

**THE TRANSITION PROCESS IN CHINA:  
AN ECONOMIC DEVELOPMENT PERSPECTIVE**

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During the last 25 years, the Chinese economy has experienced significant changes: the centrally planned economy has been reformed gradually into a market economy; the traditional agricultural economy is becoming more and more a modern industrial economy. In a dynamic two-sector-two-segment model we demonstrate that the economic reform has changed the industrialization mechanism in China. It released a decentralized industrialization process beside the centrally planned Soviet-type industrialization. This decentralized industrialization is shown to be the ultimate driving force of the transition from plan to market in China.

*Keywords:* Transition, Economic Reform, Industrialization, the Chinese Economy  
*JEL classification:* O1, O14, P2

1. INTRODUCTION

The Chinese economy experienced one of the fastest growth periods of all countries in the world over the last 25 years. It seems to be on the way towards a successful transition from a planned to a market economy, while many other post-socialist countries suffer from economic and social problems - the so called transition crisis. The question naturally arises: what are the specific reasons for the Chinese economy to perform differently than the other post-socialist countries? There is a large body of literature on this issue. Chow (2002) summarises the transition process from a historical perspective. He stresses, especially, the importance of the traditional value of education in the Chinese society and its role in building-up of human capital for the success of the transition process. Byrd (1987), Byrd (1989) and Byrd (1991) establish a general equilibrium theory for the co-existence of plan and market in the Chinese economy and provide a theoretical description the market mechanism in the transition process. Weitzman and Xu (1994) discuss the role of the township village enterprises in the transition process. Kwok, Parish and Xu (1990) investigate impact of the urbanization

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process on the economic development in China. McKinnon (1994) and Lardy (2000) investigate the role of the financial system in the Chinese transition process. Martin (1993) and Zhang (1998) construct short-run computable general equilibrium models to carry out policy analyze during the transition process.

We argue that the economic reform has changed the mechanism of the Soviet-type centralized industrialization that prevailed before the economic reform in China and has released a decentralized industrialization process. A market segment that consists of township-village enterprises and private companies emerged during the decentralized industrialization process. Taking advantage of the disequilibrium generated by the central planning in the economy, the market segment grows much faster than the planned segment that consists of the state-owned enterprises. Consequently, the proportion of the market activities in the economy becomes larger and larger and the proportion of the planned activities become smaller and smaller. This forms what we call *extrinsic transition*. Facing the faster growth in the market segment, the planned segment has been forced to adjust itself to the new situation in the economy by diverse reform efforts. This forced adjustment makes the planned segment more and more market-like. This forms what we call *intrinsic transition*.

To study this specific feature of the transition process in China, we formulate a two-sector-two-segment model in Section 2 to embed the economic transition into the process of the decentralized industrialization.<sup>1</sup> Using the theoretical concept given in Byrd (1987) and Byrd (1989), we define an equilibrium of the model as the equilibrium of the market segment that corrects the disequilibrium generated by the planned segment. As in Martin (1994) and Zhang (1998) the temporal equilibrium is solved by using the computable general equilibrium (CGE) method. However, unlike in Martin (1994) and Zhang (1998), where they use the computed equilibrium to analysis of the effects of diverse reform policies, we focus on the determinants of the growth in the two segments. We study the conditions for a successful transition. In Section 3 we analyze the impact of different factors that lead to the faster growth in the market segment and henceforth change the long run evolution path of the transition. Section 4 concludes.

## 2. A THEORETICAL MODEL FOR TRANSITION PROCESS IN CHINA

### 2.1. Model Setting

At the outset, there exists a certain productive capacity in the planned economic segment already. This subsystem bears the basic features of a centrally planned economy:

<sup>1</sup> For more detailed description of this historic perspective of the transition process, see Chow (2002) and Chow (2007).

- 1) The prices in this segment are fixed (determined by the planning authority).
- 2) There exists no equilibrium in this segment.
- 3) The production structure is rigid (shares of investment products and consumption products do not react to the demand situation).

The market economic segment, contrary to the planned economic segment, is a newly emerged subsystem. The functioning of this subsystem carries the basic features of a free market economy:

- 1) The producers are price-taker and they are in pursuit of maximal profits under given conditions on the market.
- 2) The prices response to the demand and the supply on the market and, thus keep supply and demand in balance.
- 3) The allocation of resources is determined according to the supply and demand on the market.

We consider the economy as a closed one<sup>2</sup> with an agricultural and an industrial sector, each of which produces a homogenous commodity. The output of agricultural good is consumed only. The industrial output may be consumed or invested.<sup>3</sup>

## 2.2. The Two-Segment-Two-Sector-Model

*Equations for the Planned Segment*

$$Y_{2P} = F^2(K_{2P}, L_{2P}), \quad (1p)$$

$$Y_{2P} = I_{2P} + C_{2P}, \quad (2p)$$

$$\frac{\partial Y_{2P}}{\partial L_{2P}} = \frac{w_P}{P_{2P}}, \quad (3p)$$

$$r_P = \frac{P_{2P}Y_{2P} - w_P L_{2P}}{K_{2P}}, \quad (4p)$$

$$NC_P^d = w_P L_{2P} + (1 - s_r) r_P K_{2P}, \quad (5p)$$

$$NI_P^d = s_r r_P K_{2P}, \quad (6p)$$

$$\frac{I_{2P}}{C_{2P}} = \mu, \quad (7p)$$

<sup>2</sup> Through the assumption of a closed economy we neglect the impact of international trade and foreign investment on the transition and industrialisation process. The importance of international trade and foreign on the industrialisation can be seen in Perkins (1994).

<sup>3</sup> In the development-theoretical literature as by Fei and Ranis (1961), and Jorgenson (1961) the industrial output is admitted for both consumption and investment purposes.

$$E = NC_P^d - P_{2P}C_{2P}. \quad (8p)$$

The above 8 Equations describe the activities in the planned segment. The detailed explanation of the variables is listed in the appendix. We assume that the planned segment is only engaged in the industrial production. (1p) is the production equation of the planned segment. The production function  $F$  is assumed to be twice differentiable with  $F' > 0$  and  $F'' < 0$  with constant return to scale. (2p) says the planned output consists of planned consumption goods and the planned investment goods. The planned price and the planned wage rate are exogenously determined by the planning authority. (3p) describes the cost minimizing behaviour in the planned segment, which determines the labour demand of the planned segment under full utilization of capital and given real wage rate. (4p) gives the rate of return of capital. (5p) is the nominal demand for consumption goods. We use here the classic assumption that the labour incomes are totally used for consumption and the capital incomes are partly used for consumption. (6p) is the demand for investment. (7p) expresses the Kornai's hypothesis of the "constant relation"<sup>4</sup> that says the ratio of output for consumption and for investment is planned as a constant. (8p) expresses the consequence of the inflexibility in the planned segment that there is always a shortage in consumption goods, i.e., we assume that  $E \geq 0$ .

#### *Equations for the Market Segment*

$$Y_{iM} = F^i(K_{iM}, L_{iM}), \quad (1m-2m)$$

$$Y_{2M} = I_{2M} + C_{2M}, \quad (3m)$$

$$K_M(t) = K_{1M}(t) + K_{2M}(t), \quad (4m)$$

$$\frac{\partial Y_{iM}}{\partial K_{iM}} = \frac{r_{iM}}{P_{iM}}, \quad (5m-6m)$$

$$\frac{\partial Y_{iM}}{\partial L_{iM}} = \frac{w_{iM}}{P_{iM}}, \quad (7m-8m)$$

$$L_M = L_{1M} + L_{2M}, \quad (9m)$$

$$L_M + L_{2P} = L_G, \quad (10m)$$

$$r_{1M} = r_{2M} = r_M, \quad (11m)$$

$$w_{2M} = v_E w_P, \quad (12m)$$

$$w_{2M} = \delta_E(\lambda P_{2P} + (1 - \lambda)P_{2M}), \quad (13m)$$

$$Y_{1M}^d = \varepsilon L_G, \quad (14m)$$

<sup>4</sup>Kornai (1980), p. 218.

$$NC_M^d = w_{1M}L_{1M} + w_{2M}L_{2M} + (1 - s_r)r_M K_M, \quad (15m)$$

$$NI_M^d = s_r r_M K_M, \quad (16m)$$

$$Y_{1M}^d = Y_{1M}, \quad (17m)$$

$$P_{2M}I_{2M} = NI_M^d + NI_P^d - P_{2P}I_{2P}, \quad (18m)$$

$$P_{2M}C_{2M} = NC_M^d + NC_P^d - P_{2P}C_{2P} - P_{1M}Y_{1M}. \quad (19m)$$

The above 19 Equations describe the activities in the market segment. (1m) and (2m) are the agricultural production and the industrial production, respectively. The production functions the same as in the planned segment. (4m) says the allocation of the capital resource is fully utilized in the two production sectors. (5m), (6m), (7m) and (8m) describe the cost minimizing behaviour of the producer. (9m) and (10m) indicate that the total labour resource is allocated in the planned segment and the market segment. (11m) says the allocation of the capital resource is flexible in the market segment such that the rates of return of capital are equal in both the industrial sector and the agricultural sector. (12m) describes the difference of the wage rates between the state-owned enterprises (SOEs) and non-state-owned enterprises (NSOEs). This difference is grounded by the common practice of SOEs who provide traditionally many kinds of subsidies and benefits for the employees in addition to the nominal wages, so that  $0 < v_E < 1$ . (13m) is the minimum wage function. It says the market real wage cannot be higher than the existence minimum  $\delta_E$  as long as there is still labour reserve that is willing to move from the agricultural sector into the industrial sector. (14m) is the demand for the agricultural output that is assumed to have a linear relation to the labour force. (15m) and (16m) are demand functions for the consumption goods and for the investment goods respectively. (17m), (18m) and (19m) are conditions for market clearing.

#### *Equations for the Dynamic Properties of the System*

$$K_{2P}(t) = K_{2P}(t-1) + I_{2P}(t) - \delta K_{2P}(t-1),$$

$$K_M(t) = K_M(t-1) + I_M(t) - \delta K_M(t-1).$$

The whole model consists of 31 variables with 26 independent Equations and 5 exogenous variables (See Appendix 2, p. 25). The functioning of the model can be summarized as follows. The planned segment always tends to focus on the production of investment goods and thus generates an excess demand for consumption goods. The market segment tends to cover this excess demand and keeps the whole economy in equilibrium. Due to the different prices and wages in the two segments the rates of return of capital are different. The higher rate of return of capital in the market segment results in faster growth of the capital stock in the market segment than in the planned

segment. The share of the market segments in the economy is increasing while the share of the planned segment is decreasing. This is the way how we describe the extrinsic transition. The intrinsic transition is described through the forced adjustment of the behaviour of the planned segment to the market situation, which is discussed in the next section.

### 2.3. Temporal Equilibrium

We say the model is in an equilibrium, if some positive market prices  $P_{1M}$ ,  $P_{2M}$ ,  $r_M$ ,  $w_{2M}$ ,  $w_{1M}$  exist, such that the equations of market clearing (17m), (18m) and (19m) and the equations of factor utilization (4m), (10m) can be fulfilled.

In order to study the property of equilibrium we make following assumptions in addition to the assumptions made in the specification of the model.

*Assumption 1:*  $F(K_M, L_M) > \delta_E L_G$ .

This is an assumption that the agricultural production is able to provide surplus for industrialisation process.

*Assumption 2:*  $\frac{V_E w_P}{P_{2p}} > \delta_E$ .

This assumption says that the real wage (without subsidies and other benefits) must above the existence minimum.

*Assumption 3:*  $E < w_p L_p - \delta_E \bar{P}_2$ .

This assumption implies that even under forced saving the per capita consumption in the planned segment should be above the existence minimum.

*Proposition 1:* Under Assumption 1 and Assumption 2, if  $E = 0$  there exists a unique stable equilibrium for the model specified from (1p) to (19m).

*Proposition 2:* Under Assumption 1, Assumption 2, Assumption 3 and  $E > 0$  there exists a constant  $\tau_K$  such that (1) there is no equilibrium for  $K_p / K_M > \tau_K$  and (2) there exists a unique stable equilibrium for  $K_p / K_M < \tau_K$ .

*Proposition 3:* Under Assumption 1, Assumption 2, Assumption 3,  $K_M$  will grow faster than  $K_p$ .

*Corollary 3.1:* If the model is in a disequilibrium state, it will evolve to the equilibrium state after some periods.

*Corollary 3.2:* Once the model is in an equilibrium state, its evolution will always in the equilibrium state (For details of proofs of the results see Chen and Hsiao (2005)).

## 2.4. Long Run Dynamics

The long run dynamic behaviour of the system depends on how fast capital stocks grow in each segment. At the beginning of the transition, it holds typically  $K_P / K_M > \tau_K$ . Following Proposition 2 there is no equilibrium for the model. According to Proposition 3,  $K_{Pt} / K_{Mt}$  will become smaller and smaller. Consequently the system will evolve from disequilibrium into equilibrium. We call the process during the disequilibrium state the complementary stage. In this stage the model is overall in disequilibrium, the market segment reduces the disequilibrium to some extent but cannot totally compensate it.

According to Proposition 3  $K_P$  will grow slower than  $K_M$ . Once  $K_P / K_M < \tau_K$  the model will be in an equilibrium. We call this stage the transitional stage.

The wage rate in the agricultural sector keeps increasing during the transitional stage. Once it approaches the wage rate in the industrial sector, the labour surplus disappears. The real wage rate in the market segment will start to increase. The market price for industrial product will decrease. The planned segment will face hard competition from the market and it is forced to adjust its behaviour to the market situation. We call this stage the forces adjustment stage.

## 3. ANALYSIS OF THE DRIVING FORCES OF THE TRANSITION

### 3.1. The Planned Segment and Kalecki's Model

In the model, the growth mechanism of the planned segment has the pattern of the growth in Kalecki's Model for the centrally planned economy. We assume that the price and the wage rate in the planned segment are given exogenously. The increment of production can then be determined as follow.

$$\begin{aligned} \Delta Y_{2P} &= F\left(1, \alpha \left(\frac{w_{2P}}{P_{2P}}\right)\right) \Delta K_{2P} = \phi \left(\frac{w_{2P}}{P_{2P}}\right) \Delta K_{2P} \\ &= \phi \left(\frac{w_{2P}}{P_{2P}}\right) (I_{2P} - \delta K_{2P}) = \phi \left(\frac{w_{2P}}{P_{2P}}\right) I_{2P} - \delta Y_{2P}, \end{aligned}$$

where we  $\alpha \left(\frac{w_{2P}}{P_{2P}}\right) = \frac{L_{2P}}{K_{2P}}$  and  $\phi \left(\frac{w_{2P}}{P_{2P}}\right) = F\left(1, \alpha \left(\frac{w_{2P}}{P_{2P}}\right)\right)$ . The growth rate of the production will be:

$$g = \frac{\Delta Y_{2P}}{Y_{2P}} = \phi i - \delta \quad \text{or} \quad g + \phi c = \phi - \delta,$$

where  $i = \frac{I_{2P}}{Y_{2P}}$  is the share of productive accumulation, and  $c = \frac{C_{2P}}{Y_{2P}}$  share of consumption production in the planned segment ( $c+i=1$ ). Comparing with the fundamental equation of the growth in Kalecki (1972), we see that the equation in our model is a special case with a production function of constant returns to scale.

As  $\phi - \delta$  is independent of the planning decision, the decision about the growth is a trade off between the growth rate and the contemporary consumption. This is exactly the growth pattern described by Kalecki (1972). Because the wage income is the main source of consumption, the political desire for quick growth is instrumentalized through keeping the wage rate at a low level. The evidence for the pursuit of this policy is the fact that in China despite a rather considerable growth rate of the GNP during the sixties and seventies, there was no remarkable improvement of the living standard. In fact the real average wage in 1983 did not reach the level of that in 1957.

**Table 1.** Index of Real Wage and the Annual Growth Rate of National Income

Year	Growth rate of national income (%)	Index of average real wage
1952	14(1953)	100
1957	4.5	127.9
1962	-6.5	92.1
1965	17	110.1
1970	23	105.6
1975	8.3	107.9
1980	6.4	124.7
1981	4.9	123.4
1982	8.3	124.9
1983	9.8	126.7
1984	13.5	145.6

Source: Chinese Statistic Year Book (1988), p. 52 and p. 190.

### 3.2. The Market Segment and the Dualistic Economic Model

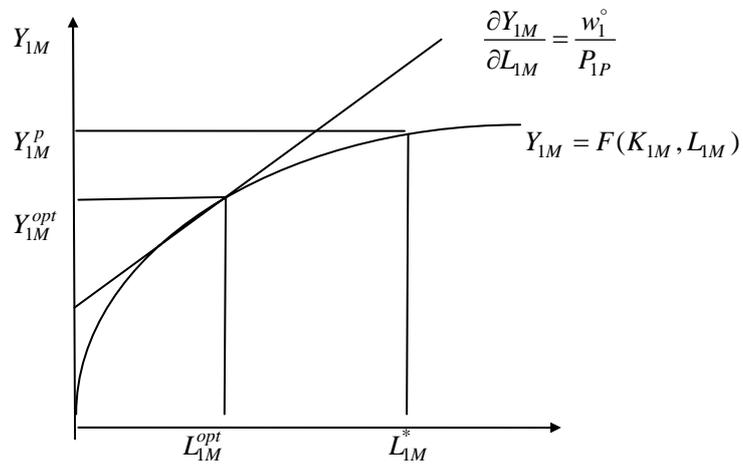
The dualistic features of the model are expressed through the asymmetric treatment of the two sectors in market segment.<sup>5</sup> In our model the dualism lies, first, in the different production condition. The production in the agricultural sector is assumed to be

<sup>5</sup> See Kelley, Williamson, and Cheetham (1972), p. 8-9.

always more labour intensive than in the industrial sector. Second, the agricultural sector is expected to absorb all the labour force, which cannot be utilised in the industrial sector. A basic feature of the duality is that the living standard in the rural area and that in the urban area are different. Hence, although the wage rate in the industrial sector is postulated at a level of existence minimum in the urban areas, the wage rate in the agricultural sector lies even lower. Third, we have assumed asymmetric consumer expenditure in two sectors. (For simplicity the demand for agricultural product was assumed to be inelastic.)

**3.3. The Rural Reform and the Stimulation of a Decentralized Industrialization Process**

The Chinese agriculture feeds more than 1 billion people and provides jobs for more than 80% of them in 1978. Before the economic reform, the agriculture in China was integrated in the planning system through an obligated quantity planning and a strict price control. Moreover, peasants were only allowed to engage in the agricultural production. Farmers had to deliver to the state the planned amount of food that was needed by the people living in the urban area and they had to produce enough food for themselves. The decision of farmers could be modelled by  $\frac{\partial Y_{1M}}{\partial L_{1M}} = \frac{w_1^\circ}{P_{1P}}$ , where  $P_{1P}$  is the planned price for agricultural product  $w_1^\circ$  the prevailing wage rate.



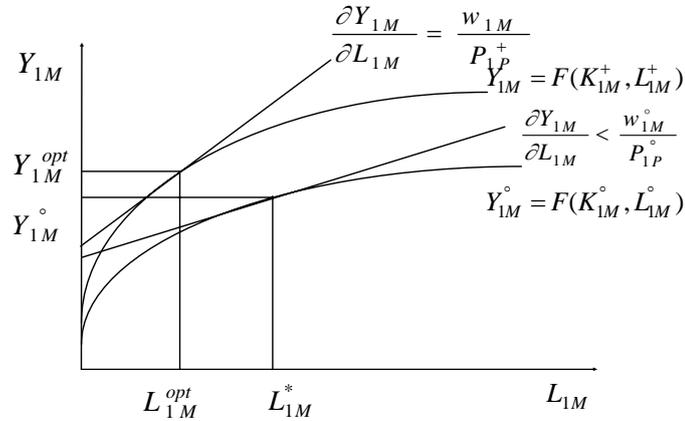
**Figure 1.** Influence of Planning on the Agriculture

We assume that for the given real wage rate, the optimal decision for the farmer would be  $L_{1M}^{opt}$  with a production amount  $Y_{1M}^{opt}$  lower than the planned production  $Y_{1M}^P$ . Because the planned target was obligatory, everything had to be done to fulfil the plan target. That means more labour input would be used, even if the marginal productivity was lower than the real wage rate, which is supposed to have reached its lower limit. Another reason for the unprofitable using of labour in the agriculture was that the agriculture had to absorb all the surplus labour that could not be utilised in the industrial sector.<sup>6</sup> This economic loss through using surplus labour resulted in reduction of the capital income in the agricultural sector. We have in this situation:  $\frac{\partial Y_{1M}}{\partial L_{1M}} < \frac{w_1^\circ}{P_{1P}}$ .

The capital income could be determined then residually from the difference between total income and the labour income.  $r_1 = \frac{P_{1P}Y_{1M} - w_1^\circ L_{1M}}{K_{1M}}$ . If the planned price is so low,

that the rate of return of capital can only keep pace with the depreciation, the marginal labour productivity will not rise. Consequently, the labour productivity, and thus, the living standard of the farmers cannot get decisively improved. Before the reform, the low planned price of the agriculture product and the bureaucratically controlled production manner had been the main obstacle to the development in the rural area. It destroyed the economic vitality of agriculture, so that a decentralized industrialisation became economically impossible, though the technological and demographic condition was mature for an industrialization "take-off". In the Table 2, we can see that from the beginning of the sixties to the beginning of the economic reform in 1978, the planned price did not change significantly.

<sup>6</sup>For detail discussion see also Perish (1990), and Perkins (1990).



**Figure 2.** Impact of Rural Reform on Agriculture

**Table 2.** Planned Price Index for Agricultural Products

Year	Planned price index
1952	121.6
1957	146.2
1962	200.1
1965	187.9
1970	195.1
1975	208.7
1978	217.4
1980	284.4
1985	362.9
1990	595.8
1991	583.9
1992	603.8
1993	684.7
1994	844.9

Sources: Chinese Statistic Year Book (1993), p. 238; Chinese Statistic Year Book (1995), p. 233.<sup>7</sup>

The rising price of agricultural products, as practised at the beginning of the rural reform and the decollectivization has given a big push in the development of agriculture. There are two direct effects resulting from raising the prices. First, the rising price led to increases in the rate of return of capital. The farmers are able to put more capital into production, which in turn leads to increases in labour productivity. The production curve

<sup>7</sup> After 1994 there did not exist a planned price index.

turns upwards. Second, the real wage rate in terms of agricultural price will decrease, thus it is more profitable to use the labour force than before the reform. These two effects result in increasing production. If the increase of the production is big enough, so that the supply of agricultural products at the previous level of the labour input is larger than the food demand, the level of employment in the agriculture will go down.

The marginal productivity will rise in agriculture, so that the improvement of the farmers' living standard is economically founded. From then on, the expansion of the capital stock in the rural areas and the labour freed from agriculture will be transferred into industrial production. In fact the rural reform changed the institutional condition in the agricultural sector in China and released a spontaneous industrialization process. See Table 3 for the rapid growth of the industrial production in the rural area.

**Table 3.** The Composition of the Total Social Products in Rural Area

Year	Total (100Mio.)	Agr. (100Mio.)	Ind. (100Mio.)	Constr. (100Mio.)	Transp. (100Mio.)	Trade (100Mio.)
1980	2792.12	1922.6	543.96	179.97	47.14	98.45
1983	4123.78	2750	826.49	320.88	82.63	143.78
1984	5067.55	3214.13	1161.31	370.58	132.55	188.98
1985	6340.04	3619.49	1750.08	510.49	190.42	269.56
1986	7554.23	4013.01	2380.79	591.93	245.4	323.1
1987	9431.61	4675.7	3284.86	723.31	334.47	413.27
1988	12534.69	5865.27	4781.16	895.33	434.44	558.49
1989	14480.17	6534.73	5886.02	919.17	515.5	624.75
1990	16619.21	7662.09	6719.13	978.47	579.62	679.3
1991	19004.09	8057.03	8266.5	1142.32	660.76	777.48
1992	25386.28	9084.71	12717.09	1570.01	906.04	1108.43
Share of each Sectors						
Year	Total	Agr.	Ind.	Constr.	Transp	Trade
1980	100	68.86	19.48	6.45	1.69	3.53
1983	100	66.69	20.04	7.78	2.00	3.49
1984	100	63.43	22.92	7.31	2.62	3.73
1985	100	57.09	27.60	8.05	3.00	4.25
1986	100	53.12	31.52	7.84	3.25	4.28
1987	100	49.57	34.83	7.67	3.55	4.38
1988	100	46.79	38.14	7.14	3.47	4.46
1989	100	45.13	40.65	6.35	3.56	4.31
1990	100	46.10	40.43	5.89	3.49	4.09
1991	100	42.40	43.50	6.01	3.48	4.09
1992	100	35.79	50.09	6.18	3.57	4.37

Source: Chinese Statistic Year Book (1993), p. 333.<sup>8</sup>

<sup>8</sup>This statistics table was not published after 1992.

### 3.4. Advantages in the Market Segment

In an economy with two subsystems organised by different principles, the vitality of a subsystem can be judged on the rate of growth of that subsystem. The rate of return of the capital under cost-minimization assumption can be calculated as follows:

$$r = \frac{PF - wL}{K} = P\left(\frac{F}{K} - \frac{w}{P} \frac{L}{K}\right) = PH\left(\frac{w}{P}\right).$$

Denote the second factor of the middle term in the equation above by  $H$ . It can be easily shown that  $H$  is independent of  $K$  but depends decreasingly on the real wage rate. Using this result we can calculate the ratio of the growth rates in the two segments.<sup>9</sup> We denote the growth rates of capital stock by  $\rho_P$  and  $\rho_M$  for the planned segment and the market segment respectively.

$$\frac{\rho_P}{\rho_M} = \frac{r_P}{r_M} = \frac{P_P H_P(w_P/P_P)}{P_M H_M(w_M/P_M)}.$$

In this formula the advantage in the market segment in terms of the rate of growth of the capital stock can be traced back to three advantages in the market segment. The first one is the price advantage. Producers from the market segment can take advantage of the shortage situation and always sell their products at a higher price. It holds that  $P_{2M} > P_{2P}$ . The second one is the wage advantage. Owing to the large labour reserve in the agricultural sector, the industrial enterprises of the market segment are facing an almost unlimited labour supply, especially at the beginning of the transition, when the demand for labour is relatively small. Therefore, they can hire the labour at lower wage rate  $w_{2M} < w_{2P}$ . The third one is the advantage of more efficient production. In the previous discussion, we have always assumed that the production technologies are the same in both segments. There are some good reasons, why the production in the market segment is more efficient than that in the planned segment. The most important one is the selectivity of the investment: The enterprises of the market segment do not need to cover every sector of the economy. They produce only in the most profitable sectors through selective investment, while the enterprises of planned economy have to cover all the branches, where some production will be unprofitable. Consequently, with the same amount of resources, more goods and service can be produced in the market segment than in the planned segment. Better management is another important reason for more efficient production in the market segment. See Table 4 for the faster growth of the market segment.

<sup>9</sup>We neglect the depreciation in the following discussion to simplify the discussion, because its effects on the two segments do not change the relative advantage/disadvantage of any segment.

**Table 4.** Gross Output Value of Industry (100 Mio.)

Year	State-owned enterprises	Township- and village enterprises/ non-state-owned enterprises	Ratio
1978	3289	358	0.11
1979	3673	423	0.12
1980	3915	509	0.13
1981	4037	579	0.14
1982	4326	646	0.15
1983	4739	757	0.16
1984	5262	1245	0.24
1985	6302	1827	0.29
1986	6971	2413	0.35
1987	8250	3243	0.39
1988	10351	4529	0.44
1989	12342	5244	0.42
1990	13063	6050	0.46
1991	14954	8780	0.59
1992	17824	13635	0.76
1993	22724	23446	1.03
1994	26200	32336	1.23
1995	31220		
1996	36173		
1997	35968		
1998	33621	67737	2.01
1999	35571	72707	2.04
2000	40554	85673	2.11
2001	42408	95448	2.25
2002	45178	110776	2.45
2003	53403	142271	2.66

*Sources*<sup>10</sup>: Chinese Statistic Year Book (1993), p. 396 and p. 412; Chinese Statistic Year Book (1995), p. 365 and p. 379; Chinese Statistic Year Book (2004), p. 524. (Since 1998 the numbers in the third column are the gross output of non-state-owned enterprises. The statistics for TVEs are not available for this period.)

<sup>10</sup> Although it is questionable, whether the sudden changes in the figures of 1984 and 1992 are reliable, there is no doubt that the TVEs are playing an increasingly important role in the economy.

### 3.5. Industrialisation and the Impact on the Intrinsic Transition

At the outset the urban minimum wage exceeds the competitive level and draws rural labour into the industrial sector. The industrial sector faces an “unlimited supply of labour” and the minimum wage can prevail. Labour force is engaged in three groups of employment: the industrial production of the planned segment, the industrial production and the agricultural production of the market segment. During the transition from plan to market, the industrialisation process is going on. The labour movement from the agricultural sector into the industrial sector proceeds continuously.

As the growth of the capital stock is much faster than the growth of the labour force (we have assumed a constant labour supply), the overall labour intensity decreases with time and so does the rental-wage ratio. From the equation (5m) and (6m) we know, that the price of industrial products will decrease. This process will go on until the market price falls below the planned price. At least from this time point on, the planned segment will be forced to follow the market price; otherwise no one would buy the products at the planned price. In this case, the planned segment obviously cannot survive in the system, if it does not adjust itself to the market situation.<sup>11</sup>

The consideration above suggests the conclusion, that the industrialisation is crucial to the transition from plan to market. As long as the industrialisation is further progressing, the thorough removal of the planned segment will be inevitable; the only one exception is that the planned segment behaves just like the market segment.

### 3.6. Savings and the Financial Market

A more realistic assumption about saving is  $0 \leq s_{wM} \leq s_r \leq 1$  and  $0 \leq s_{wP} \leq s_r \leq 1$ , where  $s_{wM}, s_{wP}, s_r$  are the saving fractions of labour income in the market segment, the plan segment and the saving fraction of capital income, respectively.

For the long run behaviour of the system, it becomes now essential, how the savings from the labour income are distributed in the two segments. We assume that the savings of the capital income will be used for the investment in the same segment. We use  $\kappa$  to denote the share of savings from labour income which is used for investment in the plan segment. The capital stock accumulation in the two segments can be described through the following two equations. We denote the sum of savings from the labour income by  $S = s_{wM}(L_{1M}w_{1M} + L_{2M}w_{2M}) + s_{wP}L_Pw_P$ .

$$\rho_P = \frac{\Delta K_{2P}}{K_{2P}(t)} = -\delta + (s_r r_P + \kappa \frac{S}{K_{2P}(t)}) / \bar{P}_2,$$

<sup>11</sup> In fact the forced adjustment took place continuously during the economic reform in China. See Chen and Hsiao (2005) for more detailed discussion.

$$\rho_M = \frac{\Delta K_M}{K_M(t)} = -\delta + (s_r r_M + (1-\kappa) \frac{S}{K_M(t)}) / \bar{P}_2.$$

The difference between  $s_r r_p + \kappa S / K_p$  and  $s_r r_M + (1-\kappa) S / K_M$  is key to the dynamic behaviour of the system. The difference depends on the rate of return in both segments. It depends also on the distribution of saved labour income. If there is no competitive financial market, which is still the case in China, the flow of the financial asset will run according to administrative rules. The simplest rule is that the distribution is held at a fixed ratio  $\kappa$ . Then the planned segment may take a constant share in the economy.

### 3.7. Welfare Effect of Transition

It is well known that welfare concept is much more comprehensive than just a single object of real income.<sup>12</sup> Constrained by the model structure, the welfare effect will be only examined in this partial aspect. In this paper the participants of the economy during the transition process can be roughly divided into 4 groups: farmers, who are engaged in the agricultural production, farmer-workers, who were farmers and became industrial workers during the industrialisation process, workers of the state-owned enterprises, and capitalists, who own the capital stocks. At the early stage of the economic reform, farmers had benefited from the rural reform through rising price of agricultural products and freeing up of the market for agricultural products. During the transition process accompanied by the industrialisation process, labourers moved continuously from the agricultural sector into the industrial sector. The marginal productivity increased in the agricultural sector, so that farmers' income rose continuously. Although farmers' income was the lowest among the four groups, farmers were facing improving living standards. Hence, they are happy with the reform policies, as long as the improvement continues.

Farmer-workers improved their living standard through moving into the industrial employment. They earn more than their former colleagues, who remained in the countryside. In this sense, they are grateful to the reform policy. However, they have to lead a rather hard life in the urban area. Owing to the excess supply of labour, their real income will be fixed on the minimum level. They faced the fact that they earned more and they had to spend more for living. Hence, their attitude to the reform is twofold. On the one hand, they were grateful to the reform policy that got the chance to work in industry and could improve their living standards in comparison to the situation before the reform. On the other hand, they will always complain about that the reform cannot give them further improvement of living standard.

Workers of the state-owned enterprises cannot profit directly from the transition

<sup>12</sup> Sen, Amartya (1988): in Hand Book of Development Economics Vol. 1, p. 12.

process, because their wage rate was determined through the planning. They might suffer from a loss of welfare due to the rising prices, which is caused by the higher prices in the market segment. However, with the progress of reform in the state-owned enterprises, the enterprises have gained comprehensive autonomy. The managers of the enterprises raised the income of the workers through raising the share of premium in the total wage. From 1987 to 1993 the share of tariff wage fell from 85.8% to 50%. According to this fact, the central planning did not play the decisive role any more in the wage determination. It raises naturally the question, how is the wage rate determined in the state-owned enterprises during the economic reform. Neither the theory of marginal productivity nor the efficiency wage model can provide a sufficient explanation to the phenomena, because statistics show that the increase of wage rate in the state-owned enterprises is larger than the increase of productivity. Obviously, the managers of the state-owned enterprises have taken the growth of real income of the workers of their enterprises into their object function.<sup>13</sup> These wage increases in the state-owned enterprises are partly responsible for the fall of profit rate in the state-owned enterprises during the transition process which will threaten the existence of the state-owned enterprises and thus the existence of the workers. Therefore, without significant technical progress, the improvement of the living standard of the workers of the state-owned enterprises cannot continue during the transition process.

The capitalists have profited the most through the transition process. At the early stage of the reform the capital rate of return was very high. With the expansion of the market segment and the capital stocks, the rate of return will go down. A new entrepreneur class is slowly forming during the transition process. This class is naturally the support of reform policy.

### **3.8. Feasible Transition Path**

Although the evolution path depends on the initial condition and the political intervention and is hence not unique, the development of the economic system will go through several similar stages along each feasible successful transition path.

At the early stage, when the market segment comes into existence, the capital stock of the market segment is small. The unsatisfied demand for consumer goods provides a ready market for the products, so that the new producers can get an easy start in the consumer sector.

With the emerging of the market segment in the economy, the supply situation is improved. The whole economy grows faster and becomes more flexible in production and resource allocation. Owing to the limited production capacity in the market segment at the earlier stage of the transition, not all deficits in supply of consumer goods can be covered. The unsatisfied consumer demand becomes forced saving. The planned

<sup>13</sup>Wing Thye Woo has argued for this behaviour in Wing Thye Woo (1994), P. 286.

segment is still dominant in the economy. The main features of the CPE, such as shortage of supply, fixed prices and rigid factor allocation, still prevailed in the economy. In general the market segment plays a complimentary role in the economy. We call this stage the complementary stage.

Since the price advantage is large in the complementary stage, the market segment grows very fast in the complementary stage. The second stage begins, when the production of the market segment can cover all the supply deficit of the consumption goods of the planned segment and expands into the production of investment goods. The market segment becomes more and more an independent economic sub-system.

During this stage, the growth rate in the market segment is larger than that in the planned segment. The price advantage, the wage advantage and the production advantage support faster growth in the market segment, though the price advantage is decreasing in this stage. The overall economic situation is much more market-like. The features of centrally planned economy (CPE) exist only within the planned segment and are not significant for the whole economy anymore. In this stage, both the planned segment and the market segment develop well. We call this stage the development stage.

Facing faster growth in the market segment and a continuously shrinking share of the planned segment in the economy, the policy makers are motivated to carry out reform to adjust the planned segment to the new economic situation. All the policies are aimed at accelerating the growth in the planned segment through catching up the advantage of the market segment. However, the advantages of the market segment can only be completely neutralised, if all the planning decisions in the planned segment will coincide with that in the market segment. This implies that the planned segment would become itself a market segment. We call this stage, the voluntary adjustment stage.

Parallel to the transition process, the industrialisation process is going on. The labour movement takes place continuously. With the increasing of the labour productivity in the agricultural sector, the wage difference between industry and agriculture is getting smaller and smaller. The labour surplus is reducing with time. The fourth stage begins, when the labour surplus disappears. At this stage, the real wage in the market segment will rise. As soon as the real wage in the market segment reaches that in the planned segment, the competition from the market segment will really threaten the existence of the planned segment. The planned segment can only survive in the system, if it performs just the same as the market segment. This implies, that the planned segment has to become itself a market segment, otherwise it will not survive in the system. Hence, we call this stage the forced adjustment stage.

#### 4. CONCLUDING REMARKS

The transition from plan to market in China characterised by “growing out of plan” is typically dominated by the extrinsic transition, where the growth, especially the faster growth of the market segment, is the most important driving force of the transition. This

particular Chinese way of transition is marked by a decentralised industrialisation process during the reform era.

Before the economic reform, the Chinese economy followed the Soviet-type industrialization via central planning that choked the decentralized industrialization mechanism, though the technological and demographical condition was already mature for the industrialization “take-off”. The economic reform led by the rural reform has changed the mechanism of the industrialisation. The improved income on the rural area, the existing technological condition, the liberalised economic environment and the established incentive stimulated and enforced the decentralised industrialisation process. A market economic segment emerged during this process. The market segment took advantage of the existing planned segment and could get a faster development than the planned segment. This formed the particular Chinese way of transition.

The intrinsic transition in China can be viewed as the adjustment process of the planned segment to the continuously changing economic situation, driven by the market force. The price reform could reduce the price disadvantage of the planned segment against the market segment and accelerate the growth in the planned segment. The reform on the labour market would reduce the disadvantage in the labour using in the long run. However, with these reform policies, the planned segment loses his planned economic nature. The disadvantages can only be totally removed if the planned segment can perform identically as the market segment, which implies that the planned segment would become itself a market segment.

The reform of the financial market is a key factor to the transition process. If the financial market is still administratively controlled and a “favour-planned-segment” policy is pursued, the transition process will end at a certain constant mixture with the planned segment on the one side and the market segment on the other. If the financial market runs somehow competitively, then the market segment will dominate in the long run.

The welfare effects of transition vary over different groups of people and over different periods during the transition. Therefore, the transition will promise a golden future for the Chinese people only if the technical progress enforced by the transition can outweigh the negative redistribution effect of the transition.

## **APPENDIX**

### *Summary of the Model*

In summary the whole model consists of 31 variables with 26 independent equations and 5 exogenous variables. The following is a list of the variables:

*List of variables*

1	$P_{2P}$	the planned price for industrial goods	Exogenous
2	$w_P$	the planned wage rate in the industrial sector	Exogenous
3	$K_{2P}$	the capital stock in the industrial sector of the planned segment	Exogenous
4	$L_{2P}$	the employed labour in the industrial sector of the planned segment	Endogenous
5	$I_{2P}$	the amount of the produced investment goods	Endogenous
6	$C_{2P}$	the amount of the produced consumer goods	Endogenous
7	$Y_{2P}$	the amount of the industrial products	Endogenous
8	$r_P$	the rate of return in the planned economic segment	Endogenous
9	$NC_P^d$	the demand for consumption from the planned segment	Endogenous
10	$NI_P^d$	the demand for investment from the planned segment	Endogenous
11	$E$	the shortage of the supply for consumer goods in the planned segment	Endogenous
12	$K_{1M}$	the capital stock in the agricultural sector of the market segment	Endogenous
13	$K_{2M}$	the capital stock in the industrial sector of the market segment	Endogenous
14	$P_{1M}$	the market price for the agricultural goods	Endogenous
15	$P_{2M}$	the market price for the industrial goods	Endogenous
16	$L_{1M}$	the labour employed in the agricultural sector	Endogenous
17	$L_{2M}$	the labour employed in the industrial sector of the market segment	Endogenous
18	$L_M$	the total labour employed in the market segment	Endogenous
19	$Y_{1M}$	the amount of agricultural goods produced in the market segment	Endogenous
20	$Y_{2M}$	the amount of industrial goods produced in the market segment	Endogenous
21	$r_{1M}$	the rate of return of capital in the agricultural sector	Endogenous
22	$r_{2M}$	the rate of return of capital in the industrial sector	Endogenous
23	$K_M$	the total capital stock in the market segment	Exogenous
24	$w_{2M}$	the market wage rate in the industrial sector	Endogenous
25	$w_{1M}$	the market wage rate in the agricultural sector	Endogenous
26	$I_{2M}$	the produced investment goods in the market segment	Endogenous
27	$C_{2M}$	the produced consumer goods in the market segment	Endogenous
28	$Y_{1M}^d$	the demand for the agricultural products	Endogenous
29	$NC_M^d$	the nominal demand for consumption from the market segment	Endogenous
30	$NI_M^d$	the nominal demand for investment from the market segment	Endogenous
31	$L_G$	total labour force	Exogenous

## REFERENCES

- Byrd, William A (1987), "The Impact of the Two-Tier Plan/Market System in Chinese Industry," *Journal of Comparative Economics*, 11, 295-308.
- \_\_\_\_\_ (1989), "Plan and Market in the Chinese Economy: A Simple General Equilibrium Model," *Journal of Comparative Economics*, 13, 177-204.
- \_\_\_\_\_ (1991), *The Market Mechanism and Economic Reforms in China*, New York: M. E. Sharpe (An East Gate Book -Studies on Contemporary China).
- Chen, P., and C. Hsiao (2005), "The Transition Process in China: a Theoretical and Empirical Study," *11th International Conference on Computing in Economics & Finance*, Washington.
- Chow, Gregory (2002), *China's Economic Transformation*, Blackwell Publishers 1<sup>st</sup> Edition.
- \_\_\_\_\_ (2007), *China's Economic Transformation*, Blackwell Publishers 2<sup>nd</sup> Edition.
- Jorgenson, D.W. (1961), "The Development of a Dual Economy," *Economic Journal*, 71 (282), 309-334.
- Kalecki (1972), *Theorie des Wachstums und der Planung in der Sozialistischen Volkswirtschaft*, Nomos Verlagsgesellschaft, Baden-Baden.
- Kelley, A.C., J.G. Williamson, and R.J. Cheetham (1972), *Dualistic Economic Development*, The University of Chicago Press, Chicago and London.
- Kornai, J. (1980), *Economics of Shortage*, North-Holland, Amsterdam.
- Kwok, R. Yin-Wang (1990), *Chinese Urban Reform: What Model Now?* M.E. Sharpe, Armon, NY.
- Lardy, Nicholas R. (2000), "When Will China's Financial System Meet China's Needs?" Paper presented at Conference on Policy Reform in China, Center for Research on Economic Development and Policy Reform, Stanford University, Stanford, CA, November 18-20, 1999 (Revised February 2000).
- Martin, W. (1993), "Modeling the Post Reform Chinese Economy," *Journal of Policy Modeling*, 15(5&6), 545-579.
- McKinnon, Ronald I. (1994), "Financial Growth and Macroeconomic Stability in China, 1978-1992: Implications for Russia and Other transitional Economies," *Journal of Comparative Economics*, 18, 438-469.
- Perkins, Dwight H. (1990), "The Influence of Economic Reforms on China's Urbanization," in Kwok R. Yin-Wang eds., *Chinese Urban Reform: What Model Now?* 78-106.
- \_\_\_\_\_ (1994), "Completing Chinese Reform," *Journal of Economic Perspectives*, Spring, 22-46.
- Ranis, G., and J.C. Fei (1961), "A Theory of Economic Development," *The American Economic Review*, 51(4), 533-565.
- Wing Thyee Woo (1994), "The art of Reforming Centrally Planned Economies: Comparing China, Poland, and Russia," *Journal of Comparative Economics*, 18, 286.

Zhang, X.G. (1998), "Modeling Economic Transition: A Two-Tier Price Computable General Equilibrium Model of the Chinese Economy," *Journal of Policy Modeling*, 20(4), 483-511.

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