

Notes on China

Econ 497

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1. Introduction

China poses an interesting contrast to EEFSU. China has achieved impressive growth since the start of reforms in 1978, an annual rate of 9.5%. Whereas growth in EEFSU declined in the onset of transition, in China it has increased continually, albeit with cycles. At the same time the proportion of the labor force employed in agriculture has dropped from 71% in 1978 to 56% in 1993, and the proportion of gross industrial output produced by state-owned enterprises declined from 78% to 43% during the same period. Meanwhile China has become increasingly integrated into the world economy; trade (exports plus imports) rose from 10% of GNP in 1978 to 36% in 1993, while direct foreign investment was \$28 billion in 1993 compared with \$2 billion in 1978. China's per-capita GDP in 2002 was \$4,600, leaving it the second largest economy in the world in PPP terms.

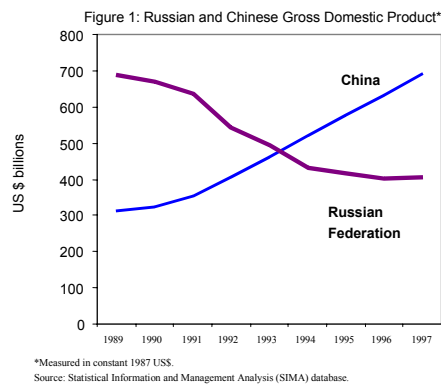


Figure 1: Chinese and Russian GDP

The comparison is most noteworthy with respect to Russia, as in figure 1.¹ Interestingly, the rapid growth in GDP in China has not been associated with the same increase in inequality as has been the case in Russia. It is clear that in Russia GDP has declined while inequality has increased. This is not the case in China. This is because when you start very poor economic growth reduces poverty. This is also evident in other indicators: for example, The number

¹But note that Russia's GDP per-capita is still twice that of China, \$8,800 in PPP terms in 2002.

of people living in absolute poverty in China has been substantially reduced – from over 250 million to about 50 million in two decades, a decline from one-third to a twenty-fifth of the population. Life expectancy on the other hand has increased from 64.37 in the 1970s to 70.80 in 1996 (68.71 for men and 73.04 for women), with infant mortality falling from over 50 per thousand in the 1970s to less than 30 per thousand in the 1990s (China Statistical Yearbook, 1997; Almanac of China's Population, 1997). This is far different from the deterioration in life expectancy and the increase in poverty experienced in Russia. It is clear that Chinese performance has been different.

Notice that China produces more of its GDP in agriculture than Russia, and much less in services.

Composition of GDP by sector

| | Industry | Agriculture | Services |
|--------|----------|-------------|----------|
| China | 49 | 18 | 33 |
| Russia | 39 | 7 | 53 |

But the labor force is even more skewed towards agriculture in China:

Labor Force by Occupation

| | <i>Agriculture</i> | <i>Industry</i> | <i>Services</i> |
|--------|--------------------|-----------------|-----------------|
| China | 50 | 23 | 27 |
| Russia | 11 | 28 | 61 |

The Chinese case is also interesting compared with India. In 1975 GDP in India was higher than in China. As a ratio of US GDP, India's was about 16% at PPP prices. China's was about 12%. By 1999, India's GDP was 26% of US GDP, while China's was almost 50% of US GDP. This is an amazing degree of catch up. Clearly, China did something right after 1978.

Rapid growth has thus had a dramatic impact on the lives of millions of Chinese citizens. An absolutely huge number of people have escaped poverty since economic reforms started in 1978. It is important to ask what changed then, and how this rapid growth was achieved.

Yet it is important to remember that this was an economy starting from a very low base. Per capita incomes remain relatively low by international standards, even after more than doubling in nominal terms and almost doubling in PPP terms in the past decade or so. The

actual numbers (less than \$1,000 a head on the World Bank Atlas method and about \$4,000 on a ppp basis) underline the point that China is still markedly poorer than many of its neighbors, and dramatically poorer than Hong Kong. It is classed by the World Bank as a lower middle income country.

Many point to Chinese success as an alternative strategy for exiting the plan. Is China an example that gradual reform is superior to shock therapy? Or are there fundamental differences which make the Chinese example irrelevant to the EEFSU case? What lessons can be learned from China?

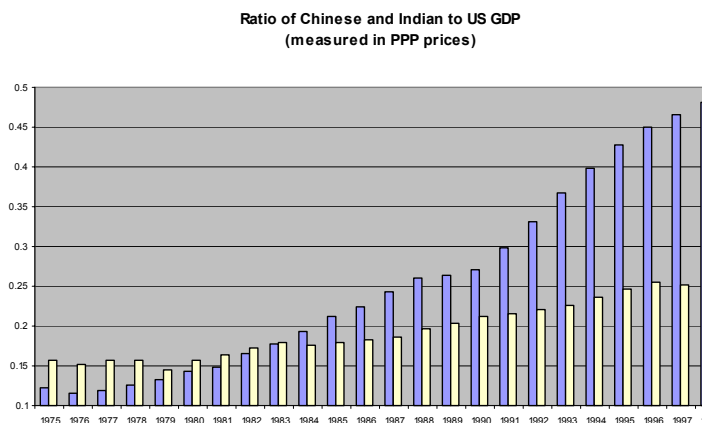


Figure 2: Chinese and Indian GDP as a share of US GDP (ppp prices)

Measured on a ppp basis, China's share of global output has risen from close to 11 percent in 2000 to a shade over 13 percent in 2004. On that basis it dwarfs Canada—and France, Italy and the UK; and is almost twice as big as Japan. Indeed, on the ppp basis it is the third largest economy if we count the euro area as a single economy.

China's share of world trade has grown more rapidly. In 1990, its share of world exports was 1.9 percent; that grew to 4 percent in 2000 and 6 percent by 2003. China's share of world imports grew from 1.5 percent in 1990, to 3.6 percent in 2000 and 5.7 percent by 2003.

The Chinese path of reform and its associated rapid growth is puzzling because it seems to defy much of conventional wisdom about transition. In particular, the Washington consensus that stabilization, liberalization, and privatization, following political democratization are es-

sential to success. Although China has adopted many of the policies advocated by economists, such as being open to trade and foreign investment and sensitive to macroeconomic stability, violations of the standard prescriptions are striking. For the most part of the past two decades, China's reform succeeded without complete liberalization, without privatization, and without democratization. One might have reasoned that coexistence of the planning mechanism with partial liberalization would only cause more distortion and become a source of disruption, not growth. Without privatization and secure private property rights, one might conclude that there could not be genuine market incentives. Without democracy, economic reform lacks a political basis and commitment to a market and thus is vulnerable.

2. Brief Background

China adopted communism in 1949. The approach was very orthodox at first, with Soviet advisers.

There are several important phases.

- Great Leap Forward
- Cultural Revolution
- Household Responsibility System

Notice that during the pre-reform period growth seems exclusively due to factor accumulation – not TFP. This is most clear in agriculture. Since reforms TFP has also contributed to growth – much due to human capital accumulation. But as we shall see, less than believed.

3. Collective Farms

collective farming (Lin, JPE, 1990); the key problem facing collective farms is shirking by workers, hence the advantage of household farming; but collective farms pool risks better and can exploit economies of scale.

- there is an incentive problem in collective farms because of the cost of monitoring effort; if there were perfect monitoring then the collective farm is superior to the household because of the complementarity of effort; but if monitoring is costly, then agents will shirk, and the household is better. Hence if collective farms can be supported by self-enforcing contracts that eliminate shirking they would have an advantage
- what would these self-enforcing contracts look like?
 - they would give the right of an agent to withdraw (exit) if others fail to live up to their obligations
 - notice that for this to work it must be a repeated game; self-enforcing contracts are infeasible in one shot games
 - the potential shirker must trade off the current gains from free riding against the discounted losses that would result (from loss of economies of scale) if the collective collapses; this can occur precisely because of exit (notice also that the most productive will leave first, and this will hasten the collapse of the collective farm).
 - it is the threat of the collective's collapse that deters shirking. This means that production will be at least as great on the collective as if they were all households
- when exit is eliminated as an option, the punishment of shirkers via collapse of the cooperative is eliminated; now monitoring is crucial, and if this is costly, productivity will collapse
- end-1955 there were only 500 advanced cooperatives, by 1957 there were 700,000 cooperatives and 119 million members. Early collectivization was successful: from 1952-1958 gross output rose by 27.8% while population rose by 14.8%. In 1958 cooperatives were amalgamated into the Peoples communes, about 24,000.
- in Chinese collective farms prior to 1958, the right of exit was enforced; exit was then removed in the Great Leap, and China did not achieve its 1957 level of grain production until the mid 1960's.

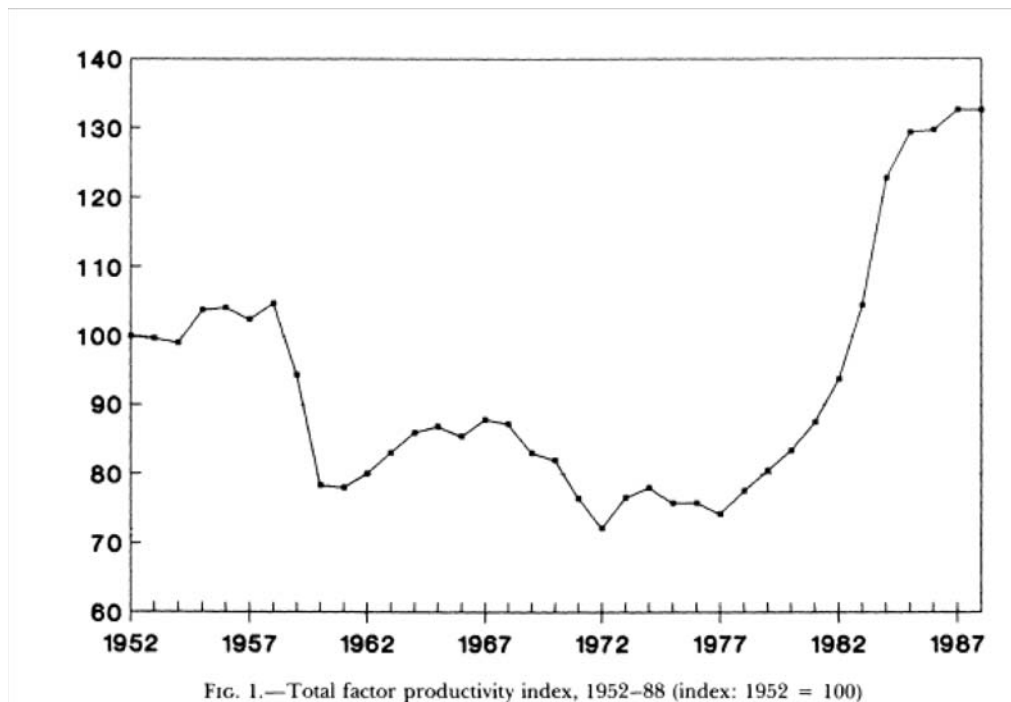


FIG. 1.—Total factor productivity index, 1952–88 (index: 1952 = 100)

Figure 3:

- look at the graph of TFP in Chinese agriculture; there are four phases; pre-58, 58-62, 62-77, and 78-87, and notice that TFP rose in the first and the last
 - if the collapse of agriculture was solely to the extremes of the Great Leap and bad weather, how to explain the third period?
 - notice that TFP rises with collectives that are voluntary in the first, and even more with HRS; of course technology is improving all this time and so there are good reasons for improvement in the HRS

3.0.1. Simple model

Agents can choose to supply low or high effort, $e = (\underline{e}, \bar{e})$. As the collective is large an agent can shirk without having an effect on his share of output this period, so $y = \bar{y}$. But if agents shirk then next period agents leave and output goes to \underline{y} , and agents have to supply high effort, as they are on their own. This state then continues for all future periods. This is called a trigger strategy: if agents defect from the cooperative outcome we revert to the bad

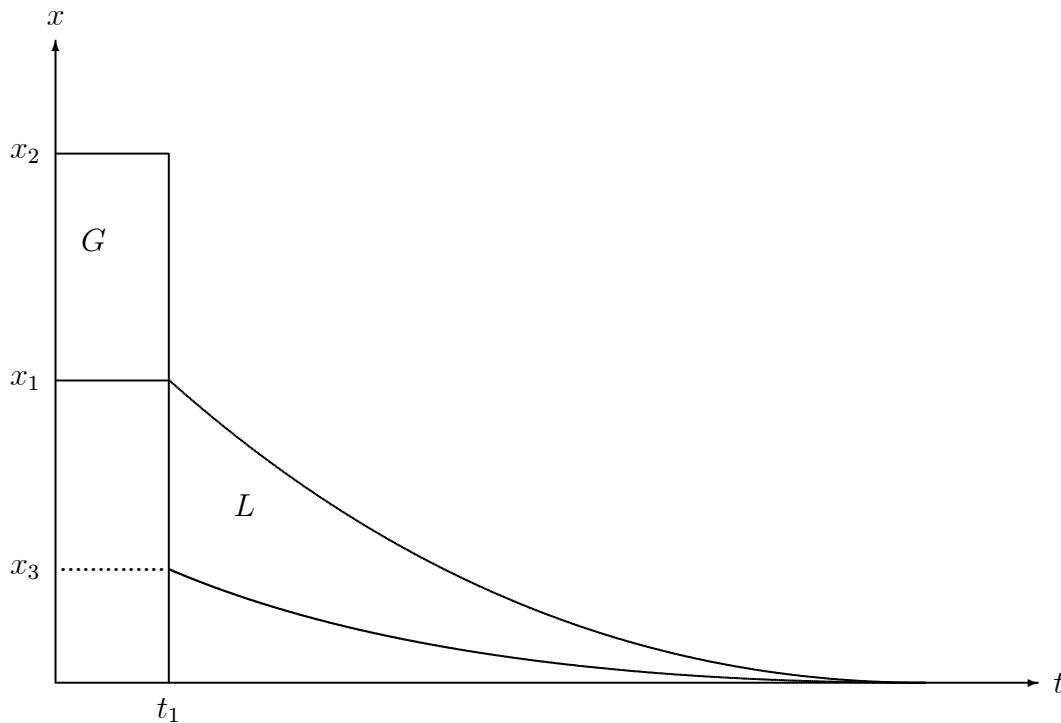


Figure 4: Gains and Losses Under Trigger Strategy

outcome in all future periods.

We thus have three possible outcomes and utility levels:

- $\bar{y} - \bar{e} \equiv x_1$
- $\bar{y} - \underline{e} \equiv x_2$
- $\underline{y} - \bar{e} \equiv x_3$

Clearly we must have $x_2 > x_1 > x_3$.

So an agent must compare the one-time gain from shirking

$$G = x_2 - x_1 = \bar{e} - \underline{e} \tag{1}$$

with the loss due to the collapse of the collective:

$$\begin{aligned} L &= \sum_{t=1}^{\infty} \beta^t (x_1 - x_3) \\ &= \sum_{t=1}^{\infty} \beta^t (\underline{y} - \bar{y}) \end{aligned} \tag{2}$$

where $\beta < 1$ is the discount factor.

Hence, an agent will choose to supply high effort if

$$G < L$$

or

$$\bar{e} - \underline{e} < \sum_{t=1}^{\infty} \beta^t (\underline{y} - \bar{y}) \quad (3)$$

It is evident from (3) that the threat of exit will deter shirking the greater is the output loss, $\underline{y} - \bar{y}$, the greater the discount factor, β , and the smaller the disutility from high effort.

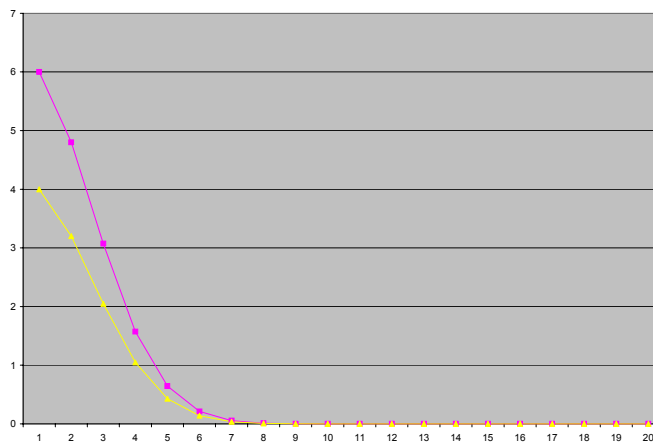
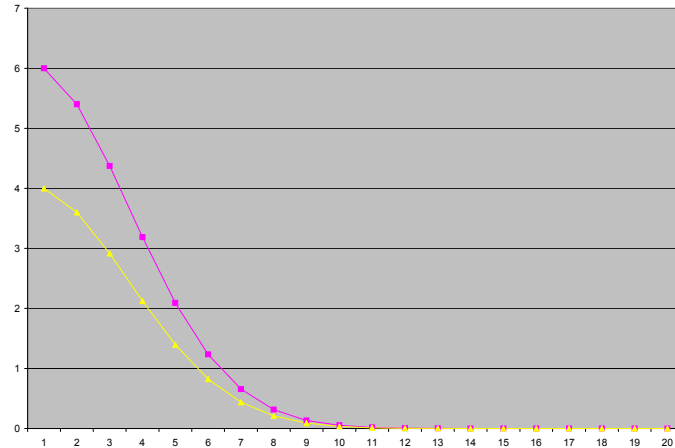


Figure 5: Area L with $\beta = .8$

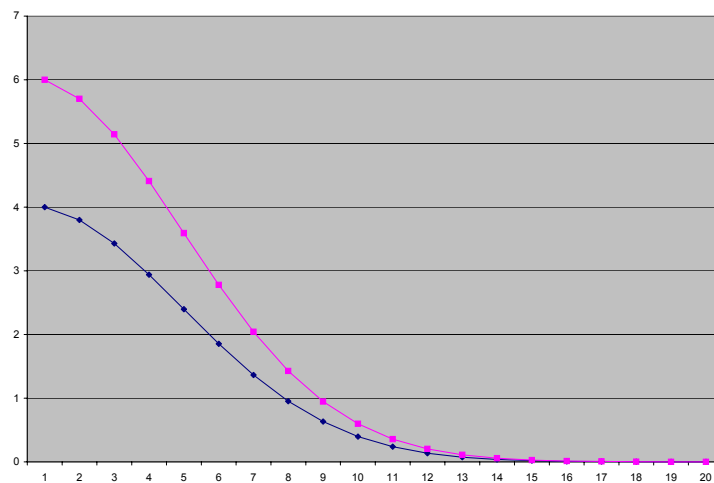
Notice that the $L \rightarrow 0$ as $t \rightarrow \infty$. We can also see that L is positively related to β : if β is low (people are impatient) then L will be smaller.

We can see this in terms of figure 1. The area denoted by G represents the current utility gain from shirking, $x_2 - x_1$. The area marked L is the future loss. Notice that this is just the discounted difference on the right-hand side of equation (3). Any agent must thus compare the one-time gain from shirking (G) with the long-run loss from the collapse of the collective (L). If the area L is bigger than the area G then the trigger strategy will support cooperation – we have a self-enforcing contract.

Figure 6: Area L with $\beta = .9$

Obviously, cooperation will be more likely the greater the gain from cooperating ($x_1 - x_3$), the smaller the gain from shirking ($x_2 - x_1$) and the more patient individuals are. We can see, in particular, that as β gets smaller the area L will shrink.

What is a normal value for β ? The discount factor is just $\frac{1}{1+\delta}$, where δ is the rate of time preference, which we can assume is equal to the rate of interest, r . Hence, $\beta = .95$ implies $r = .05$, while $\beta = .9$ implies $r = .10$, and $\beta = .8$ implies $r = .25$. Since we can think of a unit of time as one year, we should think of annual interest rates, so β closer to .95 seems plausible. Figures 5, 6, and 7 display what area L looks like with different values of β .

Figure 7: Area L with $\beta = .95$

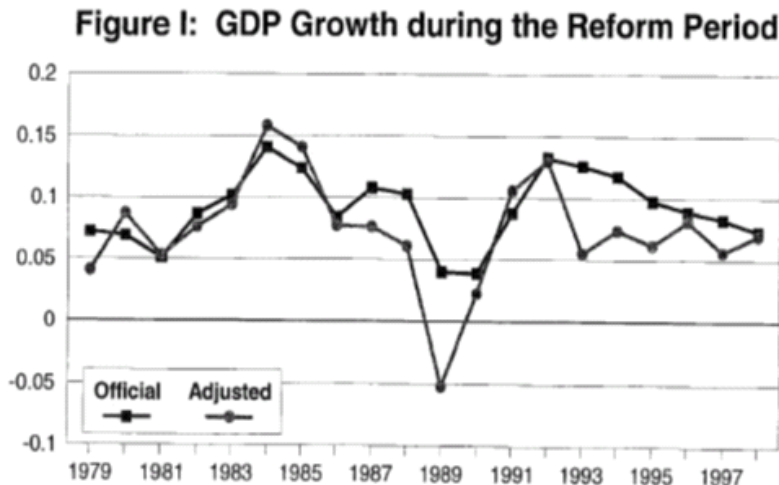


Figure 8: Official and Alternative Estimates of GDP, 1979-1998

4. Digression on Data

The Chinese record on growth is outstanding – between 1978 and 1998 per-capita GDP grew according to official statistics by about 8.0% per annum. This is a most outstanding record. Begg's question: is this the success of reforms or a feature of the data? Young (1999) has made an exhaustive analysis that shows that growth in per-capita income as well as productivity is grossly overstated.

Some idea of this is given in figure

There are many sources of bias in official data:

- revisions inconsistently applied (gross industrial output revised down but nominal value added unchanged)
- service sector growth entirely attributed to reform period
- inadequate deflation: use of implicit deflators based on enterprise reporting output in current and constant prices, rather than independent price indices
 - enterprises often just report no inflation, or some mechanical amount

Table 1: Main macro indicators of China's economy, 1998-2002 (%)

| Year | Real GDP growth (official figure) | Real GDP growth (author's estimate) | Consumer price index (prior year = 100) |
|------|--------------------------------------|--|--|
| 1998 | 7.8 | -2 to +2 | 99.2 |
| 1999 | 7.1 | -2.5 to +2 | 98.6 |
| 2000 | 8.0 | +2 to +4 | 100.4 |
| 2001 | 7.3 | +3 to +5 | 100.7 |
| 2002 | 8.0 | +5 to +8 | 98.9 |

Sources: GDP growth data for 1998-2001 is from *China Statistical Yearbook 2002* (China Statistics Press), 53; for 2002 (pre figure) from http://english.peopledaily.com.cn/200212/30/eng20021230_109314.shtml. Consumer price index for 1998 from *China Statistical Yearbook 2002*, 295; for 2002 (December) from *China Monthly Economic Indicators*, No.1, 2003, 34 (average figures for Beijing, Shanghai, Guangzhou, Wuhan, and Chongqing).

Figure 9: Rawski's Estimates

- the same effect holds true for deflating the fixed capital stock.²

Young summarizes the analysis in a simple way.

- Start with official data and growth of per-capital output is 7.8%.
- Substitute the SSB's own price deflators for its GDP deflators and you get 6.1%
- Correct for rising participation rates and you get 5.2%
- Removing agriculture raises productivity growth but the growth of employment rises further so you get labor productivity growth of 3.6%
- Account for ageing and improving educational attainment of the workforce brings it to 2.6%

Moreover, because the growth of the capital stock is overstated there has not been capital-deepening. Rather the opposite. Hence, it is labor deepening that is crucial for Chinese growth – movement from agriculture to industry and improvements in labor itself.

Even greater problems seem to plague recent statistics. For example, Rawski 7 notes that recent data is implausible for various reasons, one aspect being implied energy consumption.

²Notice that including inventories to get the physical capital stock is likely to be grossly distorting given the difficulties of treating inventories of unsold goods in state-owned enterprises.

"The yearbook figures imply that real GDP grew by 24.7 percent between 1997 and 2000. During the same three years, energy consumption dropped by 12.8 percent. The implied reduction of 30 percent in unit energy consumption over three years seems implausible, despite the rapid growth of computer manufacture and other activities with low unit energy consumption. Rapid growth of energy efficiency is not a hallmark of China's economy: in 1997/98, for example, the efficiency of energy conversion in producing thermal electricity, coke, and refined oil products all declined, and the "total efficiency of energy conversion" was no better than the average for 1983/84."³

5. Dual Track

An essential element of the first stage of Chinese reform is described as dual track. The essential idea is to combine two tracks: the plan track and the market track in all activities. Reform first started in agriculture, with the Household Responsibility System, and focused on the countryside until 1984. Since then it has been extended to the cities. In addition, there has been an increasing amount of innovation in terms of organizational forms. Chinese reform has the character of experiment: the slogan is *moshitou guohe* ("crossing the river by stepping from stone to stone"), although this may exaggerate how much was understood at the beginning [6.]

The essential idea of dual track is to liberalize at the margin. In agriculture, for example, peasants were initially allowed to lease (for 15 years) land, and were allowed to sell above plan-outputs. At first the state quota was maintained, so that any sales would reflect *additional* production.⁴ Over time, the share governed by the quota decreased. By 1993 only 5% of their production was set by the state plan. A similar process occurred in industry, where quotas went from over 90% of output in 1978 to less than 5% in 1993.

³And do not forget the Chinese fish story.

⁴This is reminiscent of the Law on the State Enterprise and *gosakhazy*. The only difference is that in the Soviet case the share of output subject to state orders *increased* over time!

5.0.2. *Dual Track Ownership*

The most important aspect of the dual track is the reform of ownership structure. Alongside the state sector, a new set of organizations have developed: private enterprises, joint ventures, and TVE's. The latter began as a result of the reform in agriculture which released excess labor. Local governments had to approve the formation of a TVE, and once approved, they faced a lower tax rate than private enterprises.⁵

In 1980 the value of industrial output produced in the non-state sector was about 24% of total industrial output. By 1986 the share was 37%, and by 1992 it was 52%. In terms of employment the shares were initially much higher (81%) and have continued so. State budget revenue from the non-state sector has doubled as a share of total state revenue over this same time period. The share of output produced by TVE's went from 9% in 1978 to 36% in 1993. They grew fast and seem to be very productive (no labor hoarding).

TVE's come in three types:

- "*wearing the red cap*": these enterprises are actually private, but register as TVE to avoid discrimination. This is less important since 1992 when regulations against private ownership were relaxed.
- *Zhejiang* model: TVE's have a financial commitment to the local government, but autonomy over decision making. The town may be a shareholder, but it does not interfere in decisions.
- *Jiangsu* model: involves tight control over the enterprise. This is popular with authorities because it seems closer to socialism.

TVE's differ from SOE's if for no other reason than this is *localized* socialism rather than centralized socialism. Even in this case then the chain of supervision is lower; the principal-agent problems with hierarchy (the McAfee-McMillan problem) is reduced. More important, perhaps, is the fact that TVE's face hard-budget constraints. TVE's are the

⁵The cooperatives movement in Russia is again familiar. The key difference is that government officials did not protect these organizations, but taxed them heavily.

responsibility of the local government, but local governments cannot print money. This greatly alters incentives. It also provides the local government with an interest in the survival of the enterprises. TVE's can also experiment more in terms of organization because there is no need for central approval.

Qian and Roland argue the TVE's have harder budget constraints than SOE's. One reason may be simply size. Much less likely to exhibit the "too-big-to fail" characteristic.

Essentially, TVE's are closer to the market than SOE's. The latter are still important, but not as a source of growth.

5.1. *More on TVEs*

TVE's mix private entrepreneurship with public ownership. They have nonetheless managed to achieve rates of success that would be welcomed in other transition economies. The key seems to have been the innovative way in which managerial control has developed without the accompaniment of the rule of law. This adaptation has taken the form of the creation of a local market for management control as a solution to the principal-agent problem, where the principal is, in this case, local government.⁶

In China, where the differential rights of managers and owners remains ambiguous, the TVE has provided an institution within which this ambiguity can become a source of competitive advantage. Entrepreneurs/managers negotiate a contract with the relevant public officials that may contain both implicit and explicit conditions. Managers can gain a great deal of flexibility in such contracts, while the relevant public officials secure for their local government (or for themselves) fixed claims to a portion of the enterprise cash flow and other agreed upon benefits in non cash form. The key point is that this system seems to create an interest on behalf of local officials to expand capitalism, since arrangements with TVEs become increasingly important to the local economy (and sometimes to meeting the personal needs of the officials).

⁶The local market for management control, created in the town-village case, is epitomized both by a high degree of illiquidity and the fact that ownership is not for sale. The private transactions that determine management contracts leaves a great deal of latitude in the hands of the owners, in this case local governments, about whether, when, and under what conditions to alter management. Ownership itself remains uncontested.

In the TVE, public officials have a greater incentive to take seriously their role as a contracting agent (playing the role of owners) in negotiating conditions with the top level managers of TVEs. The separation of ownership and management, in this context, creates an environment that fosters greater focus on generating cash flows than is the case in state owned enterprises (SOEs). The managers have to satisfy residual claims on the firms' cash flow and are subject to much harder budget constraints than SOE managers. Thus, unlike the conditions under which SOE managers operate, the managers of the TVEs have every incentive to cost minimize, including stricter oversight of the firm's existing assets, and to maximize the net present value of assets acquired during the management's tenure.

5.2. *Theory: Dual-Track Liberalization*

The intuition behind the dual track is straightforward. By liberalizing at the margin, the system increases efficiency without creating losers. The idea is that existing rents are maintained under the original plan, while allocation is improved by opening markets on the margin. This reduces opposition to reform.

Why does dual track work whereas partial reform fails? The key to dual track is enforcement of the state quota. If quotas are strictly enforced,⁷ then liberalization at the margin does not lead to diversion of inputs. Producers only sell excess output if the price exceeds the marginal cost of above-plan production. Hence, consumer surpluses in the production sectors are not reduced. If state quotas were not enforced, however, we would be exactly in the diversion case.

Dual-track reforms can be Pareto improving if: a) all markets are open, and; b) the state has the capacity to fully enforce the plan. This is the argument of 5. They show that a dual-track reform is efficient (as would be a Big Bang), but also Pareto-improving, because the initial plan is maintained, and trade occurs only at the margin.

To see this, we first examine the case where there is efficient supply and rationing. Suppose that the current plan target, $Q^P < Q^E$, the market clearing level of output. Further suppose

⁷Something which is feasible if the power of the Communist party is not reduced.

that the plan price, $P^P < P^E$, the market clearing price. Efficient supply means that planned supplies are delivered by producers with the lowest marginal cost, and efficient rationing means that the planned quota is delivered to buyers with the highest willingness to pay. We have the situation in figure 10. If we start with $P^P < P^E$ then introduction of the dual track means that producers supply Q^P according to plan quotas. The additional amount, $Q^E - Q^P$ is supplied by the market track.

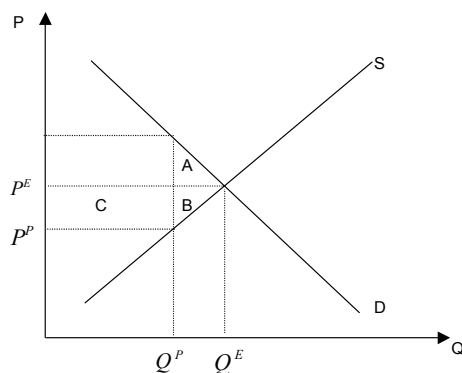


Figure 10: Dual Track Under Efficient Rationing and Supply

We can compare the operation of the dual track to complete liberalization using figure 10. The area A is captured by consumers if markets were fully liberalized, as well as under the dual track. But the area C would be transferred from consumers to producers under complete liberalization. In the dual track, however, area C remains with consumers. Area B goes to producers in either case. Now suppose that $C > A$. Then under liberalization there must be compensation for everyone to be made better off, but under dual track no compensation is needed. This is because the price of quota-supplied output is unchanged. The same result will hold true in the case of $P^P > P^E$; in that case, it is the producers rents that are saved.

We talk about conditions for this to work below (see section 5.2.2.).

We can see that over time the share of economic activity under the quota has declined. The market track has grown relative to the planned track.

| Table 3. Dual Track Market Liberalization | | |
|---|--------|--------|
| Grain (million tons) | | |
| | 1978 | 1988 |
| State procurement at plan price | 47.8 | 50.5 |
| State procurement at market price | near 0 | 43.8 |
| Total domestic production | 304.8 | 394.1 |
| Steel (million tons) | | |
| | 1981 | 1990 |
| Plan quota | 13.91 | 15.58 |
| Domestic production | 26.70 | 51.53 |
| Plan/production | 0.52 | 0.30 |
| Labor (million) | | |
| | 1978 | 1994 |
| State permanent employees | 74.51 | 83.61 |
| State contract employees | 0 | 28.53 |
| Non-state employees | 48.9 | 204.85 |
| State permanent/total | 0.60 | 0.26 |

Source: Lau, Qian, and Roland (2000).

Figure 11:

5.2.1. Model

Let $v = (v_1, \dots, v_m)$ be the national production plan, and let $c = (c_1, \dots, c_n)$ be the national consumption plan. Plan prices are denoted by $q = (q_1, \dots, q_l)$ with q_l normalized to unity. Each producer produces exactly v_i with planned profit (loss) $\pi_i = qv_i$, which is allocated to each consumer in the fixed proportion θ_{ij} . The producer's production set $y_i \in Y_i$ is the feasibility condition for production. Of course under central planning $v_i = y_i$. An economy under central planning is thus characterized by (v, c, q, θ) . We assume the plan is feasible;⁸ hence (among other conditions), $\sum_i v_i = \sum_j c_j$.

A Big Bang eliminates the central plan and frees prices. All markets instantaneously open. Producers are free to maximize profits.

A dual-track reform (not exactly China's, but similar) retains the central plan in the sense that the obligations of producers to produce and deliver are maintained, and these must take

⁸This is, of course, a very big assumption, and one that is unlikely to be satisfied.

place at prices q . But markets are also opened and producers are free to buy and sell at market prices, p , as long as they fulfill their plan obligations. Producers are free to retain all incremental profits.

Let s_i and t_i be gross sales and purchases respectively. Then under the dual track the maximized profit of the producer is given by:

$$\pi_i = \max\{qv_i + ps_i - pt_i | y_i \in Y_i, v_i + s_i = y_i + t_i\} \quad (4)$$

i.e., planned deliveries of goods plus sales to the market must equal production plus purchases.

Now $s_i - t_i = y_i - v_i$. Using this in (4) implies:

$$\pi_i = \max\{qv_i + p(y_i - v_i) | y_i \in Y_i\} = \max\{py_i | y_i \in Y_i\} - (p - q)v_i \quad (5)$$

Note that v_i, p , and q are given to the producer, so whatever maximizes $\{py_i | y_i \in Y_i\}$ unconstrained, also maximizes profit under the quota fulfillment constraints. This implies that the behavior of the producers is identical under the big bang and dual-track reforms. The only difference is in the trading behavior. The reason is clear; the dual-track only affects decisions at the margin, but this is what affects producers in the big bang as well. If production is less than deliveries in the *DT* equilibrium, then there will be net purchases. In the opposite case there will be net sales. Essentially the sales and purchases allow the producers to undo the quotas.⁹

If quotas can be undone by trades, what effect do they have? The key point is that they affect the distribution of income. The pre-reform profits can still be distributed according to the old rules, since planned deliveries still take place. Distribution of the incremental profits are independent of distribution of the initial profits.

Thus we have:

Proposition 1 *The strategy of dual-track liberalization is Pareto-improving.*

⁹In fact, the producers need not produce at all. They can deliver to their customers an amount of revenue equal to what the plan delivery costs at market prices, and the customer can buy it himself. Hence, it could be that not all producers produce what they are supposed to. The question arises, if the planners enforce *physical* fulfillment of the quotas will the *DT* equilibrium exist. The answer turns out to be yes.

The "proof" is by construction. If we start with feasibility, then the *DT* equilibrium cannot make individuals worse off. The reason is that the equilibrium differs from the central plan only due to decisions voluntarily made on the margin. They could always just stick with the plan.

Of course the Big Bang also leads to an efficient equilibrium, but the change is not Pareto-improving, unless a system of taxes and transfers can be created to compensate losers. The difficulty with the latter is what makes the BB an unpopular program. This problem does not exist with *DT*, because the initial distribution of pre-plan profits serves as the system of lump-sum transfers. It is built in with no extra costs. Of course, we can see why initial feasibility is key. The *DT* strategy uses the information contained in the initial plan; if this is not feasible, then these transfers do not suffice.

Notice that the *DT* is an effective means of transforming the system. But it does not deal directly with institutional innovation (shrinking the state sector).

5.2.2. *Conditions*

The key to the *DT* is enforcement of quotas. Without this, we get supply diversion as analyzed before. Requires credible and strong government. Else, agents will not fulfill the plan. Maybe much harder to achieve in a democracy than in a Communist government.

Moreover, there is an implicit assumption that the government will commit to leaving the incremental behavior alone. If, instead, it uses revealed information to change plan targets then agents will dissimulate as before. This is what happened with the LSE under Gorbachev.

What happens when the planned price is above the market price for low-quality consumer goods? You cannot force the consumers to actually buy the stuff. But then what happens to the rents to the producers? How does this affect opening the economy?

6. Tale of Two Reforms

Li analyzes the differences between the Chinese and EEFSU as a tale of two reforms. He compares a Big Bank with the dual track. He points out that in the STE bilateral monopoly is

controlled by centralized planning. Big Bang gives pricing authority to bilateral monopolists, during the period before entry can take place. The key insight is that big bang involves a switch from an integrated monopoly to a vertical chain with attendant double marginalization. Dual Track on the other hand, keeps plan output fixed, so it only liberalizes on the margin. This induces a rise in output rather than a fall.

Consider simple model with representative consumer who chooses labor and leisure and consumes to maximize utility $U(D, H - L)$ subject to the budget constraint $p_0D + H - L = H$, where the shadow wage rate is the numeraire, and p_0 is the shadow price of the good. Consumer demand is thus $D(p_0)$ and labor supply is $L(p_0) = p_0D(p_0)$. Total production of the single final good is $X_0 = D_0 + G$, where G is planners demand.

Think of the shadow price, p_0 , as that which solved $D(p_0) = D^*$, where the latter is the allocation. Of course the actual price may be lower leading to shortage, P_0 . The difference, $p_0 - P_0$, is the implicit price of a ration coupon or time wasted queuing. Suppose that the shortage rent is captured by the planners.

Labor is the only primary factor of production. Resources and capital are intermediate inputs owned by the planners. Planners cannot control L , however. Effective labor is purchased based on the price of goods, p_0 . So there is a tradeoff between D and G .

The economy uses a roundabout production technology. There are two intermediate product enterprises and one final product enterprise, each producing a single good. Each intermediate good is produced with a decreasing average cost technology: there is a fixed requirement of F_i units of labor ($i = 1, 2$) and each additional unit of X_i requires l_i units of labor and a_{ji} units of intermediate good $j \neq i$. The final good is produced with a constant-returns-to-scale technology: each unit of X_0 requires l_0 units of labor, a_{10} units of the first intermediate good and a_{20} units of the second intermediate good.¹⁰

Material balance in production requires:

$$X_1 = a_{12}X_2 + a_{10}X_0 \text{ and } X_2 = a_{21}X_1 + a_{20}X_0 \quad (6)$$

¹⁰This specification captures the observation that the production of intermediate inputs or heavy industrial products generally has higher capital, technological, managerial, and informational requirements and hence relatively higher overhead costs than the production of consumer products.

We can then solve for the derived demands for the intermediate goods:

$$X_1 = \left[\frac{a_{10} + a_{12}a_{20}}{1 - a_{12}a_{21}} \right] X_0 \equiv A_1 X_0 \quad (7)$$

$$X_2 = \left[\frac{a_{20} + a_{21}a_{10}}{1 - a_{12}a_{21}} \right] X_0 \equiv A_2 X_0 \quad (8)$$

where the A_i is the final good industry's total unit requirements for intermediate good i .¹¹

Labor requirements must also satisfy a material balance condition:

$$L(p_0) = l_0 X_0 + l_1 X_1 + l_2 X_2 + F_1 + F_2 \quad (9)$$

Now if we use (7), (8), $L(p_0) = p_0 D(p_0)$, and $X_0 = D_0 + G$ in (9), we obtain:

$$c_0^* G = (p_0 - c_0^*) D(p_0) - F_1 - F_2 \quad (10)$$

where $c_0^* = l_0 + l_1 A_1 + l_2 A_2$, which can be thought of as the marginal cost the planner faces.

Notice that the RHS of (10) is integrated monopoly profits; denote the RHS as $S(p_0)$. Then

$$S(p_0) = L(p_0) - c_0^* D(p_0) - F_1 - F_2 \quad (11)$$

which is the aggregate labor surplus – that above the requirements to produce for the consumer. Planners' consumption is thus financed by the surplus that is extracted from the consumer.

Notice that we could also re-write (10) as

$$G = \frac{(p_0 - c_0^*) D(p_0) - F_1 - F_2}{c_0^*} \quad (12)$$

as the economy's production possibility locus, which yields the maximum G and D given technology and institutions.

6.1. Centralized Equilibrium

In the centralized equilibrium the planner's action maximizes G . Extracting surplus is akin to taxing the consumer (suppose there is no tax on leisure). Then the planner will equate

¹¹ Feasibility requires that $1 - a_{12}a_{21} > 0$.

the marginal increase in labor supply to the marginal cost, or $\frac{\partial L}{\partial D^s} = c_0^*$. Alternatively, notice from (12) that to maximize G is equivalent to choosing p_0 to maximize $(p_0 - c_0^*)D(p_0)$. Hence, we obtain $\frac{p_0^s - c_0^*}{p_0^s} = -\frac{1}{\varepsilon}$ where $\varepsilon \equiv \frac{D'(p_0^s)p_0^s}{D(p_0^s)}$ is the elasticity of demand. The markup is just the implicit tax on consumption. Equilibrium output levels of the intermediate goods are given by $X_i^s = A_i(G^s + D^s)$ for each intermediate good i .

The key point about this equilibrium is that the planner wants to keep an integrated monopoly to maximize the surplus.

6.2. Transition Under Big Bang

The transition under BB is thought of as liberalization with autonomous enterprises but no restructuring. So technology is unchanged. Each intermediate good is produced by a monopoly, but the consumer good industry is competitive. There is no formal tax system; the government relies on enterprise profits, which are all taxed away.¹² Call these Π . A hard budget constraint thus implies that $p_0G = \Pi$.

In this decentralized economy, actions taken by the consumer and individual enterprises determine the allocation of resources. The behavior of the consumer remains valid except that p_0 should now be interpreted as the market price of the final good. The behavior of the decentralized enterprises is modeled below as a two stage price game: the intermediate enterprises simultaneously and independently name intermediate prices p_1 and p_2 , and then perfect competition in the final good market forces p_0 to equal marginal cost. Each enterprise produces output to meet its demand at the equilibrium prices.

In figure 12 we compare the two equilibria. The production loci in figure 12 show the tradeoff between government output and output distributed to consumers. When D is small labor supply is low so an increase in D increases the amount available to the government. But after some point, further increases in D take away from what is left as labor is fully supplied.¹³ Clearly, the optimum for the planners is to be at the peak of the loci. In the STE this is at

¹²Assume that a lump sum tax is set just below the enterprise's monopoly profits, leaving each enterprise with an arbitrarily small after-tax profits.

¹³You can also think of these loci as *Laffer* curves, since what the government retains is similar to taxes.

CE. What happens in a big bang reform? Intermediate producers now have monopoly power,

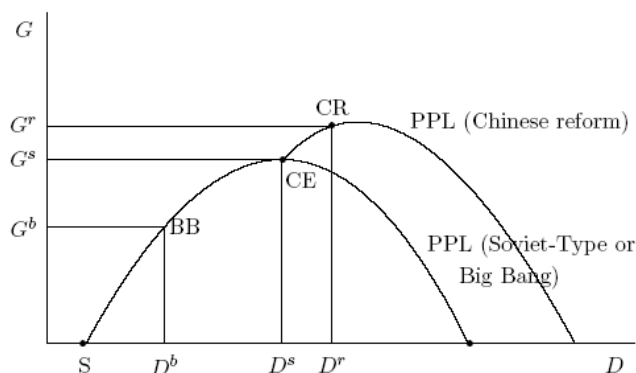


Figure 12: Production Possibilities in STE's and Transition Economies

so they raise prices. This raises the cost of producing final output. So there is less final output available, labor supply falls as does government output. The reason is that the enterprises do not consider the consequences of their price increases on the profits of the other enterprises. Since there is less left over for consumers, it is equivalent to a decrease in real wages, and hence labor supply falls.

The dual-track equilibrium is shown in figure 12 at point *CR*. Notice that output is higher. This is because under the dual track there is more output available for consumption, so more labor is supplied. Why is this the case? The dual track forces the enterprises to supply the plan levels as before, so there is no pecuniary externality as under Big Bang. But above plan levels can be sold at market prices. This must add to output, so the equilibrium must be to the northeast of point *CE*.

The equilibrium under the dual track for the firms is illustrated in figure 13. The enterprise produces its quota output at Q_i . Above-quota output is sold at the market-clearing price p_i^r , and it earns monopoly profits on the additional sales. Since the additional sales do not lower the planned price on its quota output, the enterprise has an incentive to produce beyond the quota. This means that the reform raises output in every enterprise. Hence, the equilibrium market price of final output must be smaller than the shadow price under central planning (since there is higher output), implying that the reform raises the real wage. And since each

6.3. Prerequisites for Successful Implementation

One key for dual track reform is that the quotas be strictly enforced. Without this there is no Pareto improvement. Suppose that no quotas are enforced. Then as market prices exceed plan prices every enterprise has an incentive to produce only for the market – it is the case of supply diversion. But if every enterprise does that we get the Big Bang equilibrium, which we know is not a Pareto improvement. To implement Chinese-style reform successfully it is therefore necessary to enforce quotas. A communist party still in power may help.

Another important consideration is the opportunity for corruption that is presented by the dual track. Goods are being sold at two different prices. So there are arbitrage possibilities available to government officials. Corrupt officials may enrich themselves by diverting plan resources under their control to the market. This kind of corruption will undermine the efficiency of the dual track. It probably also reduces support for reform in general.

7. China versus EEFSU

How similar are the reform problems of China and the EEFSU? China started its reform with a primarily rural economy, whereas in EEFSU industry predominated. China began reforms (1978) with 71% of employment in agriculture and 15% in industry. By comparison, Russia had only 14% of employment in agriculture in 1985, whereas 32% of employment was in industry.¹⁴

Moreover, the state sector had much deeper roots in the EEFSU than in China. Chinese state enterprises accounted for 18.6% of employment in 1978, whereas collective agriculture accounted for 72.0% of employment; by 1991 these figures were 18.3% and 63.9% respectively. Compare this with 93.1% versus 6.0% in Russia in 1985.¹⁵ The impact of this difference is manifested in the social welfare systems in the two countries. In Chinese agriculture there was relatively little social support, and a large amount of unemployment. Most social welfare

¹⁴This understates the difference, in fact, because agriculture in the SU was essentially state industry (*sovkhozy* and *kolkhozy* were wage-laborers by the 70's) whereas Chinese peasants were outside the socialist sector once the communes were disbanded.

¹⁵Recall that some of Russian agriculture was organized in *sovkhoz* which is the state sector.

applied to urban workers. Soviet-type economies, on the other hand, aspired to universal welfare systems. The greater amount of social protection in the EEFSU inhibits flows out of the state sector in these economies, compared with China where self-interest motivates workers to leave agriculture.

When reform began in China 80% of the labor force was outside the state sector. In the EEFSU practically the entire labor force was in the state sector. This is an important difference. The effectiveness of the dual-track approach may depend on the relative size of the state sector. A large state sector can leave little room for the new sectors that compete for resources.¹⁶ The larger state sector in the EEFSU meant that a greater sense of entitlement was present. This may make it harder to cut subsidies, but the size of the sector may make it necessary to do so. Moreover, in China the new sectors could expand with labor released from the agricultural sector.¹⁷ In the EEFSU, however, labor had to come from the protected state sector. Hence, the resource flow may be very different.

The reform problem in the EEFSU was structural adjustment, whereas in China it was normal economic development; transferring resources from low to high productivity sectors. The latter is Pareto-improving, the former is not.

This is important because the state sector is heavily subsidized at the onset of reforms. This means that shifts from the state sector to the private sector may not be Pareto-improving. The reason is that workers in the state sector are subsidized. Even if labor is more productively used in the private sector, workers may remain in the state sector if the wage-cum subsidy is high enough. Consequently, they may be reluctant to leave for the private sector, even if the pre-tax rate of return is higher in the latter. The problem is the difference between social and private rates of return.¹⁸

¹⁶It is interesting to note, in this regard, that per-capita income has grown most rapidly in coastal regions which were not traditional areas of heavy industry. In Liaoning and Heliongjiang, two traditional heavy industry regions, heavy industry was over 80% of total industrial output in 1982. In Jiangsu, Zhjiang, and Guangdong these percentages were less than 41%. The latter regions, of course, grew faster; Guangdong grew at 157% of the national average (Zhejiang at 165%) ompared to 80 and 57 for Liaoning and Heliongjiang, respectively.

¹⁷Indeed, the state sector has expanded employment throughout the period of the dual-track, from 78.8 million in 1978 to 106.6 million in 1991, while the share of the total labor force employed in the state sector has remained constant.

¹⁸Berliner describes the difference between reform under Gorbachev and that of China: "The Chinese

Note that this argument applies as well to other resources, notably capital. If capital is subsidized in the state sector it will not flow to the private sector, even if the net rate of return is higher.

7.0.1. A Simple Model

We consider a simple model (Sachs and Woo) that illustrates the problem. There are three sectors in the economy, agriculture, the new private sector, and the state sector. Let L_i be employment in sector i ($i = a, n, s$), and let output be given by

$$Q_i = \theta_i L_i. \quad (13)$$

We have total labor distributed in these sectors:

$$L = L_a + L_n + L_s \quad (14)$$

and let $\lambda_i = \frac{L_i}{L}$. Prior to transition $\lambda_n = 0$. Productivity is highest in the new private sector, followed by the state sector and agriculture, and assume that marginal products are constant: $\theta_a < \theta_s < \theta_n$. To eliminate the need to consider demand we assume that relative prices are given by world prices, and that they can be normalized to unity.

Labor markets are segmented, so labor flows are caused by differences in real wages, net of taxes. Let the wage in the state sector be given by $w_s = \theta_s + \sigma$, where σ is the wage subsidy to workers in state industry.¹⁹ Total subsidies are then given by $S = \sigma L_s$, which must be financed by taxation. Suppose that taxes are levied equally on all types of labor. Then, $\tau L = S$, which implies that $\tau = \sigma \lambda_s$. In the other sectors the wage is given by $w_i = \theta_i - \tau$. Thus all workers bear the cost of the subsidies to industrial workers. In practice this may work through the inflation tax, at least to some extent.

transformatio began with millions of peasants and others virtually beating at the gates of government to dismantle the restraints of the past and to let them work and thrive. When the gates were let down, they rushed in, and produced that remarkable surge of output. Soviet farmers, however, were not beating at the gates for an end to collective farming, and state enterprise managers were exceedingly chary of radical reform. It was only in the cooperatives and other independent enterprises that one found the kind of economic initiative that burst forth all over China and launched the rise of output (cited in 8, 121)."

¹⁹More generally, we can consider this the subsidy to the state sector, and the resource need not be labor.

Social welfare is clearly maximized when $\lambda_n = 1$. But given subsidies it may be difficult to achieve this. Suppose that $\theta_n - \theta_s < \sigma$. Then disposable income in the state sector will be higher than in the private sector:

$$w_s = \theta_s + \sigma - \tau > w_n = \theta_n - \tau > w_a = \theta_a - \tau. \quad (15)$$

Thus workers in the state sector are unwilling to voluntarily leave despite the higher productivity of jobs in that sector.

If the state sector is large, as in the EEFSU, it is likely that we have

$$\frac{\theta_n - \theta_s}{1 - \lambda_s} > \sigma$$

which implies that

$$\theta_n > \theta_s + \sigma(1 - \lambda_s) > \theta_n - \sigma\lambda_s \quad (16)$$

where the last inequality in (16) follows from the fact that $\theta_n - \theta_s < \sigma$. Now we note that $\theta_s + \sigma(1 - \lambda_s) = \theta_s + \sigma - \tau$, since $\sigma\lambda_s = \tau$. Hence, it follows that:

$$\theta_n > \theta_s + \sigma - \tau > \theta_n - \tau. \quad (17)$$

where the last inequality is a direct result from (15). The point of (17) is that state workers would be better off if the subsidy scheme were eliminated, but they nonetheless refuse to leave the state sector.

Notice that small cuts in σ are unlikely to reverse the inequality in (17), while larger cuts may. This suggests that gradual reform may fail where more radical reform would succeed. The problem is that a small cut in subsidies may not reverse the differential in disposable incomes. Of course, it does benefit those in private sector employment, but not enough to attract state workers. Moreover, the workers that remain in the state sector are worse off, and this could cause unrest.

8. Institutional Innovation

China has evolved a set of transitional institutions that seem unique. One important aspect is decentralization or devolution. Another is trial and error.

These institutions work because they achieve two objectives at the same time:

- they improve economic efficiency on the one hand,
- and make the reform a win-win game and interest compatible for those in power on the other.

And they take into consideration of China's specific initial conditions. At one level, one could argue that China's transitional institutions merely unleashed the standard forces of incentives, hard budget constraints, and competition. This is true, but such an economic rationale is not enough. The transitional institutions are not created solely for increasing the size of a pie, they are also created to reflect the distributional concerns of how the enlarged pie is divided and the political concerns of how the interests of those in power are served. Rudimentary political logic readily predicts the existence of inefficiency, but it has difficulties in explaining why inefficient institutions are replaced by more efficient ones. Indeed, North has argued that in many systems they will not.

One lesson that is clear is that Chinese reforms have depended on growth in the new sectors of the economy. This begs the question of why the private (or the TVE's) sector thrive in China but are relatively repressed in the FSU? Are there explanations?

These models all derive from a view of the predatory state. They try to explain why China suffers less from this than EEFSU. An important factor is the importance of local governments. Fiscal redistribution in China is small, so local governments are dependent on local economic conditions. In Russia, on the other hand, there is huge bargaining between individual regions and the center over tax revenue. These two structures imply different incentives concerning the attitude towards new private industry.

But the question is why has federalism had such different impacts? One explanation is the strength of the party in China. This is the B-S theory.

8.1. *Taxation and Decentralization*

An important difference between China and the EEFSU is the importance of decentralized government in the former. It is increasingly recognized that the role of local governments in China fosters institutional experimentation to a degree unseen in the EEFSU. This has various guises. In some models this is due to the inheritance of a more decentralized economy; in China planning was more decentralized, and local autonomy a characteristic that preceded reform. Others point to the nature of the tax system, and importantly, to the revenue assignment.

Gordon and Li For example Gordon and Li ² argue that in China local government revenue comes predominantly from new entrants while in the EEFSU tax revenue comes primarily from the old state sector. Chinese officials thus have an incentive to encourage the development of new firms, while officials in the EEFSU have the opposite incentive. Dependence on the (former) state sector for revenue provides an incentive to favor that sector over the new private sector. This hinders development.

In China, on the other hand, the local governments depend on local development. They receive taxes based on the revenue produced, after a fixed payment to the center. This provides strong incentives to favor the new private sector.

There are two questions to ask. First, why is this the revenue assignment in China different from that in EEFSU? Second, how is the center able to credibly commit to leave the revenues from development to the local governments?

Berkowitz and Li Berkowitz and Li argue that governments have a choice between being a helping hand and a grabbing hand. The difference depends on the specificity of taxation rights. When these rights are ill-defined, as in Russia, a "tragedy of the commons" type result arises. When many agencies can tap into the same reservoir of revenue there is a race to raise tax rates. Agencies ignore the external effect of their actions on other agencies, and the tax base shrinks. When rights are well-defined, on the other hand, tax authorities set lower rates. This leads to a helping hand.

Berkowitz and Li focus on the investment decisions of enterprises. They can invest in an IRS technique that is visible to the tax authorities or in a CRS technique (IPS activities) that are not visible, but less productive. The IRS technique requires a sunk investment. Tax collection goes to public goods provision which is beneficial only to the IRS technique. Local governments cannot commit to tax policies. The game involves the enterprises (industries) choosing what techniques to invest in and the agencies choosing how much to tax. When taxation is uncoordinated, too many enter and a tragedy of the commons arises. If taxes are coordinated then the external effect is internalized. If enough invest in the IRS technique, there is an equilibrium with low tax rates and high performance.

This is also an interesting approach, but it also depends on the initial condition that China has more specified tax rights than Russia. Is this due to structure or politics?

Che and Qian Notice that there is a complementarity between local public goods and local revenue. If an enterprise hides revenues from a predatory central government it will not feel the effects; at least not directly. Concealment from local governments may directly impinge on local public goods provision, and this may directly hamper the return to investment.

Che and Qian take this further and argue that local government ownership is actually superior to private ownership under incomplete property rights. Their argument is that private ownership may lead to excessive revenue hiding, while state ownership leads to low production (but low revenue hiding). Local ownership leads to less hiding because the need to provide the local public goods internalizes the cost of revenue hiding.

In this theory the TVE involves integration of local government and business. It is an organizational adaptation to the environment of predation. By integrating state and business functions the TVE internalizes the cost of revenue concealment. Notice that this form of government ownership is not a response to market failure, but rather to "state failure."

The problem in the model is the inability of the state to credibly commit to a tax policy. This prevents the first-best, which would have private ownership with no hiding. Local ownership is the second-best in this world because it leads to more activity and more revenue

for the state. With private ownership, state revenues and local revenues are very low. With local government ownership state revenues are higher than with state ownership because: a) there is more production due to greater efficiency, and; b) not all is hidden because of the complementarity with public goods.

The key assumption here is the local public goods are productive. Hence, the integration of local ownership and public goods provision is productive. In the first-best world the local government could tax private owners and provide the public goods, raising total production. But in this world, the private firms hide the revenue. They point to the comparison of Wenzhou (Zhejiang province), where there is lots of private ownership, and Wuxi (in Jiangsu province) where there are lots of TVE's. The former has poor roads and communications, poor sewage, etc.; little change since the mid-80's, except for the proliferation of extra apartments built by prosperous individuals. The opposite in Wuxi; here there are very good roads, bridges, and good communications.

Two conditions seem critical for this to work. First, local authorities have full authority to integrate government and business activities together. This is critical to get the complementarity, but it may not exist elsewhere. Second, extreme fiscal decentralization with little re-distribution. This creates the incentive effect. This is often quite rare.

8.1.1. Diversification and Fiscal Federalism

One explanation is that China is much more industrially diversified than Russia. The latter is more specialized. Indeed, Young 10 has argued that during the reform period China has become even more specialized than before. Russia is extremely industrially specialized, if you look by region.

Now suppose we are designing the sharing rules of a federal state prior to transition. We know there will be shocks to various industries, though we may not know which industries will suffer relatively. Some insurance will be optimal. But the degree of insurance will depend on the degree of specialization. If each region is completely diversified then shocks will treat all regions the same and inter-regional transfers serve no purpose. If regions are highly specialized

then shocks will impact regions differentially, so consumption will vary and inter-regional transfers will be valuable.

Now we know that fiscal transfers weaken incentives. So there is a trade-off between the insurance and incentive effects of fiscal transfers. Hence, if regions are specialized regionally we would expect more fiscal redistribution than in a homogeneous distribution. So it is natural to expect more fiscal transfers in Russia than in China.

9. In Lieu of Conclusions

The real issue for China now is what happens to the state sector. This is still important because dual track has not caused a decline in the size of this sector.

Some studies 3, 4 have argued that productivity in the state sector has improved subsequent to reforms. Although not as productive as TVE's there has been some improvement. But Woo has argued that these studies are flawed due to the use of an incorrect price deflator which overstates the growth of value added in the state sector. What we do know is that most SOE's still lose money and that most of the money-losing enterprises in China are in the state sector.²⁰ This has important consequences because of the large non-performing loans held by banks. Some estimates put these as high as 30% of GDP. This means that state sector performance may cause a severe banking crisis.

It is the potential banking crisis that has prompted the leadership to serious economic reform. There is no talk of serious privatization in that sector. It will be interesting to see how this works out. What we do know is that the dual-track reforms to date have created a better environment for this phase of reform than what existed in the mid-80's.

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²⁰Rawski has argued that this is because SOE's still provide social services that TVE's and private firms do not, and thus that the losses are due to extra burdens, not inefficiency. But there is little evidence here on this.

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