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## The Success and Failure of Reforms in Transition Economies

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Abstract. This paper argues that the different experiences of Russia and China under capitalism are the consequence of different arrangements governing the determination of prices and work practices that evolved during the transition process. In Russia, the arrangement, which conferred monopoly rights to industry groups left over from socialism, prevented better technologies from being adopted. In China, the arrangement that evolved contained no such monopoly elements. The consequence of this competitive arrangement was technology adoption. The key factor in determining which arrangement evolved was the relative strength of industry to the central government at the start of the transition. Although industry groups left over from socialism in both countries had the incentive to acquire monopoly rights, only those in Russia were able to do so on account of the central government being relatively weak there. We put forth a model that implements these ideas and provide evidence in support of this theory.

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## Introduction

Why has capitalism been a disappointing experience for Russia but not China?<sup>1</sup> This paper argues that two very different arrangements that govern the determination of prices and work practices evolved during these economies' transitions to capitalism. In Russia the arrangement that evolved conferred certain rights to industry groups left over from socialism. The arrangement, which is in the nature of a monopoly, prevented better technologies from being adopted. In China, in contrast, the arrangement that evolved conferred no such rights to industry groups left over from socialism. This arrangement, which is in the nature of perfect competition, facilitated the adoption of better technologies.

We attribute the evolution of these different arrangements in each country to the strength of industry relative to the central government at the start of the transition. In Russia, where the central government was weak relative to industry the monopoly arrangement evolved. This is because each industry had the ability to dictate the nature of reforms there, and had the incentive to make its industry a monopoly, regardless of the nature of reform in other industries. In China, where the central government was strong relative to industry, the competitive arrangement evolved. Even though each industry had the incentive to make its industry a monopoly, it did not have the ability to dictate the nature of reforms there. In part, these differences in relative strengths between

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<sup>1</sup> Throughout this paper we assess the performance of the two countries solely in terms of the TFP that they have. We do not attempt to say that overall one government is better than the other, just that it allows for higher TFP. Governments affect citizens lives in many other aspects, which we abstract from in the paper.

government and industry in each country are the consequence of differences in central plans under socialism regarding the location of industry and concentration of firms.

The basis for the first part of our argument is the Parente and Prescott monopoly rights model (1999). This model is capable of generating large differences in the performance of societies that can be attributed solely to differences in the arrangement used to determine prices and work practices. The monopoly right entitles the group to sets its membership size, the rental price to be paid for its member services, and the productivity of its members' inputs. This right is protected by the state via regulation that makes it costly for a firm to enter the industry with a more productive technology. Through a combination of its membership size and the state's protection, the group is able to deter entry by firms using superior technology.

We use this structure to make sense of the large output gap between the United States and Russia under capitalism. We also use this structure to document how a competitive country with worse technologies or perhaps a less educated labor input such as China can instead outperform Russia. We argue that certain features of Russian society justify the monopoly rights interpretation and certain features of Chinese society justify the competitive interpretation. We support these arguments with evidence of monopoly rights and government protection of workers' rights in these countries under capitalism.

We think this structure is reasonable to use for another reason. Namely, the allocations under socialism were not all that different from the monopoly rights ones. Individuals, particularly those in heavy industry, had job rights under central planning. Industry employment, productivity and wages were all set by the state. This meant that

industry groups had a history of certain rights and a familiarity with a similar arrangement entering the transition period.

Once the plausibility of this structure is quantitatively verified, we proceed to construct a model of the transition where depending on some underlying characteristics a country either has the monopoly arrangement or the competitive one. The model, which follows naturally from the Parente and Prescott framework, is characterized by a prisoner's dilemma; each individual industry always has the incentive to acquire the monopoly right, regardless of what is done in other industries. When individual agents (industries) have the ability to be monopolists, a monopoly arrangement ensues. When individual agents do not have this ability, the competitive arrangement is the outcome. We argue that this ability reflects the relative strengths of the central authority and the individual industries. We finalize our argument by documenting that China is best characterized by having a strong central government and weak industries and Russia by the opposite characteristics.

The source of the prisoner's dilemma is the potential of industry insiders to earn monopoly profits. An individual's earnings are always higher when his industry is a monopoly compared to when it is competitive. This is the true regardless of the fraction of the rest of the economy that is competitive. In the absence of a strong central government with the ability to impose uniform reforms across all industries, a group of industry insiders, therefore, always wants to acquire monopoly rights and the state's protection of that right. Since all groups would want to acquire the right, the output and earnings of industrial group members in equilibrium are lower compared to the equilibrium where all industries were competitive.

The prevalence of job rights under socialism has been identified as the reason for China's success and Russia's failure by a number of authors, most notably Sachs and Woo (1994). The Sachs and Woo interpretation of the problem is slightly different from ours. More specifically, the Sachs and Woo hypothesis is that wage subsidies to industrial workers make it unprofitable for potential entrants to lure workers away from existing firms. In our theory, a potential entrant can always hire workers from the competitive sector at the competitive wage rate. Subsidies, although not explicitly treated in our model, would have a similar effect of deterring entry, but for the reason that they allow inefficient firms to continue operating. The more substantive difference between theories, however, is that ours implies a prisoner's dilemma type problem whereas the Sachs and Woo hypothesis does not. Consequently, the Sachs and Woo theory is far more restrictive than ours; for their theory to be plausible, the after tax subsidized wage of industrial workers when no industries reform must be greater than their earnings when all industries are reformed. Our theory does not require this inequality to hold. In fact, our theory predicts the opposite relation.

Li (1999) also emphasize monopolistic elements in his theory of the relative performances of China and Russia. In contrast to our theory, Li's theory identifies pecuniary externalities as the main problem faced by transitional economies. These externalities are the result of production linkages between monopolies and between government demand for each monopolist's output. We do not share the view that externalities are the main problem inherited from socialism. Additionally, the emphasis of Li's article is on the advantages and disadvantages of a big bang versus gradual

approach to market reforms. We do not view the big bang versus gradual reform debate as central to understanding the relative success and failures of these two countries.

Our work relates to another group of papers in this literature that identify differences in governmental structure as the key determinant in understanding the economic performances of transitional economies. Papers belonging to this set include Weingast (1995), Qian, Roland, and Xu (1999), and Blanchard and Shleifer (1999). Of these papers, the closest in spirit to ours is Blanchard and Shleifer (1999) who argue that the ability of the central government to remove local authorities that stand in the way of growth enhancing reforms explains the success of China and the failure of Russia. In many ways our paper can be viewed as a complement to theirs, however. Whereas they do not model the gains or losses of groups left over from socialism that stand to benefit from maintaining the status quo, we do not explicitly model the weakness or strength of the central government.

Our work also relates to another strand of the literature that identifies the failure of reform with the political victory of groups of agents that lose with competition and innovation in the economy (Krusell and Ríos Rull (1996) and (2001)). While those papers take special care to model the political process that yields outcomes that prevent development, we concentrate in this paper in giving a detailed picture of the economics of transition and a simple mechanism for the implementation of competitive behavior. We completely abstract from the political side of the economy. As such, this paper does not address the politics by which industry insider groups in Russia secure the central government's protection of the monopoly right.

Our paper, like several of the aforementioned ones can explain the success of China and the failure of Russia under capitalism. There are a number of advantages that our theory offers compared to these other set of theories, however. First, there is ample evidence that monopoly rights of the type we consider, and state protection of those rights are prevalent in Russia but not in China. In China, the state has typically sided with the interests of entrants and not incumbents. Another virtue of our theory is that it accounts for an interpretation of the problem of Russian industry that has been offered, namely excess employment and low productivity.

The paper is organized as follows. Section 2 briefly describes the economics of the environment on which our analysis is based. The section, which essentially reiterates the Parente and Prescott model, describes the monopoly rights and competitive arrangements and the nature of the equilibria under each arrangement. Section 3 then follows with an interpretation of the performances of the U.S. economy, Russian economy, and Chinese economy under capitalism within the context of the model. Support in the form of anecdotal evidence for this interpretation is provided. This is followed by a calibration of the model to the performances of these economies. Section 4 then deals specifically with the transition from socialism to capitalism. More specifically, it asks how Russia starting from an initial allocation of agents across industry under socialism arrived at the monopoly arrangement and not the competitive one. It shows how the transition from socialism to capitalism gives rise to a prisoner's dilemma type problem for an economy characterized by a weak central government and geographically concentrated industries exist. It also shows how a strong central government can implement reforms that lead to large increases in productivity. Section 5

then provides some evidence on the relative strengths of the central government and industry in Russia and China during their transition periods. Section 6 concludes the paper.

## II. The Model Economy

The economics of the model are essentially those in the Parente and Prescott (1999) monopoly rights piece. For consistency we maintain their notation. The economy consists of a household sector, an industrial sector, and a farm sector. Industrial sector goods can be produced with one of three technologies that differ in the required labor input per unit of output. In any period a household is one of three things: a worker in the farm sector, a worker in the industrial sector, or part of a group of entrepreneurs who adopt a technology in the industrial sector. Since the industrial sector is the relevant sector in terms of the issues to be studied in this paper, our description of the household and farm sectors is brief.

### A. Household Sector:

There is a continuum of measure  $N$  of infinitely lived households. Preferences of each household are defined over a continuum of measure one of differentiated industrial goods,  $x(i,t)$ , and an agricultural good,  $a(t)$  given by a standard multi-good utility function

$$\sum_{t=0}^{\infty} \beta^t \frac{1}{\theta} \left[ \left( \int_0^1 x(i,t)^\gamma di + \mu a(t)^\gamma \right)^{\theta/\gamma} - 1 \right] \quad (1)$$

## B. Farm Sector

There is a competitive sector identified as the agriculture sector. The production technology is given by a CES function that uses a composite of intermediate goods produced by the industrial sector, and a composite of land and labor services. The composite of intermediate goods is assumed to be a substitute for the composite of land and labor services. Let  $X_a(i,t)$   $i \in [0,1]$ ,  $N_a(t)$ , and  $L_a(t)$  denote these three types of inputs.

Then total output of this sector,  $A_t$  is

$$A(t) = \left[ \psi \left( \int_0^1 X_a(i,t)^\sigma di \right)^{\rho/\sigma} + (1-\psi)(N_a(t)^\alpha L_a(t)^{1-\alpha})^\rho \right]^{1/\rho} \quad (2)$$

## C. Industrial Sector

There is a continuum of measure one of industrial goods. For each such commodity, there are three production technologies. These technologies differ in the required labor input per unit of output. Let  $\pi_0 < \pi_1 < \pi_2$  denote these technologies. Output of the  $i^{\text{th}}$  differentiated good when technology  $\pi_k$  is used equals

$$X(i,t) \leq \pi_k N(i,t).$$

No investment is required to adopt any of the three technologies.

Assumptions on household preferences and on the technology in the farm sector ensure that the demand for each differentiated industrial good is price inelastic. These assumptions imply that whenever monopolistic elements are present in an industry, the price charged will be the highest one that deters entry.

## D. Initial State

The initial state of the economy is characterized by the  $\pi_1$  technology being used by all firms in each industry. Additionally, the initial state of each industry is characterized by the number of households who worked in the industry in the previous period. The nature of reform, as we shall see, will be directed by the actions of this group.

## E. The Arrangements

There are two possible arrangements in an industry: the monopoly rights arrangement and the competitive arrangement. The arrangements are the same as those described in Parente and Prescott (1999).<sup>2</sup>

### *Monopoly Rights Arrangements*

In an economy with monopoly rights arrangements, a coalition of factor suppliers has the right to set the membership size, the rental price to be paid for member's services, and the productivity of its members (i.e., work practices). These latter two rights apply only to firms that use the  $\pi_1$  technology, and not to firms that use either the  $\pi_0$  or the  $\pi_2$  technology. The  $\pi_0$  technology represents a production method that can be operated in someone's back yard. For this reason, the rights of the coalition of factor suppliers do not apply to this technology. Their monopoly right does not apply to the  $\pi_2$  technology either. The implicit assumption is that the factor suppliers are specialized with respect to the  $\pi_1$  technology only. This specialization, although not modeled, can take the form of skills or location.

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<sup>2</sup>Parente and Prescott use the term free enterprise arrangement in place of competitive arrangement.

The monopoly right is protected by the state. The state protects this right by erecting barriers to entry by firms using the superior technology. In the Parente and Prescott model this barrier is modeled as a resource expenditure whereby a group that enters an industry with the  $\pi_2$  technology must expend  $\phi N$  units of labor to overcome resistance to the use of the  $\pi_2$  technology. This is just one form in which the barrier could take. Another form of barrier is subsidies to existing firms in an industry. As we shall document below, subsidies are an important barrier to entry by firms with better technologies in Russia.

If a firm has entered with the superior technology in the period, then any firm in the economy can use the superior technology in the next period without having to expend any resources. Effectively, a firm that overcomes the resistance to entry in an industry paves the way for any firm to enter that industry with the superior technology. This implies that an entrant with the superior technology can earn positive profits for a single period.

As long as no firm has entered with the superior technology prior to the current period, there is a game between the industry insiders and the potential entrant. These players take as given the demand for their industry's product as well as the competitive wage rate in the farm sector. These elements can be taken as given because each industry has measure 0, and so none of its actions have a consequence for the demand for its product or the competitive wage rate.

The game consists of three stages. In the first stage members of the group of industry insiders from the previous period decide non-cooperatively whether they want to be part of the coalition with monopoly rights in the current period or move to the farm

sector. Leaving is voluntary, so stayers and leavers must realize equal utility. As in Parente and Prescott side payments are ruled out so industry workers must earn a wage rate equal to the agricultural wage if some workers leave. The coalition also decides whether to admit new members. New members are entitled to the same payment as those industry insiders who remain in the industry. The coalition size in the  $i^{\text{th}}$  industry,  $N_x(i)$  thus is the sum of those factor suppliers working in the industry from the previous period less the number of these individuals who voluntarily leave plus new members. At this stage of the game, the coalition size for the period is set, and an individual who is part of this group is committed to working in the industry in the period.

In the second stage of the game, a potential entrant decides whether to enter the industry with the superior technology. If the potential entrant does not make the necessary expenditure needed to overcome resistance, then in the third stage of the game the coalition chooses the wage to be paid for its member services and the work practices. If the potential entrant overcomes the resistance then in the third stage the group of industry insiders chooses the wage and work practices and the entrant chooses the price. The potential entrant can hire any amount of labor at the competitive farm wage rate. Consequently, the potential entrant has infinite capacity and marginal cost  $wa/\pi_2$ . The coalition, in contrast, has finite capacity  $\pi_1 N_x(i)$  and zero marginal cost.

Let  $D_i(p(i))$  be the total demand for the  $i^{\text{th}}$  industry's product in the current period. Total demand is the sum of the demand for the industry's good from farm sector workers, industry sector workers, agricultural firms, and groups of entrepreneurs. In the case that a group of industry insiders has monopoly rights and successfully deters entry, the group sets the compensation rate,  $w_x$ , and work practices,  $\pi_x$ , such that

$$w_x = (w_a/\pi_0) D(w_a/\pi_0)/N_x, \quad (3)$$

$$\pi_x N_x = D(w_a/\pi_0). \quad (4)$$

Effectively, by choosing this compensation rate, the coalition ensures that the market price of the industry's product is  $p = w_a/\pi_0$ . The price  $p = w_a/\pi_0$  is the highest price that can be charged for the  $i^{\text{th}}$  industry's product without bringing about entry by agents using the back-up technology, and generates the highest industry revenues. This follows from the assumption that demand is price inelastic. Through its choice of member compensation and work practices, the coalition, effectively, is able to earn monopoly profits in the form of wages.

A necessary condition for the group to deter entry is that the period profits of the entrant are less than or equal to the cost of overcoming resistance. Because the coalition is committed in the industry, the potential entrant can correctly anticipate that the coalition will produce  $\pi_1 N_x(i)$  units of the good, so that the entrant will sell  $D_i(p(i)) - \pi_1 N_x(i)$  units of the good. The entrant can produce any quantity of the good at a marginal cost equal to  $w_a/\pi_2$ . Thus, entry is deterred if the

$$\max_{p^e} \left\{ \left( p^e - \frac{w_a}{\pi_2} \right) (D_i(p^e) - \pi_1 N_x) \right\} \leq \phi w_a N. \quad (5)$$

A necessary condition for the group to exist and deter entry is that the compensation of coalition members exceeds the agricultural wage rate,  $w_x(i) \geq w_a$ .

The game is repeated in a given industry in every period as long as there has not been entry by a group of entrepreneurs with the superior technology in a prior period. The only potential difference in the game in different periods is the demand faced by the coalition and the potential entrant. This is because in those industries in which entry is

not deterred in some period, the industries are characterized by non-competitive elements in the period of entry and perfect competition thereafter.

### *Competitive Arrangement*

In this case there are no monopoly rights. Consequently, any firm with the superior technology can enter an industry without having to expend any resources since without monopoly rights there are no barriers to entry. All product and labor markets are competitive and the superior technology will be used in all industries starting in the first period. Moreover, in the competitive equilibrium workers in industry earn the same wage rate as workers in agricultural. The productivity of a worker in industry is  $\pi_2$ .

## F. Equilibria Under the Alternative Arrangements

Parente and Prescott proceed to characterize symmetric equilibria under both types of arrangements. Essentially, under full competition the most innovative technology is used in all industries whereas under the monopoly arrangement the most innovative technology is typically not used in any industry. Instead, the inferior technology is operated inefficiently in all industries. Equilibria in which all industries are either characterized by monopoly rights or by perfect competition are not the only ones possible. In fact, for empirical purposes, it is useful to think of societies differing in the fraction of industry that operates under the monopoly arrangement, with the United States being at one end of the spectrum.

We now proceed to empirically restrict the model and use it to describe the economic performance of Russia and China relative to the United States. This we do by

assigning parametric values so that the equilibria of the model match certain aspects of these economies in the 1990s.

### III. Interpreting the Russian and Chinese Experiences

#### A. Socialism

We interpret socialism in the former Soviet Union and China prior to market reforms to be an allocation to industry using inferior technology of individuals with certain rights to industry. More specifically, we interpret socialism to be an allocation that is similar to the monopoly rights equilibrium. We say similar because although the state set industry employment, wages, and productivity, there is nothing that leads us to believe that these elements are exactly the same as those implied by a decentralized economy with monopoly rights. For the purpose at hand, it is not essential that we take a definitive stand on how this allocation was determined.

#### B. Capitalism

We interpret the productivity differential between the United States and Russia under capitalism to be the consequence of Russia having a larger fraction of industry under monopoly rights compared to the United States. For the purpose of the model calibration that follows, we assume that the fraction of industry under the monopoly arrangement is zero in the United States and one in Russia. This assumption is not critical to the results we subsequently establish. It is the easiest case to analyze. The entire argument that is set out in the next section is valid for any partition of industry between competitive and

monopoly arrangements. The choice of the partition only changes the parametric values in the calibration.

We interpret the current state of Chinese industry under capitalism to be essentially competitive and not monopolistic in nature. We attribute the current industrial productivity differential between the United States and China under capitalism to be the primary consequence of China not being able to jump to the frontier technology in one single step. In a sense, this reflects the fact that Chinese industry under socialism operated an extremely low technology, far inferior compared to Russia under socialism. Given that technology operated in the Soviet Union was not so low relative to the U.S. technology, we see it reasonable to assume that Russia could reach the U.S. technology level in a single jump. For China we do not see this as reasonable. Given the abstraction of the model, namely there are only two technologies in addition to the backup technology we, therefore, interpret the superior technology adopted,  $\pi_2$ , by Chinese industry under capitalism to be less than the U.S. technology.

For Russia under capitalism, there is also the issue of which individuals currently in industry, namely workers or management, are the main beneficiaries of the monopoly right. This issue is not critical to our theory. Clearly, within any group of industry insiders, individuals will differ in their bargaining power, and so the monopoly profits will not be shared equally. Wage arrears in the latter part of the 1990s have been a major problem, which suggests that managers and not workers are the main beneficiaries of monopoly rights. (See Desai and Idson 2000 for documentation of this phenomenon.) The fact that workers have chosen to remain in these industries suggests that their expected earnings are still higher than the alternative wage they could earn.

## C. Some Empirical Support

Before proceeding with the model calibration, we offer some empirical support for our interpretations of Chinese and Russian performance under capitalism.

### *Russia*

Strong support for our interpretation of Russian performance under capitalism comes from the 1992 report of the *Anti Monopoly Committee*. As summarized by Friebel (1995), the Anti Monopoly Committee concluded that privatization in Russia had failed to generate competition. The report concluded that most privatizations had resulted in the replacement of state monopolies with private one. Whereas the government had some control over the behavior of these monopolies, it now had very little power to intervene in the operations of the private monopolies.

Trade organizations from socialism were left intact. Friebel (1995) attributes this in part to the use of leases as the primary method through which buy-outs occurred in Russia. The parties involved in the negotiation of a lease were the directors of the enterprise, who were the workers' collective under socialism, and their superiors at the state ministries. Under this system, workers from socialism became the main contract partner of the lease. Moreover, the state's refusal to lease any property that had not been used commercially prevents entry by outsiders.

Additional support for this interpretation is provided by the McKinsey Global Institute's 1999 study on Russia's economic performance. In analyzing the performance of 10 industries, the McKinsey study found the protection of job rights to be present in almost all industries. The study documents the low productivity in each of these

industries. Part of the reason why productivity is so low is that there are a large number of excess workers in each industry. Whereas demand for these industries products had decreased by nearly one-half since the transition, the workforce in these industries fell by only 20 percent. In hotels, for example, key handling and surveillance is carried out by the *dezhurnayas* located on each floor.

The conclusion of the McKinsey study is that the state uses asymmetric regulation to protect less productive firms in an industry from competition from more productive firms. The report lists five ways by which the state has protected individual industries from entry. These are: different effective tax rates paid by companies in the same industry, preferential access to land and government procurements, different energy prices paid by companies in the same industry, differential enforcement of legal and bureaucratic codes, and differential access to government control export-infrastructure. In the confectionary industry, the government effectively bans best-practice firms from laying off excess workers. In residential construction, government contracts are typically given to only firms that guarantee no layoffs. Large retail formats are banned on the grounds that such formats will destroy jobs in small shops and open markets. In the steel and cement industries regional and municipal governments keep obsolete plants afloat through energy subsidies because such plants are often the only major employer in a town. The result of this protection is that entry by firms with better technologies is infrequent and managers and investors of existing firms do not upgrade their plants.

### ***China***

In China, the state has not been nearly as aggressive in protecting job rights of workers in state owned enterprises. An informative example of this was reported in the New York

Times from August 31, 2000. The article describes a number of incidences of worker protests in China to planned layoffs at former state owned enterprises now under foreign ownership. The article reports that foreign managers were taken hostages in one case. In another case, the article reports that several workers at the Red Lion Paint Factory in Beijing attempted suicide after the factory's communist party secretary sided with the owners of the plant. The response of the state to worker's protests at the Red Lion Factory is typical to other similar protests that have arisen from privatization. The state in China has not provided much protection of job rights given under central planning.

Chan (1998) presents a large amount of evidence of the complete lack of workers' rights at so-called township and village enterprises and foreign funded enterprises. Many of these workers are migrant workers, and as such are required to obtain a temporary residential permit from the local police station and a work permit from the local labor bureau. The work permit requires a lump-sum payment that is often paid by the factory where the worker will be employed as an advance. This gives rise to a system of bonded labor. According to Chan, factories devise their own sets of arbitrary rules often in conflict with Chinese labor laws. Factories levy fines for violation of any these rules that cover tardiness, sick days, talking on the job, and loitering outside work hours. They circumvent minimum monthly wage laws by forcing workers to work overtime below the minimum wage, in clear violation of Chinese labor rules regarding number of days a worker is entitled to have off per week. Companies use private security guards often connected with the local police to intimidate and control workers.

## D. Model Calibration

In this section we calibrate our model economy so that the equilibrium under a competitive arrangement represents the main features of the U.S. economy and the equilibrium under the monopoly rights arrangement resembles Russia under capitalism. In this context, and as discussed before, we think of China as having a competitive arrangement with a worse technology (and perhaps lower factor endowment) than the other two countries. We do not calibrate the model to the Chinese experience however; the calibration to the relative experiences of Russia and the United States is sufficient to establish the point we wish to make about the transition process.

Before assigning values to the model parameters it is necessary to specify the empirical counterparts to the model economy. Although we have labeled the two sectors of the economy as the farm sector and the industrial sector, we do not take such a narrow interpretation in the calibration. More specifically, for the purpose of the subsequent experiments the empirical counterpart of the agricultural sector includes goods and services produced and consumed by the household sector. This output is not part of measured income in the national accounts.

Additionally, it is necessary to specify the empirical counterpart of a period in the economy. A period in the model represents the time it takes for a market penetrated by an entrant with the superior technology to become perfectly competitive. In light of this we define a period in the model to be a decade. It turns out that the equilibrium allocations and prices are independent of the period length. However, by setting the length to a decade, we can treat the transition as an instantaneous adjustment from socialism to capitalism. This simplifies the analysis undertaken in the next section.

There are twelve parameters in the model. They are preference parameters:  $\beta$ ,  $\gamma$ , and  $\theta$ , industry technology parameters:  $\pi_0$ ,  $\pi_1$ , and  $\pi_2$ , agriculture technology parameters:  $\alpha$ ,  $\rho$ ,  $\sigma$ , and  $\psi$ , and policy parameter,  $\phi$ . As described in Parente and Prescott (1999) the intertemporal substitution preference parameters,  $\beta$  and  $\theta$ , are irrelevant for the experiments. Moreover, only the ratios  $\pi_2/\pi_1$  and  $\pi_1/\pi_0$  matter and for this reason  $\pi_0$  can be normalized to one. This leaves nine parameters whose values must be assigned.

In addition to these nine parameters, the initial state of the economy given by the size of the industry insider group must be specified. The initial number of industry insiders is only relevant for the economy in which there are monopoly rights. One possibility is to set this number to industrial employment in industry at the end of socialism in Russia. There are two problems with this approach. First, it is not obvious from industrial employment numbers from the Soviet Union which individuals had certain rights. Some individuals were surely in a stronger position than others, and some individuals were in industries where those rights could be easily transferred to a capitalistic system. Second, the Parente and Prescott (1999) model does not allow for a mechanism by which the initial size of the group of industry insiders can be reduced. As a matter of fact, a significant number of individuals in Russian industry lost their jobs with the switch over to capitalism. For these reasons, we assume in the numerical experiments that the number of individuals at the end of socialism in industries where monopoly rights could be acquired is just the number of individuals employed in the state-sector and  $1/3^{\text{rd}}$  of all those employed in the rest of industry in Russia under capitalism. We note that the subsequent results are not sensitive to this particular assumption.

The set of empirical conditions used to restrict the model parameters is listed in Table 3. Due to the lack of good data in Russia, the observations listed in the table are taken from a number of different years and sources.

Table 3: Restricted Equilibrium Outcomes

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1. Per Capita Output in Russia Relative to US	0.20
2. Industrial Sector Employment in Russia	0.60
3. Industrial Sector Employment in the US	0.95
4. Relative Industrial to Agricultural Wages in Russia	1.15
5. Productivity of Industrial workers In Russia relative to US	0.07
6. Actual relative to full Potential Productivity in Russia	0.50
7. Intermediate Goods' share of total Farm Output in Russia	0.20
8. Intermediate goods' share of total Farm Output in US	0.90
9. Land's share of agriculture output in the US	0.14
10. Period length	10.0

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A few additional comments regarding some of the observations are warranted. The relative output for the two countries is based on 1997 estimates of Russian and U.S. per capita GDPs of 15 percent. To this estimate we have adjusted for the greater role of home production in Russia. Work by Desai and Idson (2000) suggests that both informal activity and home production in Russia have both increased significantly during the transition. For this reason, we see a relative output of 20 percent as reasonable.

Productivity of industrial workers in Russia relative to the United States corresponds to  $\pi_x/\pi_2$  in the monopoly rights equilibrium. The observation is taken from the McKinsey Global Institute Study (2000). The study reports actual productivity of ten Russian industries in 1997 to range from 7 to 38 percent of their counterparts in the United States. Actual to relative full potential productivity corresponds to  $\pi_x/\pi_2$ . This observation is also taken from the McKinsey Report. The study reports that, on average, productivity of Soviet legacy assets could be increased to 65 percent of U.S. productivity

if minor investments were made and modern forms of organization introduced. For the purpose of this paper, only the productivity increase associated with changes in organization are relevant. For this reason, we see 50 percent as a reasonable number for the potential productivity of current Russian technology relative to U.S. technology.

The industrial sector employment outcome for the monopoly rights equilibrium corresponds to the state sector's employment share in Russia in 1994 as reported by Gomulka (1998, Table 2.1) plus 1/3<sup>rd</sup> of employment in the non-state industrial sector. The industrial sector employment share for the competitive equilibrium corresponds to non-agriculture's share of employment in the United States in 1995 from the *2000 Economic Report of the President*. Relative wages are for 1990 as reported by Sachs and Woo (1994) for Russian workers in 1990.

Observations (8)-(10) are specifically used to restrict the technology parameters in the agriculture production function outcomes. The production function implies the same share of land rental income in agriculture between the monopoly and competitive economies. For this reason there is no observation pertaining to Russia reported in the table. For intermediate goods' share of total farm output, we use .90 for the competitive economy. We arrive at this number by considering the values of fertilizer, fuels, seeds, irrigation, and depreciation on farm equipment in the United States. Since there is no capital in the model, depreciation of farm equipment is treated as an intermediate good. For the monopoly rights equilibrium outcome we use an intermediate goods' share of .20. We see this as a reasonable number for the Russian economy in light of the greater prevalence of home production there.

There are ten observations listed in Table 3 that are relevant for the calibration. There are nine policy, preference and technology parameters to the model. The initial size of the industry insider group and the period length are also parameters of the model. This brings the total to eleven parameters. The discrepancy between parameters and observations is resolved by setting the state protection parameter,  $\phi$ , so that the initial size of the industry group is the minimum one that deters entry in the equilibrium with monopoly rights.<sup>3</sup>

Before turning to the transition process, we note that our theory is quantitatively plausible on a number of dimensions. First, our theory offers a plausible explanation for the decline in productivity that is associated with transition to a market based economy in Russia. According to McKinsey (2000), Soviet legacy assets were roughly 30 percent as productive as U.S. assets in 1992. Over the next 5 years, the productivity of those assets decreased by 50 percent. In terms of the model, the relative 1992 productivity data implies industry work practices under socialism were 60 percent of their full potential in the model and were 30 percent of their full potential in 1997. According the model, the productivity of industrial workers under capitalism is roughly 20 percent of the full potential. The model, therefore, implies a decrease in productivity close to the observed decrease in productivity. Second, our theory offers a plausible explanation for the excess workers in Russian industry documented by the McKinsey Global Institute. According to this study roughly 30 percent of workers in the industries studied were considered to be excess workers. The model predicts slightly larger number equal to 57 percent.

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<sup>3</sup> The calibrated parameters are as follows:  $\pi_0 = 1.0$ ,  $\pi_1 = 7.5$ ,  $\pi_2 = 15.0$ ,  $\phi = .04$ ,  $\alpha = .86$ ,  $\psi = .23$ ,  $\mu = .50$ ,  $\rho = .72$ ,  $\sigma = -.50$ , and  $\gamma = -.11$ .

## IV. Transition to the Monopoly or Competitive Arrangement

### A. A Prisoner's Dilemma

To account for the evolution of the different arrangements in Russia and China, we begin with the following situation described in Table 4.0. The situation allows an arbitrary industry to behave monopolistically or competitively in the case where either the rest of industry is monopoly or is competitive<sup>4</sup>. Table 4.0 lists the payoff defined in terms of normalized lifetime utility associated with the individual in the  $i^{\text{th}}$  industry under each scenario. It is clear that there is a prisoner's dilemma problem associated with this game. From the individual industry's point of view, the only rational choice is to become a monopolist regardless of what the other industries do. This implies that the only Nash equilibrium of a game like this is for all industries to behave monopolistically. However, the fact that the payoff to an individual in industry when all industries including the individual's own are monopolies is smaller than the payoff when all industries including the individual's own are competitive, implies agents working there would be better off if industries could coordinate in be competitive.

Table 4.0 Rewards from Industry Specific and Economy Wide Arrangements

		All Other Industries	
		Mply	Comp
$i^{\text{th}}$ Industry	Mply	.15	1.2
	Comp	.14	1.0

<sup>4</sup> There could be of course a whole set of other possibilities of combinations of monopolistic and competitive industries. For our purposes it is enough to consider the two extremes.

The question is how to implement such an outcome. One answer is through a central government that is capable of preventing industries from behaving monopolistically. The existence of such a government should not be taken for granted. First it should not be in the hands of a subset of the industries in which case it will not enforce competitive behavior. This is our explanation for the success of China and the failure of Russia. In the rest of the section, we explain how the following payoffs were derived. In doing so, we show how the transitions of the former socialist countries can be represented as a prisoner's dilemma type of problem. After that, we proceed to put forth evidence that shows that China's government was more likely to be in a position of enforcing an all-competitive arrangement compared to Russia's government.

## B. Transition

The transition in our model is an instantaneous event, whereby the central planning mechanism is abandoned and a capitalistic mechanism is established. The reason we can view the transition as an instantaneous event is because a period in our model is roughly a decade. As part of this event, the individuals allocated to industry under socialism determine whether it is in their interest to acquire monopoly rights in their industry. We now proceed to calculate the earnings of individuals in the  $i^{\text{th}}$  industry for the case where the rest of industry is competitive and the case where the rest of industry is monopolistic. The calculations are based on the calibrated model economy of the previous section. For this reason, the transition we study corresponds to the Russian case. We note, however,

that we were to derive the payoffs for the parameterized model restricted to match China under capitalism, we would find the same prisoner's dilemma problem.

### **B.1 Economy-Wide Monopoly Arrangement**

The relevant outcomes for the purpose of computing the payoffs of an individual in the  $i^{\text{th}}$  when the rest of industry is monopolistic are those associated with the monopoly rights equilibrium. This is because each individual industry has measure zero. If the group of  $N_x(i)$  insiders in an industry acquires monopoly rights, then they earn the industrial wage earned by workers with monopoly rights in the other industries. For our calibrated economy, this wage rate is 15 percent higher than the competitive wage rate. The productivity of such a worker is 1.15, which is only 7 percent of the full potential associated with the superior technology. The coalition membership size is just the initial number of workers in the industry.

If the group of  $N_x(i)$  insiders in an industry does not acquire monopoly rights, then they earn the competitive wage rate earned by agricultural worker. This is lower than the wage rate that industry workers in monopoly industries earn, despite the fact that such workers in the  $i^{\text{th}}$  industry have a productivity that is roughly 15 times higher compared to the rest of industry. Not all individuals remain in the industry. In fact, the zero profit condition implies 11 percent of the workers that start in the industry leave the industry.

## B.2 Economy-Wide Competitive Arrangement

The relevant outcomes for the purpose of computing the payoff's of an individual in the  $i^{\text{th}}$  when the rest of industry is competitive are those associated with the competitive equilibrium. Again, this is because each individual industry has measure zero. The earnings of an individual that starts off in the  $i^{\text{th}}$  industry should that industry acquire monopoly rights and deter entry when the rest of industry is competitive is more than 3 times larger than the competitive wage rate. The productivity of workers in the industry is 3.14, and membership size is 1.40. The large membership size is needed to deter entry. This is due to the fact that when all other industries are competitive, the demand for the  $i^{\text{th}}$  industry's product is high. Monopoly rights become more valuable, but so does entry. Consequently, the group of industry insiders that started out in the industry needs to add a substantial number of members to deter entry.

If the group of  $N_x(i)$  insiders in an industry does not acquire monopoly rights they earn the competitive wage rate, which is the same for industrial and agricultural workers. By being competitive, the productivity of workers in the  $i^{\text{th}}$  industry under this scenario is 15. There are .95 workers in industry.

## B.3 Payoffs to $i^{\text{th}}$ Industry Insiders

Table 4.1 summarizes the earnings of an individual in such a group under the possible scenarios. These are not the payoffs reported in Table 4.0 because prices differ between the monopoly and competitive equilibrium outcomes. Consequently, comparisons in Table 4.1 cannot be made across rows. For this reason we proceed to a utility comparison of an individual who starts out in the  $i^{\text{th}}$  industry under the four possible scenarios. These are the measures reported in Table 4.0. The utility measures reported in Table 4.0 are

calculated as follows. First, we determine the factor by which the consumption of both the industrial goods and agricultural good of the worker in the  $i^{\text{th}}$  industry must be scaled up so his period utility equals the period utility he realizes in the case where all industries including his own are competitive. Next, we take the inverse of this factor. This is our measure of welfare. By construction the welfare measures are relative to the competitive economy, which has been normalized to 1.0 in the table.

Table 4.1 Wage Comparisons under the 4 Scenarios

		<u>All Other Industries</u>	
		Monop	Comp
$i^{\text{th}}$ Industry	Monop	0.78	6.53
	Comp	0.68	2.08

This analysis summarized in Tables 4.0 and 4.1 shows that regardless of the economy-wide situation, the members of each industry would prefer to acquire monopoly rights.<sup>5</sup> Given that an individual industry's demand is increasing in the measure of industries that are competitive, this finding extends to the case where only a fraction of the industries are competitive. Thus, regardless of the measure of industries that are competitive, each individual industry will want their own industry to be monopolistic. These results are robust to values of the technology parameters,  $\pi_0$ ,  $\pi_1$ , and  $\pi_2$ , provided the level of protection is sufficient so that the monopoly equilibrium exists.

<sup>5</sup> The above analysis implicitly assumes that industry insiders can easily organize and obtain rights over all firms that operate in their industry. Should they be unable to do so, they would not be able to realize monopoly profits. For Russia, given the structure of industry that we discuss in Section 5, this was surely not an issue. For China, it was probably more of an issue.

## V. Relative Strength of Central Government and Industry

Our theory attributes the evolution of a monopolistic arrangement in Russia to a weak central government and strong industries there at the start of the transition. In China, the competitive arrangement evolved because of a strong central government and weak industries. We now provide some evidence to support these views.

### A. Industry Strength

Industry in Russia at the start of transition was fairly powerful on account of Soviet planning which concentrated heavy industry among a small number of huge plants located in the same region. This strength was reinforced by a system that organized ministries along industries. In many cases, there was no economic advantage with locating an industry in a particular region. Entire towns, in fact, owed their creation and existence to the placement of industry by the communist leaders. These company towns were likely to become ghost towns if competition by new entrants were allowed. This fact was not lost on regional and municipal authorities. Central planning in China, in contrast, proceeded in an entirely different manner. The plan of China's communist leaders going back to 1958 was to make regions in China self-sufficient. For this reason, production was spread out among a large number of small factories located throughout the country. In addition, China had a far smaller heavy industry sector relative to Russia at the start of the transition.

## B. Central Government Authority

The argument that the central government in Russia is much weaker compared to China has been strongly made by Blanchard and Schleifer (1999). As part of this argument, they point out that governors in Russia are elected in local elections, and, therefore, cannot be replaced by the central government. In contrast, central authorities in China have the ability and have used this ability to remove local authorities that resisted reforms.

The removal of uncooperative local authorities by the central government is indicative of the top-down process of reform in China. This is not to say that local governments have been opposed to reform and growth in all cases. According to the World Bank (1995), economic reform in China has been as much as a top-down process as a bottom-up process. However, when needed, the central government has stepped in to prevent the growth process from being derailed by the actions of local governments. While it is true that power has generally been decentralized, with local authorities making more decisions particularly over state owned enterprises (SOE's), there has been re-centralization of power at several instances over the transition. For instance, in the Third Plenum in 1994, the central government made a point to control over investment at SOE's. This it did by reigning in non-circumspect lending by state banks to state-owned enterprises. Third Plenum document went on to state the central government's intention to impose uniform laws. The document also describes the central government's intention to relieve SOE's of their social obligations through deeper social security and housing reforms.

Young (forthcoming) provides more evidence of the importance of the authority of the central government in China in preventing local regions to derail economic

development. Young describes the interregional trade wars in the late 1980s and early 1990s. The source of these wars was centrally controlled prices during that time that created a large wedge between prices of final goods and their inputs. These high economic rents led to the growth of rural industries and economy-wide overcapacity. Once central price controls were relaxed and the high rents were eliminated, rural producers faced the prospect of exit as the economy was characterized by over capacity and rural producers tended to be less efficient. Provincial, county and even city governments reacted to this prospect by erecting barriers to interregional trade. Young describes the large variety of barriers erected by these regional governments to protect industrial interests in their local in such product markets as textiles, automobiles, trucks, perfumes, beverages, household electrical appliances, electrical machinery, bicycles, pens, alcohol, powders and soaps, tires, tractors, engines, processed foods, and food flavorings.

That local governments reacted to this situation by erecting barriers to trade is not a surprise. What is relevant in the context of our theory is the response of the central government to these interregional trade wars. As Young reports, the central government responded to these developments in three ways: by sending out central task force to mediate disputes among regions, by establishing a *Ministry of Internal Trade*, the purpose of which was to encourage circulation and distribution, and by sending out a large number of circulars and directives against interregional trade barriers. These circulars and directives were issued by the State Council, by the Party Congress and by the People's Congress.

## VI. Conclusion

In this paper we have provided a theory to account for the opposite economic experiences of Russia and China under capitalism. In our theory, the key impediment to economic growth is whether factor suppliers to the current production process acquire monopoly rights. In Russia, industry groups left over from socialism successfully acquired such rights because the central government was relatively weak. The result has been a period of economic stagnation. In China, in contrast, such groups failed to acquire such rights on account of the central government being relatively strong there. The result of this has been rapid growth, close to 10 percent per year. The current failure of Russia does not necessarily mean that it is doomed forever. As the level of the superior technology increases, it becomes necessary for the state to increase the protection it affords to an industry with monopoly rights. In the case of Russia, much of this protection is in the form of subsidies from the energy sector. Eventually, the size of the subsidy that must be given to each industry in the form of protection will become infeasible. When this protection ends, capitalism in Russia will be a success.

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