

Enterprise Reform in Chinese Industry

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The Chinese economy commands attention because of its immense size, and because China's unique combination of dynamic performance and unusual institutional arrangements challenges many popular notions about the reform of socialist systems. Industry, which by Chinese convention includes mining and utilities as well as manufacturing, exemplifies this arresting mix of scale, dynamism, and unexpected structural features. Industry is the largest sector of China's economy, accounting for 50 percent of total output and 80 percent of exports, and employing 102 million workers in 1992 (Survey, 1993). Its robust growth, amounting to well above 10 percent annually during the 1980s (Table 1), undergirds China's standing as the world's fastest-growing economy.¹

Since China's initial reform efforts began as experimental changes aimed at improving performance rather than, as in eastern Europe, establishing a Western-style market system, it is not surprising that institutional change has been gradual and uneven, with many features of the pre-reform system surviving even today. Rather than attempting a "big bang," China's reform path is more akin to "growing out of the plan" (Naughton, 1994).

Industry stands at the core of China's reform problem. Efforts to revitalize and restructure domestic industry are closely linked to the reform of pricing, banking, public finance, ownership, social welfare, and research and

¹We refrain from detailed comment on the accuracy of Chinese economic statistics, except to note that officially compiled data on industrial inputs and outputs typically convey the order of magnitude of relevant levels and rates of change.

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Table 1
Overview of Chinese Industrial Performance, 1980–1992

<i>A. Real Output</i>					
Ownership Type	Index of Real Output (1980 = 100)				Average Annual Growth, 1980/92 (percent)
	1980	1985	1990	1992	
State	100	148	210	257	7.8
Collective	100	247	554	914	18.4
Private ^a	100	21752	126057	241455	64.9
Other ^b	100	492	3530	8736	37.2
Total	100	176	328	480	13.1

<i>B. Shares of Various Types of Firms in Nominal Output</i>					
	Shares of Nominal Output (%)				Percent Share Of Incremental Output 1980/92
	1980	1985	1990	1992	
State	76.0	64.9	54.6	48.4	43.6
Collective					
Urban	13.7	13.3	10.3	11.8	11.5
Township-Village	9.9	18.8	25.3	26.2	28.8
Private ^a	0.0	1.9	5.4	6.8	7.9
Other ^b	0.5	1.2	4.4	7.2	8.3
Total	100.0	100.0	100.0	100.0	100.0
Total Output (¥ billion)	515.4	971.6	2392.5	3706.6	

Source: Yearbook (1993, pp. 409, 413); Rawski, (1993).

Note: Percentage totals may not check due to rounding error.

^aPrivately-owned firms employing less than 8 workers.

^bIncludes private firms employing 8 or more workers, joint ventures, foreign-owned firms, and other ownership forms.

development. If China's recent accomplishments carry distinctive implications for policy design, it is industry, where reform has side-stepped privatization and other standard remedies, that is the most likely source of lessons.

In considering China's experience of enterprise reform, this paper begins by reviewing conditions prior to the reform initiatives of the late 1970s, and then describes the impact of reform policies on structure, conduct, and performance of state-owned industry during the 1980s. Next, we examine the growth of industry outside the state sector, and discuss the problems and prospects for industry in the 1990s. Finally, we consider possible implications of China's recent industrial experience for broader issues of reform strategy in transitional economies.²

²Other discussions in this vein include Chen, Jefferson, and Singh (1992); Gelb, Jefferson, and Singh (1993); and McMillan and Naughton (1993).

Initial Conditions

Studies of Chinese industry during the era of socialist planning reveal many commonalities with the Soviet experience of centrally-directed industrialization. Managers focused on quantitative targets, especially those concerning physical output volume and total output value, rather than financial objectives. Profitability did not influence the incomes of executives and workers nor the growth prospects of firms.

Chinese socialism also developed its own distinctive features. The national planning apparatus in China was far less comprehensive than in the USSR (Granick, 1990). As early as 1979, for instance, 64 percent of cement, 41 percent of coal and 23 percent of steel were allocated outside the plan system (Fan and Schaffer, 1991, p. 9). Although fluctuations in the degree of central control over production and investment decisions date back to the 1950s, broad areas of responsibility were routinely delegated to provinces and localities (Perkins et al., 1977, pp. 272–78). Local authorities acquired custodial and usufruct rights over enterprise assets, which were sometimes transferred to enterprise management.³

Furthermore, China's mechanism of central planning often failed to determine outcomes within its intended span of control. Naughton (1994) observes that "the ability of planners to obtain compliance with specific detailed directives had always been limited" by the "extraordinarily weak planning apparatus." Hua, Zhang and Luo (1993, p. 71) trace the specific consequences of this fractured structure: "[T]he planning system was so ineffectual that township enterprises... though poorly equipped and funded, developed rapidly from the early 1970's... market transaction[s], or the 'relationship outside the plan' between township enterprises and state-owned enterprises was widespread even under the traditional system."

Thus, both administrative design and lapses in plan implementation contributed to the pre-reform development of unplanned, semi-market industrial activity under local government auspices. Since the expansion of inherited patterns is easier than the creation of new modes of production and allocation, these atypical features of China's pre-reform industrial system acted to smooth the path of reform.

Beyond these factors, several aspects of China's broader economic environment strongly affected the outcome of partial and gradual industrial reforms. These include the financial, commercial, and technical capabilities of Chinese communities in Hong Kong, Taiwan, and throughout the Asia-Pacific region, which magnified the impact of China's "open door" policy (Chen, Jefferson, and Singh, 1992); the broad dispersion of entrepreneurial drive (Cohen, 1993), which transformed hesitant reform initiatives into massive change that

³Yusuf (1993b) decomposes ownership into four basic rights: custody, or deciding how assets are used; usufruct, which entitles the holder to control income streams; alienation, determining the sale or transfer of assets; and destruction, affecting the ultimate disposition of assets.

repeatedly swamped the expectations of China's political leaders as well as foreign onlookers; and the dramatic surge in rural production and incomes following the abandonment of collective farming, which relaxed the foreign exchange constraint and gave a huge boost to China's nascent rural industries (Sicular, 1991).

China's State Industry: System Reform in the 1980s

State-owned enterprises are the natural focus of any effort to evaluate the progress of China's industrial reform. The problem is complex: the population of state-owned enterprises is large and diverse; the reforms are partial and uneven; they consist of measures that permit (rather than mandate) new courses of action; and outcomes are ambiguous. A full analysis must penetrate to the enterprise level and transcend the evidence available from anecdotes, small samples, and fragile statistical aggregates.

We adopt the structure-conduct-performance paradigm used in the field of industrial organization. In applying this framework to the area of socialist reform, we expand the notion of "structure" to include not just the nature of product and factor markets, but the whole environment surrounding and conditioning enterprise operations (Jefferson and Xu, 1991). Since data are inevitably limited and uncertain, we hope that consistent findings across three analytic dimensions can offer more convincing evidence of progress or stagnation than any single perspective. We begin with structure.

Structure

At the outset of reform, China's state-owned enterprises functioned as passive agents of the state economic bureaucracy. Managers had little authority over research and development, product innovation, investment planning, marketing, or even such routine matters as production scheduling, material purchases, wage structures, and employment levels (Komiya, 1987). Ten years of reform brought dramatic changes in the allocation of industrial products, the procurement of inputs, the character of incentives, and the degree of competition. By the end of the 1980s, enterprise managers had gained control of most business decisions. Even the largest state-owned enterprises were deeply enmeshed in markets driven by decentralized forces of demand and supply. The new structural environment facing China's state-owned enterprises evolved in response to two distinct policy initiatives.⁴

The first reform effort, implemented around 1980, consisted of tentative steps designed to improve performance within a framework dominated by mandatory output planning and administrative allocation of inputs and products. On the domestic side, state-owned enterprises gained the right to

⁴For more detailed accounts, see Hua, Zhang, and Luo (1993); Naughton (1994); and Ten Years (1990).

retain a modest share of total profits. They also obtained unprecedented control over any output beyond mandatory plan targets. Decentralized, semi-market transactions, long tolerated as a sort of grey market, were now encouraged as a means of stimulating firms to manage their affairs more actively. On the external side, a new "open door policy" dismantled long-standing barriers to international trade and investment, with southern provinces enjoying special incentives to expand foreign economic contacts.

The second set of reforms, dating from 1984, centered on two innovations: dual pricing and the enterprise contract responsibility system. Dual pricing partitioned supplies of industrial products into plan and market components. Under the dual pricing regime, most state enterprises transacted marginal sales and purchases on markets where prices responded increasingly to the forces of supply and demand. At the same time, bank loans began to replace budgetary appropriations as the chief source of external funding for industrial enterprises, signalling the emergence of embryonic factor markets.

New forms of contracting gradually supplanted annual plan targets even for the largest firms. Under the contract responsibility system, the enterprise manager, a group of managers, or sometimes the firm's entire work force agree to fulfill specific obligations, typically involving targets for total profit, delivery of profit to the state, and productivity increases, in return for extensive control over enterprise operations, including full or substantial retention of excess profits.

The most visible consequence of these reforms was a shift from planning toward the market. Surveys of state-owned enterprises show that between 1980 and 1989, the share of material inputs purchased through the market rose from 32 to 59 percent (Dong, 1992), or from 12 to 66 percent (Zou and Wang, 1993). The same surveys show the share of output sold on the market rising from 49 to 60 percent (Dong, 1992), or from 13 to 66 percent (Zou and Wang, 1993). Surveys also show that enterprise funds and bank loans replaced state budgetary grants as the chief sources of investment finance during the 1980s (Dong, 1992; Fan and Woo, 1992). The overall impact of reform on the structural environment surrounding state-owned enterprise operations emerges from a review of three categories: autonomy, incentives and competition.

Autonomy. As the scope of mandatory planning declined, the managers of state-owned enterprises acquired growing authority over decisions about the quantity and variety of output, production methods, and selling price. A host of market-supporting institutional developments enhanced enterprise autonomy by increasing choice and reducing transaction costs, thereby expanding the capacity of state enterprise managers to restructure business arrangements. These included the creation of markets for industrial materials; the deregulation of trucking and wholesale trade; the erosion of barriers to commercial arrangements involving foreign participants; expanded opportunities to hire consultants and temporary or contract workers; new mechanisms for enforcing contracts and resolving commercial disputes; patent and copyright legislation; the commercialization of scientific and technical research; the growth of trade

and professional associations; and the expansion of advertising, insurance, banking, and telecommunications.

Greater enterprise autonomy has not eliminated intrusive regulation. State agencies sometimes refuse to allow enterprises to exercise their new "rights," especially with respect to foreign trade, employment and financial management. Government officials sometimes manipulate remaining controls in ways that effectively nullify the expansion of enterprise autonomy (Enterprise, 1993). There are also complaints that state-owned enterprise managers seek responsibility only for profits and expect the state to cope with financial losses (Liu and Zou, 1992). Despite these limitations, autonomy has expanded. Survey data from the late 1980s show that the decision-making authority of state firms, previously subject to tight government controls, is no different from the autonomy reported by managers of urban and suburban collectives (Jefferson, Rawski, and Zheng, 1992b). Groves et al. (forthcoming) use another set of survey data to demonstrate that the grant of autonomy leads enterprises to hire more contract (non-permanent) labor, increase the share of compensation tied to performance, and raise productivity.

Incentives. New incentive mechanisms have reconfigured the relations between effort, financial outcomes, individual reward, and enterprise control over resources. Beginning around 1980, state-owned enterprises were allowed to retain part of their profits. Unlike Hungary and Poland, where similar reforms failed to alter the leveling tendency of tax and subsidy policy (Kornai and Matits, 1984; Farrell, 1991), Chinese data reveal a substantial and growing link between profit and retained earnings. Data from a World Bank survey of over 900 state enterprises, summarized in Table 2, show that a 10 percent rise in gross profit led to increases in retained earnings of 7.6 percent during 1980–83, 8.7 percent during 1984–87, and 9.2 percent during 1988–90. Many enterprises now retain 100 percent of earnings in excess of fixed quotas for profit remittance.

Despite continuing support of loss-making enterprises and their employees from direct budgetary subsidies, flexible tax rates, and "soft" bank lending, new incentive arrangements began to generate penalties as well as rewards. Morris and Liu (1993) find that while subsidies rose in response to deteriorating profit performance during the late 1980s, there was a considerable reduction in the softness of budget constraints for state firms. The recession initiated by the anti-inflation policies of 1988–90 forced many state-owned enterprises to curtail bonuses, furlough some workers at a fraction of their basic wage, and pay others in kind rather than in cash. Even in the boom year of 1988, one study of the coal industry, where price controls ensure widespread losses, noted that if "enterprises accumulate large losses, this cannot but influence workers' living standards" (Coal Policy, 1988).

Competition. Reform has meant an expansion not only of markets, but also of competition. Naughton (1992) observes sharp reductions in both the level of state enterprise profits and the dispersion of profitability across branches of Chinese industry. He attributes the decline and convergence of profit rates to

Table 2
Measures of State Enterprise Conduct, 1980–1990

Regression results: $\ln Y = \alpha + \beta \ln X + \varepsilon$		1980–83	1984–87	1988–90
an increase of 1% in <i>gross profit</i> (X) yields a rise in <i>retained profit</i> (Y) of	$\hat{\beta}$	0.76	0.87	0.92
	<i>t</i>	(71.84)	(110.15)	(137.25)
	R^2	0.67	0.79	0.76
an increase of 1% in <i>labor productivity</i> (X) yields a rise in the <i>average wage</i> (Y) of	$\hat{\beta}$	0.04	0.13	0.18
	<i>t</i>	(8.76)	(19.11)	(25.69)
	R^2	0.03	0.11	0.22
an increase of 1% in <i>labor productivity</i> (Y) yields an increase in <i>per capita bonus</i> (X) of	$\hat{\beta}$	0.22	0.37	0.51
	<i>t</i>	(17.02)	(25.38)	(27.75)
	R^2	0.09	0.18	0.26
an increase of 1% in <i>gross profit</i> (X) yields an increase in the <i>per capita bonus</i> (Y) of	$\hat{\beta}$	0.97	1.01	0.99
	<i>t</i>	(58.02)	(68.36)	(43.69)
	R^2	0.56	0.62	0.50
an increase of 1% in <i>current</i> (X_1) or <i>lagged value</i> (X_2) of <i>retained earnings</i> yields an increase in <i>investment</i> (Y) of	$\hat{\beta}_1$		0.23	
	<i>t</i>		(3.72)	
	$\hat{\beta}_2$		0.50	
	<i>t</i>		(7.62)	
	R^2		0.50	

Source: World Bank Survey, covering approximately 900 firms.

Note: The final set of estimates covers 1984–90; the estimating equation is $\ln Y = \alpha + \hat{\beta}_1 \ln X_1 + \hat{\beta}_2 \ln X_2 + \varepsilon$.

the continuing erosion of barriers that formerly protected state enterprises against competition from collective firms, from imported products, and from innovative rivals within the state sector. As a result of past efforts to build “complete sets” of industries in every province, eight-firm concentration ratios for Chinese industry tend to fall considerably below comparable figures for the United States and Japan; they also show a declining time trend (Table 3). With military industries converting to civilian production, barriers to internal trade in decline, import penetration on the rise, and the prospect of sweeping reductions in import restrictions if China joins the GATT, we see rivalrous markets as a well-entrenched fixture of China’s industrial economy.

Conduct

Changes in the structure of Chinese industry have, in turn, induced changes in conduct. There is little room to doubt that profit has become the dominant objective of managers in China’s state industries. Dong Furen (1992, p. 4) summarizes the outcome of one large survey effort by noting that

Table 3
Eight-Firm Concentration Ratios for Industrial Products, 1980–1988

<i>Product</i>	<i>China</i> 1980	<i>China</i> 1985	<i>China</i> 1988	<i>Japan</i> 1980	<i>United States</i> 1982
Beer	16.2	8.1	10.2	98.9	64.0
Cement	5.7	3.8	2.5	46.0	24.0
Cotton yarn	4.1	3.9	2.8	28.0	44.0
Diesel engines	22.6*	15.6*	16.2*	60.1	n.a.
Machine tools	12.5	10.5	n.a.	n.a.	22.0
Nylon	76.0	62.4	51.2	n.a.	78.0
Refrigerators	42.3	35.7	26.1	73.3	82.0
Steel	37.1	34.7	32.5	65.0	n.a.
Structural glass	40.6	33.6	25.6	100.0	90.0
Televisions	35.8	21.2	19.8	59.2	n.a.

Source: Chen *et al.*, 1991, pp. 196–97.

*Three-firm concentration ratios.

“enterprises arrange production plans according to market conditions with the objective of increasing profit.” Many authors echo this view. Some writers accuse state enterprise managers of excessive attention to short-run financial outcomes (Liu and Wang, 1993; Gu and Cao, 1993); the frequent inclusion of investment and product innovation targets in management contracts indicates that supervisory bodies share this concern. But other observers note a tendency for large firms and enterprise groups to sacrifice current profit for longer-term strategic advantage (Jiang *et al.*, 1993).

Changing attitudes toward the planning system offer another perspective on the objectives of state-owned enterprises. Beginning in the late 1980s, state enterprise leaders sought relief from “unfair” competition with collective firms owned by local governments (Investment, 1991). Their complaints had a strange sound, coming from the very firms that had benefited for decades from preferential allocations of funds, equipment, foreign exchange, university graduates, skilled labor, and scarce materials. In our view, these demands reflect the growing conviction among state-owned enterprise managers that the costs of continued participation in the planning system had come to outweigh the benefits.

Some observers, struck by rapid increases in wages and benefits for workers in state enterprises, argue that worker incomes outweigh profits in the minds of state enterprise managers (Woo *et al.*, forthcoming). Indeed, average monetary compensation of state-owned enterprise industrial workers rose by 252 percent between 1980 and 1992. But nominal labor productivity rose by 231 percent over the same period, or nearly as much as wages, so that labor’s income share (wages plus bonuses) of gross output rose only slightly, from 7.0 to 7.5 percent (Yearbook, 1993, pp. 107, 130, 412). Even if we assume that a full accounting of labor’s share, including housing and other benefits paid in

kind, might double the ratio of labor income to total output, labor's effective income share is unlikely to exceed 0.15, the figure around which estimates of labor's (gross) output elasticity appear to cluster.

Hay and Liu (1992) reach a similar conclusion. Working with panel data, they find that standard neoclassical cost functions can successfully model the behavior of state enterprises. Their results indicate that state firms respond to changing factor prices as anticipated by standard theory, that enterprises located near the production frontier conform more closely to cost-minimizing behavior than other firms, and that the widely criticized system of bonus payments "appears to have been highly effective . . . in improving efficiency and keeping costs down."

If the profit motive dominates decision-making in state enterprises, how do managers distribute the fruits of higher profits and productivity? Table 2 uses survey data from a World Bank project to illustrate the evolution of several key relationships during the first decade of reform. The first line of the table illustrates the growing link, noted earlier, between gross profits and retained earnings. The next three lines indicate that wage payments (including base wages and bonuses) have become increasingly responsive to changes in profits and productivity.

The last set of results shows that during 1984–90, investment responded significantly to current or lagged profit performance. This critical link between profitability and capacity expansion is a central requirement for long-term economic success. It is precisely this connection that was absent in Kornai and Matits' (1984) investigation of Hungarian firms' investment behavior between 1975 and 1980. Morris and Liu (1993) confirm the link between profitability and capacity expansion among Chinese state enterprises during the 1980s.

Performance

How have these changes in industrial structure and enterprise conduct affected industrial performance? Rapid growth is the most obvious feature of recent industrial activity. Although the share of the state sector in total industrial output has declined, the real product of state industry more than doubled during the 1980s; expansion continues apace. But rapid, high-cost growth at the extensive margin is the hallmark of socialist systems. So rapid growth of state industry alone cannot demonstrate the efficacy of China's unorthodox reforms.

Expansion of overseas sales offers a more convincing test, especially in view of the recent removal of direct export subsidies.⁵ Comprehensive information about the exports of state-owned enterprises is available only for 1985. Available data show, however, that the combined exports of state-owned enterprises and urban collectives grew at an annual rate of about 16 percent during 1985–90. Since the output of state-owned enterprises was nearly five times that of urban collectives in 1985 and somewhat higher in 1990 (Table 1), it seems

⁵Indirect subsidies remain, including low-interest bank loans to favored exporters (Lardy, 1993).

Table 4
Estimated Rates of Annual Productivity Growth in Chinese Industry

	1980-84	1984-88	1988-92
<i>A. Total Factor Productivity</i>			
State sector	1.8%	3.0%	2.5% ^a
Collective sector			
Urban and township	3.4	5.9	4.9 ^a
Township-Village	7.3 ^a	6.6 ^a	6.9 ^a
<i>B. Labor Productivity (real terms)</i>			
State sector	3.8	6.2	4.7
Collective sector			
Urban and township	8.6	7.0	13.8
Township-Village	5.8	14.4	17.7

Source: Jefferson, Rawski, and Zheng, 1992a; Yearbook, 1993; authors' calculations.

^aPreliminary results.

evident that the exports of state-owned enterprises grew rapidly during the latter half of the 1980s.

Information about export composition, which shows swift expansion in categories dominated by state-owned firms (power-generating equipment, textile machinery, machine tools), reinforces this impression, as do survey results showing state enterprise exports growing at annual rates of 20 percent during the late 1980s (Machinery, 1991; Rawski, 1993). Data from a World Bank survey indicate that the ratio of state-owned enterprise exports to value-added rose during the 1980s to levels that match comparable aggregates for U.S. manufacturing. Apparently, many of China's state-owned enterprises are gaining ground in the international marketplace.

Trends in total factor productivity offer another perspective on the performance of state-owned enterprises. Using aggregate data, K. Chen et al. (1988) found that total factor productivity in state industry stagnated from the mid-1950s to the late 1970s, but increased during the reform period. We have identified 13 studies of total factor productivity in China's state industry during the 1980s, most based on sample surveys. Nine studies report annual growth of total factor productivity within the range of 2-4 percent. Of the remaining four studies, two show higher rates and two obtain lower rates of productivity change. Table 4 summarizes the results of our own work, which is based on aggregate rather than sample data.

Can we corroborate indications of rising total factor productivity with micro-level evidence of increases in static or dynamic efficiency? We can investigate static efficiency by identifying statistical relationships that should exist in a market system and then testing for their emergence during the reform process.

Market forces create a tendency to equalize financial returns to factors employed in different lines of business. Several studies identify measurable improvements of this sort. China has seen sharp reductions in the dispersion of profitability across branches of industry (Naughton, 1992) and across different ownership types (Rawski, 1993). There is also evidence of convergence in financial returns to capital, labor and materials across ownership types (Jefferson, Rawski, and Zheng, 1992a) and among large- and medium-size state-owned enterprises (Jefferson and Xu, forthcoming). The dispersion of total factor productivity across enterprises has declined during the reform period, with the greatest convergence evident among enterprises with sales fully disengaged from the plan (Jefferson and Xu, forthcoming). A study of province-level total factor productivity trends for state industry finds "a pattern of convergence among measures of provincial efficiency levels both nationally and across...the coast, the centre, and the west" (Hsueh, Rawski, and Tsui, 1992).

Total factor productivity can also grow in response to improved dynamic efficiency, by which we mean accelerated expansion of production frontiers through the adoption of new products, new processes, and new organizational arrangements. Although studies of socialist industrial reform devote little attention to the sources of technological change, a variety of evidence indicates that reform has substantially accelerated innovation in China's state enterprises.

Export growth is perhaps the most visible outcome of successful innovation. During the 1970s, visitors agreed that Chinese manufactures seemed unlikely to penetrate markets in the United States, Japan, or other economies where buyers value style, packaging, finish, service, and prompt delivery as well as low cost and functionality. The recent surge of exports from China's state industries, noted above, includes large sales to the United States and Japan. In apparel and other fields, Chinese export producers have begun to move beyond their initial focus on the low end of the quality/price spectrum; some have even begun to adopt features of "just-in-time" production.

Reform has also increased the effectiveness of innovative efforts. China's government has eased the long-standing split between the efforts of state-sponsored research institutes and the commercial needs of industry by the simple expedient of cutting the budgets of research organizations. This has created a powerful stimulus for researchers "to better serve the economy" (Suttmeier, 1992). Enterprise funds have replaced state appropriations as the major source of finance for research and development: the share of state grants in research and development spending by large and medium enterprises dropped to 11 percent in 1987 and only 7 percent in 1991 (S&T, 1990, p. 251; Yearbook, 1992, p. 749).

Survey research confirms the acceleration of innovative activity within state industry. One study found enterprises focusing on "the development of new products and the abolition of old products" (Dong, 1992); another survey found over 90 percent of large and medium enterprises engaged in some form of innovative activity, with 81 percent developing new products (Innovation,

1993); a third showed that the output share of new products rose substantially during the 1980s (Jefferson, Rawski and Zheng, 1992b). Over 90 percent of the state-owned, urban-collective and township-village enterprises in the latter survey cited state-owned enterprises as the principal innovators in their product lines.

This review leads to the conclusion that reform has pushed China's state-owned enterprises in the direction of "intensive" growth based on higher productivity rather than expanded resource consumption. Although the production of unwanted goods and other characteristic socialist flaws persist (Liu, 1993), we observe a consistent picture of improved results—higher output, growing exports, rising total factor productivity, and increased innovative effort—against a background of gains in static and dynamic efficiency that reflect the growing impact of market forces.

Our survey reveals a massive shift from planning toward market coordination, vigorous competition in product markets, substantial gains in performance, and a distinct, albeit gradual and uncoordinated "corporatization" of China's state industries. Despite these achievements, certain dysfunctional aspects of the former planning regime remain more or less intact. In particular, weaknesses in the financial system perpetuate costly resource misallocation and threaten macroeconomic stability, while the continued absence of well-defined property arrangements compromises incentives and autonomy. Although these defects have not prevented China's state-owned enterprises from increasing output, exports, productivity, and efficiency, the cost of failing to grapple with these issues appears large. Before considering these matters, we turn to a survey of developments outside the state sector.

Beyond the State Sector

No review of China's recent industrial experience can overlook the large and beneficial contribution of enterprises outside the state sector. These enterprises have fortified national economic statistics with substantial increases in output, exports, productivity, and employment. The dynamic performance of enterprises outside the state sector has reduced the share of state-owned firms in total industrial output from more than three-fourths at the beginning of the reform to less than half in the early 1990s (Table 1).

The entrepreneurial firms that have undercut the dominance of state-owned producers are widely described as "non-state" enterprises. The data in Table 1 make it clear that most of the output in the non-state sector comes from collective firms. These collectives, which are typically controlled by local governments, are part of the public sector. Despite the falling output share of state-owned firms, public enterprise continues to dominate China's industrial scene. The contribution of genuinely private firms, although difficult to measure, is in the vicinity of 10 percent. We focus our study of non-state industry

Table 5

Characteristics of State and Non-State Industrial Enterprises, 1987

Category	1987 Gross Output ¥ Billion current prices	Workers per firm	Fixed Assets (yuan per worker)		Labor Productivity (thousand yuan per worker)
			original cost	net value	
I. State-owned enterprises					
All State Firms	825	4110	19,142	13,070	20.6
Firms employing over 5,000	261	9851	30,080	19,750	21.3
Other large and medium firms	304	1492	17,620	12,310	24.6
Small state enterprises	263	256	11,760	8,470	16.0
II. Non-state enterprises					
A. Collective ownership					
Urban collectives	167	110	4,670	3,380	11.3
Rural enterprises					
Township	141	61	3,052	2,388	8.9
Village	120	25			6.8
B. Private ownership					
Urban firms ^a	5	2	n.a.	n.a.	5.6
Rural households ^a	80	3	n.a.	n.a.	4.1
C. Other ownership^b					
	28	202	n.a.	n.a.	35.3

Source: Rawski, 1993; Yearbook, 1989; TVE, 1989; Industry, 1988.

^aPrivately owned firms employing less than 8 workers.

^bIncludes private firms employing 8 or more workers, joint ventures, foreign-owned firms, and other ownership forms.

on collective firms, particularly rural collectives, widely known as “township and village enterprises.”

Rural collectives expanded during the 1980s on foundations established by the earlier efforts of local governments to promote rural industry (Perkins et al., 1977). Like their predecessors, township and village enterprises operate “under close supervision from the township or village industrial departments” which contribute start-up funds, appoint managers, and “are intimately involved in major strategic decisions” (Wong, 1993, ch. 9; Ody, 1991, p. iv). The growth of township and village enterprises benefited from the success of China’s agricultural reforms, which greatly expanded the supply of rural savings, freed millions of workers to seek non-farm employment, and boosted rural demand for consumer goods.

Table 5 describes the scale, capital intensity, and labor productivity of firms operating under different ownership regimes: state, collective, private and “other” (a residual category including joint ventures with foreign participation). We focus on data for 1987 because they permit a breakdown of state-owned enterprises based on firm size. The data show a steady downward progression of scale (measured by workers per firm), capital intensity, and labor productiv-

ity as we move from large to small state enterprises and then down the administrative ladder to include collectives organized in cities, townships (*xiang*), and villages (*cun*). A dynamic perspective would show both the collective and private sectors gaining ground on state-owned enterprises, especially the smaller units, in terms of total output, enterprise scale, capital intensity and labor productivity. Nominal labor productivity in the collective sector (excluding village-level units), for example, jumped from 60 to 76 percent of the average for state enterprises between 1987 and 1992 (Survey, 1993, p. 81).

The achievements of China's non-state enterprises can be summarized briefly. Output has risen explosively, although standard data probably exaggerate real growth (Ody, 1991; Rawski, 1991). Growing production has absorbed tens of millions of workers. The exports of township and village enterprises (including some non-industrial goods) shot up from US\$3.9 to US\$12.5 billion between 1985 and 1990, the latter figure amounting to over one-fifth of China's total exports for 1990 (Lardy, 1992). Although efforts to measure productivity growth in the collective sector are impeded by inadequate output deflators and inconsistencies between statistical measures of output and employment, it appears that the growth of output per worker, output per unit of capital, and total factor productivity in the collective sector—and especially among township and village enterprises—has outstripped comparable measures for the state sector. Table 4 contains a set of productivity comparisons that includes township-village enterprises.

The expansion of non-state enterprises has served as a lever forcing often reluctant state firms in the direction of market-oriented behavior. Our own calculations and those of Singh, Ratha and Xiao (1993) show that profitability within the state industry is lowest in provinces where the output of non-state industry has grown most rapidly. Singh, Ratha, and Xiao also find that large provincial shares of non-state industrial output are associated with high levels of total factor productivity in state industry, suggesting that robust growth of the non-state sector both squeezes profits and motivates greater efficiency in the state sector.

The impact of competition extends even to industries like steel and petroleum that face little rivalry from collective enterprises. The continuing fall in profit rates throughout industry, coupled with the expansion of enterprise claims on profit flows, has caused government, the chief holder of industrial capital, to suffer a crushing decline in revenue growth. Fear of inflation has left the state with little choice but to restrict the growth of subsidies and push an ever-growing list of industries into the hurly-burly of the marketplace.

The success of China's collectives has sparked growing interest in measuring and explaining their conduct and performance. Recent studies direct attention to several features that distinguish rural collectives from state enterprises: 1) information channels linking (government) principals with (managerial) agents tend to be shorter and simpler for non-state firms than for state-owned units (Groves et al., forthcoming); 2) local officials and non-state enterprise managers focus sharply on financial objectives (profit plus local tax

revenues), while managers of state enterprises, burdened with responsibility for housing and other social services⁶ as well as industrial operations, face a more complex set of objectives (Byrd and Gelb, 1990); 3) because localities lack the center's borrowing capacity, enterprises under local jurisdiction face harder budget constraints than state-owned enterprises and often fall into bankruptcy (Qian and Xu, 1992).

Several researchers have also suggested that, despite the absence of well-specified private property rights, the demographic stability of China's rural communities promotes the emergence of "invisible institutions" to provide a "moral framework for rights" or a "cooperative culture" that serves to reduce problems of shirking and monitoring found in most public enterprises (Byrd and Lin, 1990; Yusuf 1993a, 1993b; Weitzman and Xu, 1993).

It is not clear that these considerations can explain the vibrancy of the township and village enterprise sector. Ties with the state sector represent an important and widely neglected ingredient in the successful development of non-state firms. Collective units rely on the state sector as a source of capital, materials, equipment, specialized personnel, technology, sub-contracting arrangements, and sales revenues. In southern Jiangsu province (near Shanghai), a center of booming rural enterprise development, "more than two-thirds of township and village enterprises . . . have established various forms of economic and technical cooperation arrangements with industrial enterprises, research units, and higher educational institutions in larger cities" (Xu, Mao, and Yuan 1993). Officials attempting to develop industry in poor localities are encouraged to pursue "joint operations with scientific research organizations or large- and medium-scale enterprises" (Du, Huang, and Chen, 1992). Survey results indicating near-equality of financial returns to the employment of engineers in urban state firms and suburban collectives provide some quantitative measure of the extent to which reform-induced developments have broken long-standing patterns of market segmentation (Jefferson, Rawski, and Zheng, 1992b).

The erosion of entry barriers associated with China's industrial reform has created a domestic product cycle in which new products, materials, and processes introduced by innovative state firms are adopted by non-state enterprises which use their cost advantages to erode state sector profits and force state industry toward fresh innovations. Chinese manufacturers are enmeshed in multi-layered innovation ladders that link international firms and their Chinese branches to small and unsophisticated township and village enterprises through the agency of state-managed factories, laboratories, and universities (Jefferson and Rawski, 1994).

Despite the important contribution of non-state firms to China's recent industrial achievements, it is too soon to conclude that China's collectives represent an enduring organizational innovation. The dependence of non-state

⁶Du and Shang (1993) note that state enterprises provide housing for 93 percent of their employees and 51 percent of all urban residents.

enterprises on resources from the state sector, the tendency for non-state enterprise operations to cluster at the low end of the scale and technology spectrum, and the somewhat artificial nature of the domestic cost advantages enjoyed by non-state firms all suggest that their rapid gains owe much to specific circumstances of China's economy in the 1980s. Some authors predict that, as underlying economic conditions change, rural industry will lose ground to large domestic firms, enterprise groups, and joint venture companies during the course of the 1990s (Jiang et al., 1993; Pan, 1993).

Chinese Industry in the 1990s

The 1990s have brought an unprecedented and virtually unrestrained push toward the market. This dynamic draws on the extraordinary success of China's southern regions as well as a new vision, shared even by the Communist party, of a market-dominated system in which the state's contribution is limited to indirect macroeconomic controls, microeconomic regulation, passive ownership of assets, and the enunciation of overall economic priorities.

Regulations on "Transforming the Management Mechanisms of State-Owned Industrial Enterprises" reflect this new attitude, formalizing the autonomy of state-owned enterprises and their responsibility for the financial consequences of independent business decisions and of market-driven economic change (Regulations, 1992). The text allows firms to "reject" or "refuse" official instructions, including mandatory plan directives, that fall outside narrowly defined boundaries. Overzealous officials who encroach upon enterprise autonomy will "bear responsibility for a criminal act" (FBIS, 1992). Enterprises can dismiss managers and technicians or assign them to blue-collar positions. They can "select employees according to their merits" and "dismiss and fire workers and staff" (Regulations, 1992).

Official foot-dragging has effectively denied these "rights" to some units, especially large firms in the state sector. Even so, managers have begun to address the difficult and politically sensitive issue of redundant workers in state industry. In 1992, China's coal industry cut its work force by 4 percent, while large and medium enterprises in Liaoning province, the heart of China's industrial "rust belt," reduced employment by over 6 percent (Wall Street Journal, December 27, 1993, p. 8; Liaoning, 1993). State industrial enterprises are transferring growing numbers of redundant personnel to newly established units, most engaged in service operations, which will gradually sever their financial ties with the parent units.

The reform of incentives has also expanded the gap between winners and losers. Contrary to the expectations of Chinese managers, who concealed huge profits in advance of negotiations for the renewal of enterprise responsibility contracts in 1990/91 (Wang Haibo, 1992), the new contracts appear to have avoided "ratchet effects" that would have penalized successful firms (Jefferson

and Singh, 1993). With state subsidies fixed in nominal terms despite substantial inflation and rising enterprise losses, workers and managers attached to unsuccessful firms face growing financial pressure. While some managers may have expected "virtually unlimited budgetary subsidies" in the past (Ody, 1991, p. 30), financially troubled enterprises now face growing uncertainty about their access even to partial compensation for financial losses, price shocks, or falling profits.

In addition, the central government has expanded the role of market transactions in coal, petroleum, steel, and other sectors formerly regarded as bastions of mandatory planning. By 1993, central plans controlled only 7 percent of industrial output value (Su, 1993). Even these mandatory commodity allocations often "depend on market prices" (Zhang Zhiping, 1993, p. 14). These initiatives, along with a continuing inflow of foreign technology and equipment, have contributed to the continued outward shift of industry's efficiency frontier.

While China's industrial economy is rapidly acquiring many characteristics of a market system, important weaknesses remain. We must differentiate between fundamental issues that could potentially block the path of reform and the myriad distortions and bottlenecks that create difficulties without threatening to derail the reform process. For China, these fundamental issues cluster in two areas: finance and ownership.

The shift from plan to market in the financial sphere has lagged behind parallel changes affecting the markets for industrial materials and products. Official interference in credit decisions, weak control over lending, and insufficient sanctions against insolvent enterprises perpetuate the accumulation of bad debts by major banks. "Policy loans" that are unlikely to be repaid are said to account for 30 percent of new bank credit. Firms often continue to supply non-paying clients in the expectation that the banks will eventually commit funds to eradicate chains of inter-enterprise obligations.

The macroeconomic consequences of these financial arrangements are discussed in a companion paper by Shahid Yusuf. On the microeconomic side, the long-standing policy of maintaining artificially low interest rates encourages excessive investment demand, particularly for mechanization, with three unwanted effects: there are the usual inefficiencies associated with credit rationing; managers devote excessive attention to acquiring new equipment, while neglecting opportunities to improve performance by reorganizing currently available personnel and facilities; low interest rates encourage capital-intensive techniques that aggravate the problem of redundant labor and raise the social cost of labor market reform.

The Chinese government plans to reorganize the banking system during 1994. There will be three types of banks: a central bank, profit-oriented commercial banks, and specialized institutions to finance important projects that may not meet commercial loan standards. There is no guarantee that these changes will halt the accumulation of bad debts in commercial bank portfolios.

However, the rapid decline of price controls has reduced one important source of resistance to the imposition of commercial lending standards. This offers some cause for optimism. Success in curtailing the accumulation of unrepayable loans could open the door to liberalization and diversification of domestic capital markets, which would in turn provide new opportunities as well as financial discipline for China's industrial enterprises. At the very least, the most recent reforms will have the desirable effect of consolidating industrial subsidies channeled through the banking system and making them more transparent than in the past.

What of ownership reform? It is essential to recall that 90 percent of Chinese industrial activity, including most of the output from non-state firms, resides in the public sector (Table 1). Even joint ventures with foreign firms often include Chinese state enterprises as partners. China's experience of industrial reform suggests that economists tend to overstate the importance of early privatization during the transition process. The strength of government efforts to force enterprises toward financial independence may count for more than the locus of ownership. However, even if this unorthodox view is accepted, we must guard against exaggeration of China's accomplishments. Although reform has reversed a long interlude of productivity stagnation, the scale of recent productivity growth in the state sector is modest at best. No one can doubt that most state enterprises operate well inside their production frontiers. Ownership reform has the potential to unlock further productivity gains in both state and collective industry.

Foreign as well as Chinese economists have expressed misgivings about the incentives created by the current system of responsibility contracts in state industry. These contracts, which typically extend for a term of three to five years, have undoubtedly shifted managerial incentives toward improving financial performance. But they create principal-agent problems that appear more serious than comparable issues arising from corporate management arrangements in the major market economies. Current contracting arrangements provide no opportunity to anticipate the plethora of contingencies associated with rapid institutional change. With a small number of official bodies charged with the supervision of 93,700 state enterprises, monitoring costs are high and information channels clogged. Enforcement costs are magnified by the difficulty of enlarging the current pool of enterprise leaders; the number of people with the specific knowledge and experience required to master the bureaucratic complexities of the state sector environment is very small.⁷

Discussion of ownership reform, temporarily halted following the ouster of Premier Zhao Ziyang in 1989, has resumed with full vigor (Wood, 1991, 1993;

⁷One experienced manager told us that learning to deal with various administrative superiors, which he regarded as more difficult than the technical issues or intra-firm responsibilities associated with his current executive post, had taken four years.

Zhou Shulian, 1993), now accompanied by free-wheeling experimentation. Provincial and local governments have begun to sell loss-making enterprises. Provisions for multi-year tax holidays and expanded autonomy for joint ventures have spurred state enterprise managers to scour the market for offshore investors. Workers, managers and supervisory bodies have converted thousands of collectives and some state-owned firms into locally-held joint-stock companies. In addition to these bottom-up initiatives, the central authorities have (as of late 1993) authorized nearly 150 state enterprises to issue shares on stock exchanges in Shanghai, Shenzhen, Hong Kong, and New York.

As debate and experimentation continue, we see three possible approaches. The government will certainly continue its current policy of expanding managerial autonomy and sharpening the incentive structure of state enterprises. Current reform plans call for intensified efforts to restructure the governance of state enterprises by distributing shares among multiple owners—provincial and local governments, other state firms, banks, newly established asset management companies, and individuals—in the expectation that arm's-length relations between owners and managers will promote better performance. Finally, it is possible that localities, provinces, or even the central government will initiate comprehensive privatization via auction or voucher plans. There is no financial obstacle to selling large numbers of state firms. The bank deposits of China's households, which have grown much faster than the fixed assets of state industry in recent years, amounted to about ¥1.3 trillion at the end of 1992, while year-end 1992 net fixed assets of state industry amounted to ¥1.1 trillion (Yearbook 1993, pp. 419, 664, 667). Seventy firms with assets in excess of ¥1 billion each accounted for ¥225 billion of this total (1991 year-end figures from Industry 1992, p. 416).

Conclusions

The governments of eastern Europe have clear economic objectives: they hope to build Western-style economic systems that will reward their citizens with income levels comparable to those enjoyed in western Europe and qualify their nations for membership in the European Economic Community. China's leaders initiated industrial reform in the hope of eliciting better performance, but with no specific vision of a desirable post-reform industrial system. Not surprisingly, China's reforms have followed an evolutionary path marked by frequent shifts of direction and ad hoc responses to unanticipated outcomes. Bottom-up initiative, experimentation, learning, and adaptation stand at the core of the reform process in Chinese industry.

We view the implementation of substantive economic reform measures from the perspective of the microeconomic theory of investment (Jefferson and Rawski, 1993). If investment decisions cannot be costlessly reversed, we expect a firm that faces uncertain demand prospects and uncertain returns to changes

in technology, product mix, and capital stock to invest more gradually than an enterprise with a sharply delineated vision of demand conditions and project outcomes (Pindyck, 1991). This approach provides a purely economic explanation for China's seeming hesitancy to move decisively toward market-style institutions.

If China's circumstances suggest a theoretical case for a more gradual approach to reform than what we see in nations like Poland or the Czech Republic, China's recent history proves that gradual reform of state industry is a feasible policy alternative that is capable of generating very substantial results. We do not deny that reform is a "seamless web" in which the rate of progress in one direction affects the consequences of reform efforts in other directions (Dhanji, 1991). But this does not imply that every reform component, however desirable in the long run, must be initiated at once. In the reform of socialist economies, as in earlier episodes of industrialization (Gerschenkron, 1962) and development (Hirschman, 1958), a comparative approach demonstrates that there is no unique recipe for successfully managing economic change.

The technique of building a market system is not one of fixed proportions. Temporary recourse to semi-market arrangements like China's systems of dual pricing and management contracts may produce outcomes that dominate the result of immediate efforts to achieve comprehensive price liberalization or rapid privatization of state enterprises. China's industrial gains of the past 15 years are partly attributable to favorable initial conditions. But the contrast between China's trend of buoyant increases in industrial output, real wages, employment, and exports and the performance of industry in states that have attempted to accelerate the pace of institutional change is too large to be explained solely by differences in initial conditions. We cannot avoid speculating that China is not the only venue in which the optimal path from plan to market might involve a lengthy interlude of gradual reform and a succession of transitional structures that deviate widely from standard market institutions.

During the past 15 years, China's industrial economy has achieved important progress toward building a market system. The accumulation of market experience and the confidence inspired by large increases in living standards have created a consensus favoring a market-based economy with a limited role for state ownership, government planning, and bureaucratic regulation of economic activity.

This new sense of purpose, which did not exist ten, five, or even three years ago, is itself a consequence of gradual reform. The emergence of a widely shared vision of China's post-reform economy has broadened the scope of feasible policy alternatives. Both the government and the Communist party have approved a new reform agenda that promises to install many elements typical of a full market system. The new reform push has begun with the creation of a unified exchange rate and a sweeping reduction in price controls for industrial goods. China's leaders now seem intent upon pursuing more complex and difficult industrial reform objectives, including the commercializa-

tion of bank lending, the expansion of domestic markets for industrial labor and capital, the creation of genuinely independent business management, and the reduction of government staff in industry-related fields to levels appropriate to the needs of strategic planning rather than micro-management of individual enterprises.

China has deployed an unorthodox strategy of industrial reform to great advantage. An initial round of partial reforms opened the door to growing competition involving old and new forms of public enterprise. During the 1980s, competition emerged as a powerful force for beneficial change in all segments of China's semi-market industrial system. As a result, this episode of partial reform raised the level of industrial output and enhanced the economic welfare of China's factory work force while creating the foundation for a market system.

Starting from the semi-market economy of the early 1990s, the current acceleration in the tempo of industrial reform, with its new focus on establishing conditions similar to standard market economy arrangements, may open the way to harnessing China's potential for further gains in industrial productivity without creating intolerable political tensions or social costs.

■ *We gratefully acknowledge research support from the Woodrow Wilson International Center for Scholars, the John Simon Guggenheim Memorial Foundation, the Henry Luce Foundation, Brandeis University's Mazer Fund, the University of Pittsburgh's University Center for International Studies, and the World Bank. We also thank Joseph Bertiner, Alan Gelb, Alan Krueger, Nicholas Lardy, Derek Morris, Peter Murrell, Barry Naughton, Dwight Perkins, Carl Shapiro, Timothy Taylor, Shahid Yusuf, and Yuxin Zheng for detailed comments on our initial drafts.*

References*

Byrd, William A., and Alan Gelb, "Why Industrialize? The Incentives for Rural Community Governments." In Byrd, William A., and Qingsong Lin, eds., *China's Rural Industry: Structure, Development, and Reform*. New York: Oxford University Press, 1990, 338–58.

Byrd, William A., and Qingsong Lin, "China's Rural Industry: An Introduction." In Byrd, William A., and Qingsong Lin, eds., *China's Rural Industry: Structure, Development, and Reform*. New York: Oxford University Press, 1990, 3–18.

Chen, Kang, Gary H. Jefferson, and Inderjit Singh, "Lessons from China's Economic Reform," *Journal of Comparative Economics*, 1992, 16, 201–25.

Chen, Kuan et al., "Productivity Change in Chinese Industry, 1953–1985," *Journal of Comparative Economics*, December 1988, 12, 570–91.

Chen Xiaohong, et al., "Preliminary Overview and Analysis of Concentration in Chinese Industry." In Wang Huijiong and Chen Xiaohong, eds., *Chanye zuzhi ji youxiao jingzheng: Zhongguo chanye zuzhi de chubu yanjiu* (Industrial organization and effective competition: a preliminary study of Chinese industrial organization). Beijing: Zhongguo jingji chubanshe, 1991, 191–209.

Coal Policy, "A Study of China's Policy on Coal Prices, Part 1," *Jiage lilun yu shijian* (Price Theory and Practice), 1988, no. 6, 40–46.

*Authors of Chinese-language publications are cited in the Chinese fashion, with surnames first.

Cohen, Myron L., "Cultural and Political Inventions in Modern China: the Case of the Chinese 'Peasant,'" *Daedalus*, Spring 1993, 151-70.

Dhanji, Farid, "Transformation Programs: Content and Sequencing," *American Economic Review Papers and Proceedings*, May 1991, 81:2, 323-28.

Dong Furen, "Behavior of China's State-owned Enterprises Under the Dual System," *Caimao jingji* (Finance and Economics), 1992, no. 9, 3-15.

Du Haiyan, and Shang Lie, "Distribution of Fringe Benefits for Employees of State-owned Enterprises," *Zhongguo gongye jingji yanjiu* (Research on Chinese Industrial Economics), 1993, no. 2, 46-52, 30.

Du Miaodeng, Huang Shiqiu, and Chen Xuewen, "On the Management of 'High Starting Point' Enterprises in Poor Townships and Districts," *Jingji guanli* (Economic Management), 1992, no. 12, 55-57.

Enterprise, "How Has the Self Management Right of Enterprises Been Implemented?" *Jingji cankao* (Economic reference news), February 22, 1993, 1.

Fan, Gang, and Wing Thye Woo, "Decentralized Socialism and Macroeconomic Stability: Lessons from China," Department of Economics, University of California-Davis, Working Paper Series No. 411, 1992.

Fan, Qimiao, and Mark E. Schaffer, *Enterprise Reforms in Chinese and Polish State-owned Industries*. London School of Economics Development Economics Research Programme, STICERD, CP No. 13, 1991.

Farrell, John P., "Monitoring the Great Transition," *Comparative Economic Studies*, 1991, 23:2, 9-28.

FBIS, "More on [Minister] Chen Jinhua Comments on State Firms Law," U.S. Department of Commerce, Foreign Broadcast Information Service, *Daily Report: China*, July 28, 1992, p. 27.

Gelb, Alan, Gary H. Jefferson, and Inderjit Singh, "Can Communist Economies Transform Incrementally?," *NBER Macroeconomics Annual 1993*. Cambridge: MIT Press, 1993, 87-132.

Gerschenkron, Alexander, *Economic Backwardness in Historical Perspective*. New York: Praeger, 1962.

Granick, David, *Chinese State Enterprises: A Regional Property Rights Analysis*. Chicago: University of Chicago Press, 1990.

Groves, Theodore, Yongmiao Hong, John McMillan, and Barry Naughton, "Autonomy

and Incentives in Chinese State Enterprises," *Quarterly Journal of Economics*, forthcoming.

Gu Shutang, and Cao Xuelin, "Create the Conditions for Surmounting Difficulties: On Enlivening State Enterprises to Escape Contradictions," *Jiage lilun yu shijian* (Price theory and practice), 1993, no. 2, 12-17.

Hay, Donald A., and Guy S. Liu, "Cost Behaviour of Chinese State-owned Manufacturing Enterprises During the Reform Period, 1979-1987," Applied Economics Discussion Paper No. 134, Institute of Economics and Statistics, Oxford University, 1992.

Hirschman, Albert O., *The Strategy of Economic Development*. New Haven: Yale University Press, 1958.

Hsueh, Tien-tung, Thomas G. Rawski, and Kai-yuen Tsui, "The Impact of Reform on China's State Industry: A Regional Perspective." Paper presented to a conference on "Productivity, Efficiency, and Reform in China's Economy," Chinese University of Hong Kong, August 1992.

Hua, Sheng, Xuejun Zhang, and Xiaopeng Luo, *China: From Revolution to Reform*. Houndsmills: Macmillan, 1993.

Industry, 1988, 1991, 1992. *Zhongguo gongye jingji tongji nianjian* [Statistical Yearbook of China's Industrial Economy]. Beijing: Zhongguo tongji chubanshe, annual.

Innovation, "Technical Development in Large and Medium Industrial Firms—Innovative Activity Develops Universally," *Zhongguo tongji* (China's Statistics), 1993, no. 4, 10.

Investment, "Speed Up the Pace of Technical Reform at Large and Medium State Enterprises: Summary of a Meeting on 'Policy Toward Enterprise Technical Reform' Organized by the China Association of Investment Studies." *Touzi yanjiu* (Investment research), 1991, no. 7, 45-48.

Jefferson, Gary H., and Thomas G. Rawski, "A Theory of Economic Reform," University of Pittsburgh, Department of Economics, Working paper No. 273, 1993.

Jefferson, Gary H., Thomas G. Rawski, and Yuxin Zheng, "Institutional Change and Industrial Innovation in Transitional Economies." Paper presented at the Annual Meeting of the Allied Social Science Associations, Boston, 1994.

Jefferson, Gary H., Thomas G. Rawski, and Yuxin Zheng, "Growth, Efficiency, and Convergence in China's State and Collective Industry," *Economic Development and Cultural Change*, 1992a, 40:2, 239-66.

Jefferson, Gary H., Thomas G. Rawski, and Yuxin Zheng, "Innovation and Reform in Chinese Industry: A Preliminary Analysis of Survey Data (1)." Paper delivered at the annual meeting of the Association for Asian Studies, Washington DC, April 1992b.

Jefferson, Gary H., and Inderjit Singh, "China's State-Owned Industrial Enterprises: How Effective Were the Reforms of the 1980s?" Washington DC: World Bank, 1993.

Jefferson, Gary H., and Wenyi Xu, "The Impact of Reform on Socialist Enterprises in Transition: Structure, Conduct, and Performance in Chinese Industry," *Journal of Comparative Economics*, 1991, 15, 45-64.

Jefferson, Gary H., and Wenyi Xu, "Assessing Gains in Efficient Production Among China's Industrial Enterprises," *Economic Development and Cultural Change*, forthcoming.

Jiang Xiaojuan et al., "New Features of China's Industrial Growth and Structural Change," *Zhongguo gongye jingji yanjiu* (Research on Chinese Industrial Economics), 1993, no. 8, 32-40.

Komiya, Ryutarō, "Japanese Firms, Chinese Firms: Problems of Economic Reform in China, Part 1," *Journal of the Japanese and International Economies*, March 1987, 1:1, 31-61.

Kornai, Janos, and Agnes Matits, "Softness of the Budget Constraint—An analysis relying on data of firms," *Acta Oeconomica*, 1984, 32:3-4, 223-49.

Lardy, Nicholas R., "Chinese Foreign Trade," *China Quarterly*, 1992, no. 131, 691-720.

Lardy, Nicholas R., "China's Foreign Trade Reform in the 1990's." Paper presented to the Association for Asian Studies, Los Angeles, 1993.

Liaoning, "Increase the Developmental Stamina of Large and Medium State-Owned Enterprises," *Shengchanli zhisheng* (Voice of Productive Forces), 1993, no. 5, 6-7, 12.

Liu Li, "Analysis of Industrial Results for 1992 and Thoughts on the Strategy for Industrial Development," *Jingji guanli* (Economic Management), 1993, no. 2, 12-14.

Liu Lili, and Wang Shengjiao, "Strengthen the Management of State-owned Coal Resources, Perfect the Mechanism of Contract Service," *Zhongguo nengyuan* (China Energy), 1993, no. 1, 21-23.

Liu Renxiu, and Zou Bailin, "We Must Smash the Problem of Enterprises Taking Responsibility for Profits and not for Losses,"

Jingji yanjiu (Economic Research), 1992, no. 12, 22-24.

Machinery, 1986-1990 *Zhongguo jidian chanpin chukou wunian* (China's exports of machinery and electrical products over five years, 1986-1990). Beijing: Gaige chubanshe, 1991.

McMillan, John, and Barry Naughton, "How to Reform a Planned Economy: Lessons from China," *Oxford Review of Economic Policy*, 1993, 8:1, 130-43.

Morris, Derek, and Guy Shaojia Liu, "The Soft Budget Constraint in Chinese Industrial Enterprises in the 1980s," unpublished manuscript, Oxford University, January 1993.

Naughton, Barry, "Implications of the State Monopoly Over Industry and its Relaxation," *Modern China*, 1992, 18:1, 14-41.

Naughton, Barry, *Growing Out of the Plan: Chinese Economic Reform, 1978-1993*. New York: Cambridge University Press, 1994.

Ody, Anthony J., "China: Rural Enterprise, Rural Industry, 1986-1990," unpublished paper. Washington DC: World Bank, 1991.

Pan Xining, "Development of Rural Industry Confronts Nine Big Issues," *Shengchanli zhisheng* (Voice of Productive Forces), 1993, no. 7, 33-34.

Perkins, Dwight H. et al., *Rural Small-Scale Industry in the People's Republic of China*. Berkeley: University of California Press, 1977.

Pindyck, Robert S., "Irreversibility, Uncertainty, and Investment," *Journal of Economic Literature*, September 1991, 29:3, 1110-48.

Qian, Yingyi, and Chenggang Xu, "Why China's Economic Reforms Differ: The M-form Hierarchy and Entry/Expansion of the Non-State Sector," Stanford University CEPR Publication No. 319, 1992.

Rawski, Thomas G., "How Fast Has Chinese Industry Grown?" Research Paper Series, No. 7, Socialist Economies Reform Unit, Country Economics Department, World Bank, 1991.

Rawski, Thomas G., "An Overview of Chinese Industry in the 1980s," unpublished, University of Pittsburgh, 1993.

Regulations, "Text of Regulations on Transforming State Enterprises," U.S. Department of Commerce, Foreign Broadcast Information Service, *Daily Report: China*, July 28, 1992, 27-36.

S & T, *Zhongguo kexue jishu sishinian (tongji ziliao) 1949-1989* (Statistics on Science and Technology of China 1949-1989). Beijing: Zhongguo tongji chubanshe, 1990.

Sicular, Terry, "China's Agricultural Policy During the Reform Period." In U.S. Congress,

Joint Economic Committee. *China: Economic Dilemmas in the 1990s: The Problems of Reforms, Modernization, and Interdependence*. Washington DC: U.S. Government Printing Office, 1, 340-64.

Singh, Inderjit, Dilip Ratha, and Geng Xiao, "Non-State Enterprises as an Engine of Growth: An Analysis of Provincial Industrial Growth in Post-Reform China," working paper, Transition and Macro Adjustment Division, the World Bank, 1993.

Su, Ning, "China's Industrial Policy During Economic System Transformation." Paper delivered at an International Conference on Macroeconomic Management," Dalian China, 1993.

Survey, Zhongguo tongji zhishu 1993 (A Statistical Survey of China 1993). Beijing: Zhongguo tongji chubanshe, 1993.

Sutmeier, Richard P., "High-Technology Development in China: Some Critical Issues," unpublished paper, University of Oregon, 1992.

Ten Years, Zhongguo qiye gaige shinian [Ten Years of Enterprise Reform in China]. Beijing: Gaige chubanshe, 1990.

TVE, Zhongguo xiangzhen qiye nianjian 1978-1987 [Yearbook of China's village and township enterprises, 1978-1987]. Beijing: Nongye chubanshe, 1989.

Wall Street Journal, "China To Free Coal Prices," December 27, 1993, p. 8.

Wang Haibo, "Now is the Time to Strengthen the Unity Between High Speed Growth and Raising Efficiency," *Zhongguo gongye jingji yanjiu* (Studies in Chinese Industrial Economics), 1992, no. 10, 23-28.

Weitzman, Martin, and Chenggang Xu, "Chinese Township and Village Enterprises as Vaguely Defined Cooperatives," unpublished manuscript, Harvard University, 1993.

Wong, Christine, "Economic Reform in China," unpublished manuscript, University of California, Santa Cruz, 1993.

Woo, Wing Thye, et al., "The Efficiency and Macroeconomic Consequences of Chinese

Enterprise Reform," *China Economic Review*, forthcoming.

Wood, Adrian, *Joint Stock Companies with Rearranged Public Ownership: Invigoration of China's State Enterprises Further Considered*. Programme of Research into the Reform of Pricing and Market Structure in China. London: STICERD, 1991.

Wood, Adrian, "Joint Stock Companies with Rearranged Public Ownership: What Can We Learn from Recent Chinese Experience and East European Experience with State Enterprises?" Paper delivered at the International Symposium on Economic Transition in China, Haikou, 1993.

World Bank Survey, "Industrial Reform and Productivity in Chinese Enterprises," a research project administered by the Transition and Macro-Adjustment Division, World Bank.

Xu Fengxian, Mao Zhichong, and Yuan Juying, "New Development at la Sunan," *Jingji yanjiu* (Economic Research), 1993, no. 2, 49-55.

Yearbook 1989, 1992, 1993. Zhongguo tongji nianjian (China Statistical Yearbook). Beijing: Zhongguo tongji chubanshe, annual.

Yusuf, Shahid, "The Rise of China's Non-state Sector," unpublished manuscript, World Bank, 1993a.

Yusuf, Shahid, "Property Rights and Non-State Sector Development in China," unpublished manuscript, 1993b.

Zhang, Zhiping, "Capital Goods Turn to Free Market," *Beijing Review*, July 5-11, 1993, 36:27, 13-16.

Zhou Shulian, "Stock-holding is the Way to Transform the Operating Mechanism of State Enterprises," *Zhongguo gongye jingji yanjiu* (Studies in Chinese Industrial Economics), 1993, no. 4, 8-13.

Zou, Gang and Zhigang Wang, "Marketization and Productivity Change," unpublished, University of Southern California, 1993.