The Developing Economies, XXXIV-2 (June 1996)

EXPLAINING CHINA'S BUSINESS CYCLES

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I. INTRODUCTION

SINCE the Communist government instituted centralized economic management and planning in the mid-1950s, the Chinese economy has gone through business cycles of sizable amplitude. The objective of this paper is to present a comprehensive explanatory framework for China's business cycles and to reinterpret the cycles of the past four decades. The main feature of this framework is that the interaction between exogenous shocks, on the one hand, and central planners' reaction through regulating fixed investment, on the other, generates business cycles. Exogenous shocks, whether of supply or demand, lessen or augment capacity pressure. Capacity pressure, an indicator of macroeconomic tension, rises as aggregate demand moves closer to or exceeds aggregate supply capacity. Planners react to changes in capacity pressure by adjusting the growth rate of state fixed investment. Because exogenous shocks appear continually, subsequent fluctuations in macroeconomic variables form business cycles whose core element is investment cycles. For ease of analysis, business cycles in this study are represented as recurring short-term fluctuations in the growth rate of aggregate output. The growth rate is referred to as the economic growth rate. This study covers the 1955–94 period and relies mainly on annual data.

In Sections II and III, I review the empirical regularities in China's short-term macroeconomic behavior and the existing hypotheses about business cycles. My explanatory framework for China's business cycles is introduced in Section IV. The dynamic property of China's business cycles is investigated through a series of simulations in Section V. A chronological review of business cycles based on the explanatory framework follows in Section VI. The main findings are summarized in the final section.

I am grateful to Dr. Carl Christ and the late Dr. Bela Balassa for helpful comments on earlier drafts. I also owe a debt of gratitude to Harvard University's John King Fairbank Center for East Asian Research, where I wrote the last draft.

II. CHINA'S BUSINESS CYCLES

Table I tabulates the annual economic growth rate based on net material product (NMP) in 1952 prices. Because GDP data are available only from 1978, to identify business cycles, NMP in constant prices is used as the measure of aggregate output in this section.[1] The economic growth rate through the 1955–94 period displays conspicuous cyclical patterns, and the amplitude of short-term fluctuations is large. The standard deviation of the growth rate is computed for the two subperiods (1955–78 and 1979–93) before and after the initiation of economic reforms. The 1955–78 period registers a much larger amplitude of standard deviation (11.7) than the 1979–93 period (3.8). A substantial part of the numerical difference between the two periods appears to come from the presence of two major disturbances in the pre-1978 period: the collapse of the Great Leap Forward at the end of the 1950s and the climactic period (1967–68) of the Cultural Revolution. The post-1979 period is characterized by high growth as well as relative stability. The economic growth rate rose from 5.7 per cent in the 1955–78 period to 9.3 per cent in the 1979–93 period.

I have identified business cycles for the 1955–93 period, each of which consists of an upswing and a downturn, with a set of numerical criteria based on the economic growth rate.[2] Also, the final year of a downturn is termed a trough. An assumption here is that business cycles are short-term deviations around the long-term stable growth rate path of output. An upswing is the period in which the growth rate accelerates or stays above or around its long-term trend rate. For the Chinese economy, there was an upward shift around 1979 of the long-term trend rate, roughly from 6 per cent to 9 per cent, associated with the beginning of eco-

[1] The two largest sources of the difference between GDP and NMP are the omission in NMP of (i) the depreciation of capital stock and (ii) part of services such as residential construction, passenger transportation, retailing, medical care, education, and government administration. Because of the omission, NMP is significantly smaller than GDP. In 1993, nominal NMP and GDP were, respectively, 2,488.2 and 3,138.0 billion yuan [19, 1994 ed., pp. 32–33]. The growth rates of NMP and GDP in constant prices are usually quite close, however.

[2] The numerical criteria adopted are:

(i) A business cycle begins in the year following a trough and ends in the next trough.

(ii) The threshold rates are 4.8 per cent for the 1955–78 period and 7.0 per cent for the 1979–93 period. These rates represent 75 per cent of the arithmetic mean growth rates.

(iii) A trough is the final year in which a negative growth rate is registered (or the year in which the growth rate is the lowest) if the growth rate is negative (or positive but less than the threshold rate) for more than a year.

(iv) An upswing is the period that begins in the year after a trough and goes through a period of higher-than-threshold growth for more than a year.

(v) A downturn begins when the growth rate drops below the threshold rate and ends in a trough.

TABLE I

BUSINESS CYCLES

(%)

	Business Cycles		Growth Rates			Rate of Inflation	Shares in NMP/GDP	
			NMP	Agric. Output	State Fixed Investment		Agric. Output (NMP)	State Fixed Investment (GDP)
1955	i	U	6.4	7.9	3.7	1.7	52.9	—
1956	i	U	14.1	4.5	54.2	1.8	49.8	—
1957	i	D	4.5	3.1	–3.6	–0.1	46.8	—
1958	ii	U	22.0	0.2	85.0	1.8	39.4	—
1959	ii	U	8.2	–16.4	28.1	0.2	30.8	—
1960	ii	D	–1.4	–16.9	12.2	6.2	27.2	—
1961	ii	D	–29.7	1.3	–62.7	25.5	43.4	—
1962	ii	D	–6.5	4.7	–45.7	0.1	48.1	—
1963	iii	U	10.7	11.5	35.3	–9.7	44.8	—
1964	iii	U	16.5	13.1	42.6	–5.7	47.1	—
1965	iii	U	16.9	9.8	37.7	–0.9	46.2	—
1966	iii	U	17.0	7.3	20.1	3.3	43.6	—
1967	iii	D	–7.2	1.7	–25.9	0.5	47.3	—
1968	iii	D	–6.5	–1.9	–18.3	2.6	50.5	—
1969	iv	U	19.3	0.5	65.9	–1.2	44.7	—
1970	iv	U	23.3	5.7	49.3	–2.8	40.4	—
1971	iv	U	7.0	1.6	12.3	1.5	38.9	—
1972	iv	D	2.9	–1.1	–0.7	–0.1	37.8	—
1973	v	U	8.3	9.0	4.4	2.2	38.2	—
1974	v	D	1.1	4.0	4.7	0.2	39.3	—
1975	vi	U	8.3	1.9	17.0	0.3	37.8	—
1976	vi	D	–2.7	–2.0	–4.4	0.6	38.7	—
1977	vii	U	7.8	–2.5	4.0	1.3	34.5	—
1978	vii	U	12.3	3.9	20.5	1.3	32.8	18.5
1979	vii	U	7.0	6.4	2.8	1.4	36.6	—
1980	vii	D	6.4	–1.8	1.0	6.3	36.0	16.5
1981	vii	D	4.9	7.1	–12.0	2.8	38.3	—
1982	viii	U	8.2	11.8	24.2	1.6	40.5	—
1983	viii	U	10.0	8.5	9.5	1.5	40.6	—
1984	viii	U	13.6	12.9	19.2	3.8	39.8	16.5
1985	viii	U	13.5	2.7	31.9	7.2	35.5	18.7
1986	viii	U	7.7	3.0	11.6	5.5	34.6	19.4
1987	viii	U	10.2	4.5	7.5	5.7	33.9	19.2
1988	viii	U	11.3	2.3	7.4	21.7	32.5	18.5
1989	viii	D	3.6	3.2	–15.2	14.9	31.9	15.0
1990	ix	U	5.1	7.5	9.2	0.6	34.8	15.8
1991	ix	U	7.7	2.3	16.4	2.9	31.8	16.8
1992	ix	U	15.4	5.0	26.1	5.6	28.7	19.8
1993	ix	U	15.1	4.0	14.7	13.0	25.4	22.2
1994	ix	U	11.8[a]	4.0[b]	10.3	21.7[c]	—	20.7

TABLE I (Continued)

Period	Standard Deviations and Growth Rates					
	NMP		Agricultural Output		State Fixed Investment	
	S.D.	(*G.R.*)	*S.D.*	(*G.R.*)	*S.D.*	(*G.R.*)
1955–78	11.7	(5.7%)	7.2	(1.9%)	37	(8.7%)
1979–93	3.8	(9.3%)	3.8	(5.2%)	13	(9.5%)

Sources: [19, 1993 ed., pp. 31–36, 149, 239] [19, 1994 ed., pp. 33, 34, 243] [19, 1995 ed., pp. 32, 137, 233, 250] [8, p. 148].

Note: Roman numerals denote separate business cycles, and U and D denote, respectively, the years of upswing and downturn within these cycles. *S.D.* and *G.R.* stand for, respectively, the standard deviation and the geometric-mean growth rate. Agricultural output is a subcategory of NMP. The deflator for state fixed investment is the mean of the deflators for industrial output and construction in the NMP accounts until 1991. The 1992–94 figures are the growth rates of the price index of investment in fixed assets. The rate of inflation series up to 1990 is based on the consumption goods price index (this is the largest sub-category of the retail price index). This rate is adjusted for repressed inflation [8]. The rate of inflation from 1991 to 1993 is the growth rate of the consumption goods price index.

[a] The growth rate of real GDP.

[b] The growth rate of the primary sector's real output in the GDP accounts.

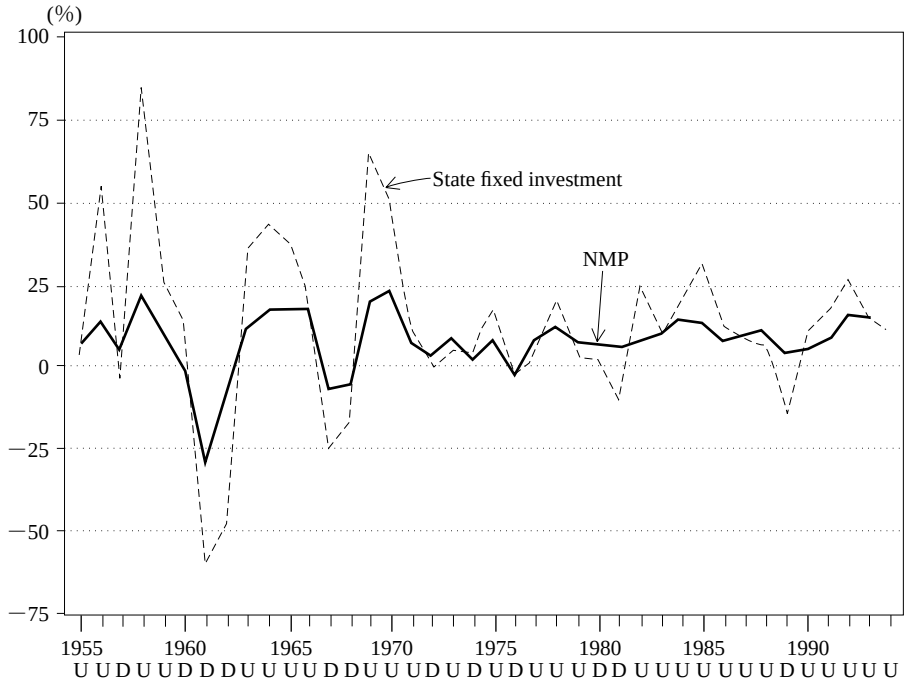
[c] The growth rate of the retail price index.

nomic reforms. A large part of an upswing and the period around a trough correspond, respectively, to a boom and a recession in common usage.

Table I indicates the business cycles with Roman numerals and divides each cycle into the years of upswing (U) and downturn (D). There are seven complete business cycles (cycles ii to viii), of 2 to 8 years in length, identified in the 1955–94 period. The average length is 4.6 years. The first cycle began before 1955 and the ninth cycle was still in progress in 1994. The NMP growth rate series in the table reveals significant variability in duration and amplitude across the cycles. There are, nevertheless, a number of characteristics listed below in the short-term behavior of the Chinese economy which, considered together, suggest some mechanisms behind China's business cycles. These are also the empirical regularities which my explanatory framework will address. Four commonly observed patterns (a–d) are presented here. The relative cyclical stability of the post-1979 period is included as the fifth characteristic (e). Table I lists and Figure 1 displays relevant statistical series.

(a) *Investment cycles*. State fixed investment (in constant prices, depreciation included), the bulk of which is fixed capital formation of state enterprises, moves closely with output. State fixed investment is one of the major demand components of GDP, making up between 16 and 20 per cent of it in a typical year (Table I). This also accounts for around 65 per cent of total fixed investment, which includes the non-state sector's fixed capital formation, in the post-1979 period. When numerical criteria similar to those above are applied to the growth rate of state fixed invest-

Fig. 1. Net Material Product and State Investment: Growth Rates



Source: Table I.
Note: U = upswing; D = downturn.

ment (Table I), six complete investment cycles are identified.[3] The timing of these investment cycles generally matches that of the business cycles.[4] If the percentage difference between the years of the highest and lowest growth rates in a cycle is used as a measure, the amplitude of the investment cycle is always larger than that of the business cycle. The standard deviation of the growth rate in the 1955–78 and 1979–93 periods are, respectively, 37.0 and 13.0. These regularities strongly suggest that investment cycles are one of the main driving forces of China's business cycles.

(b) *Harvest fluctuations*. The agricultural sector has accounted for about a third of NMP and employed more than half the work force in recent years.[5] These

[3] The criteria are the same as the above except for the threshold rates. The threshold rates for the investment cycles are 10.5 per cent for the 1955–78 period and 8.6 per cent for the 1979–93 period. These are 75 per cent of the arithmetic-mean growth rates of state fixed investment in the respective periods.

[4] There is an exception: the two business cycles from 1973 to 1976, the fifth and sixth, are backed by a single investment cycle.

[5] The number of workers in the primary sector of the economy was 333.86 million, representing 54.3 per cent of the total employment (614.70 million) at the end of 1994 [19, 1995 ed., p. 83].

weights were higher in earlier periods (Table I). The fluctuation of agricultural output (see the growth rate in Table I) has a pervasive effect on economic activity because of agriculture's critical position. A poor harvest typically affects nonagricultural economic activity by constraining the supply of wage goods for workers and inputs for the industrial sector. Good (poor) harvests, therefore, lead to higher (lower) economic growth. Harvest fluctuations often stem from random variation in climatic conditions.

(c) *Political disturbances*. The Chinese government occasionally embarks on major economic policy realignments. Also some other political events in the past have resulted in temporary economic disruptions. These are interpreted as two kinds of political disturbances affecting economic activity.

(d) *Inflation and periodic retrenchments*. Inflationary pressures in the consumption goods market, either repressed or open, move cyclically (rate of inflation, repressed inflation-adjusted, in Table I).[6] High inflationary pressures are the result of abrupt supply shortfalls or the fast expansion of demand from households. Common causes of demand expansion include increases in nonagricultural employment and hikes in state sector wages or in the purchasing prices of agricultural products. Whenever inflationary pressures mount significantly, the government adopts a strong contractionary policy (retrenchment), the major content of which is restraint of state fixed investment.

(e) *Relative stability in the 1979–93 period*. There is a marked decrease in the amplitude of business cycles from the 1955–78 to the 1979–93 period. Year-to-year variations in the economic growth rate in the post-1979 period as a group (Table I) appear to be smaller than those in the preceding period even after setting aside the years affected by the Great Leap Forward and the early part of the Cultural Revolution (1958–62 and 1967–69, respectively). This can also be confirmed visually by comparing the economic growth rate paths of the two periods in Figure 1: the path in the latter period is smoother than that in the former period.

III. CYCLE HYPOTHESES

A. *Kornai's Investment Cycle Hypothesis*

Former centrally planned economies (CPEs) in Eastern Europe also experienced business cycles with some of the above patterns, the most pronounced similarity

[6] The rate of inflation in Table I, estimated by Imai [8], adjusts for repressed inflation (in the form of shortages in consumption goods). This index approximates the sum of open inflation and the increment of repressed inflation. The rate of open inflation is the annual growth rate of the consumption goods price index. The cyclical movement is more pronounced in the pre-1979 period when underlying repressed inflation is accounted for. The prices of consumption goods were kept stable through state regulations in this period. Assuming that repressed inflation had disappeared by the end of 1990, the rates since 1991 simply correspond to the rate of open inflation.

being investment cycles. The presence of substantial output fluctuations in Eastern European economies has prompted economists in the last three decades to explore the causes of short-term instability. Kornai, the central figure in this group of economists, offers a hypothesis of an investment cycle based on the systemic features of CPEs [10]. State enterprises in a CPE generally lack strict financial accountability (soft budget constraint); their investment decisions are made through bargaining with higher-level authorities. A large part of state enterprise investment is financed through budgetary grants and state-bank loans, and the government routinely compensates the losses of enterprises. These systemic features lower the cost of investment to the enterprises and eliminate most investment risks. They also relegate the profitability of an enterprise to a secondary criterion when government bureaucrats review investment proposals. In this institutional environment, the strong pressure from enterprises for expansion makes the effective control of aggregate investment a difficult task for central planners.

Because the authority of central planners is inadequate, investment in CPEs grows by itself until the economy's supply capacity imposes a ceiling on investment. Potential capacity constraints are: (i) physical capacity of the consumption goods industry; (ii) that of the investment goods industry; and (iii) balance of payments and foreign debts [10, pp. 192–93]. At the beginning of the cycle, low capacity pressure prompts planners to accommodate funding requests from enterprises. As investment accelerates, it successively enlarges excess demand for at least one of the two kinds of goods or worsens external balances; the emerging signs of macroeconomic disequilibrium force planners to restrain the level of investment by adopting hard bargaining positions. As a consequence, part of the planned expenditure is cut back across the board, leading the way for a downturn phase in the investment cycle. When capacity pressure abates substantially, a new round of investment expansion begins, and the cycle repeats itself.

The above process implies that the growth rate of investment responds inversely to capacity pressure, the degree of tautness in the economy's supply capacity. An equation that specifies this relationship represents the economy's investment function. Because this relationship originates from central planners' behavior in the bargaining process, the equation is also called the planners' reaction function. The measure of capacity pressure is the tension indicator; the candidates for this are the measures in the above three potential supply constraints. Depending on which of these constraints is binding, an appropriate tension indicator for a CPE can be selected.

B. *Eckstein's Harvest-cum-Policy Cycle*

On China's business cycles, Eckstein undertook the pioneering work in the late 1960s [6]. Based on a survey of China's economic data from 1949 to 1966, Eckstein found a pattern of economic fluctuations which was generated by the interaction of a harvest cycle and a policy cycle. Eckstein's business cycle starts with

a good harvest which provides additional mobilizable resources for the government. The government seizes this opportunity by stepping up the rate of growth of fixed investment. Measures are taken to raise the level of extraction from the agricultural sector. Investment expansion lasts until growing demand or a poor harvest depletes a large proportion of mobilizable resources. The contraction phase is characterized by the deceleration of fixed investment and the reversal of policies toward the agricultural sector.

Eckstein identified three such cycles between 1952 and 1962 (1952–54, 1955–57, and 1958–62).[7] The empirical validity of Eckstein's hypothesis, however, fell after the period of his inquiry. Although the hypothesis indicates that a good (poor) harvest precedes an acceleration (deceleration) phase of investment, this relationship was weak at best in the post-1963 period. The investment cycle, a vital element under the Eckstein's hypothesis, can be interpreted as a subcategory of Kornai's hypothesis, where the physical capacity of the agricultural sector is the binding constraint. Significant changes in harvests, therefore, augment or lessen capacity pressure and prompt the government to reconsider the speed of expansion in investment. By so doing, large harvest changes mark the turning points of the investment cycle.

C. *Naughton's Investment Cycle Model*

Naughton's work in the 1980s offers a model of China's investment cycle for the pre-reform period which incorporates Kornai's hypothesis: state fixed investment in China oscillates responding to conditions in the consumption goods market [13] [14]. In this model, the consumption goods sector replaces the agricultural sector in Eckstein's investment cycle. Investment expansion follows a period in which the supply of consumption goods is adequate to meet the demand generated by household money income; an investment contraction sets in after the appearance of a significant shortfall of consumption goods relative to household purchasing power. The relative degree of shortage of consumption goods, Naughton's tension indicator, moves in tandem with the level of investment. Investment expansion (contraction) leads to higher (lower) employment and larger (smaller) household money income; these developments augment (restrain) demand for consumption goods and exacerbate (alleviate) shortages. Naughton estimated the planners' reaction function in China for the pre-reform period.

[7] In the first two cycles, good harvests (1952 and 1955) were immediately followed by periods of high rates of growth in fixed investment (1953 and 1956). Compulsory grain purchase quotas were introduced in 1953, and an agricultural collectivization drive was accelerated in 1956. The growth rate of fixed investment slowed down in the subsequent years. In the third cycle, the government stepped up the ongoing massive investment program and initiated a reorganization of agricultural cooperatives into communes alter the good summer harvest of 1958. The government was forced to curtail drastically the scale of investment and relax its control over the agricultural sector in 1961 and 1962 after poor harvests.

IV. EXPLANATORY FRAMEWORK

The three hypotheses described above demonstrate how the investment cycle is propelled and also, in the case of the Chinese economy, the roles played by harvest fluctuations and consumption goods market pressures. I accept Kornai's hypothesis and expand it into a comprehensive explanatory framework of China's business cycles in which the investment cycle is coupled with exogenous shocks. My view is that events such as random variation in climatic conditions or major political upheavals can be regarded as exogenous shocks. These shocks feed into the investment cycle and alter the output of current and later periods. As exogenous shocks of various kinds appear, the path of economic growth rate displays cycles of dissimilar width and length, ones analogous to the output cycles observed in China.

Note that Table I and Figure 1 give little indication that economic reforms since 1979 have significantly affected the general pattern of fluctuations in investment and output. My conjecture is that, because of the continuity of the systemic features, the basic mechanism that propels the investment cycle put forward by Kornai applies to the Chinese economy in the post-1979 period as well as to that in the preceding period. Following this conjecture, my explanatory framework for China's business cycles encompasses the periods before and after the initiation of economic reforms. In introducing the framework, I will first confirm that the Chinese economy since 1979 maintains the systemic features that lead to the investment cycle in Kornai's hypothesis. Then the investment cycle and exogenous shocks are discussed separately.

A. *Systemic Features behind China's Investment Cycle*

Although reform measures have dramatically narrowed the range of economic plans, the core systemic features that generate the investment cycle appear to have persisted. These are: the predominance of state investment in total fixed investment, the weak financial accountability of state enterprises, and investment decision making through bargaining in the bureaucracy.[8] The last, in recent years, is performed typically through negotiations in which enterprises attempt to win funding from state banks by enlisting the support of local governments.

Let us consider how these features bring about investment cycles in the post-1979 Chinese economy. To begin with, the chronic deficits incurred by a substantial proportion of China's state enterprises and the small incidence of bankruptcies in these enterprises demonstrate the weak financial accountability. In 1993, at the

[8] See [11] for more discussion. Wong [21] found in the middle of the 1980s that economic reforms had failed to change enterprise behavior fundamentally. Naughton [15] discusses the behavioral patterns of China's enterprises in Kornai's framework.

height of a boom, about a third of state industrial enterprises operated with deficits.[9] The central government spent 36.6 billion yuan in 1994 on subsidies to support state enterprises in deficits [19, 1995 ed., p. 218]. Chronic deficits, however, seldom force state enterprises into bankruptcy. The liquidation of state enterprises is still rare, all state enterprises liquidated to date have been small ones, and the number of bankruptcies settled through the courts has been extremely low.[10]

Weak financial accountability should, as Kornai reasons, drive state enterprises into spending as long as external funds are readily available.[11] The main source of external financing for China's state enterprises in the post-1979 period has been loans from state banks, and these loans appear to have sustained the high growth of state fixed investment.[12] Because their authority is limited, state banks cannot easily resist pressure from enterprises, local governments, and central government ministries to extend loans.[13] Also, banks lack an incentive to stand fast, since they do not bear ultimate responsibility for the qualitative deterioration of their loan portfolio. With state banks thus receptive to enterprises, aggregate investment and bank credit expand together. This is confirmed by the data on annual plan targets and actual records in fixed investment and bank loans.

The targets for state fixed investment in the annual economic plans drafted by the State Planning Commission have been published since 1982, except for 1985. Table II shows that the actual amounts of state fixed investment were always higher than the targets for all those twelve years up to 1994. This leads one to suspect that state fixed investment overruns the plan by a significant margin unless strong mea-

[9] In the first half of 1993, 31.1 per cent of state industrial enterprises ran deficits [17, July 20, 1993]. The annual data from 1975 to 1991 are found in [24, p. 304]. The proportion was 31.4 per cent in 1975 and 9.6 per cent (the lowest) in 1985. The sum of deficits of those enterprises running deficits is found on the same page. The sum for all state enterprises was 93.1 billion yuan and that for state industrial enterprises was 30.0 billion yuan in 1991.

[10] Interview with Hong Hu, deputy director of the State Commission for Restructuring Economy [16, January 20, 1994]. According to Hong, China's courts accepted 948 bankruptcy proceedings from state and non-state enterprises from November 1988 to June 1993, and 481 of these cases have been settled. A more recent report indicated that the number of cases settled reached 940 by the end of 1994 [16, December 5,1995]. Note that there were 102,200 state enterprises at the end of 1994 in the industrial sector alone [19, 1995 ed., p. 375]. Also, small non-state enterprises often close their business without going through court procedures.

[11] Having stated that the problem with fixed investment in 1993 was its large magnitude, low returns, and skewed sectoral composition, a reporter in the official Chinese press comments: "The crux of all these problems lies in the lack of a risk investment system under which investors assume sole responsibility for profits and losses" [22, p. 19].

[12] In 1994, 49.0 per cent of state fixed investment was financed externally and 52.5 per cent of external funds used that year were loans from banks [19, 1995 ed., p. 141].

[13] Note that the local branches of state banks not only report to the headquarters in Beijing but also accept advice from local governments. According to Chinese economists, local party officials are involved in the supervision and appointment of local branch officers. Local branches recognize their duty in promoting regional economic development under the guidance of local governments. These, in essence, turn local branches into functional sub-divisions of local governments [5, p. 47].

TABLE II

PLAN TARGETS AND ACTUAL RESULTS

(Billion yuan)

	State Fixed Investment			Increment in Loans Outstanding (State Banks)			Increment in Currency in Circulation		
	Target	Actual	Deviation (%)	Target	Actual	Deviation (%)	Target	Actual	Deviation (%)
1982	63.0	84.5	34.1	—	28.8	—	—	4.3	—
1983	74.7	95.2	27.4	34.5	37.9	9.9	6.0	9.1	51.7
1984	94.0	118.5	26.1	42.3	98.9	133.8	8.0	26.2	227.5
1985	—	168.1	—	71.5	148.6	107.8	15.0	19.6	30.7
1986	157.0	197.9	26.1	95.0	168.5	77.4	20.0	23.1	15.5
1987	195.0	229.8	17.8	122.5	144.2	17.7	23.0	23.6	2.6
1988	206.0	276.3	34.1	—	151.9	—	20.0	68.0	240.0
1989	210.0	253.5	20.7	—	185.8	—	40.0	21.0	–47.5
1990	251.0	291.9	16.3	170.0	275.7	62.2	40.0	30.0	–25.0
1991	324.5	362.8	11.8	210.0	287.8	37.0	50.0	53.3	6.6
1992	387.0	527.4	36.3	280.0	357.2	27.6	60.0	115.8	93.0
1993	565.0	765.8	35.5	—	484.6	—	—	152.9	—
1994	875.0	932.2	6.5	470.0	514.2	9.4	—	142.4	—
1995	1,160.0	—	—	570.0	—	—	—	—	—

Sources: The target for state fixed investment is from the report on the national economic and social development plan by the chairman of the State Planning Commission at the National People's Congress each year. Each year's report is published in the *Beijing Review* ([3] for the 1995 report). The targets for the increment of loans outstanding in 1994 and 1995 are also from these reports. The actual amount of state fixed investment are from [19, 1993 ed., p. 149] [19, 1995 ed., p. 137]. The targets for the increments of loans outstanding and currency in circulation between 1983 and 1992 are from [7, p. 25]. The actual amounts of the increments of loans outstanding and currency in circulation are from [19, 1988 ed., p. 769] [19, 1993 ed., p. 664] [19, 1995 ed., p. 572].

Note: Targets and actual amounts are in current prices. The deviation is the percentage difference of the actual amount from the target.

sures are taken. The deviations from the targets in these twelve years fell between 6.5 (1994) and 36.3 (1992) per cent, a magnitude large enough to alter substantially the economic growth rate. Note that a 20 per cent overrun of state fixed investment alone could lift the economic growth rate by 3 to 4 per cent from the planned level.[14]

The financial sector component of annual plans shows that the target overruns in state fixed investment are matched by those in state banks. State banks in China follow the annual credit and cash plans in managing lending activity and currency supply [12, pp. 111–16]. The annual increments in loans outstanding and currency in circulation are among the most important plan targets. The targets for the increment of loans outstanding are available for the nine years between 1983 and 1994.

[14] Ignoring the multiplier effect and crowding out, and assuming excess capacity in the investment goods industry, GDP grows by an additional 3.6 per cent when state fixed investment expands by another 20 per cent and the initial state fixed investment share of GDP is 18 per cent.

Table II shows that actual increments in loans outstanding always exceeded the targets for these nine years. In four years (1984–86 and 1990), actual increments were more than 50 per cent higher than planned. This appears to support the conjecture that the state banks' readiness to finance growing fixed investment indeed enables the state sector to exceed the investment target by sizable margins. In so doing, state banks too overrun their target.

Because the currency stock is determined largely by the deposit-loan position of the state banking system, the unplanned growth of loans ceteris paribus brings about an unanticipated increase of currency in circulation. Only an offsetting large growth in deposits—one of its sources could be savings deposits from households—can block the rapid expansion of currency. Needless to say, a high growth of currency, with some lag, generates inflationary pressures. Table II shows that, from 1983 to 1992, the targets for annual increment of currency in circulation were exceeded, except for two years (1989 and 1990) during which the economy was in recession (Table II). One of the main causes of the excess was credit expansion to finance state fixed investment. The large deviations observed in 1984, 1988, and 1992 preceded or coincided with the acceleration of the rate of inflation in 1985, 1988, and 1993 (Table I). The cycles in investment and inflation are linked by the action of the state banking system to issue currency passively upon extending loans to support state enterprise spending.

It is clear from the above that two major institutional reforms in the area of state fixed investment in the post-1979 period—the central government's devolution of investment decision making to the localities and enterprises and the shift of the main funding method from budgetary grants to state bank loans—altered little the behavior of aggregate state investment.[15] The high levels of investment have often been sustained by local governments sanctioning new investments in enterprises and then urging state banks to fund them. To counter inflationary pressures following investment booms, the central government resorted to periodic cutbacks in state bank loans as a contractionary policy tool in the post-1979 period. Consequently, state investment followed a cyclical path throughout this period. In the period before the institutional reforms, strong investment booms usually brought about budgetary deficits, and retrenchment took the form of reductions in budgetary appropriations for fixed investment.

B. *Investment Cycle: Cycle-Generating Mechanism*

In considering China's investment cycle, one has to specify the binding constraint and the tension indicator for the economy. As was done in Naughton's model, I choose the physical capacity of the consumption goods industry for the

[15] Budgetary grants and bank loans that financed state fixed investment in 1981 were, respectively, 27.0 and 12.2 billion yuan. The corresponding numbers in 1994 were 46.4 and 239.6 billion yuan [19, 1988 ed., p. 559] [19, 1995 ed., p. 141].

constraint. Among the three potential constraints mentioned by Kornai, this appears to be the most critical for the Chinese economy. The majority of consumption goods sold are of agricultural origin.[16] The agricultural sector's output depends critically on climatic conditions, and room for its rapid expansion is limited by the nature of technology. Extensive price controls, rationing, and the persistence of shortages in major merchandise, all observed until a few years ago, underline the tight supply capacity of consumption goods in the past four decades.[17]

Another potential constraint, according to Kornai, is the balance of payments. Although the Chinese economy has become highly dependent on foreign trade in the post-1979 period thanks to the adoption of the open door policy, its remarkable ability to expand exports and to attract direct foreign investment has provided the government with sufficient leeway to avoid serious balance-of-payments problems.[18] The other potential constraint is the physical capacity of the investment goods industry. Fixed investment in China registered very high growth rates on a number of occasions. This seems to suggest that the mobilizable capacity of the investment goods industry has been large relative to that of the consumption goods industry. The choice of the binding constraint depends ultimately on the answer to the following question: which of the three potential constraints sets the lowest limit when the government planners pursue maximum economic growth in China? During the past nine business cycles, neither balance-of-payments deficits nor shortages and high prices of investment goods were sufficient force the government to adopt a retrenchment program.

The rate of inflation serves as the measure of capacity pressure (tension indicator) for the Chinese economy in this article's investment cycle. In the pre-1978

[16] Food made up 57.3 per cent of consumption goods sales in 1994 [19, 1995 ed., p. 525]. Also a substantial proportion of nonfood consumption goods, such as natural-fiber cloths and wood furniture, use materials of agricultural origin.

[17] To assess the extent to which the supply capacity of agricultural output constrains the consumption goods market in the post-1979 period, I have computed the correlation coefficient of the growth rates of personal consumption and agricultural output. The two statistical series are based on the consumption by residents in 1978 prices in the NMP accounts [19, 1993 ed., p. 46][19, 1994 ed., p. 41] and the output of the primary sector also in 1978 prices in the GDP accounts [19, 1993 ed., p. 31][19, 1994 ed. p. 32][19, 1995 ed., p. 32]. Although the correlation coefficient in the same year is almost zero (1979–93, –0.071), that of the current year consumption and the previous year's agricultural output is sizable (1980–93, 0.481), presumably on account of the timing of harvests.

[18] To consider whether the balance of payments has been a binding constraint, I estimated an investment function for the 1955–94 period. The dependent and independent variables followed the planners' reaction function reported below in this section. The dependent variable was the growth rate of state fixed investment in constant prices (Table I). The ratio of trade balance to NMP in the previous year was included as an independent variable along with four other variables, one of which was the rate of inflation in the previous year (Table I). While the inflation variable was highly significant statistically, the level of significance on the trade balance variable was 48 per cent. When the function was reestimated for the 1979–94 period, the level of significance of the trade balance failed to improve.

period, a significant part of inflationary pressures appeared as repressed inflation (shortages) because of pervasive price controls. The price reform since the 1980s, however, changed China's consumption goods market from a fixed-price to a flexible-price regime, and repressed inflation finally became negligible a few years ago.[19] For this reason, the rate of inflation based on the price index of consumption goods can be used as the tension indicator in the recent period. (This must nevertheless be adjusted for repressed inflation in the pre-1978 period.)

The cycle-generating mechanism can be set up using the rate of inflation. Planners react, with some delay, to this tension indicator in guiding aggregate state fixed investment. The growth rate of state fixed investment therefore accelerates as long as the rate of inflation falls, and decelerates as inflation intensifies. There is also a reverse relationship: expansion of state fixed investment brings about a rise in the rate of inflation by enlarging aggregate demand. Combining the two, the basic pattern of China's investment cycle is that the growth rate of state fixed investment and the rate of inflation move in tandem. This shows up as the oscillation of aggregate output—hence, by definition, business cycles, since state fixed investment is a component of aggregate demand.

Restating the above, the growth rate of state fixed investment depends inversely on the rate of inflation with some lag, and at the same time, the rate of inflation depends (positively) on the growth rate of state fixed investment. It is well known that this kind of dependency between the two variables is capable of generating cyclical movements. I tentatively assume that the underlying relationship between the two variables in China yields stable cycles. This will be confirmed with a dynamic simulation in Section V.

A schematic picture of a business cycle driven by the investment cycle starts with an acceleration of state fixed investment in the initial period. Because high investment necessitates an increase in employment in the investment goods industry, total wage payments, which constitute household incomes, also increase. This leads to higher market demand for consumption goods and, therefore, growing inflationary pressures. Although high investment generates new output capacity for consumption goods, there is a significant lag before this supply-side effect fully materializes. As the rate of inflation rises, planners curtail the scale of state fixed investment. When inflationary pressures drop to a low level, the next round of investment surge begins. Note that the movement of bank credit and currency in circulation are linked with developments in the goods markets. The bulk of loans extended to finance investment are, in the end, paid out in cash to workers employed. Fast expansion of fixed investment generates inflation by prompting the

[19] Repressed inflation seems to have disappeared by the end of 1990. An official account states that aggregate supply and demand were basically in equilibrium in 1990 [25, p. II-1]. Strong contractionary policy from 1988 brought about a marked deceleration of economic growth and weaker consumer demand.

state banking system to pump new currency into households to be spent.

How well does the cycle-generating mechanism approximate China's underlying investment cycle? I have estimated the planners' reaction function by ordinary least squares using the data for the 1955–94 period.[20] Dealing with annual data, a one-year delay is assumed when planners respond to the rate of inflation.

$$\Delta I\% = 17.534 - 1.886\ \Delta P_{-1}\% + 67.825\ DGL + 12.996\ DDX,$$
$$(5.250)(-3.915) \qquad (5.148) \qquad (1.1150)$$

Adjusted $R^2 = 0.532$, $D.W. = 1.894$, period = 1955–94,
(Figures in parentheses are *t*-statistics.)

where

$\Delta I\%$ = percentage growth rate of state fixed investment in constant prices (Table I);
$\Delta P_{-1}\%$ = previous year's percentage rate of inflation, adjusted for repressed inflation (Table I);
DGL = dummy variable associated with the Great Leap Forward (1958 = 1, 1961 = −1, zero in other years); and
DDX = dummy variable associated with the high growth policy proposed by Deng Xiaoping (1992, 1993, and 1994 = 1, zero in other years).

The coefficient of the previous year's rate of inflation is negative and highly significant statistically, thereby confirming the planners' reaction pattern. The coefficient estimate implies that, on average, each 1 per cent of the rate of inflation depressed the growth rate of state fixed investment in the following year by about 1.9 per cent during the 1955–94 period.

C. *Exogenous Shocks*

Let us consider how exogenous shocks interact with the investment cycle and modify the schematic picture above. Exogenous shocks can be classified into supply and demand shocks, depending on the nature of their impact. A supply shock can be judged favorable or unfavorable based on its effect on output. Notable supply shocks in China have been: (i) random variation in climatic conditions that affects harvests; (ii) political events, such as the Cultural Revolution, that caused the disruption of production in nonagricultural sectors (unfavorable); (iii) the adoption of new technology that raises labor productivity (common in the industrial

[20] As an alternative specification, the independent variables of the investment function may include the increment of aggregate output. When investment behavior follows Kornai's hypothesis, one can expect a strong correlation between investment and the increment of output. This correlation, however, does not confirm the accelerator principle in which producers adjust capital stock to market demand. Rather, it merely reflects the accounting relationship that investment is a component of output. I have therefore excluded the increment of output from explanatory variables.

sector, favorable); and (iv) new agricultural policies that alter the incentive structure and change labor productivity in the agricultural sector (such as the adoption of the contract responsibility system in the early 1980s). To consider how an exogenous shock modifies an ongoing cycle driven by the investment cycle, take, for instance, a clement spring and summer climate (i) during an upswing. This brings about a good harvest, which partially offsets the inflationary pressures generated by high investment. A clement climate, therefore, prolongs an upswing.

Two kinds of common demand shocks have been: (i) hikes in state sector wage rates or state purchasing prices of agricultural products, and (ii) new investment policies, such as the one under the Great Leap Forward, that led to sudden rises (and falls) of state fixed investment. The high growth policy adopted in 1992 falls into this category. Note that hikes in state purchasing prices may also have a significant positive impact on the supply of agricultural products by raising peasants' work incentives. Also, the Great Leap Forward contained other policies that affected the supply side, too.

Take an across-the-board hike in state sector wages (i) during an upswing for instance. Wage hikes increase nominal household incomes and, therefore, demand for consumption goods. The rate of inflation rises accordingly, and this brings about a delayed fall in the rate of growth of state fixed investment. Large wage hikes, therefore, shorten the upswing. In the case of a positive investment shock (ii), this also increases demand pressures on the consumption goods market. A positive initial impact on economic growth through investment expansion would be followed by a negative impact of investment wind-down. This investment shock, therefore, heightens the amplitude of the business cycle by generating an inflationary boom.

Note that among the five characteristics of China's business cycles introduced in Section II, the investment cycle in the explanatory framework accounts for recurring investment cycles (a) and periodic retrenchments in response to high inflationary pressures (d). Part of investment fluctuations in (a) and inflationary spells in (d) are attributed to demand shocks in the form of, respectively, new investment policies and measures to abruptly raise nominal household incomes. The consequences of harvest fluctuations (b) and political disturbances (c) can be analyzed as supply shocks feeding into the investment cycle. Let us consider the last of the characteristics.

D. *Relative Macroeconomic Stability in the Reform Period*

The marked decrease in the amplitude of output fluctuations in the post-1979 period remains a puzzle. Based on our framework, one can classify the sources for the relative macroeconomic stability in the post-1979 period compared with the preceding period into two categories: (i) shifts in the numerical relationships that affect the investment cycle and (ii) dissimilarity in the set of exogenous shocks.

Assessing the impact on output fluctuations of (i) is a daunting task with the simple macroeconomic model used in this paper (cf., Appendix) and available data.[21] There is, however, a noteworthy development in this category that appears to have a significant stabilizing effect. Successive rises in the household savings rate since the 1980s mitigated the inflationary consequence of investment expansion by offsetting part of the consumption goods demand stemming from rapid growth in household incomes. This delayed retrenchments and extended upswings.

The nature of exogenous shocks (ii) in the two periods merits further discussion. A careful consideration of economic developments in past business cycles leads one to suspect that the exogenous shocks in the post-1979 period as a set had a less destabilizing impact on the economy than those in the preceding period. Above all, political events that resulted in significant disruptions of productive activity have been rare since the death of Mao in 1976. Also, technical change in the agricultural sector, exemplified by the increase in irrigated fields, advances in water control, and higher use of modern inputs, has substantially lowered the extent to which climatic variation affects agricultural output. There is a noticeable fall in the standard deviation of the growth rate of agricultural output from the 1955–78 to the 1979–93 period (from 7.2 to 3.8 per cent, Table I). Moreover, as the rapid expansion of the industrial sector reduced the agricultural sector's aggregate output share over time, the destabilizing impact of harvest fluctuations on aggregate output decreased accordingly.

Some of the new policies directed toward the consumption goods industry and market also appear to have dampened output fluctuations in the post-1979 period. The high growth of agricultural output during the decollectivization of agriculture in the first half of the 1980s (Table I) softened the 1980–81 downturn and prolonged the 1982–88 upswing by relieving pressures on the consumption goods market. The rapid increase in industrial consumption goods output outside the state sector around the middle of the 1980s, as well as marked increases in consumption goods imports, seem to have extended the upswing through similar effects on the market.[22] In my explanatory framework, these are interpreted largely as favorable supply shocks which interact with the investment cycle.

There has also been a new development in the area of fixed investment. The proportion of non-state sector investment in total fixed investment rose from 30.5 per cent in 1981 to 34.4 per cent in 1990 and to 43.1 per cent in 1994. Relying less

[21] This may involve confirming the parameter shifts of structural equations in the macroeconomic model of the Chinese economy from the pre-1978 to post-1979 period and then performing the dynamic simulation for the two periods based on the different set of parameters to compare the amplitude of output cycles generated.

[22] Collective and township enterprises, whose scales of operation tend to be small and whose comparative advantage is generally in consumption goods, expanded rapidly, and this reduced the state enterprise share in gross industrial output from 73.4 per cent in 1983 to 56.8 per cent in 1988 [19, 1992 ed., p. 406].

on the assistance and protection from the government, China's non-state sectors do not share the same characteristics with state enterprises in investment behavior. Because Kornai's hypothesis is inapplicable, the sectors' fixed investment must be treated as exogenous in the explanatory framework. Aggregate fixed investment in non-state sectors did, in fact, follow closely state fixed investment cycles despite its higher trend growth rate until 1992.[23] In the 1993–94 period, however, the growth rate of non-state sector fixed investment far outstripped that of state fixed investment despite the government's contractionary policy. Part of the increase reflected the extraordinary rise of foreign direct investment in the two-year period.[24] Because foreign exchange received from investors abroad would be spent on imports, the inflationary impact of investment expansion in non-state sectors in the period must have been offset partially. On the whole, it appears that fixed investment outside the state sector has not played a stabilizing role since the early 1980s.

In sum, part of the relative macroeconomic stability in the post-1979 period can be attributed to the change in the composition of exogenous shocks. The extent to which exogenous shocks disturbed short-term output was less after 1979 than in the preceding twenty-plus years.

V. DYNAMIC SIMULATION

I have investigated the dynamic property of China's business cycles by performing a simulation with an eight-equation macroeconomic model that incorporates the investment cycle-generating mechanism above (see Appendix for details). The model is designed to find the dynamic paths of eight endogenous variables (which include state fixed investment, consumption goods output, and the price of consumption goods) given the values of a set of exogenous variables (which include a nominal wage and an interest rate). Aggregate output (termed gross material product, GMP) in the model is the sum of state fixed investment and consumption goods output.[25]

[23] The percentage growth rates of fixed investment in non-state sectors in the 1982–94 period are: 1982, 28.7; 1983, 20.7; 1984, 29.7; 1985, 23.9; 1986,14.4; 1987, 19.4; 1988, 15.4; 1989, –14.6; 1990, –9.3; 1991, 15.1; 1992; 19.0; 1993, 46.9; 1994, 33.0. The geometric mean growth rates of fixed investment in the non-state and state sectors in the 1982–94 period were, respectively, 17.5 and 12.7 per cent [19, 1988 ed., p. 559] [19, 1993 ed., pp. 33–34, 145] [19, 1994 ed., p. 139] [19, 1995 ed., pp. 137, 250].

[24] The proportion of fixed investment financed by foreign funds reached 10.8 per cent in 1995 from 5.8 per cent in 1992 [19, 1994 ed., p. 139] [19, 1995 ed., p. 137].

[25] Consumption goods output is represented by the real value of household cash expenditures for consumption goods and services. The narrow but simple aggregate output measure (GMP) defined by the author covered 56.0 per cent of nominal GDP in 1992. State fixed investment, household cash expenditures in goods and services, and nominal GDP in 1992 were, respectively, 527.4, 965.2, and 2,663.5 billion yuan [19, 1993 ed., pp. 602, 611] [19, 1995 ed., pp. 32, 141]. Demand components of GDP omitted here are gross fixed investment in non-state sectors, inventory invest-

Three behavioral equations in the model (planners' reaction, consumption goods demand, and currency demand functions) have been estimated with the annual data since the late 1970s. For the simulation, which is run for the fifteen-year period, the estimated coefficients are used and the initial values of endogenous variables follow those in 1977. With smoothed series of exogenous variables based on data for the 1979–92 period, a stable environment in which the simulation is performed is constructed. These arrangements should replicate the general macroeconomic environment since the late 1970s. We anticipate that the simulation will yield the cycles of the growth rate of state fixed investment and the rate of inflation. The latter is represented by the growth rate of the price of consumption goods. State fixed investment being a component of GMP, investment cycles will also generate the cycles in the economic growth rate.

The first simulation, Case 1, is designed to draw the sustainable, or constant-rate-of-inflation, growth path by suppressing the cycles. To do so, state fixed investment for each year is set to the level that keeps the rate of inflation at the mean of the 1979–92 period (6.0 per cent). The trajectory of GMP in Case 1 roughly indicates the long-term stable growth path, around which output fluctuates in the short term. The mean GMP (Y) growth rate over the fifteen-year period in Case 1, reported in Table III, is 9.0 per cent. This appears to indicate that China's potential growth rate since the late 1970s has been around 9 per cent.

For Case 2, a demand shock, which raises the growth rate of state fixed investment by an additional 10 per cent in year 1, is inserted to activate the investment cycle. The growth rates of GMP and state fixed investment and the rate of inflation (Table III, Case 2: Y, I, and P) exhibit a series of two-year cycles after the initial demand shock. The amplitude of the cycles, however, falls rapidly, and the growth rates converge with their long-term trends, suggesting that the investment cycle in China is dynamically stable. Case 2 appears to indicate, as economists generally believe, that a demand shock does not much alter the long-term growth path of output. The difference between Cases 1 and 2 in the end point GMP (year 15, 772.0 and 804.6 billion yuan) is relatively small. This finding also applies to a supply shock. Inclusion of a single-year supply shock, in the form of a reduction of consumption goods output, in a simulation does not change output substantially in the long term.

Because the Chinese economy is continually subject to exogenous shocks, what one actually observes is a series of recurring cycles of varying magnitude and length. In Case 3, to investigate how the dynamically stable investment cycle above interacts with a succession of random shocks, a proxy variable for the variability of climatic conditions is included in the model to alter the output of con-

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ment, household self-consumption, household consumption through payment in kind, non-household consumption, and net exports.

TABLE III

SIMULATED PATHS

(Billion yuan, 1952 prices)

Year	Growth Rates (%)					Case 1 (*Y*)	Case 2 (*Y*)	Case 3 (*Y*)
	Case 1 (*Y*)	Case 2 (*Y*)	Case 2 (*I*)	Case 2 (*P*)	Case 3 (*Y*)			
0	—	—	—	—	—	211.4	211.4	211.4
1	9.0	13.3	18.8	10.7	12.6	230.5	239.5	238.1
2	9.0	6.5	3.4	2.7	7.2	251.2	255.1	255.2
3	9.0	10.9	12.7	7.6	11.3	273.8	282.9	284
4	9.0	8.4	7.0	4.7	5.2	298.5	306.6	298.9
5	9.0	9.9	10.4	6.4	13.4	325.4	336.8	338.9
6	9.0	8.9	8.4	5.5	7.7	354.7	366.9	364.9
7	9.0	9.4	9.4	6.1	10.1	386.6	401.3	401.7
8	9.0	9.1	8.8	5.8	7.5	421.4	437.8	431.7
9	9.0	9.2	9.1	6.0	7.0	459.4	478.0	462.2
10	9.0	9.1	8.9	5.9	10.7	500.8	521.5	511.4
11	9.0	9.1	9.0	5.9	8.4	545.9	569.0	554.3
12	9.0	9.1	8.9	5.9	8.1	595.1	620.6	599.3
13	9.0	9.1	8.9	5.9	10.5	648.9	676.8	662.4
14	9.1	9.0	8.9	5.9	8.5	707.7	738.0	718.5
15	9.1	9.0	8.9	5.9	6.5	772.0	804.6	765.5

Note: Y = gross material product (GMP), I = state fixed investment, and P = consumption goods price index.

sumption goods each year. A simulation is run following the same specifications under Case 2. Instead of converging with the long-term rate after a demand shock in year 1, the growth rate of GMP in Case 3 displays cycles of dissimilar amplitude and length. If the same numerical criteria to identify business cycles in footnote 2 (with the 7.0 per cent threshold growth rate) are applied, there are three cycles (years 1–4, 5–9, and 10–) in the fifteen-year period. Note that any exogenous shocks of significant magnitude appearing continually can generate recurring cycles. Case 3 is consistent with the conjecture that China's observed business cycles are the product of a set of exogenous shocks that interact with a dynamically stable investment cycle.

The simulation exercise indicates that exogenous shocks do not much affect the path of output in the long term, owing to the stability of the underlying investment cycle. The planners' reaction serves, in fact, as a stabilizing force for the economy. A corollary is that economic growth deviating widely from the potential growth rate does not last long. Growth significantly higher than the potential rate sooner or later brings about an acceleration of inflation, and therefore such high growth is unsustainable.

VI. CHRONOLOGICAL REVIEW

I have reconstructed the nine business cycles with economic and statistical references.[26] This review represents a reinterpretation of the cycles based on the explanatory framework. Some of the statistical series mentioned are found in Table I. The economic growth rates cited are based on NMP unless stated otherwise.

First cycle (*–1957*)*: upswing, –1956; downturn, 1957*

The government drafted an ambitious annual economic plan in 1956 after a good harvest in 1955. State fixed investment in 1956 grew by 54.2 per cent, reflecting in part the rapid expansion of the state sector following the nationalization drive of industry and commerce that year. In April, the government raised the wages of state sector workers by an average of 14.5 per cent [2, p. 173]. The high 1956 growth target for gross agricultural output (11.5 per cent) was not fulfilled (actual growth, 5.0 per cent).[27] Serious shortages of consumption goods appeared in the urban areas in the autumn. The government balanced the budget by reducing capital construction expenditures, lowered output targets, and restrained new hiring in the state sector in 1957. Pressures in the consumption goods market had receded, and currency in circulation had fallen by the end of 1957.

Second cycle (*1958–62*)*: upswing, 1958–59; downturn, 1960–62*

Under the Great Leap Forward from 1958, the government promoted an expansion of fixed investment and industrial production centered on heavy industry, and it reorganized agricultural cooperatives into communes. State sector employment grew from 24.5 million in 1957 to 45.3 million in 1958, and budgetary appropriations for capital construction almost tripled during the 1958–60 period (1957, 12.4 billion yuan; 1960, 35.4 billion yuan).[28] Unfavorable weather resulted in poor harvests for three consecutive years until 1961. The growth of industrial production decelerated as shortages of raw materials and energy became widespread. The massive spending on fixed assets was slow to turn into new capacity because of construction delays. The state budget marked record deficits in 1959 and 1960 (6.6 and 8.2 billion yuan respectively) [19, 1993 ed., p. 215], and currency in circulation grew by 138.1 per cent in the 1958–61 period [23, p. 349]. Food shortages resulted in famines in a number of regions around 1960. Faced with a crisis, the government called off the Great Leap Forward in the autumn of 1960 and initiated a retrench-

[26] The references used are: [2] [4, various issues] [16, various issues] [17, various issues] [18] [19, various issues] [20, various issues] [23].

[27] The target and actual growth rates are from [2, p. 162] and [19, 1984 ed., p. 132], respectively.

[28] State sector employment and budgetary appropriations for capital construction are from [19, 1993 ed., pp. 97, 222], respectively.

ment program in 1961. Capital construction expenditures were cut back drastically to regain budgetary balance, and heavy industry was consolidated. Serious shortages of daily necessities lasted long after the cancellation of the Great Leap Forward. Real NMP at the trough (1962) declined to 64.8 per cent of the peak (1959) [19, 1993 ed., p. 34].

Third cycle (*1963–68*)*: upswing* (*1963–66*)*; downturn* (*1967–68*)

The Chinese economy recovered from the deep recession by 1965, and the economy was in an investment-led boom when the Cultural Revolution broke out in the spring of 1966. Disorder associated with intense political campaigns seriously affected industrial production, construction, and transportation from mid-1967 to early 1969. The revenue shortfall stemming from a sudden fall of industrial output (−13.8 per cent) generated a large and unexpected budgetary deficit (2.3 billion yuan) in 1967 [19, 1993 ed., pp. 215, 413]. While industrial output continued to fall (−5.0 per cent), gross agricultural output also dropped (−2.5 per cent), mainly because of poor weather conditions in 1968 [19, 1993 ed., p. 413] [19, 1984 ed., p. 132]. Acute shortages of non-staples appeared that year. State fixed investment declined by a large margin after a drop in 1967 (billion yuan: 1966, 25.5; 1967, 18.8; 1968, 15.2), owing to retrenchment as well as to the disruptive effect of the Cultural Revolution [19, 1993 ed., p. 149]. The state budget was balanced in 1968. The NMP declined two years in a row (1967, −7.2 per cent; 1968, −6.5 per cent).

Fourth cycle (*1969–72*)*: upswing, 1969–71; downturn, 1972*

The recovery from the recession marked the beginning of a new round in the industrialization drive. In the 1970–71 period, budgetary appropriations for capital construction and new hiring in the state sector exceeded their initial targets by large margins. Budgetary appropriations for capital construction in 1970 and 1971 were, respectively, 29.8 and 31.0 billion yuan [19, 1993 ed., p. 222], as against the targets of 21.2 and 27.0 billion yuan [2, pp. 469, 486]. While the initial plan for new hiring was 3.1 million during the two years, the number of state sector workers actually increased by 9.8 million [2, p. 490]. Although rising demand pressures in the consumption goods market were partly offset by a good grain harvest in 1971, the government imposed a mild restraint on fixed investment and new hiring in 1972. A poor harvest in 1972 also contributed to the deceleration of economic growth that year (2.9 per cent).

Fifth (*1973–74*) *and sixth* (*1975–76*) *cycles: upswing, 1973 and 1975; downturn, 1974 and 1976*

These were back to back two-year cycles in the latter half of the Cultural Revolution period. China went through continual political campaigns in this period as

various groups vied for post-Mao leadership. Disruption of economic order associated with the "Anti-Lin, Anti-Confucius" campaign adversely affected industrial production (growth rate of gross industrial output, 0.6 per cent [19, 1993 ed., p. 413]) and put an end to the fifth cycle in 1974. The downturn phase of the sixth cycle, 1976, was an eventful year. In view of the outbreak of yet another political campaign organized by party radicals, government planners laid down modest growth targets for gross industrial (8.2 to 9.0 per cent) and agricultural (4 per cent) output [2, p. 555]. A powerful earthquake in July left the North China industrial and mining heartland paralyzed for some months. In October, a month after the death of Mao, the moderate wing of the party, which had secured power, announced the ending of the Cultural Revolution. Gross industrial (1.3 per cent) and agricultural (2.5 per cent) output fell far short of the targets; the economic growth rate turned negative (–2.7 per cent), and the state budget ran a sizable deficit (3.0 billion yuan) in 1976 [19, 1993 ed., pp. 215, 413] [19, 1984 ed., p. 132]. Shortages of some major consumption goods were reported in 1974 and 1976 [2, pp. 532, 561].

Seventh cycle (*1977–81*)*: upswing, 1977–79; downturn, 1980–81*

The ending of the Cultural Revolution brought back order in work places throughout the nonagricultural sectors. In early 1978, after an economic recovery, the government announced a Ten-Year Economic Program which called for a simultaneous expansion of major productive sectors through massive modernization investment. The plan was soon abandoned because of its failure to address economic systemic problems. The party made a decision to launch economic reforms instead in December 1978, the major contents of which were decentralization of economic administration, wider use of markets, partial liberalization of private business activities, and promotion of foreign trade. Reform measures were adopted step by step from 1979. Some of the initial policies adopted, such as wage increases, hikes in purchasing prices of agricultural products, and reductions in agricultural taxes, forced the government to run large budgetary deficits in 1979 (17.1 billion yuan) and 1980 (12.8 billion yuan) [19, 1993 ed., p. 215]. Because most of the deficits were covered by borrowing from the central bank, currency in circulation grew rapidly (1979, 26.3 per cent; 1980, 29.3 per cent). Inflationary pressures, however, stayed at manageable levels thanks to good harvests in 1978 and 1979 and some new government measures; it began issuing treasury bonds, promoted savings deposits with high interest rates, and directed resources to consumption goods industries to assist their output expansion. State fixed investment was curtailed in 1981, and the economy experienced a mild recession from 1980 (economic growth rate, 6.4 per cent) to 1981 (4.9 per cent).

Eighth cycle (*1982–89*)*: upswing, 1982–88; downturn, 1989*

Decentralization of investment decision making under economic reforms brought about successive increases of investment financed by internal reserves and state bank loans. An investment-led boom began in 1982 and continued through 1985. Decollectivization in agriculture and the adoption of the contract responsibility system resulted in sizable growth in agricultural output and rural household incomes until 1984. As regulations on wages and bonuses in the state sector were relaxed, cash incomes of urban households also grew at high rates.[29] Inflationary pressures rose significantly by early 1985. The government restrained bank lending to curb investment spending from the second half of 1985. The contractionary policy was terminated in the first half of 1986, before the rate of inflation dropped to low levels comparable to those of past disinflationary periods. A vigorous economic expansion led mainly by private consumption began with this relatively high rate of inflation. Inflationary pressures rose from the spring of 1987 and peaked in the summer of 1988. Although most of the pressures found their way into rising prices, shortages appeared in some daily necessities and consumer durables in major cities around the summer of 1988. Having recognized that inflation was at its most serious since the early 1960s, the government implemented a strong contractionary policy from the fall of 1988 to the spring of 1990. State banks restricted lending across the board, and state fixed investment was curtailed by fiat or suasion. As the economy went into a recession, inflationary pressures receded.

Ninth cycle (*1990–*)*: upswing 1990–*

After a slow recovery, the Chinese economy was in the early stage of a boom when Deng Xiaoping proposed the acceleration of economic growth in the spring of 1992. A powerful investment boom followed immediately; state fixed investment grew by 26.1 per cent in 1992 and by 14.7 per cent in 1993. This brought the state fixed investment share of GDP to a very high level by 1993 (22.2 per cent), and the economic growth rate (as measured by GDP) reached 14.2 per cent in 1992 and 13.5 per cent in 1993 [19, 1995 ed., p. 32]. High growth brought about accelerating inflation and a deteriorating trade balance. The rate of inflation (as measured by the retail price index) grew from 2.9 per cent in 1991 to 13.2 per cent in 1993 [19, 1995 ed., p. 233]. The trade balance moved from a surplus in 1992 (U.S.$4.4 billion) to a deficit in 1993 (–U.S.$12.2 billion), reflecting the surge in imports [19, 1995 ed., p. 537].

[29] The wage reforms in the mid-1980s allowed state enterprises to set wages independently as long as the growth of wages was linked to the indexes of enterprise performance. Decentralization of wage setting resulted in fast increases of nominal wages in the state sector. The growth of wage costs as well as expanding aggregate demand brought about the two most recent inflationary spells (1987–88 and 1992–94). Accounting for the dynamics behind the wage-cost inflation in the past decade is beyond the scope of this article. See Imai [9] for further discussion.

Reacting to these signals of rising macroeconomic pressure, the government imposed a mild contractionary policy in mid-1993 which included restraint on bank lending and state sector spending and interest rate hikes. Control over the growth of state bank loans was tightened successively in the following two years to lessen the growth of fixed investment and wage payments, and the yuan exchange rate was devalued from 5.8 to 8.7 yuan (official rate per U.S.$) in January 1994. Economic growth decelerated in 1994 (GDP, 11.8 per cent) [19, 1995 ed., p. 32] as the growth rate of state fixed investment fell (10.3 per cent), and the trade balance moved to a surplus the same year (U.S.$5.4 billion) [19, 1995 ed., p. 537]. The impact of contractionary policy on inflationary pressures in the retail market was, however, slow to appear. The rate of inflation peaked in 1994 (retail price index, 21.7 per cent) [19, 1995 ed., p. 233] before dropping significantly in 1995 (January–November, 15.4 per cent) [17, December 12, 1995]. Deng's 1992 growth acceleration policy appears to have served as a demand shock that amplified the ninth cycle.

VII. CONCLUSION

The Chinese economy has experienced sizable short-term fluctuations of aggregate output in the past forty-one years since 1955. Nine business cycles can be identified based on the growth rate of NMP during this period. There are common patterns, such as investment cycles, harvest fluctuations, and periodic retrenchments, which suggest the presence of some mechanisms for China's business cycles. Another notable feature is the relative macroeconomic stability of the post-1979 period compared with the preceding period. My explanatory framework is that China has an investment cycle of the kind described by Kornai's hypothesis, and that this cycle interacts with exogenous shocks and generates business cycles of dissimilar amplitude and duration. According to Kornai, an investment cycle is generated by the patterned reaction of central planners who adjust the level of fixed investment in response to capacity pressure, an indicator of macroeconomic tension. An institutional prerequisite of this cycle is the weak financial accountability of state enterprises, which results in the upward drift of state fixed investment. My survey has indicated that the Chinese economy, seventeen years after the initiation of economic reforms, still has an investment cycle with these characteristics. The rate of inflation being an indicator of macroeconomic tension, state fixed investment and the rate of inflation move in tandem in China's investment cycle. The exogenous shocks in the post-1979 period as a set seem to have been less destabilizing to the economy than those in the preceding period, and this may partly explain the relative macroeconomic stability of the past seventeen years.

The dynamic simulation performed, based on the data since the late 1970s, indicates that the underlying investment cycle in China is dynamically stable. Because

of this stability, an exogenous shock has little effect on the long-term growth path of output. China's potential growth rate in the reform period appears to be around 9 per cent. The simulation results also indicated that a series of random shocks, such as those associated with climatic variation that affect agricultural output, could produce recurring output cycles of different amplitude and length. Chronological accounts appear to show that economic developments during the past nine business cycles were largely consistent with the explanatory framework presented.

Will ongoing economic reforms alter the pattern of China's business cycles? In the long term, rapidly expanding non-state sectors may reduce the state sector to a small segment of the economy. Then the peculiarities in state enterprise investment behavior will no longer significantly affect the patterns of output fluctuations. In November 1993 the Communist Party stopped short of accepting the state sector's decline into irrelevance and announced that the government would gradually implement banking and taxation reforms and promote the introduction of private funds into state enterprises over the coming years [1, pp. 14–21]. As reforms proceed, it is conceivable that state enterprises will eventually assume full financial accountability or be privatized. Also, state banks will begin to act as independent commercial banks, applying objective economic criteria in lending. At that point, state enterprises will lose their bias for expansion and the pattern of business cycles will change.

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APPENDIX

MACROECONOMIC MODEL FOR DYNAMIC SIMULATION

A. *Notation*

Numerical subscripts with minus signs indicate past years (e.g., −1 denotes the previous year). Δ denotes the annual increment. Endogenous variables are repre-

sented by capitals; exogenous variables are denoted by either lower case or Greek letters.

Endogenous variables:

F = nominal savings deposit balances (year end).
G = nominal household income (annual).
I = state fixed investment in 1952 prices (annual).
K = capital stock in the consumption goods industry in 1952 prices (year end).
M = nominal currency supply (year end).
P = price of consumption goods (annual mean, base year = 1952, 1952 level = 1).
Q = output of consumption goods in 1952 prices (annual).
Y = gross material product (GMP) in 1952 prices (annual).

Exogenous variables and coefficients:

r = nominal interest rate on savings deposits.
t = time trend (zero until 1978, 1979 = 1, 1980 = 2, . . .).
w = nominal annual wage rate.
ϕ_a = labor productivity in the consumption goods industry.
ϕ_b = labor productivity in the investment goods industry.
γ = allocation ratio of new capital to the consumption goods industry.
τ = rate of depreciation.
ρ_{-i} = distributed lags describing the pattern in which current and past years' investment fully contributes to the expansion of capital stock. ρ_0 is the weight on current year investment.

B. *Equations*

$$Q = \alpha K_{-1}, \tag{1}$$
$$\alpha > 0, \ K > 0.$$

$$100 \cdot \left(\frac{I}{I_{-1}} - 1 \right) = \beta_1 + \beta_2 100 \cdot \left(\frac{P_{-1}}{P_{-2}} - 1 \right), \tag{2}$$
$$I > 0, \ \beta_1 > 0, \ \beta_2 < 0.$$

$$\Delta K = \gamma \sum_{i=0}^{j} \rho_{-i} I_{-i} - \tau K_{-1}, \tag{3}$$
$$0 < \gamma < 1, \ \rho_{-i} > 0, \ \rho_0 + \rho_{-1} + \ldots + \rho_{-j} = 1, \ 0 < \tau < 1.$$

$$G = \left(\frac{w}{\phi_a} \right) \alpha K_{-1} + \left(\frac{w}{\phi_b} \right) I + r_{-1} F_{-1}, \tag{4}$$
$$w > 0, \ \phi_a > 0, \ \phi_b > 0, \ r > 0, \ F > 0.$$

$$G = PQ + \Delta M + \Delta F, \tag{5}$$
$$P > 0.$$

$$\left(\frac{M}{P}\right) = \delta_1\left(\frac{G}{P}\right) + \delta_2 t\left(\frac{G}{P}\right), \tag{6}$$

$\delta_1 > 0,\ \delta_2 > 0.$

$$Q = \lambda_1\left(\frac{G}{P}\right) + \lambda_2 Q_{-1} + \lambda_3 t\left(\frac{G}{P}\right), \tag{7}$$

$0 < \lambda_1 < 1,\ 0 < \lambda_2 < 1,\ \lambda_3 < 0.$

$$Y = Q + I. \tag{8}$$

This calendar-year-based model has two sectors (state-controlled business sector and households) and considers the markets for two goods (consumption and investment goods) and for two assets (currency and savings deposits). The output of the investment goods industry is state fixed investment. Equation (1) indicates that consumption goods output is constrained by capital stock. Equation (2) is the planners' reaction function in which the growth rate of state fixed investment depends inversely on the previous year's rate of inflation. Equation (3) describes how past investment transforms into new capital stock in the consumption goods industry. Equation (4) is the expenditure of the state-controlled business sector. The first two terms represent the wage payments of the consumption and investment goods industries, and the last term the interest payments of savings deposits. Note that G also stands for nominal household income. Equation (5) is the budget constraint of households. Equation (6) indicates that household currency demand depends on nominal incomes. t accounts for the continuous increase of currency demand-income ratio (M/G) reflecting the monetization of the economy. Equation (7) is the consumption goods demand function based on the permanent income hypothesis. Gross material product (GMP) is defined as the sum of two goods produced by the two industries in equation (8).

Equations (2) and (7) form the cycle-generating mechanism. The planners' reaction function (equation 2) is paired with the reverse relationship; the rate of inflation depends positively on the growth rate of investment through the consumption goods demand function (equation 7). The demand for consumption goods rises when household income grows according to equation (7), one of the sources of income growth being investment expansion. This leads to a high rate of inflation because consumption goods supply is constrained by capital stock whose size is determined by past investment (equations 1 and 3).

C. *Estimation of the Three Behavioral Equations*

(i) Planners' reaction function (equation 2)

$$100 \cdot \left(\frac{I}{I_{-1}} - 1\right) = \underset{(3.757)}{15.842} - \underset{(-2.396)}{1.164} \cdot 100 \cdot \left(\frac{P_{-1}}{P_{-2}} - 1\right) + \underset{(1.371)}{9.512}\, DDX, \qquad (2)'$$

Adjusted $R^2 = 0.256$, $D.W. = 1.659$, period = 1979–94.
(Figures in parentheses are *t*-statistics.)

DDX, the dummy variable associated with the high growth policy proposed by Deng Xiaoping (1992, 1993, and 1994 = 1, zero in other years), is added as an explanatory variable.

(ii) Currency demand function (equation 6)

$$\left(\frac{M}{P}\right) = \underset{(17.356)}{0.123}\left(\frac{G}{P}\right) + \underset{(14.122)}{0.009t}\left(\frac{G}{P}\right), \qquad (6)'$$

Adjusted $R^2 = 0.994$, $D.W. = 1.905$, period: 1978–92.

(iii) Consumption goods demand function (equation 7)

$$Q = \underset{(17.308)}{0.812}\left(\frac{G}{P}\right) + \underset{(3.228)}{0.172}Q_{-1} - \underset{(-12.359)}{0.013t}\left(\frac{G}{P}\right), \qquad (7)'$$

Adjusted $R^2 = 0.998$, $h = -0.528$, period: 1978–92.

D. *Numerical Assumptions*

(i) Coefficients estimated above are used for equations (2), (6), and (7).

(ii) Initial value of K_{-1}: 250 billion yuan in 1952 prices. This is the assumption on the size of the capital stock in the consumption goods industry in 1977. Using equation (1), α (0.364) is obtained as the ratio of consumption goods output (Q) in 1978 (91.0 billion yuan in 1952 prices) to capital stock (K) in 1977 (250 billion yuan).

(iii) r: 6.9 per cent through the period (mean interest rate on one-year savings deposits in the 1979–92 period).

(iv) w's annual growth rate: 14.5 per cent (geometric mean growth rate in the 1979–92 period).

(v) ϕ_a's annual growth rate: 4.9 per cent (geometric mean growth rate in the 1979–92 period).

(vi) ϕ_b's annual growth rate: 8.2 per cent (geometric mean growth rate in the 1979–92 period).

(vii) γ: 0.5.

(viii) τ: 0.05.

(iv) ρ_{-i}: $\rho_0 = 0.4$, $\rho_{-1} = 0.3$, $\rho_{-2} = 0.2$, $\rho_{-3} = 0.1$.

E. *Simulation Setup*

Case 1. Equation (2) is dropped, and P is set exogenously to grow by 6.0 per cent a year through the simulation period. This is the growth rate of the consumption goods price index in the 1979–92 period. The seven equations determine the

values of seven endogenous variables recursively each year. Each of the seven endogenous variables is associated with an equation: (1)-*Q*, (3)-*K*, (4)-*I*, (5)-*F*, (6)-*M*, (7)-*G*, (8)-*Y*. The simulation is run for nineteen years. The initial values of endogenous variables are set at the 1977 level. Because it takes a few years before endogenous variables move smoothly, the observations in the first four years are discarded and the fifth year is labelled as year 1 and the nineteenth as year 15.

Case 2. Case 2 uses the full eight-equation model. Each of the eight endogenous variables is associated with an equation: (1)-*Q*, (2)-*I*, (3)-*K*, (4)-*G*, (5)-*F*, (6)-*M*, (7)-*P*, (8)-*Y*. An investment shock term, which adds another 10 per cent to the growth rate of state fixed investment, is inserted in equation (2) in year 1. The simulation is run for fifteen years.

Case 3. A proxy variable that represents the variation in climatic conditions is included in equation (1) as a multiplicative term on the right-hand side. Other specifications are the same as in Case 2. The climatic variation variable is based on the ratio of the crop acreage affected substantially by natural disasters to the total sown area for the fifteen years from 1978 to 1992 [19, 1993 ed., pp. 358, 391]. The mean of this ratio is 0.132. Crop acreage affected substantially indicates the output per area fallen by more than 30 per cent from the normal-year level [19, 1993 ed., p. 391]. The percentage deviation of this ratio is divided by 15 to generate the series of the proxy variable. This implies, for the sake of simulation, that a 10 per cent rise in the ratio from 0.132 to 0.145, reflecting poor climatic conditions, results in a 0.67 per cent reduction in consumption goods output.

F. *Description of the Data*

F = savings deposits balances at the end of the year [19, 1993 ed., p. 285].
I = state fixed investment (see Table I, source).
M = nominal household currency balances [18, p. 8].
P = consumption goods price index in the retail price index (see Table I, source).
Q = nominal value of household cash expenditures for consumption goods and services divided by P [18, p. 14].[a]
r = mean annual interest rate on one-year savings deposits [26, p. 385].
w = G net of interest payments ($r_{-1}F_{-1}$) divided by the number of employees at the end of the year [19, 1993 ed., p. 97].
ϕ_a and ϕ_b = computed using the numbers of workers in the two industries. The number of workers in the investment goods industry is obtained by dividing

[a] Note that Q omits the bulk of the value of services consumed by households, because households typically pay only a small part of the costs of some services such as housing and health care in urban areas. This is why expenditures for services are very small relative to those for consumption goods. In 1992, household cash expenditures for services and goods were, respectively, 103.1 and 862.1 billion yuan [19, 1993 ed., pp. 602, 611].

nominal gross state fixed investment by *w*. The number of workers in the consumption goods industry is obtained as the difference between the total number or workers and the number of workers in the investment goods industry.

G and *Y* = computed using equations (4) and (8).