81 to 1988-90, C = annual growth rate of GDP from 1980 to 1990.

Sources: A and B are from Chemical & Engineering News, August 23, 1993. C is from World Development Report, World Bank, 1992.

## 6.2 A Leader-Follower Model

Now we construct a leader-follower model that matches most of the stylized facts listed above. We formalize one of the key ideas of Abramovitz's classic (1986)—catching up conditional on "social capability".

In this subsection, all the quantities are in per capita terms. We will focus on the growth paths of the follower and assume that the growth path of the leader is exogenously given. Let  $Y_t = AH_t^\alpha K_t^{1-\alpha}$  be the leader's production function, where  $Y_t$  is output at date  $t$ ,  $A$  and  $\alpha$  are positive constants with  $0 < \alpha < 1$ ,  $H_t$  knowledge capital, and  $K_t$  physical capital. Knowledge capital is embodied in culture which includes science, technology and management. Assume

$$H_t = H_0(1 + G)^t$$

where  $H_0$  and  $G$  are positive constants.

Here we assume that the follower's initial knowledge capital stock is less than the leader's. The follower has access to the leader's knowledge capital, and its knowledge capital stock cannot surpass the leader's. Although the follower has access to the leader's knowledge capital, it needs to learn and how fast it can learn depends on its own knowledge capital stock, the distance from the leader's technology frontier, and the efforts it puts into learning as well as its ability to learn.

There is a representative consumer in the follower's economy, whose problem is as follows (given  $p_t$ ,  $w_t$  and  $r_t$ , he chooses  $c_t$ ,  $k_t$ ,  $h_t$  and  $l_t$ .)

$$\begin{aligned} & \max \sum_{t=0}^{\infty} \beta^t u(c_t, 1-l_t) \\ & s.t. p_t c_t + k_{t+1} - k_t = w_t h_t + r_t k_t, \\ & h_t = \min\{h_{t-1} + \rho_t H_t, H_t\}, \\ & \rho_t = a l_t \left(1 - \frac{h_{t-1}}{H_t}\right)^\gamma \left(\frac{h_{t-1}}{H_t}\right)^{1-\gamma}, \\ & 0 \leq l_t \leq 1, h_0, k_0 \text{ given}, h_0 < H_0 \end{aligned}$$

where  $\beta$  is the discount factor,  $u$  is the instantaneous utility function,  $c_t$  consumption,  $l_t$  the time spent in accumulating knowledge capital  $h_t$ ,  $p_t$  the price of output,  $k_t$  physical capital,  $w_t$  the return to knowledge capital,  $r_t$  the return to physical capital,  $\gamma$  is a constant with  $0 < \gamma < 1$ .

Let us call  $\rho_t$  the *learning rate*, which we think is positively related to both the follower's own relative knowledge capital and the relative distance between the leader and the follower measured in terms of knowledge capital, and to the time devoted to accumulating knowledge capital. Everything else that may affect the learning rate is summarized in  $a$ , which measures "social capability". Social capability  $a$  clearly depends on exports, imports, DFI, human capital, organization among other things. (See Abramovitz (1986) and Nelson & Wright (1992) for more detailed discussions.)

There is also a representative firm whose problem is (given  $p_t$ ,  $w_t$  and  $r_t$ , it chooses  $k_t$ ,  $h_t$ )

$$\max \sum_{t=0}^{\infty} (p_t A h_t^\alpha k_t^{1-\alpha} - w_t h_t - r_t k_t).$$

In equilibrium,

$$c_t + k_{t+1} - k_t = A h_t^\alpha k_t^{1-\alpha} \text{ for all } t.$$

We will not characterize the equilibrium paths here. For our purpose, we will ignore physical capital (set  $K_t = k_t = 1$ ) and assume that the consumer does not care about leisure. Then the leader's production function becomes  $Y_t = A H_t^\alpha$ . For the follower,

$$\begin{aligned} y_t &= A h_t^\alpha, \\ h_t &= \min\{h_{t-1} + \rho_t H_t, H_t\}, \\ \rho_t &= a \left(1 - \frac{h_{t-1}}{H_t}\right)^\gamma \left(\frac{h_{t-1}}{H_t}\right)^{1-\gamma}. \end{aligned}$$

Denote

$$g_t = \frac{h_t - h_{t-1}}{h_{t-1}}, r_t = \frac{y_t - y_{t-1}}{y_{t-1}} = (1 + g_t)^\alpha - 1, R = (1 + G)^\alpha - 1.$$

Here  $R$  is the growth rate of output of the leader, which is clearly smaller than  $G$ , the growth rate of the leader's knowledge capital. Similarly  $r_t$  is smaller than  $g_t$ . This implies that knowledge capital grows faster than physical production. To study the output path, it is enough to study the path of knowledge capital.

Before catching up to the leader, i.e., when  $h_t < H_p$ , we have

$$g_t = a \left( \frac{H_t}{h_{t-1}} - 1 \right)^\gamma = a \left( \frac{H_{t-1}(1+G)}{h_{t-2}(1+g_{t-1})} - 1 \right)^\gamma.$$

Given  $a$ ,  $\gamma$  and  $H_p$ ,  $g_t$  is negatively correlated with  $h_{t-1}$ , that is, there is a **conditional negative relationship between the level and the growth rate, or conditional convergence**. It is easy to see that for all  $t \geq 1$ ,

$$\begin{aligned} g_t &< g_{t-1} && \text{if } g_{t-1} > G, \\ g_t &= g_{t-1} && \text{if } g_{t-1} = G, \\ g_t &> g_{t-1} && \text{if } g_{t-1} < G. \end{aligned}$$

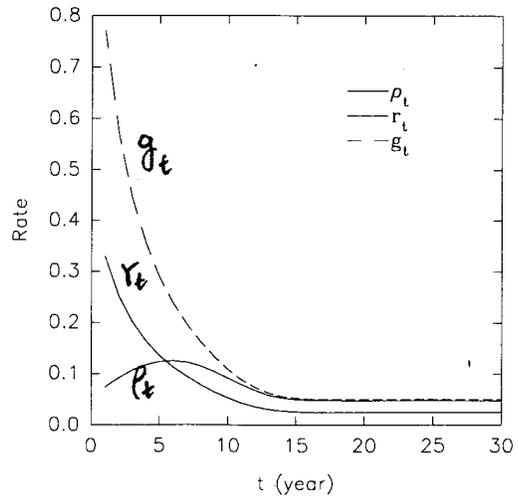
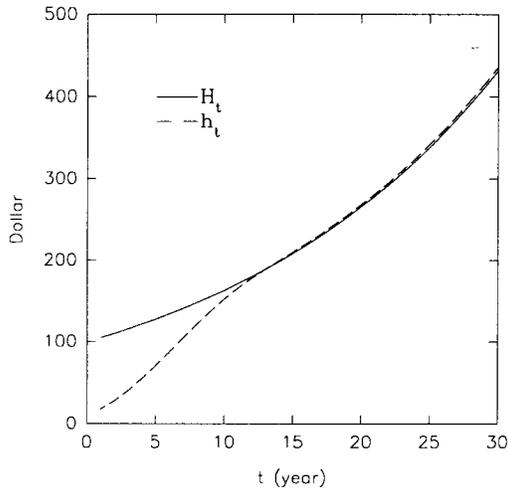
This implies that **the growth rate of the follower's knowledge capital tends to converge to the leader's**. It can be shown that if  $a > G^{1-\gamma}$ , then  $g_t \geq \bar{g} > G$  with  $\bar{g} = aG^\gamma$  for all  $t$  such that  $h_t < H_p$ . It follows that  $h_t$  will converge to  $H_p$ , and  $y_t$  will converge to  $Y_p$ . That is, the follower will **catch up** to the leader.

These results could explain the findings of Maddison (1982, 1991), Baumol (1986), Mankiw et al. (1992) and Dollar & Wolff (1993).

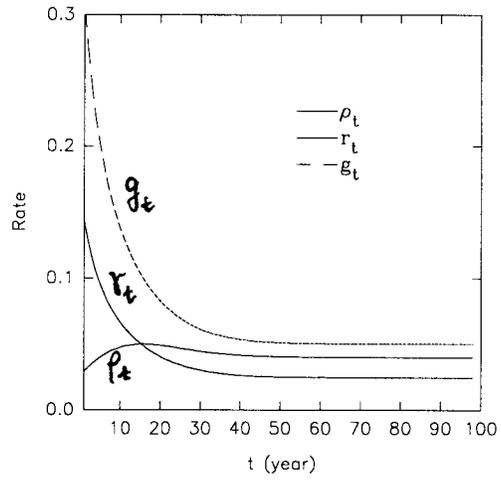
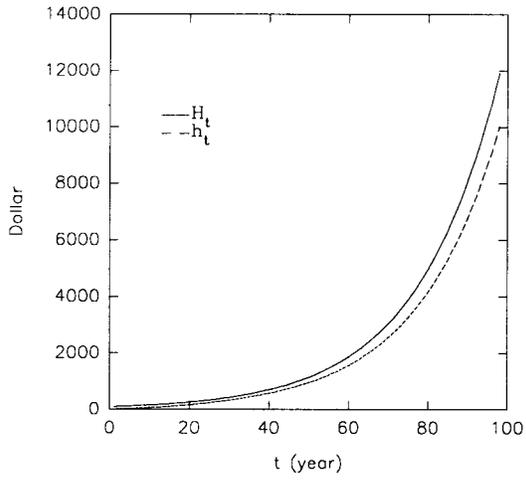
Computer simulations demonstrate that given  $H_0$  and  $G$ , there are three possibilities due to the different values of the parameters  $a$ ,  $h_0$  and  $\gamma$ :

- (i)  $g_t \geq G$  for all  $t$ ,  $g_t > G$  for some  $t$ ,  $g_t$  converges to  $G$ , and  $h_t$  converges to  $H_t$ .
- (ii)  $g_t \geq G$  for all  $t$ ,  $g_t > G$  for some  $t$ ,  $g_t$  converges to  $G$ , and  $H_t - h_t$  goes to positive infinity.
- (iii)  $g_t \leq G$  for all  $t$ ,  $g_t < G$  for some  $t$ ,  $g_t$  converges to  $G$ , and  $H_t - h_t$  goes to positive infinity.

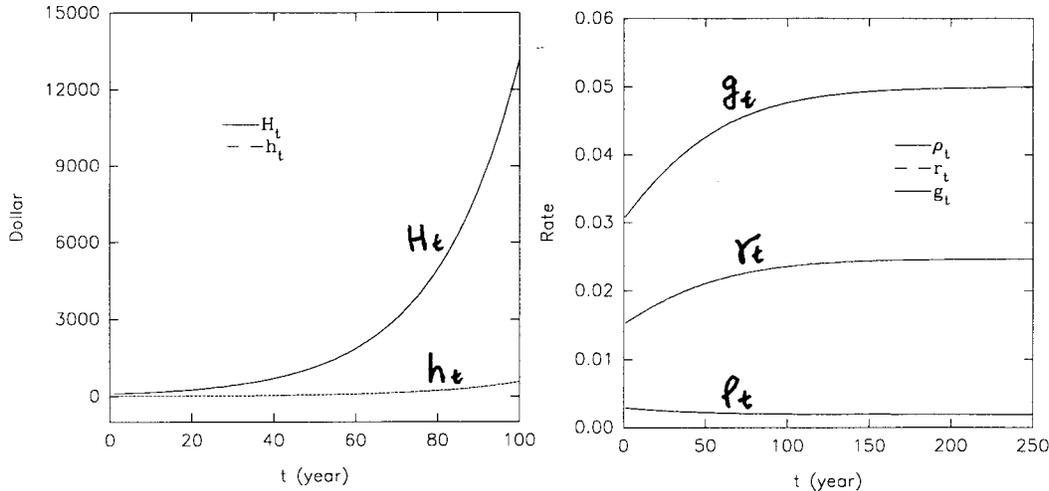
Case (i) is consistent with the experiences of Japan and Eastern Asian NIEs as followers of the US. The growth rates of these followers seem to begin to slow down and converge to the leader's. Cases (ii) and (iii) appear similar to the experiences to date of Latin America and Sub-Saharan Africa respectively.



**$G = 5\%, \alpha = 0.5, \gamma = 0.5, a = 0.25, H_0 = 100, h_0 = 10$**



**$G = 5\%, \alpha = 0.5, \gamma = 0.5, a = 0.1, H_0 = 100, h_0 = 10$**



$$G = 5\%, \alpha = 0.5, \gamma = 0.5, a = 0.01, H_0 = 100, h_0 = 10$$

Clearly, social capability  $a$  is crucial in determining whether a follower can catch up or not. The above analysis suggests that given other parameters, there exists a *critical minimum level*  $a^*$  such that a follower can catch up if and only if its social capability is above  $a^*$ . Also the above analysis tells us that  $\hat{a} \equiv G^{1-\gamma}$  is a sufficient level, that is, a follower can catch up if its social capability is above it.

The Chinese experience (1978-1993) no doubt belongs to Case (i) or (ii). It appears that Case (i) is more likely; that is, China seems to have the potential to catch up. Of course, whether or not China will actually catch up depends on the overall successfulness of her transition, which in turn depends on the initial conditions, boundary conditions, and transitional dynamics (policy as inputs).

Finally, we are ready to explain how top growth rates may accelerate. First, the follower may grow faster than a leader, and the follower's follower may grow faster than this follower. Second, knowledge capital accumulation and trade expansion (Facts 6, 7) make social capability higher over time.

## 7. The Chinese Economy in Transition

### 7.1 The Initial Conditions

I.1 A large agricultural sector (especially in terms of labor share) (In contrast, the agriculture sector in most ECE and FSU countries are much smaller.)

I.2 M-form planning system<sup>17</sup> (In contrast, most ECE and FSU countries adopted U-form planning system.)

I.3 Macroeconomic stability (In contrast, there was high inflation, high fiscal deficits and high current account deficits in many ECE and FSU countries when they began their reforms.)

<sup>17</sup>See Williamson (1985) and Qian & Xu (1993) for discussions of M-form and U-form organizations.

## 7.2 The Boundary Conditions

B.1 Ethnic and geographic connections with NIEs Hong Kong and Taiwan

B.2 Coexistence with the most advanced economies: US and Japan in the Pacific Rim

A non-institutional integration is forming in the Greater China Area (which includes China, Hong Kong and Taiwan) due to low transaction costs (low transportation costs and low communication costs). DFI from Hong Kong and Taiwan is mainly used to produce labor-intensive exports, while DFI from US and Japan is mainly used to produce capital-intensive import-substitutes.

## 7.3 The Transition Dynamics: Policy as Inputs

P.1 Gradualism as an approach to accumulate private organizational capital

P.2 Policy inputs as outputs of experiments

P.3 Agriculture reform as entry

P.4 TVEs as a key to industrialization

P.5 Special Economic Zones (SEZs) as a key to draw DFI

P.6 Export-promotion as one engine of growth

As discussed in Section 3.1, although physical capital can be transferred from the state sector to the private sector, organizational capital cannot. And it takes time to accumulate private organizational capital. This is why a gradualism transition is associated with growth, while a big bang transition results in recession.

A transition from a planned economy to a market economy is unprecedented, so (field rather than classroom) experiments are necessary. But experiments require resources and time. China as a large economy with macro-stability makes experiments possible and profitable. Most important transition policies are based on experiments in China. (See the Appendix)

Organizational capital can be decomposed into *internal organizational capital* (organizational capital within the firms, IOC, as emphasized by Prescott and Visscher (1980)) and *external organizational capital* (outside the firms, including the market system and government regulations, EOC). In traditional family agricultural firms, it is easy to accumulate IOC. This implies that the transition of the agriculture sector could be completed faster than the industry sector. But even for the agriculture sector, a big bang approach is not preferable since EOC accumulation takes time. The big bang approach adopted in the FSU showed that a significant proportion of grains could not be transferred from fields to consumers.

The successful agricultural reform as entry provides relatively rich foods and other consumer necessities, which lessens inflation pressure from price liberalization (low  $\pi_0$ ) as analyzed in Section 3.3. It also provides relatively rich raw materials, a larger labor supply and market to the industry sector. As we will see in Section 7.5, an agricultural fluctuation in fact led to an industrial fluctuation in China. So the success of the agricultural reform was the basis of the success of the industrial reforms.

Economic history tells us that for all developing countries industrialization is the only way to modern economic growth. According to the classification of Section 5.2, China's industrialization proceeds in the mode of Post Migration. The expansion capacity of the cities in China is limited due to the high density of population and the bottlenecks in energy, raw materials, transportation and communication. As a major part of the non-state sector and an important part of the non-agricultural sector, TVEs are the key to industrialization in China. The fast expansion of TVEs speeded up the transition process and contributed a great deal to the economic growth in the 1980s. TVEs will make the urbanization process more smooth in the 1990s.

The establishment of SEZs is a catalyst to the Chinese economic transition and serves multi-purposes. First, it is a key in attracting DFI. It provides an experimentation base for formulating transition policies. This establishment connects mainland China to Hong Kong, Taiwan and the industrialized countries. Finally, it becomes the crucial element of the gradient development scheme of Special Economic Zones--Coastal Open Cities--Coastal Open Economic Zones--Hinterland.

The economic success of the "four little dragons" has convinced the Chinese government to switch its development strategy from import substitution to export-promotion (see the following tables). Trade liberalization is pushed by both domestic economic forces and international connections. Export-promotion has brought forth great development opportunities for the NIEs, especially for the East Asian economic miracles. That China, with a huge potential domestic market, adopts export-promotion as its development strategy seems also to make the world's most populous country to be well on the road to becoming the biggest NIE. Most developing countries' industrialization falls under the mode of Post Immigration. The experiences of NIEs, and now China, encourage developing countries to adopt an export-promotion strategy.

Table 7.1 China's Export-GNP Ratio (%)  
Based on Official Exchange Rate

Year	1978	1979	1980	1981	1982	1983	1984
Ratio	4.7	5.3	6.1	7.7	8.0	7.6	8.3
Year	1985	1986	1987	1988	1989	1990	1991
Ratio	9.5	11.2	13.0	12.6	12.3	16.9	19.3

Source of basic data: Statistical Yearbook of China, 1992

Table 7.2 China's Export-GDP Ratio (%)  
Based on Purchase Power Parity

Year	1980	1988	1990	1991
Ratio	1.1	1.7	2.8	3.1

Source of basic data: 1. Summers, Robert and Alan Heston, "A New Set of International Comparisons of Real Product and Price Levels Estimates for 130 Countries, 1950-1985," Review of Income and Wealth, March 1988, Series 34, 1-25.

2. Summers, Robert and Alan Heston, "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988," *The Quarterly Journal of Economics*, May 1991, 106, 327-68.  
 (iii) World Development Report, various issues, World Bank.

Table 7.3 Export-GDP Ratio (%) of Top 10 Economies  
 Based on Purchase Power Parity in 1991

Country	Brazil	China	France	Germany	India
Ratio	5.0	3.1	19.7	23.7	1.1
Country	Italy	Japan	Russian	UK	US
Ratio	18.4	10.6	NA	20.8	7.1

Source of basic data: World Development Report, 1993, World Bank.

For developing countries, the estimation approach based on exchange rate overestimates the export-GDP ratios since this approach underestimates the GDPs. Therefore, we computed the export-GDP ratios in Tables 7.2 and 7.3. We observe that

(i) The approach based on exchange rate significantly overestimates China's export-GDP ratios.

(ii) China's export-GDP ratio has been rising steadily.

(iii) China's export-GDP ratio is far below most large developed economies.

(iv) The export-GDP ratios of the EEC members are significantly higher than other economies.

Therefore, China has great potential to promote its exports, in particular via the integration of Great China and the cooperation of APEC.

#### 7.4 The Regional Coordination Problem: A Prisoner's Dilemma?

In either a planned economy or a market economy, the rules of the game are well defined. Agents of the economies behave accordingly. The transition from a planned economy to a market economy presents a challenges to the policy makers. Since it takes time to accumulate either external or internal organizational capital, it is an evolutionary process for enterprises to become independent market players. An important part of the gradualism approach adopted in China was to decentralize the power to the local governments. As the local governments are empowered, they become important economic players. During the transition period, they integrate the administrative decisions and economic decisions. They become the representatives of the economic agents locally.

Since the mechanism of the planned economy no longer works well and the new market mechanism is under building, the economy has the following characteristics: an administrative banking system, a significant portion of the production materials controlled by the governments, a tax system on a bargaining base between the central government and the local governments, the local governments (such as the governments at the provincial level and county level) as representatives of the local communities taking advantages of both the broken planned mechanism and the nonmature market mechanism to maximize their benefits. This is a multi-player, multi-strategy game. Let's take a two-player, two-strategy game to show the consequences. Every player has two

strategies to play:  $H$  (high growth) and  $N$  (normal growth).  $H$  is supported by supplying more loans to the firms to break the planned quotas, asking more favorable policies in taxes, foreign investments and trade from the central government, acquiring more control on the production materials.  $N$  is the strategy corresponding to social optimal outcome. The game can be specified by the following strategy-payoff matrix:

	$H$	$N$
$H$	(0, 0)	(1+g, -l)
$N$	(-l, 1+g)	(1, 1)

where  $l, g > 0$ .

If everybody else plays  $N$ , one can get a high return (say  $1+g$ ) by playing  $H$  through making more loans to the firms to acquire more production inputs from other provinces, inducing foreign investment by promising more favorable policies. Similarly, if everybody else plays  $H$ , one will incur a loss  $l$  by playing  $N$ . Without coordination, this is the Prisoner's Dilemma game. The only Nash equilibrium is that every player plays "high growth" ( $H, H$ ). In this case, every local government pursues high growth, and asks for more favorable policies from the central government. The consequences are inflation and overheatedness. Strong administrative interventions from the central government appear cyclically. This is one micro-mechanism by which we can explain the cyclical overheatedness of the Chinese economy during the transition period. Therefore coordination becomes a crucial problem for the central government of China during the transition period. Redundant construction, redundant import of production lines, and specialization without considering comparative advantages are also some indications of the coordination failure.

The possible solutions for solving this dilemma are the separation of business and government, reorganization of the banking system, normalization of the tax system, and reduction or elimination of the economic function of the local governments.

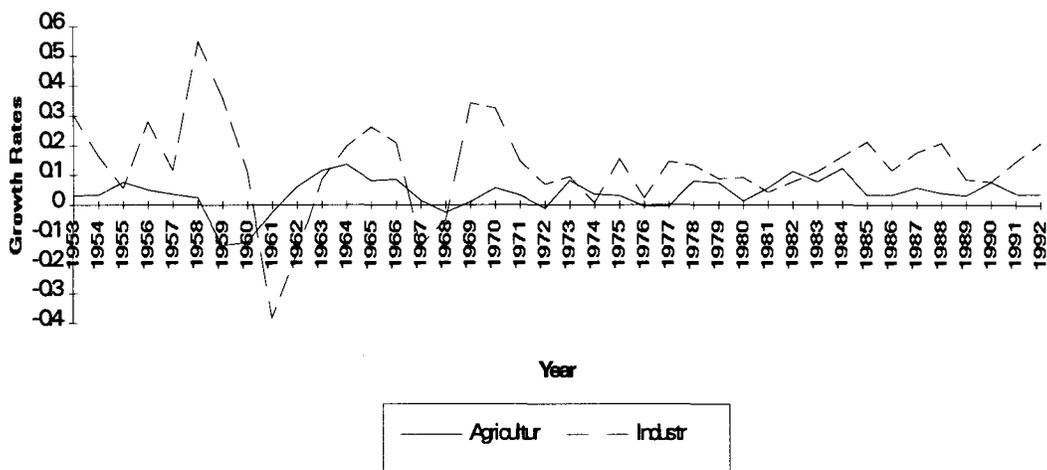
### 7.5 Business Cycles: Production, Money and Price

Li and Liang (1988) found that the agriculture sector was the engine of the business cycles in China from 1949 to 1986. We find that this conclusion can be extended to at least 1989. They also found that the money growth rate lagged behind the national income growth rate by about one year, which is a reflection of the "barter" planned Chinese economy. This phenomenon stands in sharp contrast with the fact that money leads income in the US business cycles. It is not surprising to observe that money and income seemed to move synchronously from 1987 to the present as the Chinese economy becomes more monetarized and marketized. Finally, their observation that the inflation rate lagged behind the money growth rate by about one year still applies in recent years.

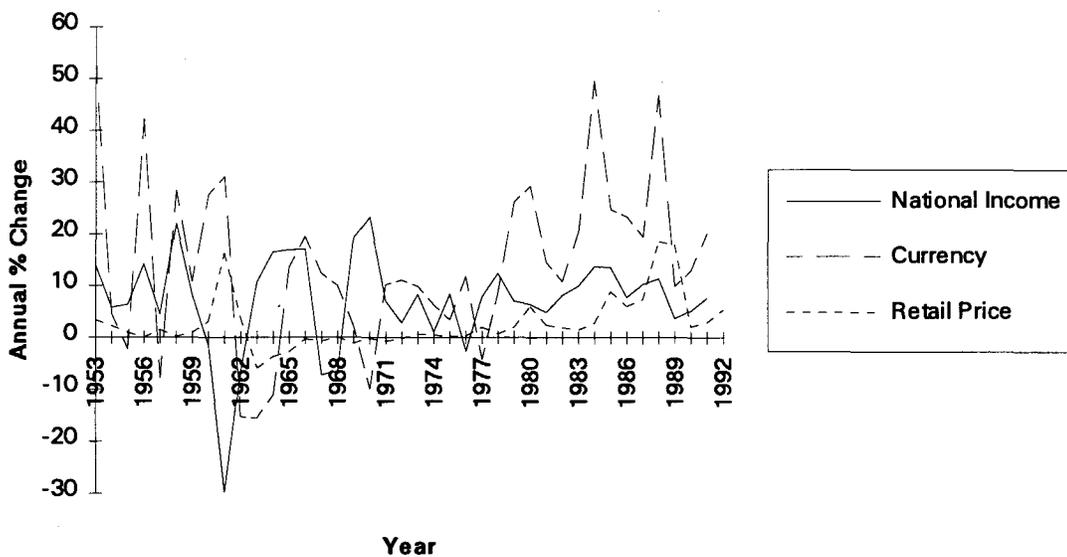
As industrialization advances, the industry sector will no longer be a "football" of the agriculture sector. Currently, ineffective macro (monetary and fiscal) instruments tend to aggravate economic fluctuations due to the employment of administrative means in overheated times. Therefore, comprehensive financial reform and fiscal reform will be

very important to stabilize the economy in the near future. Financial reform will be explored in another paper.

### Agriculture-led Fluctuation



Source of basic data: Statistical Yearbook of China, 1992

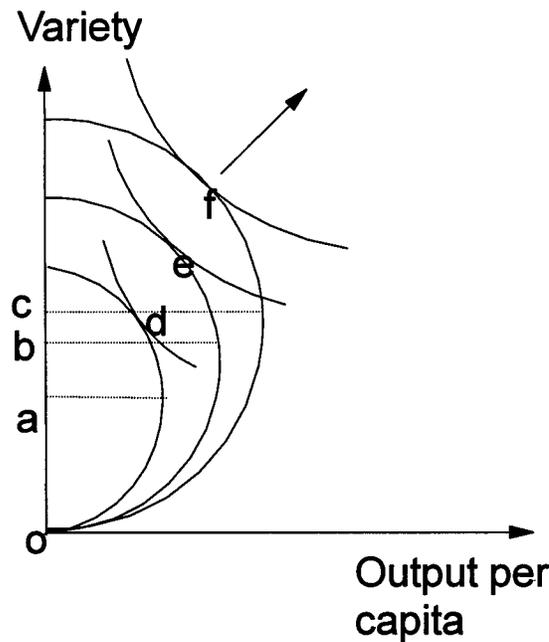


Source of basic data: Statistical Yearbook of China, 1992

## 8. Economic Development: the Expansion of Scale and Scope

Ultimately, we are interested in some summary statistic to measure economic development.

Economic development is a very rich phenomenon, of which the changes of scale and scope are central. Growth and structure changes at the macro level are the consequences of the changes of scale and scope at the micro level. The creation of the mass production system (MPS) based on transfer lines at the turn of this century has tremendously increased the economies of scale, which has resulted in a consistent rise of output per capita. As output per capita increases, consumers' demand shifts from quantity to variety. In the 1960s and 1970s, the flexible manufacturing system (FMS) based on the combination of numerically controlled machines and transfer lines was invented. FMS has significantly increased the economies of scope. The history of economic development is also the history of expansion of scale and scope, or the history of the increase of both output per capita and variety (see the following figure).



The out-bowed curves are production possibility frontiers;  $oa$ ,  $ob$ ,  $oc$  are, what we call, *minimum efficient varieties*. The main reasons for this are: (i) different resources are not equally suited for producing a particular product; (ii) there exists complementarity among different production factors, for instance, to increase grain products, we need to increase the production of fertilizers; (iii) there exists complementarity among consumption goods and consumption may affect labor productivity. That is, to increase aggregate product, we may need to increase variety initially. Of course, as we reach a certain level of variety, there will exist a trade-off between aggregate output and variety. The curves that bow toward origin are

indifference curves. The tangent points *d, e, f* are optimal bundles. The above analysis implies that variety grows faster than per capita output, which, of course, in reality depends how we measure variety.<sup>18</sup>

To measure and compare economic development levels of different countries is important and challenging due to the differences in resources, population and institutions. We here propose a measure: *relative development index* (RDI)

$$RDI = ROPC \times RCES,$$

$$RCES = \text{Variety of exports} / \text{Variety of imports}$$

where ROPC is relative output per capita, and RCES is the *revealed comparative economies of scope*.

The relative output per capita of the leader country is set to be 1, and the relative output per capita of each follower is its output per capita as percentage of that of the leader. The degree of economies of scope in a country is positively correlated with its variety of exports, while negatively correlated with its variety of imports since it cannot efficiently produce these imported products, which indicates some lack of economies of scope. In order to compare the comparative economies of scope across countries, it is beneficial to use the ratio (rather than the difference) of the variety of exports and the variety of imports for a country to get rid of the country size effect.

Because of international labor divisions and individual country specialization, most countries export less varieties than they import, hence they have a RCES less than one. Some oil exporting countries have a RCES much less than one. To be precise the variety computation should be based on some weighted averages and based on a certain time span. The following result was computed based on simple count of the SITC 5 digits for forty countries in a single year, and it is only for an illustration.

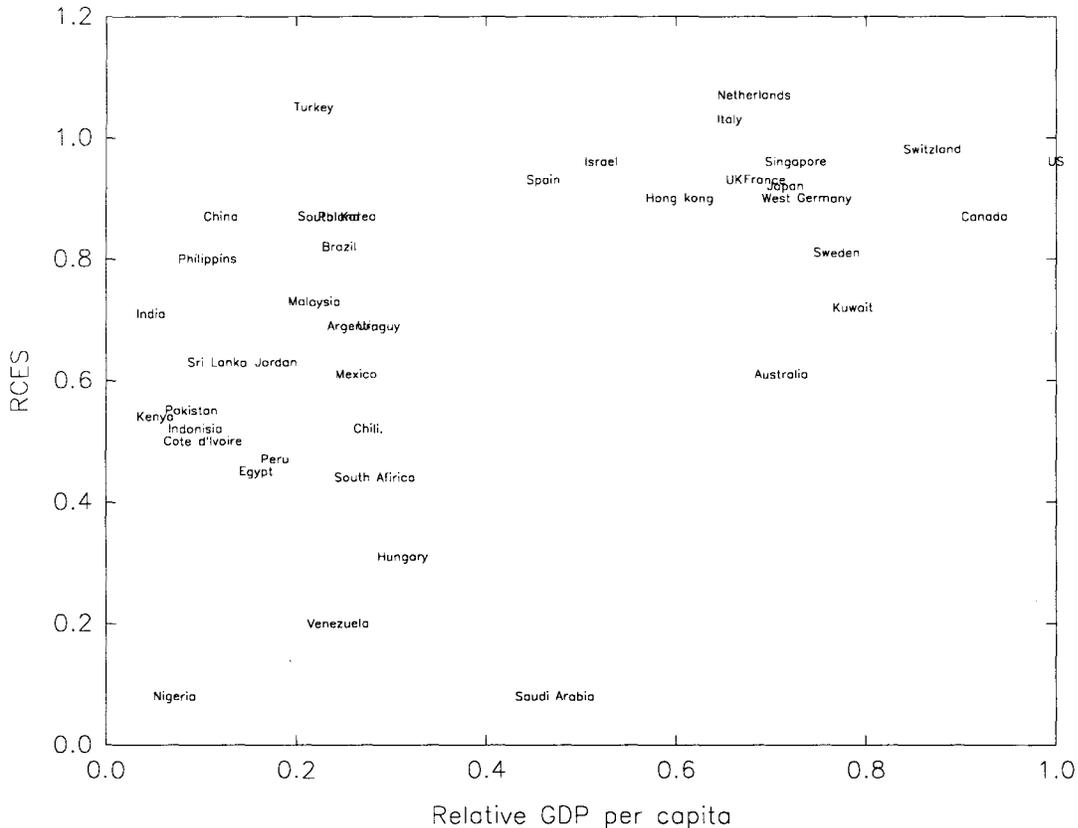
Table 8.1 Comparisons of RDI, ROPC and RCES of 40 Selected Countries

Country	ROPC	RCES	RDI	Country	ROPC	RCES	RDI
Argentina	0.264	0.69	0.18	Mexico	0.263	0.61	0.16
Australia	0.711	0.61	0.43	Nigeria	0.072	0.08	0.01
Brazil	0.245	0.82	0.20	Netherlands	0.682	1.07	0.73
Canada	0.925	0.87	0.80	Pakistan	0.090	0.55	0.05
Chile	0.276	0.52	0.14	Peru	0.178	0.47	0.08
China	0.121	0.87	0.11	Philippines	0.107	0.80	0.09
Cote d'Ivoire	0.102	0.50	0.05	Poland	0.245	0.87	0.21
Egypt	0.158	0.45	0.07	Saudi Arabia	0.472	0.08	0.04
France	0.693	0.93	0.64	Singapore	0.726	0.96	0.70
Hong kong	0.604	0.90	0.54	South Africa	0.283	0.44	0.12
Hungary	0.312	0.31	0.10	South Korea	0.243	0.87	0.21
India	0.047	0.71	0.03	Spain	0.46	0.93	0.43
Indonesia	0.094	0.52	0.05	Sri Lanka	0.117	0.63	0.07
Israel	0.521	0.96	0.50	Sweden	0.769	0.81	0.62

<sup>18</sup>One way to measure variety is to estimate the stock of trademarks in use. For U.S. from 1930s to 1980s, per capita output grew about 2% annually, trademarks registered each year grew about 3%. Conceivably, the stock of trademarks in use grew more than 3% annually.

Italy	0.656	1.03	0.68	Switzerland	0.870	0.98	0.85
Japan	0.715	0.92	0.66	UK	0.661	0.93	0.61
Jordan	0.179	0.63	0.11	Uruguay	0.287	0.69	0.20
Kenya	0.052	0.54	0.03	US	1.00	0.96	0.96
Kuwait	0.786	0.72	0.57	Venezuela	0.244	0.20	0.05

Sources of basic data: 1. The Economist Book of Vital World Statistics, The Economist Book Ltd, 1990. 2. International Trade Statistics Yearbook, 1991, Part I. ROPC of each country is based on PPPs in 1988. RCES of a country is based on a year of 1985-1990.



Source of basic data: Table 8.1

We observe that:

(i) There is a (very) weak positive correlation between output per capita and RCES.

(ii) High output per capita is usually associated with high RCES and hence with a high development index. Economies with such indexes represent the developed countries. The rest are the developing countries.

(iii) Saudi Arabia has about the same output per capita as Spain, but its RCES (0.08) is well below Spain's RCES (0.93). Thus the development index of Saudi Arabia (0.04) is well below Spain's (0.43).

(iv) Among the forty countries, the US has the highest development index (0.96), Nigeria has the lowest (0.01), China has a very low development index (0.11) which is about the same as that of Jordan and South Africa. China's RCES is fairly high (0.87), it is about the same as that of South Korea and Canada; but output per capita in China is very low, it is at about the same level as that of Sri Lanka and the Philippines.

## **9. Concluding Remarks: Implications for Policies and Theories**

### **9.1 Policy Implications In General**

1. Adopt gradual reform and avoid the big bang approach when feasible.
2. Assign profit-related quotas and avoid output-related quotas to SOEs as much as possible.
3. Eliminate price subsidies or make targeted subsidies and avoid uniform subsidies whenever possible.
4. Encourage an export-promotion rather than an import-substitution.
5. Encourage human capital accumulation and R&D investments.

### **9.2 Policy Implications for China**

1. Due to the beginning of the slowdown of the birth rate in 1970s, population/labor-led growth will be much lower in 1990s than in 1980s.
2. The potential of privatization-led growth is significant since the state sector possesses more than half of the assets in industry and the losses of money-losing SOEs is about 2-4 % of GNP. The actual privatization-led growth will depend on the successfulness of the transformation of large SOEs.
3. The industrialization-led growth will be great. This is because the nonagriculture/agriculture labor productivity ratio is between 4 and 5, which is unprecedentedly high. The further development of TVEs will be very important in this respect.
4. The leader-led growth will be great since China is not only a follower of the US and Japan, but also a follower of Eastern Asian NIEs. The further integration of Greater China will improve China's social capability significantly. The progress of APEC will also contribute to China's ability to catch up to the leaders. In particular, social capability can be improved by promoting export in which China still has great potential.
5. To solve the regional coordination problem well, local enterprises should be encouraged to become national ones by increasing factor mobility, establishing national markets and separating government from business; local government taxes should be separated from central government taxes; direct credit control should be replaced with (indirect) monetary control by developing private commercial banks and security markets.
6. Large political/military instability should be avoided. The lessons in the Philippines, some countries in Africa, Middle East and Latin America show that rapid economic growth cannot occur if there exists political/military turmoil.

7. Therefore, provided that there is no political/military turmoil, the economic growth in 1990s will be at least as rapid as in the 1980s.<sup>19</sup> And if the present world (economic and demographic) growth pattern continues, China will surpass US and have the largest economy by around 2010. However, labor productivity and hence per capita output will remain very low (with relative GDP about 0.2). Thus although China has potential to become the largest economy, she does not have the potential to become the economic leader with the highest labor productivity in the near future.

### 9.3 Theory Implications

It is beneficial to draw an analogy from the development of economy, and decompose the development of economics into three stages:

1. Significant economic events occur and the stylized facts of these events are summarized.
2. Conceptual frameworks are constructed, which match these stylized facts.
3. The conceptual frameworks are refined by employing/developing advanced mathematical techniques.

Since the end of W.W.II, there have been three major economic events among others:

1. The growth rates of the OECD accelerated from 1950 to 1973 and (more importantly) began to be slow down in 1973.
2. The growth rates of the Eastern Asian economies: Japan (1955-1973), Rep. of Korea, Taiwan, Hong Kong, Singapore (from early 1960s to the present) and China (from 1978 to the present) were unprecedentedly high.
3. Around 25 FPEs are in the process of transition to market economies now, and the process will most likely continue until at least the end of this century.

These events would stimulate economists to develop the theories of growth, development, transition and integration. This paper attempts to summarize some primitive stylized facts and construct some preliminary conceptual frameworks. Much of it need be refined in the future.

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<sup>19</sup>This prediction is similar to that of Perkins (1986) and World Bank (1992).

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## Appendix

### Chronology of Policies in the Chinese Economic Transition

- April 1978----A general trade contract is signed with the European Community.
- Aug. 1978----A treaty of peace and friendship with Japan is signed.
- 1978----The practice of giving material rewards is resumed. Wage increase, piece rates, bonuses for good performance are introduced.
- 1978----The above-quota outputs are permitted to be marketed at prices that could vary by 20% from the fixed state prices for some enterprises.
- Dec. 1978----Mutual and unconditional diplomatic recognition with the United States is announced.
- Dec. 1978----The third plenary session of the 11th Central Committee of the Communist Party is held. An ambitious program of reforms in foreign trade, banking, enterprise management and rural development is developed.
- Jan. 1979----The resolution for accelerating agricultural development is published.
- March 1979----The State procurement prices for 18 basic agricultural products are raised by an average of 24.8%.
- May 1979----The prices of raw coal are raised by an average of 31.5%.
- June 1979----"Readjustment, reformation, consolidation, and improvement" of the national economy would take at least three years.
- June 1979----A comprehensive trade agreement between China and the United States is signed, including the granting of most-favored-nation (MFN) status to China.
- July 1979----Guangdong and Fujian provinces are allowed to carry on special policy in the field of foreign economic activity and allowed more autonomy.
- July 1979----The first Joint Venture Law is formulated, revealing that China's desire for foreign capital and expertise.
- August 1979----The State Council issues a decree about the large-scale development of foreign trade which increases the foreign exchange revenues.
- Sep. 1979----The State affirms the contractual responsibility system linked to production.
- 1979----The Agricultural Bank of China is restored, regulating the financial business in the countryside. Bank of China is separated from the People's Bank of China, which deals with foreign exchange transactions.
- 1979----The State-run enterprises are allowed to keep a certain portion of the profits as enterprise funds.
- 1979----Industrial enterprises are given greater power of self-management on a trial basis.
- 1979----The State carries out on a trial basis a price increase of 50% for the over-quota production of centrally distributed coal in some major mining bureaux.
- Oct. 1979----The China International Trust and Investment Corporation is founded, whose main function is to absorb foreign investment and import advanced technology and equipment to expedite China's economic development.
- Nov. 1979----The prices of non-staple foods (pork, beef, mutton, poultry, eggs, vegetables, aquatic products and milk) are raised, and a monthly subsidy is granted to the workers and urban residents.
- Nov. 1979----The wages of workers and government employees are increased in a way which takes into consideration of an individual's contributions, attitude towards work and technical ability.
- 1980----The "Six Priorities" policy is implemented to light and textile industries.
- 1980----In Sichuan province reforms are introduced where the state commercial enterprises are responsible for their own profits and losses, experimental taxation is initiated, and implementing independent business accounting is introduced.
- 1980----The domestic insurance business is restored for the People's Insurance Company of China.
- April 1980----Bank of China issues Foreign Exchange Certificates(FEC) to foreigners.
- Aug. 1980----The State proposes that every province may choose one or two State-owned enterprises to experiment independent accounting systems, pay taxes and assume profit or loss .
- Aug. 1980----The employment in the collective enterprises, private enterprises, service sector, construction sector and labor-intensive sector is encouraged to expand.
- Aug. 1980----Competition among enterprises is encouraged.
- Aug. 1980----Shenzhen, Zhuhai, Shantou and Xiamen are granted Special Economic Zone status, allowing them to grant preferential treatment to foreign investors and traders.
- Sep. 1980----Factories assume the sole responsibility for their own profits or losses on a trial basis.
- 1980----China assumes seats on both the IMF and World Bank.
- 1981----The treasury bills are distributed.

1981---Foreign oil companies are introduced.

1981----Investment in China's capital construction is switched from government allocation to bank loans, which was tested in 6 enterprises in 1979, and in 626 enterprises in 1980.

July 1981----The State supports individual private industrial and commercial enterprises by supplying raw materials and marketing.

1981---Various production contract systems are adopted in the countryside, the People's Communes are being dismantled.

Nov. 1981----The prices of trueran are decreased by an average of 17%. The prices of cigarettes and alcohol are raised.

Dec. 1981----At the Fourth Session of the Fifth People's Congress, the new industrialization strategy is put forward: a shift away from high-speed economic development towards satisfying people's needs, a shift away from a heavy industry-centered strategy toward a balanced, coordinated development strategy, a shift away in the style of economic growth from being "extensive" to more "intensive".

Jan. 1982----The prices of mechanical watches, black-white TVs, radios and trueran are reduced.

1982----Enterprises are given the authority to set their own prices for 160 commodities.

May 1982----The State Commission for the Reform of the Economic System is created.

May 1982----The first two medium-size cities (Shashi and Changzhou) are earmarked for complex experiments developing economic regions around cities and small towns.

1982----The State begins to develop the "National Economic and Social Development Plan" which pays attention to the integration of economy, science and technology and social planning, instead of the "National Economic Plan".

Sep. 1982----The 12th Party Congress draws up that the general objective of China's economic development for the next two decades, from 1981 to the end of this century. The goal is, while steadily working for more and better economic results, to quadruple the gross annual value of industrial and agricultural production--from 710 billion yuan in 1980 to 2800 billion yuan or so in 2000.

Jan. 1983----The prices of trueran are decreased by an average of 31%, and the price of cotton is increased by an average of 19%.

1983----The State Council selects Chongqing, the seventh largest city of PRC, as a theater for experimentation with developing economic regions around cities.

1983----The program period of the planning department is switched to the Seventh Five-Year Plan and the Twenty-Year Long-Term Programme, instead of annual plans to guide the national economy.

1983----Peasants are allowed to migrate to cities to provide needed construction and service labor.

April 1983----The rural economic policy, which accelerates the rural economic reform, is published.

1983----China joins the GATT-sponsored Multifibre Arrangement.

1983----The governments collect both taxes and profits from enterprises, and taxes and profits coexist.

Sep. 1983----The People's Bank of China is designated as the central bank. The Industrial and Commercial Bank of China is established, dealing with loans, credit and saving business.

Nov. 1983----The State Council stipulates that the agroindustrial-commercial joint enterprises would assume the economic functions of the People's Communes.

Dec. 1983----The prices of railway cargo freight per ton/km are raised by 21%, while those of shipping cargo freight per ton/km are raised by 73%, and those of passenger traffic by 30%.

Jan. 1984----The duration of contracts in the countryside is extended to 15 years or more.

1984----Fourteen coastal cities are granted special development incentives and privileges.

1984----"Dual-track" pricing policy is introduced, that is, state-fixed prices, state-guided prices, and market prices all coexist.

1984----The contract responsibility system is formalized for large and medium-sized SOEs, which specifies performance targets, supplies quotas and tax obligations.

1984----Most small commercial SOEs are contracted or leased to collectives or individuals.

April 1984----The first patent law is formulated.

May 1984----The State further enlarges the autonomy of the State-run enterprises.

Sep. 1984----China reforms and decentralizes the foreign trade system. The arrangements between the local and central governments are formalized.

Oct. 1984----The governments collect taxes from the enterprises, the after-tax profits belong to the enterprises.

Oct. 1984----Twenty four large interior cities are allowed to accept foreign capital investments and to create various joint ventures.

Oct. 1984----The Central Committee of the Communist Party decides to reform the enterprises, and the prices, to push reforms into the cities and to reform the industrial structure in the countryside.

1985----The State abolishes the price control on pork and pig, adjusts the state purchasing and selling prices of grains, raises the prices of passenger traffic and railway cargo freight.

Jan. 1985----The three delta areas, Yangtse River, Zhujiang River and Southern Fujian, are designated as open economic zones.

1985----China reforms the planning system, reduces the range of direct planning, and enlarges the scope of indirect planning and markets.

1985----The countryside begins to adjust the production structure, the agriculture sector begins to commercialize and specialize.

1985----The State Science and Technology Commission launches the "Spark Program", which provides technology-upgrading, staff training and information services to the rural enterprises.

1985----The central bank reforms its management system and the funds allocation method.

1985----China reforms the tax system. Local taxes, central taxes and joint taxes from the local governments and the central governments are proposed.

April 1985----Provisions to the joint venture banks and foreign banks in Special Economic Zones are formulated.

1985----Some enterprises are given the right to retain a portion of foreign earnings.

May 1985----The farmers can pay taxes in cash instead of real commodities.

Sep. 1985----The Chinese government suggests that the capital market, technology market, and the labor market should be developed.

Nov. 1985----The funds of People's Construction Bank of China are brought to the credit planning of the People's Bank of China.

March 1986----Horizontal economic integration is encouraged by the State Council.

March 1986----The "863 Programme" is proposed. It focuses scientific resources on some strategic technologies---biotechnology, energy, new materials, information, automation, lasers, space and telecommunications.

1986----All banks are allowed to engage in foreign transactions.

1986----The dual price system is extended into the foreign exchange trading in three Special Economic Zones.

Oct. 1986----China promulgates rules giving foreign investors more flexibility.

1986----China submits its application to the GATT secretariat.

Dec. 1986----China's first bankruptcy law is formulated.

Dec. 1986----The State Council proposes further enterprise reforms including leasing small and medium-size enterprises, imposing a responsibility system for large and medium-size enterprises, adopting a shareholding system for large and medium-size enterprises on a trial basis.

Dec. 1986----The small commodity prices are allowed to be determined by the markets.

March 1987----Some conglomerates are listed separately in the national planning report.

1987----Revenue-sharing contracts between the central government and provincial governments begin to be implemented, which include an agreed base figure and an annual rate of increase.

Oct. 1987----The thirteenth Party Congress introduces a three-step development strategy: doubling the GNP of 1980 (fulfilled by 1987), doubling the 1987 GNP level by the end of the century, and reaching the per capita GNP level of the then middle-income countries by the middle of the next century. The gradient development scheme of Special Economic Zones--Coastal Open Cities--Coastal Open Economic Zones--Hinterland is formulated.

Jan. 1988----A uniform upper price limit is adopted for the out-of-plan production materials.

Feb. 1988----The State Council publishes a comprehensive reform plan covering the areas of enterprises, investment, materials, commerce, banking and finance, fixed capital investment, and prices. Experiments are needed.

March 1988----Hainan as a province and a Special Economic Zone is established.

March 1988----The trade system is reformed. A responsibility system is adopted. Every province, municipal, autonomous region and plan-listed city only assumes the responsibility of foreign exchanges turned over to the central government.

1988----The coastal region (10 provinces and cities) is granted special status in foreign investment and exports, special autonomy with respect to economic decisions, and a share of earned foreign exchange.

1988----A system of unemployment compensation is tested in Shenyang.

April 1988----The seventh National People's Congress relaxes the restrictions on the transfer of agricultural land.

May 1988---- The State Council approves the establishment of the first new-technology industry development experiment zone.

May 1988----The State Council encourages investments in Hainan province.

May 1988----Beijing City adjusts the prices of four major non-staple foodstuffs, a compensation for the employees is adopted.

June 1988----The State Council decides to collect individual income adjustment taxes from private enterprise investors.

July 1988----The price control on name-brand cigarettes and alcohol is eliminated.

Aug. 1988----The "Torch Programme" is initiated in order to reform the traditional industries and combine science with industry. Twenty seven hi-tech parks are set up.

Sep. 1988----Shanghai Foreign Exchange Swap Center is opened.

March 1989----The State Council formulates the industrial policy and the sequence of industrial development.

1989----China offers special insurance against political risks for foreign investors in Hainan.

1990----New laws allow the foreign ownership and development of large tracts of land.

1990----Shanghai Pudong development project is implemented.

Oct. 1990----Zhengzhou Futures Exchange is opened.

Dec. 1990----China opens her first securities exchange in Shanghai.

Jan. 1991----The State adjusts exchange rates, and equalizes the rate of the retained foreign exchange earnings.

1991----China abolishes subsidies to the trading firms, unilaterally reduces tariffs on 225 goods.

March 1991----The State Council approves another 26 state level hi-tech industrial parks.

April 1991----Preferential treatments are given to foreign investors by the Income Tax Law for Enterprises with Foreign Investment and Foreign Enterprises.

May 1991----Some adjustments in urban prices of grain and oil are made.

July 1991----Shenzhen Stock Exchange is opened.

Jan. 1992----The Chinese senior leader Deng Xiaoping tours southern China, while encouraging more capitalist management to be adopted, and a higher growth rate.

April 1992----The government makes a large adjustment in urban prices of grain and oil.

1992----China Securities Supervision Committee approves nine large and medium-size state-owned enterprises to list their stocks in Hong Kong Stock Exchange.

1992----China reduces the number of licenses on import goods to 138, which is down by 52%.

June 1992----The Central Committee of the Party proposes the Yangtze River development project.

June 1992----Forty-nine Yangtze River and interior cities are permitted by the central government to offer foreign preferential terms similar to those offered in the open coastal cities.

June 1992----The Chinese government announces plans to develop the tertiary industry, improve the market system and establish social security system. The growth rate of the tertiary industry is targeted to be faster than those of the agriculture and industry.

July 1992----The first state-run enterprise, Wuhan Cityford Dyeing & Printing Industry Co., allows foreign owners to have 51% share.

July 1992----The State Council issues guidelines for State-Owned enterprises to transform the management structure to accommodate market development.

Sep. 1992----The Chinese government lifts price controls on 593 types of production materials. Only 89 of the previous 737 products remain to be regulated.

Oct. 1992----The fourteenth Party Congress introduces market economy.

1992----Trade authorities agree to publish and make freely available all tariff rates, rules and regulations.

Oct. 1992----The market access agreement between the United States and China is signed.

Dec. 1992----The State Science and Technology Commission launches the "Climbing Program" to revitalize and promote continuous progress of China's basic research, 30 major research projects are included.

Dec. 1992----Tariff rates are reduced on 3371 goods, with an average of reduction by 7.3%.

Jan. 1993----China eliminates the list for the import substitution commodities.

Feb. 1993----The State Council decides to speed up the development of village and township enterprises in the midwest area.

Feb. 1993----The state allocation and transfer planning system for grain is replaced by contracts between the buyers and sellers. To safeguard the grain producers, a protective price system is initiated.

April 1993----Guangdong is declared as an experimentation site for exploring market economy legislature, drawing on the experience of foreign countries while consistence with the international laws is emphasized.

April 1993----The State Council announces that major infrastructure projects, including power stations, railways, highways, ports, and telecommunications networks, are open to foreign investors.

May 1993----Provisions on the Rules of Securities Offering and Exchange is published.

June 1993----Shanghai Futures Exchange for Grain and Vegetable Oil is opened.

July 1993----China adopts the International Accounting Standard.

July 1993----A collection of eight enterprise groups are granted the right to manage the national assets on a trial base.

Sep. 1993----The first law against unfair competition is formulated.

Sep. 1993----The Economic Contract Law is revised.

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