

# Reform without Losers: An Interpretation of China's Dual-Track Approach to Transition

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This paper develops a simple model to analyze the dual-track approach to market liberalization as a mechanism for implementing efficient Pareto-improving economic reform, that is, reform achieving efficiency without creating losers. The approach, based on the continued enforcement of the existing plan while simultaneously liberalizing the market, can be understood as a method for making implicit lump-sum transfers to compensate potential losers of the reform. The model highlights the critical roles of enforcement of the plan for achieving Pareto improvement and full liberalization of the market track for achieving efficiency. We examine how the dual-track approach has worked in product and labor market liberalization in China.

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## I. Introduction

Efficiency-enhancing economic reform should potentially allow winners to compensate losers, thereby making the reform Pareto-improving. However, in practice, it seems very difficult to find mechanisms that make economic reform Pareto-improving, and even more difficult for reform to be simultaneously Pareto-improving and efficient, because of distortionary costs of compensation or the lack of credibility of its implementation. We demonstrate in this paper that a simple mechanism of a "dual-track" approach, as used in China's economic reform, can serve to implement efficient Pareto-improving economic reform. The basic principle of the dual-track approach is as follows. Under the plan track, economic agents are assigned rights to and obligations for fixed quantities of goods at fixed plan prices as specified in the preexisting plan. In addition, a market track is introduced under which economic agents participate in the market at free-market prices, provided that they fulfill their obligations under the preexisting plan.

We distinguish two types of market liberalization in this context. We refer to it as "limited market liberalization" if market resales of plan-allocated goods and market purchases by planned suppliers for fulfilling plan-mandated delivery quotas are not permitted. Thus, under limited market liberalization, planned suppliers must physically produce all plan-mandated output deliveries and physically use all plan-allocated inputs themselves even though it might have been cheaper to sell the inputs on the market track and purchase the same output from the market track for redelivery. In contrast, we refer to it as "full market liberalization" if market resales and market purchases for redelivery are all allowed by a planned supplier or a rationed user, as long as its obligations under the plan are all fulfilled.

Within the conventional supply and demand framework, we analyze various distributional and efficiency aspects of the dual-track mechanism.<sup>1</sup> We show that, independently of the initial conditions concerning supply and demand, as long as the preexisting feasible plan continues to be enforced appropriately, the dual-track approach to market liberalization is always Pareto-improving. In addition, it also achieves efficiency under full market liberalization and other usual conditions such as profit maximization and perfect competition.

The idea that the dual-track approach can provide a concrete mechanism for the implementation of efficient Pareto-improving re-

<sup>1</sup> See Lau, Qian, and Roland (1997) for a general equilibrium analysis.

form is both simple and subtle. The introduction of the market track provides the opportunity for economic agents who participate in it to be better off, whereas the maintenance of the plan track provides implicit transfers to compensate potential losers from the market liberalization by protecting the status quo rents under the preexisting plan. Thus the dual-track approach is, by design, Pareto-improving. Moreover, as the compensatory transfers are inframarginal and thus lump-sum<sup>2</sup> in nature, the dual-track approach can be efficient too. One desirable feature of the dual-track approach is its minimal *additional* informational and institutional requirements: it utilizes the existing information contained in the original plan and enforces the plan through existing planning institutions. No new information and no new institutions are needed.

While the "single-track" (or "big-bang") full market liberalization will lead to efficiency under the usual conditions such as profit maximization and perfect competition, Pareto improvement cannot in general be assured. In contrast, the dual-track full market liberalization provides a useful way to implement a reform without creating losers while simultaneously achieving efficiency under the same conditions. In transition economies under both democratic and non-democratic systems, there is a need to buy off bureaucrats, government employees, workers, and consumers accustomed to receiving implicit subsidies and to prevent reform reversal being pushed by coalitions hurt by the reform. Because of its Pareto-improving property, the dual-track approach minimizes political opposition to reform *ex ante* and maximizes political opposition to reversal of reform *ex post*. Enforcement of the plan track is crucial for preserving the preexisting rents. Sufficient state enforcement power is needed here *not* to implement an unpopular reform, but to carry out a reform that creates no losers, only winners.

An implicit guiding principle underlying China's economic reform strategy since 1979 has been that reform should proceed without creating losers, and the dual-track approach has been a concrete mechanism to achieve that objective.<sup>3</sup> The agricultural market liber-

<sup>2</sup> The term "lump-sum transfers" as used here simply means that the transfers are independent of the actions of the individual economic agents. The values of such transfers may depend on market prices.

<sup>3</sup> The principle of reform without losers has been perceived as common wisdom in the Chinese economic reform literature. Although economists inside China (e.g., Wu and Zhao 1987; Zhang and Yi 1995; Lin, Cai, and Li 1996) and experts on the Chinese economy outside China (e.g., McMillan and Naughton 1992; Naughton 1995) have made informal discussions on the issue, they have not presented formal analysis and systematic evidence. The only exceptions are Sicular (1988) and Byrd (1991), who analyzed the dual-track pricing in China's agricultural and industrial reforms, respectively.

alization illustrates that the dual-track approach can be both Pareto-improving and efficient. The commune (and later the households) is assigned the responsibility to sell a fixed quantity of output to the state procurement agency as previously mandated under the plan at predetermined plan prices and to pay a fixed tax (often in kind) to the government. It also has the right (and obligation) to receive a fixed quantity of inputs, principally chemical fertilizers, from state-owned suppliers at predetermined plan prices. Subject to fulfilling these conditions, the commune is free to produce and sell whatever it considers profitable and retain any profit. Moreover, the commune can purchase from the market grain (or other) output for resale to the state in fulfillment of its responsibility. There is thus full market liberalization.

Beyond the Chinese experience, schemes involving various forms of "grandfathering" in the West resemble the dual-track approach. For example, the two-tier wage system with lower wages for newly hired personnel and higher wages for existing personnel has been used in some industries such as the U.S. airline industry. Discussions of pension reform involving the transition from "pay as you go" to funded pension schemes also feature similar considerations.

The rest of the paper is organized as follows. We present a theoretical analysis of the dual-track liberalization in Section II. In Section III, we discuss the conditions for the success of the dual-track approach. In Section IV, we examine to what extent these conditions were fulfilled in China and provide examples of its dual-track experience in product and labor markets. Section V presents concluding remarks.

## II. The Theoretical Analysis

In order to understand fully the dual-track mechanism, we consider a variety of possible market situations concerning demand and supply. Since the plan price and quantity are fixed by the state, they need bear no particular relationship to the market equilibrium price and quantity and can be either below or above the market price and quantity, respectively. The plan prices of most normal producer and consumer goods are likely to be below the market prices; however, the preexisting total compensation (wage plus housing, health, and pension benefits) of workers in state-owned enterprises (SOEs) under the plan may well be above the market wage rate. Similarly, while high-quality goods are often in short supply under the plan, the plan production of low-quality and unwanted goods may be greater than the total demand under full market liberalization. Furthermore, in general, there is no reason to assume that the planned output is

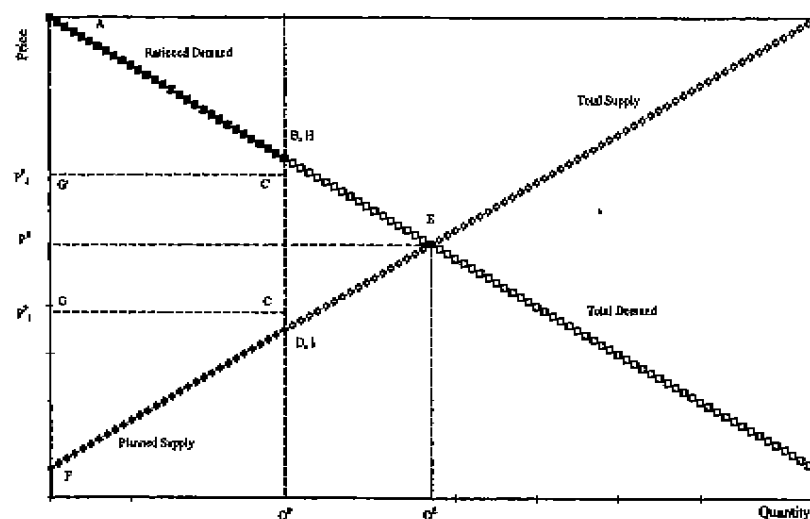


FIG. 1.—Efficient rationed demand and efficient planned supply

allocated to users with the highest willingness to pay (efficient rationing) or that the planned supply is delivered by suppliers with the lowest marginal costs (efficient planned supply). In what follows, we denote by  $P^M$  and  $P^E$  (respectively,  $Q^M$  and  $Q^E$ ) market equilibrium prices (quantities) under limited and full market liberalization. We use  $Q^P$  to denote plan quantity and  $P_i^P$  ( $i = 1, 2$ ) to denote possible plan prices, with  $P_1^P$  below  $P^E$  and  $P_2^P$  above  $P^E$ .

### A. The Plan Quantity Is Less than the Fully Liberalized Market Equilibrium Quantity

We begin with the special case of efficient rationing and efficient planned supply. Rationed demand and planned supply are therefore the top and bottom segments of the willingness to pay curve and the marginal cost curve, respectively (see fig. 1). Under the assumption of atomistic profit and utility maximization, the willingness to pay and marginal cost curves turn out to be precisely the market supply and demand curves. Dual-track liberalization means that  $Q^P$  continues to be delivered at plan price  $P_1^P$  but that any additional quantity can be sold freely in the market. The market track will thus provide an additional supply  $Q^E - Q^P$  at price  $P^E$ . The allocative outcome under dual-track liberalization is just as efficient as that under single-track liberalization. The difference between the two is entirely distributional.

Suppose first that the plan price is  $P_1^P$ , below  $P^E$ . Under the plan, the rationed users have a surplus given by the area bounded by  $ABCG$ ; the planned suppliers have a planned profit/loss equal to area  $GCDF$ . With the dual track, the surpluses of the rationed users and the planned suppliers remain exactly the same, by design. Compared to the outcome of the single-track liberalization, there is an implicit lump-sum transfer equal to  $(P^E - P_1^P)Q^P$  from the planned suppliers to the rationed users so that the latter and the former are both no worse off than before.<sup>4</sup> However, the new users and suppliers outside the plan are together better off by the area of the triangle  $BED$ . The analysis is similar if the plan price is  $P_2^P$ , above  $P^E$ .

Note that in this special case of efficient rationing and efficient planned supply the introduction of the market track achieves efficiency even under limited market liberalization. The reason is that the most deserving users and the most efficient suppliers are already under the plan track, and they would have been the first users and suppliers in a fully liberalized market in any case.

We next consider the general case in which  $Q^P$  is not necessarily allocated to users with the highest willingness to pay and some of the planned suppliers may have higher marginal costs than other potential suppliers. In figure 2, we represent the willingness to pay curve of the rationed users by a generic curve  $AH$  and the marginal cost curve of the planned supply by a generic curve  $FI$ .

In contrast to the special case above, the allocative outcome now depends on whether there is limited or full liberalization of the market track. Under limited liberalization, the plan track and the market track are completely segregated; therefore, in our partial equilibrium framework the market track consists of only the residual demand and supply, that is, total demand and supply reduced, respectively, by the rationed demand and planned supply. Their intersection represents the limited market liberalization equilibrium. While under limited liberalization the dual-track approach is Pareto-improving, it cannot in general achieve efficiency because one cannot rule out the possibility that a rationed user may have a willingness to pay below  $P^E$ , or a planned supplier may have its marginal cost above  $P^E$ . In fact, the following proposition shows that limited liberalization of the market track always leads to inefficiency in the form of overproduction relative to the fully liberalized market equilibrium.

<sup>4</sup> Note that in a general equilibrium framework, an equilibrium under a fully liberalized dual-track approach is generally not the same as that under a single-track approach because of differences in the distribution of income (see Lau et al. 1997). However, efficiency holds in either case.

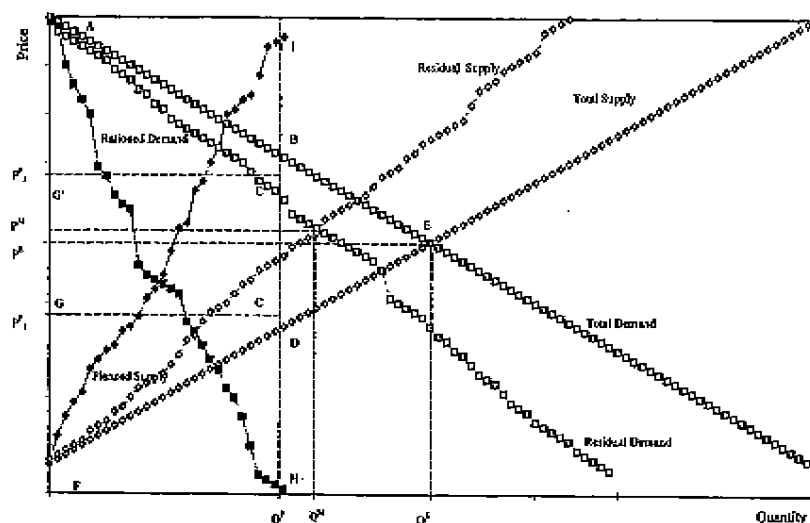


FIG. 2.—Inefficient rationed demand and inefficient planned supply: Planned quantity is less than the fully liberalized market equilibrium quantity.

**PROPOSITION 1.** If the plan quantity is less than the fully liberalized market equilibrium quantity, then (1) the combined output of the plan and market tracks under limited liberalization of the market track is greater than or equal to the fully liberalized market equilibrium quantity, and (2) the market equilibrium price under limited liberalization is greater (less) than or equal to the market equilibrium price under full liberalization of the market track if planned supply (rationed demand) is efficient.

*Proof.* If  $P^M \leq P^E$ , then every potential user with a willingness to pay greater than or equal to  $P^E$  will be an actual user; moreover, since rationing is not necessarily efficient, there may also be actual users of planned supplies whose willingness to pay is below  $P^E$ . Thus total actual demand,  $Q^P + Q^M$ , must be greater than or equal to  $Q^E$ . If  $P^M \geq P^E$ , then every potential supplier with a marginal cost less than or equal to  $P^E$  will be an actual supplier; moreover, since supply planning is not necessarily efficient, there may also be one or more actual suppliers whose marginal costs are above  $P^E$ . Thus total actual supply,  $Q^P + Q^M$ , must also be greater than or equal to  $Q^E$ .

If there is efficient planned supply, the residual supply curve is the top segment of the total supply curve. Since the total supply curve is monotonically increasing,  $Q^P + Q^M \geq Q^E$  implies that  $P^M \geq P^E$ . Similarly, if there is efficient rationing, the residual demand curve is the bottom segment of the total demand curve. Since

the total demand curve is monotonically decreasing,  $Q^P + Q^M \geq Q^E$  implies  $P^M \leq P^E$ . Q.E.D.

We now analyze full liberalization of the market track. Rationed users are now allowed to resell rationed goods in the market as long as  $Q^P$  is delivered to and accepted by them at plan price  $P_1^P$ . Similarly, planned suppliers are allowed to purchase the goods in the market to fulfill their delivery obligations at plan price  $P_1^P$  instead of producing the goods themselves. Thus the market consists of the total demand and supply.

Suppose that the plan price  $P_1^P$  is below  $P^E$ . Under the plan, the rationed users have a surplus given by the area under the rationed demand curve  $AH$  less the rectangle  $P_1^P \cdot Q^P$ ; the planned suppliers have a planned profit/loss equal to the difference between  $P_1^P \cdot Q^P$  and the area under the planned supply curve  $FI$ . Compared to the outcome of the single-track liberalization, the dual-track liberalization entails an implicit lump-sum transfer equal to the rectangle  $(P^E - P_1^P) \cdot Q^P$  from the planned suppliers to the rationed users. As a result, a rationed user whose willingness to pay is greater than or equal to  $P^E$  and a planned supplier whose marginal cost is less than or equal to  $P^E$  will have their prereform rents unchanged. A rationed user whose willingness to pay is less than  $P^E$  will still accept delivery from planned suppliers at the plan price but will resell the plan-allocated inputs on the market at price  $P^E$ , thereby obtaining a surplus equal to  $P^E - P_1^P$ . This corresponds to the common practice of "resale" of rationed goods. A planned supplier whose marginal cost is above  $P^E$  will still deliver to its rationed users their plan-mandated supplies at the plan price, but instead of producing them, he will try to purchase them on the market at price  $P^E$  for redelivery, thereby limiting his loss to only  $P^E - P_1^P$ . This corresponds to the common practice of "subcontracting" by inefficient planned suppliers to more efficient suppliers. Clearly, the rationed users and the planned suppliers are no worse off than before; and at least some of them are even better off. Thus Pareto improvement and efficiency are simultaneously attained.

A similar argument can be made for  $P_2^P$  above  $P^E$ , as, for example, in the context of a labor market. Under the dual-track approach, an enterprise whose marginal product of labor exceeds or equals  $P^E$  will also have its prereform rents unchanged. An enterprise whose marginal product of labor is below  $P^E$  will still pay the plan wage but will "resell" its labor on the market for  $P^E$ , thereby limiting its loss to the difference between  $P_2^P$  and  $P^E$ . This corresponds to the common practice of "labor reallocation." Reallocated workers preserve their preexisting rents because they continue to receive a total compensation equal to the plan rather than the market wage rate. Simi-

larly, those workers whose reservation wages are less than or equal to  $P^E$  will also have their prereform rents unchanged. Those workers whose reservation wages are above  $P^E$  will receive  $P_2^P - P^E$  and be replaced by workers whose reservation wage is below or equal to  $P^E$  at market wage  $P^E$ . This corresponds to the common practice of "labor substitution," which can take different forms. For example, a worker may be persuaded to take an early retirement package, or a worker may resign in exchange for a job for his or her child or relative, who may have a lower reservation wage. The rents received by existing workers under the plan are preserved in the form of (implicit) lump-sum transfers from the SOEs to the existing workers.

The discussion above is summarized by the following proposition.

**PROPOSITION 2.** If the plan quantity is less than the fully liberalized market equilibrium quantity, then, independently of the initial conditions concerning the plan price and the degree of efficiency of rationed demand and planned supply, (1) the dual-track approach with either limited or full liberalization of the market track is Pareto-improving and (2) the dual-track approach with full liberalization of the market track achieves efficiency.

Now consider sequential dual-track liberalization of the market in the following fashion: in a first stage, limited market liberalization is implemented, and then in a second stage, full market liberalization is implemented. By proposition 1, the first-stage limited market liberalization leads to inefficient overproduction; by proposition 2, the second-stage full market liberalization implies efficiency, and thus there must be production contraction. Furthermore, in the first stage, when one goes from a centrally planned economy to limited market liberalization, Pareto improvement is clearly attained, but efficiency cannot be guaranteed. In the second stage, when full liberalization is introduced, compared with the terminal point of the first stage, the reform is still Pareto-improving for agents within the plan but is not necessarily Pareto-improving for agents outside the plan, although efficiency is attained.<sup>5</sup> Therefore, the sequential dual-track liberalization may result in some opposition to further reforms (from some agents outside the plan) after the first and before the second stage, whereas the dual-track full market liberalization implemented in one stroke will not. Nevertheless, it is also clear that even under the sequential dual-track liberalization, there are no losers at the end of the second stage relative to the status quo before the reform.

It is useful to compare our results with those of the related litera-

<sup>5</sup> By the same argument, if there are black marketeers before the reform, they are likely to be made worse off by full market liberalization.

ture. Murphy, Shleifer, and Vishny (1992) study a "partial reform" scheme in a similar partial equilibrium model in which (a) suppliers are free to sell to all users (no quota delivery enforcement) and (b) private firms can freely purchase inputs at any price but state-owned firms (which are covered by the plan) are not allowed to purchase inputs above the plan price. They show that such a partial reform may lead to inefficient supply diversion, compared to the efficiency of the single-track liberalization. In their model, there is no assurance that the partial reform is Pareto-improving since suppliers are freed from any prior delivery obligations. Moreover, inefficiency of the plan (e.g., inefficient planned supply) may persist under the partial reform. Our definition of dual-track liberalization differs from that of their partial reform in two important respects: not only are plan delivery quotas enforced under the dual-track approach, but also SOEs, like private firms, in all sectors are allowed to buy and sell any inputs (and outputs) freely at the market price. In our model, the dual-track liberalization is Pareto-improving, and with full liberalization of the market track, it also achieves efficiency even if the original plan is inefficient.

Sachs and Woo (1994) observe that, in Eastern Europe and the former Soviet Union, a too high subsidized wage rate prevents employees of SOEs from moving to the more efficient non-SOEs, which pay the lower market rate of total compensation. They therefore argue that it is necessary to cut subsidies and close down SOEs in order to achieve an efficient labor reallocation. This is a situation of inefficient rationing in the labor market with the plan wage rate above the fully liberalized market equilibrium. Our results show that the dual-track approach with full liberalization can provide a mechanism for achieving an efficient labor reallocation in a Pareto-improving way. For example, workers who benefit from subsidized wages in inefficient SOEs can be allowed to keep the housing provided by their enterprise while taking a new job in the more efficient but lower-paying nonstate sector. Under this scheme, workers should have the incentive to leave the SOEs and accept the lower market wage rate because they would not be made worse off.

#### B. *The Plan Quantity Is Greater than the Fully Liberalized Market Equilibrium Quantity*

This case applies to the overproduction of goods such as tanks and other low-quality unwanted goods or to the overemployment of labor. The generic rationed demand and planned supply curves are depicted in figure 3. Under limited market liberalization, the plan track and the market track are completely segregated. By assump-

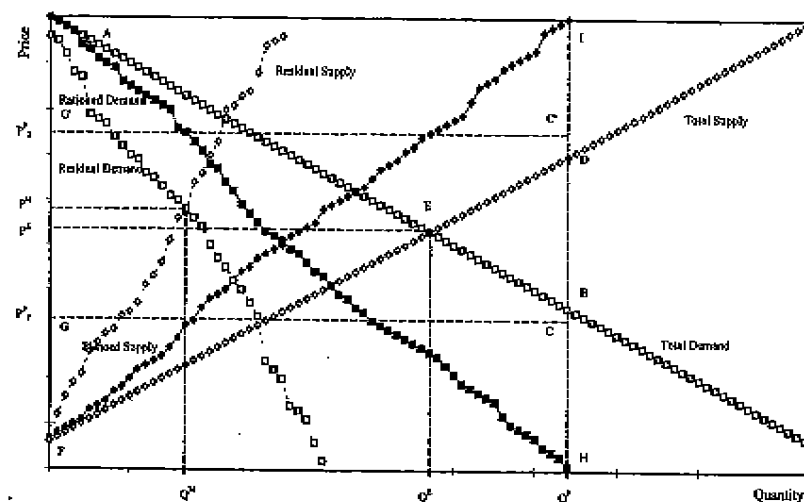


FIG. 3.—Inefficient rationed demand and inefficient planned supply: Planned quantity is greater than the fully liberalized market equilibrium quantity.

tion,  $Q^P \geq Q^E$ . What is notable is that, generically, there is still positive demand and supply in the market track because among the residual users and suppliers there are still those with high willingness to pay and low marginal costs. Thus, once again,  $Q^P + Q^M \geq Q^E$ . Clearly, the dual-track approach is Pareto-improving but cannot achieve efficiency since the total quantity for the entire economy is greater than  $Q^E$ , the efficient quantity.

Under full liberalization, the market consists of the total demand and supply. The important difference from the case above is that the physical fulfillment of the plan production target is incompatible with efficiency. However, Pareto improvement and efficiency can be achieved if the plan is enforced in terms of the rents that it generates rather than the physical output targets. With  $P_1^P < P^E$ , a planned supplier can buy back from the market, at equilibrium, delivery obligations (which may be interpreted as "call options" exercisable at  $P_1^P$ , held by the rationed users) in the good that it is supposed to deliver under the plan, at  $P^E - P_1^P$ , thus reducing or even eliminating the necessity of making physical deliveries (and actual production). A rationed user should be indifferent between accepting physical delivery and selling his delivery rights ("call options"), at a price  $P^E - P_1^P$ , since it is always possible to buy at the market price  $P^E$ . Profitable market exchanges of rights and obligations are possible because of the inefficiencies caused by the plan. Under this scenario, the net output of the good will be equal to  $Q^E$ , and yet there will

be no complaints about the nonfulfillment of plan obligations from anyone. Indeed, the planned suppliers and rationed users have all received or given value for their plan rights and obligations and in fact are at their optimized levels of profits and utilities. Hence, we conclude that even when the plan quantity is greater than the market equilibrium quantity, the dual-track approach with full market liberalization still results in the simultaneous attainment of Pareto improvement and efficiency as long as the plan is enforced in terms of the rents that they generate but not in terms of physical production.<sup>6</sup>

The case of  $P_2^P$  above  $P^E$  can be similarly analyzed. A rationed user can buy back from the market acceptance obligations (which may be interpreted as "put options" exercisable at  $P_2^P$ , held by the planned suppliers) at price  $P_2^P - P^E$  in the good that it is supposed to receive under the plan. For the labor market, under full market liberalization, enterprises allocated labor under the plan will "resell" labor at a loss of  $P_2^P - P^E$  per unit if its marginal product falls below  $P^E$ . This is equivalent to a subsidy scheme at the rate of  $P_2^P - P^E$  provided by the enterprise. Workers within the plan whose reservation wage is higher than  $P^E$  accept the subsidy and quit the job. Thus all enterprises will actually employ labor up to the point at which the value of the marginal product is equal to  $P^E$ . Any worker with a reservation wage below or equal to  $P^E$  will be actually employed. Efficiency is thus achieved. Moreover, the allocation is Pareto-improving. Before the reform, the workers within the plan have a surplus equal to  $P_2^P \cdot Q^P$  less the area under the reservation wage curve  $FI$ . The enterprises within the plan have a surplus equal

<sup>6</sup> Another way to look at this case is to take into account the possibility of "recycling" of goods through the market. If the plan period, say a year, is subdivided into a sufficiently large number of subperiods, say 365, then in each subperiod a planned supplier should produce  $Q_1^P/365$  as planned output and be required to deliver  $Q_1^P/365$  to rationed users. The planned supplier can meet his physical delivery obligations as follows. He produces and physically delivers  $Q_1^P/365$  for the first subperiod at the plan price and then simultaneously repurchases from the market any available quantity at the market price  $P^E$  from rationed users whose willingness to pay is below  $P^E$ . In the second subperiod, the planned supplier produces to the point at which his marginal cost is equal to  $P^E$ , say  $Q_1^*/365$ , which he delivers together with his market purchases made in the previous subperiod, and just sufficient additional new current production if necessary so that his physical delivery obligations of  $Q_1^P/365$  are fulfilled ( $Q_1^*$  can be zero). But simultaneously he repurchases again from the market a quantity equal to  $(Q_1^P - Q_1^*)/365$  at the market price  $P^E$  from rationed users whose willingness to pay is below  $P^E$ . Every period, he continues this pattern of partial production cum purchases and resales until the end of the year. He would have produced approximately  $Q_1^*$ , which can be significantly less than the planned supply of  $Q_1^P$ , but he would have physically delivered exactly  $Q_1^P$ , as required by the plan. Thus total net production under full market liberalization will not exceed  $Q^E$ , but physical delivery is "fulfilled."

to the area under the curve  $AH$  less  $P_2^P \cdot Q^P$ . After the reform, all workers within the plan with a reservation wage above  $P^E$  are clearly better off since they no longer have to work at  $P^E$  and in addition receive a subsidy  $P_2^P - P^E$ . All enterprises with marginal products of labor below  $P^E$  are also clearly better off since they have to overpay their plan-allocated workers only by at most  $P_2^P - P^E$ . The remaining workers and enterprises within the plan are no worse off than before. Workers and enterprises outside the plan are also clearly better off because of the new opportunities offered by the market track.

The following proposition summarizes the discussion above.

**PROPOSITION 3.** If the plan quantity is greater than the fully liberalized market equilibrium quantity, then independently of the initial conditions concerning the plan prices and the degree of efficiency of rationed demand and planned supply, (1) the dual-track approach with limited or full liberalization is always Pareto-improving and (2) the dual-track approach with full liberalization achieves efficiency if the rights and obligations under the plan are enforced in terms of the rents.

### III. Discussions on the Conditions for Pareto Improvement and Efficiency

#### A. Condition for Pareto Improvement: Enforcement of the Plan Track

The Pareto improvement property of the dual track requires enforcement of the rights and obligations under the plan track. Such an enforcement, together with incremental autonomy on the market track, is also sufficient for Pareto improvement. No other conditions such as profit maximization or perfect competition or full liberalization are needed. By definition, enforcement of the plan track preserves existing rents whereas autonomy on the market track allows agents to exploit opportunities for trade. This also implies that enforcement of the plan track alone prevents any decline in aggregate output. This argument applies to the models that explain the output declines in Central and Eastern Europe by the disruption effects from the single-track liberalization under some types of market imperfection (Blanchard and Kremer 1997; Li 1999; Roland and Verdier 1999).

While Pareto improvement is always qualitatively valid under the enforcement of the plan track, how much scope for such improvement is there under limited market liberalization? It depends on how many slack resources are available. As argued by Kornai (1980), there was always coexistence of shortages and slack in the planned

economy. Furthermore, because of the very poor incentives of economic agents in the planned economy, the production was often organized deep inside the production possibility frontier. Therefore, even if the plan seemed taut, once some incentives are provided, new resources can be released for production and the scope for Pareto improvement can be substantial.

There are several reasons that make enforcement of the plan track possible. First, even if incentives to evade quotas may be stronger under reform than under central planning, these incentives would be the same in regard to the fulfillment of ex post unprofitable contracts in a conventional market economy. In either case, the government will have the responsibility for contract enforcement. Moreover, in a previously centrally planned economy, such enforcement can be implemented by utilizing the existing institutions, and no new institutions need to be created.

Second, enforcing the preexisting plan is informationally much less demanding for the government than drawing up a new plan. Under central planning, the information requirement for drawing up a plan is huge because the market is not used. Enforcing a preexisting plan is different. In fact, the dual-track approach uses minimal additional information as compared with other possible compensation schemes that may be used with other approaches to reform.

Third, under the dual track, the focus of plan enforcement shifts to the plan-mandated interenterprise deliveries as opposed to total enterprise productions. Under central planning, when an enterprise fulfills the production target, it will also fulfill the plan-mandated deliveries because there is no real incentive to do otherwise. In contrast, under the dual-track approach, an enterprise can fulfill its production target and yet at the same time fail to make or accept any planned deliveries (e.g., by selling the entire production or buying inputs on the market track). Therefore, the focus of enforcement must be shifted from physical production to deliveries, with the consequence that complaints from planned delivery recipients and planned suppliers become the most important source of information on plan compliance. Typically, enforcement actions will be undertaken only in response to complaints from the plan-mandated recipients or suppliers of the planned output deliveries.

Fourth, the rents of the economic agents under the preexisting plan can be protected without the enforcement of *physical* deliveries. Physical deliveries are also difficult to enforce unless the state actively monitors the interenterprise material flows of the plan individually. Under the reform, the state needs to react only when delivery disputes arise, taking into account that there will be cases in which it is in the joint interests of the planned suppliers and the rationed

users to evade the plan. In practice, the rights and obligations under the plan are likely to be enforced by the state only in terms of the rents that they generate. The plan-allocated delivery quotas can be viewed as the combination of a (put) option on the part of the planned suppliers to sell at price  $P_1^p$  to the rationed users and a (call) option on the part of the rationed users to buy from the planned suppliers also at price  $P_1^p$ .<sup>7</sup> Under full market liberalization, enforcement of the rights and obligations under the plan amounts to enforcement of these options.

However, there are also reasons that may make enforcement of the plan track difficult. First, it is difficult, if not impossible, to enforce the allocation of consumer goods, especially when the plan price is above the market price. For example, low-quality consumer goods may become unwanted once the market is open to non-planned suppliers. According to the logic of the dual-track approach, the rationed users who no longer purchase planned quantities at the plan price must compensate the planned suppliers to maintain the latter's rents. This is clearly more difficult to enforce if the rationed users are individual consumers rather than enterprises.

Second, compliance with the plan by economic agents depends on their expectations of the credibility of state enforcement. If state enforcement is not credible, then the economic agents will have no incentive to fulfill their plan obligations. If anyone thinks that the plan-mandated deliveries at plan prices are not going to be received by him or her, he or she will not make the plan-mandated sales at the fixed plan prices either. In that case, dual-track liberalization degenerates to single-track liberalization. In general, multiple (self-fulfilling) equilibria (outcomes) are possible under a dual-track approach, depending on the expectations of the credibility of state enforcement.

#### B. Conditions for Efficiency

Additional conditions of profit and utility maximization, perfect competition, and full liberalization of the market track are required for efficiency of the dual-track liberalization. But these conditions are also necessary for the efficiency of single-track liberalization.

Our market supply and demand curves are assumed to reflect the marginal costs of suppliers and the willingness to pay of users. Behind these supply and demand curves, the enterprises are assumed

<sup>7</sup> The values of these options are precisely the lump-sum transfers. Of course, the two options cannot simultaneously have positive value since they are exercisable at the same price.



to be atomistic (which implies perfect competition) and profit-maximizing, and the households are assumed to be utility-maximizing. Because the planned track represents lump-sum transfers, profit maximization at the margin would be the same as total profit maximization. The assumptions of utility and profit maximization at the margin ensure that enterprises and households will have the right incentives. The efficiency of the dual-track approach relies on those incentives, which may depend on the ownership and governance structure.<sup>8</sup>

As we have shown, efficiency requires full market liberalization under which market resales, subcontracting, and market purchases for redelivery are all allowed. Indeed, our distinction between limited and full market liberalization is a major difference between our model and those of Byrd (1991) and others on the dual-track approach.

#### IV. The Chinese Experience with Dual-Track Liberalization

##### A. *Applicability of the Model to China*

To what extent are the conditions laid out in Section III fulfilled in China's implementation of dual-track liberalization?

First, the credibility of continued enforcement of the rights and obligations under the plan seems not to be an issue in China.<sup>9</sup> Evidence of the credibility of continued enforcement is provided by the actual volume of transactions at plan prices, which, as we shall show below, remains large in absolute terms after a decade of reform. Moreover, it is also clear that until recently, SOEs in China could not lay off their preexisting workers, nor could their preexisting workers leave the enterprises without permission, which provides another example of the effective enforcement of the plan. With regard to consumer goods in the plan, it turns out that for China, almost all of them (cloth, grain, meat, oil, housing, etc.) were in excess demand at the beginning of the reform; thus they were not subject to the problem that plan quantity was greater than the fully liberalized market quantity.

Second, the validity of the profit-maximization condition depends

<sup>8</sup> We do not consider the incentive problem resulting from the soft budget constraint. The soft budget constraints have the greatest impact on dynamic decisions concerning new investment, which are beyond the scope of this paper.

<sup>9</sup> In contrast, the collapse of the Council for Mutual Economic Assistance and the breakup of the Soviet Union made unenforceable the cross-country planned deliveries in Eastern Europe and the former Soviet Union under the original plans.

on circumstances. In the agricultural reform, the dual-track approach was introduced simultaneously with the household responsibility system, which essentially made farm households residual claimants (Lin 1992). Therefore, the assumption of profit maximization is valid. In urban state-owned industrial enterprises, a "contract responsibility system" was introduced to expand autonomy and grant profit retention to enterprises. This reform also improved enterprise incentives and performance (Groves et al. 1994). However, in contrast to the agricultural reform, the contract responsibility system in industrial enterprises is not a good substitute for ownership reform. Indeed, the incentives of SOEs are much weaker than those of non-SOEs.

Third, the Chinese experience in the product market liberalization is close to the case of full market liberalization because resales, subcontracting, and purchases for redelivery were not prohibited. For example, farm households have been permitted to purchase grain or other output on the market to be redelivered to the state procurement agencies in fulfillment of their planned delivery quota since 1979. However, in the 1980s, there was only limited liberalization of the market track in the labor market. Employers with plan-allocated workers were obliged to retain them at their preexisting wage rates, and the market track applied only to new employment, with the market wage rate set by the equilibrium of the residual labor supply and demand. It is only in the mid 1990s that China has begun to deal with the problems of labor reallocation and layoffs on a significant scale.

##### B. *Dual-Track Liberalization in Product Markets*

The agricultural reform undertaken in 1979 is the first successful application of the dual-track approach. Table 1 shows that the state procurement of domestically produced grains has remained essentially fixed over time, despite an almost one-third increase in grain output over the decade 1978-88.<sup>10</sup> The data also demonstrate sufficiently effective enforcement by the state of the planned delivery obligations.

Table 2 shows that between 1978 and 1985, the share of transactions at plan prices in agricultural goods fell from 94 percent to 37 percent. Unfortunately, the absolute values of these transactions are not available. However, we do know that, between 1978 and 1990,

<sup>10</sup> The years 1983 and 1984 were anomalies since there were bumper harvests and the state made additional purchases over and above the mandatory delivery quotas, partly because the market price was below the plan procurement price.

TABLE 1  
DUAL TRACKS IN GRAIN (Million Tons)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
State procurement at plan price	47.8	54.0	50.2	52.1	56.2	91.2	102.4	59.6	53.3	56.9	50.5
State procurement at market price				10.6	17.5	7.6	9.3	19.6	32.3	42.3	43.8
Total domestic production	304.8	332.1	320.6	325.0	354.5	387.3	407.3	379.1	391.5	403.0	394.1
Plan procurement/domestic production	.16	.16	.16	.16	.16	.24	.25	.16	.14	.14	.13

SOURCE.—*Historic Materials for Grain Works in Contemporary China* (1989, pp. 1800–1805, 1838–39), Domestic production: *China Statistical Yearbook*, various issues.

TABLE 2

## DUAL TRACKS IN AGRICULTURAL GOODS (Percentage of Output Value)

	1978	1985	1986	1987	1988	1989	1990
Transactions at plan prices	94.4	37.0	35.0	29.4	24.0	35.5	31.0
Transactions at market prices	5.6	63.0	65.0	70.6	76.0	64.5	69.0

SOURCE.—*China Reform and Development Report* (1992–93), p. 54.

NOTE.—Transactions at market prices include transactions at so-called guide prices, which are government-set prices but with reference to market supply and demand.

TABLE 3

## DUAL TRACKS IN INDUSTRIAL GOODS (Million Tons)

	1981	1983	1985	1987	1988	1989	1990
	Coal						
Plan quota	328.94	365.31	400.25	402.58	407.98	426.66	455.19
Domestic production	621.64	714.53	872.28	928.08	979.88	1,055.14	1,079.88
Plan/production	.53	.51	.46	.43	.42	.40	.42
	Steel						
Plan quota	13.91	17.85	18.81	18.96	17.84	16.56	15.58
Domestic production	26.70	30.72	36.93	43.86	46.89	48.59	51.53
Plan/production	.52	.58	.51	.43	.38	.34	.30

SOURCE.—*China Statistical Yearbook* (1991, p. 482).

the agricultural output of China doubled. Table 2, therefore, provides evidence of the huge supply response to the introduction of the market track in agriculture.

The most noticeable and often-cited application of the dual-track approach concerns industrial goods. Dual pricing in industry was first used for crude oil in 1981, when the government allowed the export of above-quota crude oil at a higher price. In 1984 the government permitted the market track for all industrial goods but with the market price range restricted to be within 20 percent of planned prices; such a restriction was removed in early 1985 (Wu and Zhao 1987). As a result, the share of transactions at plan prices, in terms of output value, fell from 100 percent before the reform to 64 percent in 1985 and further to 45 percent in 1990 (Xu 1988, p. 292; *China Reform and Development Report* (1992–93), p. 54). This provides evidence of the decline of the plan track relative to the market track but also of the relatively effective enforcement by the state of the plan delivery obligations (otherwise the share would have declined to zero).

Table 3 presents the cases of coal and steel, two of the most impor-

tant industrial commodities, which were also the most tightly controlled under central planning. For coal, China's principal energy source, the planned delivery had some slight increases in absolute terms during the 1980s, but the market track increased much more. The increments came mainly from small rural nonstate coal mines run by individuals and township and village enterprises. As a result, the share of the plan allocation declined from 53 percent in 1981 to 42 percent in 1990.<sup>11</sup> For steel, the plan track in absolute terms was quite stable (with a slight decline after 1987), but the share of plan allocation fell from 52 percent in 1981 to 30 percent in 1990. Unlike coal, steel came mainly from large SOEs rather than from small nonstate firms (Byrd 1991).<sup>12</sup> In both the cases of coal and steel, because the plan track is essentially frozen, the economy is able to "grow out of the plan" on the basis of the market track expansion by state or nonstate firms (Naughton 1995).

As for consumer goods, urban residents continued to have the right to purchase grain, meat, electricity, and housing at the same prereform prices and within the limits of the prereform rationed quantities. But at the same time, they were also free to buy the consumer goods from the free market at generally higher prices. Because we do not have data on the total retail sales of goods covered by the plan, we present in table 4 available data on the share of transactions at plan prices in such retail sales. It shows that the proportion of transactions at plan prices declined from 97 percent in 1978 to only 30 percent in 1990. It has continued to decline since 1990.

### C. Dual-Track Liberalization in the Labor Market

China's labor market reform started with limited market liberalization. China's high saving (investment) rate provides the potential

<sup>11</sup> Outside the planned delivery, some local state-owned mines might be subject to a local plan. However, according to Byrd (1991), of the total incremental output between 1978 and 1984, 21.2 percent came from "unified allocation coal mines" (most of them were under the central plan), 8.4 percent from local state-owned mines, and 70.4 percent from nonstate mines, which were under the market track. Similarly, Naughton (1995) figured that of the total increment between 1983 and 1987, the central government mines accounted for 27 percent, local state-owned mines 1 percent, and the nonstate mines 72 percent. Therefore, the picture will not change even if we do not know exactly how local state-owned mines allocated coal.

<sup>12</sup> There might be some local government planned delivery outside the planned delivery figures here. We have data on enterprise direct sales of steel between 1987 and 1990, which are 9.53, 13.18, 14.57, and 18.23 million tons, respectively (*China Statistical Yearbook* 1988, p. 461; 1989, p. 379; 1990, p. 512; 1991, p. 478). If the difference between domestic production and plan quota together with enterprise direct sales is the local government planned delivery, then they represent 15.37, 16.31, 17.46, and 17.72 million tons, respectively, between 1987 and 1990, which are quite stable. Almost all increases in these years came from the market track.

TABLE 4

DUAL TRACKS IN RETAIL SALES (Percentage of Sales)

	1978	1985	1986	1987	1988	1989	1990
Transactions at plan prices	97.0	47.0	35.0	33.7	28.9	31.3	30.0
Transactions at market prices	3.0	53.0	65.0	66.3	71.1	69.7	70.0

SOURCE.—*China Reform and Development Report (1992-93)*, p. 64.

NOTE.—Transactions at market prices include transactions at so-called guide prices, which are government-set prices but with reference to market supply and demand.

for the rapid creation of new jobs in the market track without privatization of the SOEs.<sup>13</sup> Table 5 shows that between 1978 and 1994, employment in the nonstate sector increased by 318.8 percent (with the urban nonstate sector increasing by 171.4 percent and the rural nonstate sector by 426.4 percent), whereas employment in the state sector (including civil servants in government agencies and non-profit organizations) increased by only 50.5 percent. But within the state sector, there are two tracks. Beginning in 1980, while preexisting employees maintained their permanent employment status, most new hires in the state sector were made under the more flexible contract system and often at lower wage rates. Table 5 shows that employment in the plan track has been virtually stationary: it went from 87.14 million in 1983, the eve of the introduction of economic reform in industry, to 83.61 million in 1994.<sup>14</sup>

A similar dual-track scheme is applied to senior government bureaucrats. In the early 1980s, the old revolutionaries who joined the government in 1949 were allowed to keep their benefits and ranks and were not forced to retire. But for all new appointments in the government, there have been strict age limits: 65 for ministers or provincial governors, 60 for vice ministers or vice provincial governors, and 55 for bureau directors. There are also term limits as well: two three- or five-year terms. Mandatory retirement has also been imposed.

As proposition 1 implies, limited labor market liberalization had led to overemployment as compared with the full market liberalization outcome. Mass labor furloughing and reallocation by SOEs have become a major nationwide phenomenon since 1994. In 1996, approximately 10 million factory workers lost their jobs (*China Daily*, April 5, 1997), but these furloughed workers are compensated. Two

<sup>13</sup> The experience in Taiwan and South Korea showed a similar pattern (Lau and Song 1992).

<sup>14</sup> If, in addition, we exclude civil servants in government agencies, employment in the plan track would not have risen at all.

schemes used for protecting workers' preexisting rents are *xiagang* ("stepping down from one's post") and *zaijiuye* ("reemployment"). *Xiagang* workers continue to receive a partial salary, housing, health care, and other benefits from their enterprises. Many furloughed workers were retrained through *zaijiuye* projects and later found jobs in the nonstate sector. By the end of 1996, out of the 8.91 million *xiagang* workers, 3.57 million had found jobs, 2.94 million had decided to stay home, and 3 million were still looking for jobs (Cao, Qian, and Weingast 1999). Although the interests of furloughed workers in the SOEs are protected, workers outside the state sector, say some migrant workers from rural areas, will suffer as a result of full market liberalization because both the market equilibrium employment and wage rate are lowered. This is precisely the result of sequential dual-track liberalization of the market as discussed in the paragraph after proposition 2.

## V. Concluding Remarks

The tables in Section IV show the gradually declining trend of the plan track throughout the 1980s, providing evidence that, *ex post*, there is no "ratcheting up" of the plan. Moreover, recent data reveal that the plan track in product markets has been largely "phased out" in the 1990s, and this phasing out of the plan track was generally accompanied by explicit compensation. By 1996, the plan track was reduced to 16.6 percent in agricultural goods, 14.7 percent in industrial producer goods, and only 7.2 percent in total retail sales of consumer goods (*People's Daily*, August 22, 1997). Why was the implicit commitment on the part of the state to no ratcheting up or no phasing out without compensation credible? Without credible commitment, either the property of Pareto improvement is lost or economic agents would have diminished incentives to participate in the market track. Industrial enterprises may have found the no ratcheting up credible because of the earlier successful experience of dual-track reform in agriculture. Moreover, with rapid growth, the plan track becomes, in no time, a matter of little consequence to most potential losers, which in turn reduces the cost required for compensating them. The questions of credibility are beyond the scope of our paper because our model is essentially static and does not address the issues of investment and capacity expansion both within and outside of the plan. They will be pursued in future research.

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TABLE 5  
DUAL TRACKS IN NONAGRICULTURAL EMPLOYMENT (Million Employees)

	1978	1983	1985	1988	1989	1990	1991	1992	1993	1994
State	74.51	87.71	89.90	99.84	101.08	103.46	106.64	108.89	109.20	112.14
Permanent	74.51	87.14	86.58	89.76	89.18	89.74	90.75	88.31	85.24	83.61
Contract	.00	.57	3.32	10.08	11.90	13.72	15.89	20.58	23.96	28.53
Nonstate	48.90	62.10	107.97	138.28	136.49	152.53	159.49	172.28	195.87	204.85
Urban	20.63	29.75	38.18	42.83	42.82	43.84	46.04	47.41	50.45	56.01
Rural	28.27	32.35	69.79	95.45	93.67	108.69	113.45	124.87	145.42	148.84
State permanent + (state + nonstate)	.60	.58	.44	.38	.38	.35	.34	.31	.28	.26

SOURCE.—China Statistical Yearbook (1994, pp. 84-85; 1995, p. 99).

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