

To Restructure or Not to Restructure: Informal Activities and Enterprise Behavior in Transition*

Clifford Gaddy[†]

The Brookings Institution

Barry W. Ickes[‡]

Pennsylvania State University

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Abstract

We analyze the process of restructuring in Russia. The Russian economy is bifurcating as some enterprises restructure and reduce the distance to the market, while other enterprises exploit relationship capital to survive without restructuring. Survival in this environment depends on initial conditions and on investment in relations with officials. Enterprises can produce cash and non-cash goods, and this choice effects the survival possibilities in subsequent periods. Implications of the theory, with special reference to monetary policy, barter, intergovernmental fiscal relations, and Financial Industrial Groups, are discussed.

1 Introduction

Although Russia appears to have achieved financial stabilization and formally privatized most of the industrial sector the pace of economic restructuring is still grossly inadequate to ensure stable economic growth: Evidence of the lack of restructuring is abundant. Russian enterprises still employ far more workers than warranted by their level of output.¹ Investment continued to decline last year, bringing the volume of capital investment for 1997 to less than 24% of its 1990 level [8, 37].² Aggregate

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[†]Email: cgaddy@brook.edu

[‡]Email: bwickes@psu.edu

¹While officially measured GDP has fallen by more than 40% during the 1990's, employment has fallen about 25%.

²See also *Interfax Statistical Report*, no. 4, 1998. Although some decline in investment-GDP ratio was a necessary response to the excessive rates of the Soviet period, this seems to be an over-correction. This is evident in the aging of the capital stock. In 1980 the average age of plant and

real profits in industry were down again in 1997. By now, the share of manufacturing enterprises that show no profit at all is approaching 50%. Meanwhile, enterprises continue to trade with one another without the use of money – either by not paying each other at all or by using nonmonetary means. Estimates of the share of sales made in the form of barter or other nonmonetary forms range as high as 70% (see 2.1). At the same time Russia suffers from a fiscal crisis. Low collection rates combined with tax offsets results in shortfalls of revenue that have caused delays in IMF disbursements.³

In short, rather than recording success in adapting to the marketplace, Russia's enterprise sector shows every sign of moving away from it. These facts are clearly recognized at the highest levels. In his most recent State of the Nation message Boris Yeltsin told his listeners that:

"The Russian market is still crammed with barter deals and is suffocating on mutual arrears. Enterprises live on borrowed resources, yet are unwilling to pay debts. Reasons are many. One key reason is that the budget is unrealistic. *This country is an economy of irresponsible debtors.* This practice is fallacious. Continuing it is unacceptable. It is senseless and pernicious to try and dupe the economy (emphasis added)."

What explains the failure of Russian enterprises to restructure? One argument that is often given is the inadequacy of Russian management. Recently Boris Nemstov argued that Russia "is now short not only of money but also of well-trained executives. All positive macro-economic gains achieved in Russia over the past few years will fall flat unless enterprises are managed properly."⁴ Boris Yeltsin made the same argument when he called for 5,000 managers annually to be sent to the West for training. The essence of this argument is that the lack of restructuring is due to inadequate management. An alternative explanation is that managers are rational and that the environment induces them to postpone (avoid) restructuring.

We argue that this is not due to irrationality or ignorant enterprise directors. Rather, the incentives that directors face support the behavior we observe. Russia

equipment was 9.5 years; in 1995 it was 14.1 (See table). This is all the more ominous given the fact that in the Soviet period replacement rate were very low, and capital was kept in place until physically obsolete.

³In the first quarter of 1997 the Russian government collected about 69% of projected tax revenues. This rose in the second quarter to 87% as Gazprom paid its tax arrears, but then it fell back to 52% in the third quarter (*PlanEcon*, Vol. XIII, 47-48, Dec 31, 1997: 12). For the year as a whole, the federal government collected only 65% of the taxes due during the year. By year-end the accumulated tax debt was enormous. Industrial enterprises were particularly egregious delinquents. The amount owed by industry on January 1, 1998 (112 billion new rubles) was equal to 46% of the sum remitted in taxes by industrial enterprises for all of 1997 (246 billion rubles). (*Interfax Statistical Report* no. 14 (Mar. 28-Apr. 3), 1998.

⁴Nemstov went on to argue that "the catchword 'cadres decided everything' is today no less urgent than fifty years ago." (Alexandra Akayeva, Moscow, December 22, RIA Novosti).

appears to be generating a dual economy. Alongside a modernizing private sector that is increasingly resorting to ADR's to finance investment, a paternalistic, unstructured, industrial sector continues to hang on, and even regenerate. The economy is bifurcating.

1.1 GDP Data: An Anomaly?

Russian government leaders point proudly to official statistics that show an increase in the nation's GDP last year - the first time since transition started. Is this evidence that restructuring has begun? Perhaps the opposite. Consider the following report on performance for the first half of 1997 (compared to the first half of 1996), Goskomstat asks us to believe that Russia outperformed Moscow during 1997:

Table 1: Performance in First Half of 1997 compared with First Half of 1996

	Russia	Moscow
GDP	-0.2%	-4.5%
Industrial output	+1.2%	-4.9%
Capital investment	-8.4%	-18.9%
Retail sales	+0.5%	-0.1%

source: Russia, *Ekonomika i zhizn*, no. 35, 1997; Moscow, *Ekonomika i zhizn*, (Moscow supplement), no. 25, 1997.

The paradox here is that if Russia is really on the road to recovery - if the point has been reached where GDP growth signals success in restructuring - then clearly Moscow should be leading the way. The fact that Moscow under-performs Russia indicates that this point may not yet have been reached. We suggest, rather, that what is happening is that the increase in industrial output is due to increased production in 1997 of what might be called "soft goods," that is, noncompetitive goods produced by precisely the category of enterprises we identify as the old, unstructured sector.⁵

Various pieces of evidence reinforce this picture of a largely unstructured sector attempting to hang on. In 1997, Russia's industrial enterprises produced more output and employed more workers that they did in 1996. At the same time, they were losing money at a faster pace than ever before. Industrial output in constant prices rose 1.9% in 1997, while overall unemployment fell. In industrial enterprises underemployment (short working days or weeks and involuntary leaves) decreased by 32% in the first three quarters of 1997 as compared with the previous year. And large and medium-sized industrial enterprises hired 6.6 million new workers in the first 9 months of 1997;

⁵The argument that the apparent improved performance is due to increased production of soft goods is buttressed by the fact that beginning in July, Goskomstat explicitly attributed the overall increase in industrial output to growth in the large and medium-sized enterprises. See Goskomstat's monthly reports for August 1997 (in *Interfax Statistical Report*, vol. 6, no. 41, October 3-10, 1997) and September (*Interfax Statistical Report*, vol. 6, no. 42, Oct. 10-17, 1997).

as a percentage of payroll this was a higher rate than for the same period in 1996. Meanwhile, real profits fell by 5% in 1997, and the share of industrial enterprises reporting net losses was 47.3% in October 1997, up from less than 27% in 1995.⁶

Why do enterprises hoard labor? An important explanation is paternalism. In a survey conducted by the Russian Economic Barometer, 60% of enterprises reported that they had surplus labor in 1995-6. Fully 71% of those surplus-labor enterprises explained that the reason they kept the unneeded workers was social responsibility.⁷

And what about the profit motive? Privatization was supposed to create owners who would seek profits. Aukutsionek finds, however, that only 31% of enterprise directors mentioned profit as one of their top two goals in 1994, by 27% in 1995, and by 21% in 1996. In fact, in the fourth quarter of 1996, the percentage had dropped to 12%! (By comparison, in that quarter, 27% listed *maintaining or increasing employment* as a top priority; 59% mentioned *maintaining or increasing output*, and 65% listed *maintaining or improving the financial situation* of the enterprise. It was understandable that enterprise directors would act paternalistically in the early period of transition, but why does this continue?

So what's to explain all this, and what can be done about it? The Russian economy is bifurcating. Some enterprises are moving towards the market, but others are moving in the direction of the informal economy. This is the direction of barter, tax offsets, and survival. The goal of the paper is to explain the factors that propel enterprises in both directions.

2 Formal and Informal Activities: Cash and Non-cash Production

Studying the Russian economy today is similar to examining an iceberg. Above the surface one views only a part of the object, and to confuse this part with the whole is misleading and dangerous. In the case of the Russian economy what lies above the surface are the formal activities of enterprises. The product of formal activities are what show up in official statistics and what result in the cash payment of taxes.⁸ But below the surface Russian enterprises also engage in informal activities. Enterprises engage in informal activities as a means of survival in the transition, and as a response to the structure of taxation and the weak system of corporate governance.

Informal activities take various forms but the key aspect of them is lack of transparency. Formal activities are exemplified by the world of contracts. Informal activi-

⁶All data are from *Goskomstat* as reported in *Interfax Statistical Reports*, nos. 14, 51/52: 1997, 4: 1998, and 5: 1998.

⁷Expectation of growth in demand and high redundancy costs were the next highest explanations (Aukutsionek 1997: 305).

⁸Actually *Goskomstat* adjusts official statistics to include an estimate of the informal sector. This involves scaling up officially recorded output.

ties may also utilize contracts, but if so in form rather than substance. To engage in informal activities an enterprise requires proper relationships with other enterprises.

Informal activities are not unique to Russia. What we analyzing here is the peculiar Russian phenomenon of producing and exchanging goods and services in a parallel, noncash economy. In many countries informal activities mainly take the form of cash payment under the table. While this form of informal activity is also widespread in Russia, the informal activities we are concerned with are paid for with nonmonetary means of payment.

Formal activities require greater investment in physical and human capital to produce new goods. Informal activities require greater investment in *relational* capital.⁹ This suggests that firms which find themselves strapped for funds would invest more in informal activities. Lack of credit could affect the balance between the two strategies.

The simplest way to think about formal and informal activities is in terms of the means of payment. We view enterprise directors as facing a menu of actions, that we divide into cash and non-cash production.¹⁰ The key distinction is whether the enterprise receives money or goods as payment.¹¹ This is similar, but not exactly the same distinction as formal and informal profit seeking activities.¹² We will also refer to the production of hard (formal) and soft (informal) goods. The key distinction is whether the enterprises sells for cash or not.

It is important to note that informal activities can involve various types of non-monetary transactions, such as barter or payment of taxes in-kind. It also includes the use of promissory notes such as *veksels*. The key point about such transactions is that they occur outside the formal monetary system. This has the important effect of making such transactions much less observable.

⁹A critical type of these investments is in relations with local government officials. An enterprise like *Severstal* or *Novolipetsky* invest in local politicians to protect against outside investors. This is most important in these cases because they have marketable output. The fact that IPS lets them keep excess workers helps with local governments.

¹⁰This is different from *beznalichnye* (non-cash money) and *nalichnye* (cash money). Most of what we refer to as cash production earn revenue in the form of *beznalichnye*. The distinction between cash and non-cash production refers to whether receipts are monetary or not, not on the *type* of money that is received.

¹¹Although when enterprises pay taxes in kind their behavior is observable, yet these are informal activities. In particular, they depend on the quality of enterprise relationships.

¹²According to [4] informal profit-seeking activities refers to the production of wealth that can be hidden from official view. The informal activities that we discuss may or may not be hidden from official view. For example, an enterprise may pay its taxes with offsets. This is not a hidden activity. Using barter to evade payments to shareholders would be. The key point in the current context is whether or not the transaction is paid for with money.

2.1 Barter

The growing importance of barter in the Russian economy has been noted by many observers [1].¹³ In a 1994 survey of 150 Russian enterprises, Ickes and Ryterman found that the incidence of barter had increased from 5% of the value of transactions in 1992 to approximately 20% in 1994; [1] report a further increase to approximately 40% in 1996. A 1997 survey of 350 enterprises obtained a similar result: 42% was the reported share of sales that were conducted with barter.¹⁴ This growth in barter, and in other non-monetary means of payment, has led to a *re-demonetization* of the Russian economy [4].

Barter has been a part of Russia's transition economy virtually from the beginning. Initially, barter was considered to be a natural response by some enterprises to the high inflation that prevailed in Russia after prices were liberalized. Curiously, though, the incidence of barter has increased substantially as financial stabilization has proceeded. For this reason, the growth of barter has sometimes been attributed to a shortage of liquidity created by stabilization, as high real interest rates make it hard for enterprises to borrow. It is important to note, however, that the impetus to barter often comes from the seller [1]. This suggests that other motivations for barter may be at work.

An alternative explanation for the growth of barter focuses on its utility in enhancing the ability to survive Russia's onerous tax system. The first and most obvious use of barter in this regard is for tax evasion. A more subtle, and more peculiarly Russian, reason for barter is not to evade taxes, but to *pay* them - only not in cash.

As an alternative to monetary exchange, barter directly aids in tax evasion by avoiding the first line of tax collection. Transactions that flow through the banking system are available for collection by the State Tax Service for enterprises that are delinquent on their tax obligations. This provides a direct incentive for enterprises in arrears to avoid using money, as the effective tax rate on revenue is 100%.

Barter also plays a more direct role in tax evasion. The use of barter allows enterprises to record the value of transactions in ways that reduce overall tax incidence. By inflating their production costs, profitable enterprises can reduce their tax payments. Of course the other party to the transaction will have greater accounting revenues, but if this enterprise is a value-destroying enterprise, this will not result in increased tax liability.¹⁵

¹³It took some workers at a clock factory in Penza, a city 340 miles southeast of Moscow, three days to carry their salaries home. That's because the bonus was paid in toilet paper. Each worker got about 150 rolls. But workers had trouble "spending" the bonus: one woman tried to pay her rent in toilet paper, but municipal housing officials refused to accept it. (AP, November 4)

¹⁴See also the results of Aukutsionek (reported in [8, 116]) which gives very similar results. A recent government study of the 210 largest corporate tax delinquents (which account for 23% of the industrial labor force) found that they conducted 73% of their transactions in noncash form [7].

¹⁵We examine this more carefully in the appendix, where we consider two examples which show how loss-making enterprises can facilitate tax evasion through barter.

Of course barter is very costly; especially multilateral barter that requires the creation of chains of exchanges. This suggests that the tax wedge in Russia must be rather high. One means of reducing the costs of barter is through the use of *veksels* (promissory notes). These are notes issued by commercial banks, governments, and enterprises, and they serve as an alternative medium of exchange. The use of *veksels* has become widespread: by some estimates the outstanding stock is roughly about two-thirds of ruble M2 [8, 178]. Enterprise *veksels* are issued by large established firms (e.g., Gazprom, UES). These notes circulate among chains of enterprises that owe goods to the issuer. Eventually the note is redeemed by some customer of the issuer. They are particularly useful in relieving the problem of mutual nonpayments.

What makes *veksels* interesting in the current context is that they afford the enterprise a means of circumventing the tax authorities claim on bank deposits. Because *veksels* circulate outside the banking system an enterprise with a blocked account can make and accept payments and avoid taxation. While, in principle, receipts received in the form of *veksels* are taxable, the payments technology is such that the opportunities for evasion are much lower.

2.2 Tax Offsets: Noncash Production to Pay Taxes

The mechanism of tax offsets lies at the heart of the specific form of barter observed in Russia today. Russian governments at all levels are increasingly willing to offset enterprises' tax obligations against goods or services delivered to the government. At the federal level, the government cancels tax arrears or taxes due in lieu of payment for state orders. Local governments more frequently use offsets in exchange for services provided by enterprises. These cloud the division of revenues between local and federal governments. They may be a convenient method for local governments to capture a larger share. Tax offsets provide enterprises with the opportunity to play off one level of government with another.¹⁶

STS officials are typically captured by local governments and enterprises which supply services, etc. Payment of taxes in kind affords great flexibility to managers. Managers can pay taxes with in-kind services and tax offsets.¹⁷ The former are important for local taxes, the latter for federal taxes (in lieu of payments from the government).

Some idea about the magnitude of offsets can be seen from Table 2.

¹⁶Note that they can often facilitate the barter process. A hospital director in Kostroma suffered from a shortage of linens. Her response was to call a local textile producer and inquire into their tax situation. Of course the textile firm had outstanding local tax liabilities, so the hospital director arranged to have these offset in exchange for the delivery of linens to the hospital.

¹⁷Notice that the enterprise is often the monopoly supplier of the service. This results in lower effective taxation. Enterprises form organizations to coordinate offsets. In *Vologda*, the metallurgical combine, *Severstal*, set up the *Vologdachina*, headed by *Severstal's* financial director. This movement exists to perform offsets for the oblast budget. Notice that this is very important for the local government as well as the enterprise.

Table 2: Federal Tax Collection, 1995-1997
(trillions of 1997 rubles)

	Total taxes due	Taxes collected in cash	Taxes collected in non-cash form	Taxes not collected in any form
1995	366.0	189.9	59.5	116.6
1996	333.6	184.9	59.6	89.0
1997	333.6	134.7	94.9	104.0

In 1997, less than 60% of all federal taxes collected were paid in cash; the rest were in the form of offsets. In 12 of Russia's 89 regions, cash accounted for less than 40% of federal tax payments. These regions include some of the biggest taxpayers, and some regions with the biggest and most paternalistic enterprises: Nizhny Novgorod, Sverdlovsk, Perm, and Kemerovo.¹⁸ At the local and regional level, barter and offsets are even more widespread.¹⁹

Payment of taxes in nonmonetary form has great implications for the governments themselves, an issue we examine in Section 7, below. But most important for our immediate discussion is the fact that tax offsets fundamentally change the choice set for Russian enterprise directors. By allowing the enterprise to pay taxes in "soft goods," that is, output for which there is no effective demand, they give an incentive to avoid restructuring. For many enterprises it is easier to produce soft goods than to restructure and earn additional cash income to pay taxes in cash. Soft goods production allows for use of idle capital and labor, and offers an additional explanation for labor hoarding.

In short, tax offsets permit enterprises to survive without restructuring. In the next section, we examine how enterprise behavior in Russia is fundamentally changed by this option.

3 Types of Enterprises and Initial Conditions

Whether or not an enterprise chooses to restructure depends on the fundamental opportunities it faces. We can assume that the enterprise's initial conditions consist of the physical and human capital stock it possesses, on the one hand, and its stock of relational capital, on the other. These two factors, respectively, govern the possibilities for producing marketable products (restructuring), and the potential for survival without restructuring. Enterprises differ in their inheritances with respect to these two factors, and these differences explain the choices enterprises make about restructuring.

¹⁸V. Butkevich, "Mezhdu proshlym i budushchim," *Ekonomika i zhizn'*, no. 5, 1998, p. 3.

¹⁹For a sample of 39 regions (of Russia's total 89), the average share of noncash tax revenues in 1996 was 60% to regional (oblast, kray, and republican) budgets and 43% to local (district and city) budgets [8, 181].

Let r_i be the stock of relational capital of enterprise i , and let k_i be its stock of physical capital. Let a bar denote the initial levels of these two variables. Then the initial conditions for enterprise i can be written as $\{\bar{r}_i, \bar{k}_i\}$. The physical capital stock is straightforward. The relational capital stock is not.

3.1 Market Distance

It is useful to consider not only how much physical capital the enterprise happens to have at the onset of transition, but also how much it needs to succeed in a market economy. To make this more precise, let us define the distance the enterprise must cover to produce a marketable output. Let k_{it} be the current capital stock and k_i^m be the capital stock required to produce a marketable product at cost.²⁰ Then $d_i = \delta(k_i^m - \bar{k}_i)$ is the economic distance enterprise i must traverse to become marketable at the start of transition, and $d_{it} = \delta(k_i^m - k_{it})$ is the current distance. This distance depends on two factors: the characteristics (quality and cost of production) of the good in question, and the cost of changing these characteristics. An oil producing enterprise, for example, may have a very low d_i , while a machine-tool producer may have a larger distance to travel. Initially, there is some distribution of d_i across enterprises.

It is important to emphasize that distance depends on current conditions and costs of changing them. An enterprise may currently be destroying value but its d_i could still be low. The question for the enterprise is the cost of reducing this distance; how much investment will it take to reduce the distance, and what is the opportunity cost of that investment. The concept of economic distance is introduced to capture the amount of effort that will be required to produce a commodity that can be sold profitably. It is thus a function of history and the costs of restructuring.²¹

3.2 Relational Capital

Enterprises also differ in their inherited stock of relational capital. Some enterprises (directors) have very good relations with local and/or federal officials. Relations with other enterprises (directors) will also vary. The stock of these relationships determines the types of transactions that can be supported (barter versus cash, pre-payment, etc.).

Relational capital is goodwill that can be translated into informal economic ac-

²⁰Note that this will include changes in marketing and organizational behavior. But these changes also require investment, of one type or another, so this can be thought of in terms of the capital stock.

²¹This suggests, for example, that shocks to the cost of capital result in an increase in distance for all enterprises, but that this is greater for those which require greater investment to complete the path.

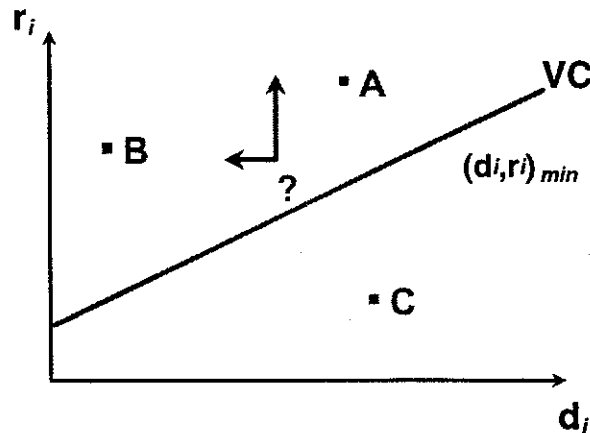


Figure 1: R-D Space

tivity.²² It refers to relations with other enterprises and with government officials.²³

The actions that an enterprise takes can affect its stock of relational capital. Just as investment augments the physical capital stock, enterprises can invest in relational capital as well. An enterprise can, for example, perform services for the local government. This action may enhance the enterprise's relationships with local officials, and thus increase its capacity to conduct informal activities in the future. It is important to recognize that augmenting relational capital is costly.

Enterprises can thus be considered in terms of their inheritance of \bar{r}_i and d_i , and the behavior of an enterprise will depend on where the enterprise is in $r - d$ space. Consider figure 1, where we represent the distribution of enterprises in terms of these initial conditions.

A crucial aspect of transition is that the initial distribution of d_i inherited from the Soviet period differs from the distribution that we would observe in a market economy. In a market economy entry into an industry depends on expectations about the potential firm's costs (productivity) compared with the costs (productivity) of existing firms. Firms that enter *expect* that they are low cost producers. Because of uncertainty some firms enter an industry only to learn that they are really a high cost producer. If expected costs are sufficiently high *ex ante*, then entry will not occur. Hence, the distribution of d_i will be centered around some very small value. The distribution of d_i is censored for two reasons. Firms with high *ex ante* costs do not

²²It is important to note that relations aid in production. Hence, investing in relations is *not* the same activity as rent-seeking.

²³In the Soviet context enterprise directors relied on the accumulation and use of influence (*blat*). This was critical to performance in the highly distorted regime of central planning, where supply failures were a constant feature of economic life. Relations with local party officials were often crucial to obtaining scarce inputs. Much of this remains in substance, and often in form as well.

enter, and firms with high *ex post* costs exit.²⁴

In transition, however, the initial distribution of costs is such that many enterprises have d_i that would not be observed in a market economy. This is, of course, the essence of the restructuring problem, that enterprises have to radically reduce their distance to the market economy. Hence, the center of the distribution of d_i at the onset of transition is shifted to the right. Distances that would not be observed in market economies are observed in transition economies.

Thinking about transition in terms of $r - d$ space provides an alternative way to think about transition. Conventionally, success in enterprise management is thought of in one dimension only: movement to move to the left on the d -axis in figure 1. Progress for the aggregate economy is viewed as a shift to the left of the entire distribution of enterprises. Failure to achieve this is attributed to the persistence of soft-budget constraints, ineffective bankruptcy procedures and untrained managers. The $r - d$ view suggests that success for an individual enterprise is to be viable in *either* dimension. A viable, even flourishing enterprise does not have to be one that has adapted to the market. It may have adapted to the informal regime of paternalism, tax offsets and barter, via the strategic use of relational capital.

Once we recognize the importance of relational capital, it is apparent that GDP growth may be due not only to restructuring, but also to informal activity. The production of soft goods can also lead to increases in output. This means that resurrections in GDP growth may not be the best indicators of restructuring.

3.3 Viability Constraint

Although relations can allow an enterprise to compensate for large distance, some enterprises have such poor initial combinations of r and d that they are unviable. Not only are these enterprises situated far from the market, but the quality of their relations with officials and other enterprises is so poor that they cannot be relied on for survival. Clearly, the minimum level of relations needed to survive is increasing with distance. So we can imagine a boundary (VC in figure 1) with positive slope that separates the region of viable enterprises from those that are not viable.²⁵ It is clear that the larger is the distance to the market the greater are the minimum level of relations necessary to survival. This implies the positive slope of the VC line. How steep VC will be depends on the institutional setting.²⁶ In a fully transparent economy relations may compensate very little for large distance. If officials are more corrupt, then relations may be much more important.

²⁴See [5] for an analysis of the implications of the absence of exit on industrial dynamics in planned economies.

²⁵Notice that the position of the VC line will depend on how open is the economy. Enterprises that would be unviable (for given d) in an open economy may be viable if the economy is autarkic.

²⁶As d increases, we may further suppose that the minimum r necessary to survival increases at an increasing rate.

We can imagine that initially enterprises fall into three broad types. If both d_i and r_i are small, for example the firm produces oil, then restructuring may be optimal and the firm enters the formal sector. If d_i is large, and if relations are good, the firm stays in the informal sector. Finally, the directors of enterprises that have low levels of relational capital *and* have a high d_i may be convinced that they have little chance of survival in either regime. They may simply abandon the enterprise, looting it on the way out (or leaving it to be looted by others). the enterprise.²⁷

It is interesting to consider the minimum r necessary to maintain viability as $d_i \rightarrow 0$. In an Arrow-Debreu economy relations are unimportant because all transactions are anonymous; hence, the viability constraint would be a ray from the origin. In some economies, however, relations are critical even if the firm has $d_i = 0$ (technically viable). For example, bribes may be necessary for survival. In that case the VC will intersect the r axis at some positive level. Indeed, one could think of the position of the intercept as a corruption index.

After some time, however, the looted enterprises shrink away and we are left with the two basic types, and a bifurcation of the enterprise sector. Once the uncompetitive fringe has been eliminated, the focus of attention is on those enterprises that are in the intermediate condition: those where there is a balance between d and r . Indeed, the most interesting enterprises are those that have low d and high r . These enterprises can go either way, and the key question for restructuring is in which direction will they focus their attention. This is important because they can contribute to tipping between two possible equilibria.

The essence of this argument is that differences in initial conditions are important in determining behavior. The reason is that enterprises can use relational capital to survive *without* closing the distance to the market. In the absence of this alternative then the initial distribution of d_i would not matter, except to predict who will be most successful. All enterprises would have to adjust in the same *direction*. With the viability of an *informal* strategy, however, there is another alternative direction that enterprises can take. This is what leads to the bifurcation in behavior.

4 Enterprise Objectives

To understand restructuring we need to understand how decisions are made? What do directors maximize? Not measured profits, because their incomes and the profits from the enterprise differ dramatically due to corporate governance. Directors divert enterprise income to their own use. It is useful to think of two types of activities.

²⁷They steal *from* the enterprise rather than *for* the enterprise.

4.1 Igor's "Four Principles of Management Planning"²⁸

Igor offers four principles for successful management planning in the current Russian environment:

1. *Have some percentage of your sales to the federal government.* Ideally, at about the level of your estimated federal taxes. You know you will not be paid for these sales, but you use it to offset taxes.
2. *Export something to a paying, hard currency market.*²⁹ You need some cash for your operations, mainly for urgently needed inputs. Exports need not be of your major product.
3. *Set up some barter operations for the rest of your inputs, especially fuels, electricity and so on.*³⁰ It is best if you have some products that utilities need. Then they will pay you in *vekselya* that you can redeem for the inputs.
4. *Have the capability to provide municipal services so that you can offset local taxes.* An ideal method is to have a construction division that can fix schools, etc.

Igor's final injunction: Whatever you do don't make a profit: the government will take it all in taxes.³¹

Which enterprises can best follow Igor's rules? A large, diversified, integrated, paternalistic enterprise with good relations to both federal and local authorities. E.G., a defense plant. An enterprise that has a large stock of social assets. If the plant has its own housing and schools, it is in the best position to provide services to these "customers" in lieu of local taxes. This makes it a seller's market in supplying these services.

Enterprises that follow Igor's rules could produce more but they do not. They could restructure, but they do not. Why? Profits can be costly to the manager, as we see below.

4.2 An Example: The Tutayev Engine Plant

It is useful to consider an example of adjustment in the current environment. Whereas Igor's enterprise is in an intermediate position, well endowed with relationships, yet able to go to the market as well, the Tutayev Engine Plant is much closer to the

²⁸Igor manages the *Izhevskiy Radiozavod*.

²⁹*Novolipetskiy Metallurgical* exports 72% of its output. Out of the remaining 28% that goes to the domestic market, only 4.5% is paid for with cash.

³⁰Severstal exports most of its output. 40% of production is sold domestically. Of this, 30% is bartered with the "Three Fat Boys (*Tri tolstyaka*):" *Gazprom*, *RAO YeES Rossi*, and *MPS*. Of the remaining 10% presumably this is used to pay local taxes.

³¹Of course what Igor really means is do not make a profit that can be observed.

exit boundary. As such it is typical of many enterprises in heavy industry. This plant employed 12,000 people in the 1980's, in a town of 45,000 (Tutayev in Yaroslavl oblast). It is now a private company, although the state still holds a substantial minority stake. This plant was the major Soviet-era producer of diesel V-8 engines for tractor-trailers trucks, dump trucks, earth-moving equipment, and farm tractors.

Reform has led to a near total collapse of production. The plant has capacity to produce about 18,000 diesel engines annually. In 1996 production was 401 engines; i.e., capacity utilization of about 2.2%. Since 1990 sales at the plant are down approximately 80% but employment is down only by 17%, reflecting the labor hoarding that is typical of Russian enterprises.

What is most interesting about Tutayev is the structure of payments for its products. This is given in table 1 for 1996. *Notice 92% of sales are paid for in offsets, and that for several categories of production this figure is 100%. The plant is relying on offsets to pay its taxes and to pay for inputs.*

Table 2: 1996 Sales and by type of payment for Tutayev Plant

<i>Product</i>	<i>% of sales</i>	<i>% paid by offsets</i>	<i>% paid in cash</i>
Components for Yaroslavl Engine Plant	35	100	0
Spare parts for diesel engines	29	80	20
Diesel engines	7	70	30
Other products (heat, water, etc.)	29	100	0
Total	100	92	7

Would the director of TMZ would prefer to sell more for cash? Given that only 7% of sales are paid for in cash one may suspect that the answer is yes. But, in fact, the problem is more complex. The problem, he explains, is that "customers from commercial structures buy our output for cash, but they pay only 50-60% of our official sales price." How should we interpret this? Obviously their costs are excessive compared with the price they receive for output. But nonetheless the enterprise continues to sell some output for cash: "This vicious practice, which in effect means that these various commercial structures are parasitizing our enterprise, has nevertheless been a vital necessity in current circumstances and has allowed the plant to obtain at least a minimum of cash." This comment contains the key idea: a firm needs to obtain some cash to cover certain types of expenses, so it will sell some output even at a loss.

Naturally Tutayev has problems making payments to workers as well. In 1996 they managed to pay only 61% of their wage bill. That included 36% that was paid in cash, with the rest paid in the form of foodstuffs, food coupons, etc. In January 1997 the situation was worse: only 34% of wages were paid at all.

5 What do Directors Maximize?

It is frequently argued that enterprise directors in Russia do not maximize profits. The lack of restructuring can then be explained by the problem of poor management. This conclusion seems to fit well with Igor's injunction. Our argument, however, is that directors do maximize profits *suitably measured*. The key point is that directors care about the sum of formal and informal profits. Indeed, formal profits are rather costly for the director in current circumstances.

5.1 The Cost of Profits

There are several reasons why formal profits are costly to the manager. This sounds strange, but in fact it captures a key element of the current environment. Formal profits entail a risk to directors that they seek to avoid.

First of all, formal profits attract the attention of the tax authorities. Second, they attract the attention of criminal organizations. Formal profits (even cash flow) is attractive to criminals; it is harder to sell goods. Third, formal profits draw attention to the enterprise as a potential takeover target.³²

We may also consider that formal profits make it harder to delay paying wages to workers. Presumably there is a *decency* constraint which relates non-payment to profitability. There are social norms that govern the degree to which an enterprise can engage in non-payment activities.³³ An enterprise that is earning high profits, or has a large cash-flow, is in a poor position to delay payments.³⁴ Notice that the ability to engage in non-payment is also related to the current state of relations. An enterprise that has poor relations with governments will be subject to more severe pressure if wages are unpaid than an enterprise that has good relations.

Thus, let ψ be the maximum acceptable rate of non-payment, and let cf_t be cash flow. Then $\psi_t = f(\frac{cf_t}{k_t}, r_t)$, with $f'_1 < 0$ and $f'_2 > 0$. Although wages are occasionally paid in kind, typically they are paid in cash. Therefore, a decrease in ψ_t results in an intensification of the cash constraint for the enterprise. By choosing to produce more cash goods the director limits his opportunities to use nonpayment as a means of appropriating income.

The key point here is that the director feels that the enterprise belongs to him, but his formal ownership share is much smaller. Hence, the director's legal rights to the cash flow are much weaker than his perception of what he is entitled to. If the director owned the firm entirely he would not need to engage in actions that divert income from shareholders. If the director owned a majority of the shares he could be bought

³²It is not exactly clear how this effect goes. On the one hand, higher profits makes the firm an attractive takeover target. On the other hand, a firm that has low profits relative to assets may be an attractive target given that the possibilities for increasing profits with a successful takeover are enhanced.

³³To the tax authorities, shareholders, material suppliers, or to workers.

³⁴This is like the decency constraint of Shleifer-Vishny.

off (if formal activities are more productive than informal ones) because his profits from takeover could exceed those from diversion. But with incomplete ownership – directors that own relatively small numbers of shares – the director cannot appropriate his perceived fair reward except by diverting income.³⁵

5.2 Profit Maximization with Variable Effort

A productive way to think about the director's problem is to consider the choice over how to allocate effort to maximize profits. The key variable input is the director's effort, which is given at \bar{e} .³⁶ This must be divided between producing cash goods and non-cash goods, i.e., $e_c + e_{nc} = \bar{e}$. Then let restructuring be a function of effort. The effort needed to produce cash and non-cash goods differs. It is costly to produce a new marketable product. Then it may be advantageous for the firm to produce informal products, which take less effort to produce.

The amount of effort needed to produce cash and non-cash goods is not the only difference between the two types of output. Evasion is another. Goods sold for cash incur *monetary* tax liabilities and income that must be paid to shareholders and other stakeholders.³⁷ Soft goods, on the other hand, are exempt from these demands. A wedge is thus created between the returns to the two types of activities. The combination of these two differences between cash and non-cash goods – the differing costs of production and the difference in returns due to the tax wedge – means that the resources used by the enterprise in production have two prices: a market price and an informal shadow price.

An enterprise will have resources that it can use to generate both hard and soft revenues. For example (see section 4.2) Tutayev has engines. These can be sold to commercial structures for cash or bartered for inputs or used as offsets. As long as the enterprise's cash constraint is binding (see equation 4) then the shadow price for cash sales will be high. But if this constraint is satisfied, then the market price may be below the informal price, and resources will be used to produce in the informal sector.

Obviously the firm chooses a mix of formal and informal products. We can think of them as low and high effort products.³⁸ Formal goods are typically high effort products especially when directed to export markets. They require marketing and often new suppliers. Traditional customers are more likely to be illiquid, so formal goods require attracting new customers, and this may require a better product. In-

³⁵Incomplete ownership refers to the difference between the actual control the director has of the assets of the enterprise and the legal rights he has to the formal profit (cash) stream.

³⁶The idea is that maintaining one's position as director is so lucrative compared with other alternatives that directors supply as much effort as possible. Hence we can ignore the question of the *level* of effort and focus on its composition.

³⁷It is important to distinguish between monetary tax liabilities and tax liability in general. As we have emphasized the effective tax rates differ between these categories.

³⁸See Igor's "Four Rules of Management."

formal goods typically are the enterprise's traditional products, so less restructuring is required to produce and sell them. But informal goods do require investment in search for barterable goods. Note that these heavily rely on historical relations.

The firm produces low effort products as long as there is a market for them. There is a tradeoff: To continue to produce low-effort goods an enterprise must retain good relations with government. High-effort goods are easier to translate into cash, which may be needed to procure important inputs,³⁹ but they are harder to produce.

Remark 1 *Low effort goods are soft goods. They are potential for barter or for tax offsets, but they cannot be turned into cash without incurring a loss. Producing hard goods requires higher effort; to produce the same level of output requires higher effort in the production of cash goods: $q_c = q_{nc} \Rightarrow e_c > e_{nc}$.*

A director chooses how much to produce of each good. Let the production function for the cash good be given by $y_c = f(e_c, d)$ and let the production function for the non-cash good be given by $y_{nc} = g(e_{nc}, r)$, where d is the distance to the market defined above, and r is the stock of relationship capital.⁴⁰ We assume that $f_1, g_1, g_2 > 0$, $f_2 < 0$, and $f_{11}, g_{11} < 0$. Notice that labor does not appear in these functions: enterprises hoard labor and we assume that this can be freely allocated to production of each type of good, and that the marginal product is the same in both activities. The profit function can thus be written as:

$$\pi = pf(e_c, d) + \hat{p}g(e_{nc}, r) - wl \quad (1)$$

where p and \hat{p} are the prices of cash and non-cash goods, respectively, and wl are fixed costs of production which are independent of the choice of which type of good to produce.⁴¹ What is important for the director's decision is *how* he must pay for inputs. We thus distinguish between inputs paid for in cash and those which can be bartered. We denote these by m and x respectively, so that (1) becomes

$$\pi = pf(e_c, d) + \hat{p}g(e_{nc}, r) - m - x \quad (2)$$

which is subject to two constraints, one on effort and one on cash:

$$e_c + e_{nc} = \bar{e} \quad (3)$$

$$pf(e_c, d) \geq m \quad (4)$$

The cash constraint says that sales of cash goods must be at least as great as the level of inputs that must be paid for in cash.⁴²

³⁹One of Igor's rules is to minimize the enterprise's dependence on such inputs, compared with the barter alternative.

⁴⁰We drop the i subscript when the firm in question is obvious.

⁴¹This appears somewhat peculiar. We would typically think of labor costs as variable costs of production. But paternalistic enterprises employ labor somewhat independently of the level of production, and certainly independently of the type of production. So for this problem it is useful to treat them as fixed costs.

⁴²Notice that we have continued to assume that all costs of production are fixed, i.e., $wl = m + x$.

Cash Constraint Igor's second principle stresses the necessity to earn a certain minimum level of cash, a sentiment echoed by the director of the Tutayev Plant. The main reason the enterprises need cash is to pay wages, but it may also be required to procure key inputs, for bribes, and for other emergencies. An alternative to selling output for cash is to borrow, but this is rather expensive under current conditions, and in any event requires selling for cash in the future. That enterprises face an absolute demand for cash, a *cash-constraint*, is evident in the fact that enterprises often sell for cash at a loss.⁴³

We suppose, for the purposes of the static model, that the enterprise carries into the period zero cash balances. Hence, all the cash it will have for purchases in the current period are based on current sales. Let ϕ be the share of costs that must be paid for in cash, i.e., $\phi = \frac{m}{m+x}$. The cash constraint is thus $pf(e_c, d) \geq \phi(m+x)$. Now what does ϕ depend on? Clearly, it depends (inversely) on the quality of the enterprise's relationships with officials, (directly) with the distance the enterprise is from the market, and other enterprise characteristics. This means that ϕ depends on past decisions with respect to how to allocate effort. The greater the investment in relationships, the greater the facility for avoiding cash. Hence, the minimum cash level for enterprise i , ϕ_i , will be drawn from some distribution Φ . Notice that the higher is ϕ_i , the greater the cost of survival under the assumption that obtaining cash is costlier than selling for non-cash.

The director will choose effort to equalize the marginal revenue products of each type of effort. Using the effort constraint to substitute for e_{nc} in the non-cash production function,⁴⁴ and assuming that the cash constraint is *not* binding, we can obtain:

$$\frac{p}{\hat{p}} = -\frac{\frac{\partial g}{\partial e_c}}{\frac{\partial f}{\partial e_c}} \quad (5)$$

It follows from (5) and from diminishing returns, that an decrease in the relative price of formal to informal goods shifts effort to informal production.⁴⁵ One such factor could be an increase in taxes.

What would be expect the relationship between p and \hat{p} to be? Nominally the former is higher, but the relevant issue is after-tax profits. If we consider that shareholders also "tax" the profits of the firm, then we could have $p < \hat{p}$ for the director.

We could add variable costs that depend on the level of production, but little would be changed. For example, we could re-write the maximand as $\pi = pf(e_c, l_c, d_i) + \hat{p}g(e_{nc}, l_{nc}, r_i) - w(l_c + l_{nc})$, where w is the wage and l_{nc} is the amount of labor used in non-cash production. We could then write the cash constraint as $pf(e_c, l_c, d_i) \geq \phi w(l_c + l_{nc})$, where ϕ is the share of cost that must be paid in cash.

⁴³See the example of Tutayev ?? above.

⁴⁴We thus write $y_{nc} = g[(\bar{e} - e_c), r]$, and note that $\frac{\partial g}{\partial e_c} < 0$.

⁴⁵What about the cross-partials? The greater the distance to the market the harder it is to produce cash goods, so it seems logical to assume that $f_{12} < 0$. Better relations with officials reduces the cost of producing non-cash goods, so we assume that $g_{12} > 0$. Thus relations and effort are strategic complements in the production of non-cash goods.

Letting τ be the tax rate the director faces (5) becomes

$$\frac{p(1-\tau)}{\hat{p}} = -\frac{\frac{\partial g}{\partial e_c}}{\frac{\partial f}{\partial e_c}}. \quad (6)$$

An increase in taxation shifts effort to informal activities.⁴⁶ Clearly the relevant comparison for the director is the after-tax prices: $p(1-\tau)$ and \hat{p} .

It is important to emphasize here that τ is the *total effective* tax rate on cash goods. It thus includes payments of profits to shareholders, mafia attention, and takeover attention, in addition to formal taxes. There is also a cost to engaging in non-cash production. This can be thought of as an expenditure of relational capital: for example, in order to induce a local government official to accept tax offsets. We might then replace \hat{p} with $\hat{p}(1-\eta)$, where η is the cost of avoiding detection (broadly defined).⁴⁷

We assume that taxes on cash production must be paid in cash.⁴⁸ Taxes on non-cash production are more complex. Some of these taxes can be paid in kind. Tax offsets, for example, represent taxes paid in non-cash form. Perhaps the primary reason why an enterprise engages in non-cash production is to pay taxes with this output. Other taxes, however, may have to be paid in cash: this would certainly be true for bribes. Let ζ be the share of non-cash production that must be paid in cash.⁴⁹ Then the cash constraint (4) is now written as:

$$pf(e_c, d) \geq m + \tau pf(e_c, d) + \zeta(1-\eta)\hat{p}f(e_{nc}, d) \quad (7)$$

The greater the number of enterprises operating in the cash economy the harder it is to engage in non-cash production. It may also be difficult to engage in barter transactions when most enterprises use cash. Conversely, a lower n – a greater share of enterprises in the non-cash economy – will reduce the cost of engaging in non-cash activities. For instance, in regions where large numbers of enterprises pay their taxes in the form of barter deliveries or offset schemes, local governments establish special companies authorized to sell or exchange barter goods on behalf of the government.

⁴⁶A presumably equivalent way to think about this is in terms of the disutility of effort. Suppose that the effect of effort on profits is the same, whether or not the output is for formal or informal, but that $e_c > e_{nc}$ (i.e., effort on formal production causes higher disutility for the director). The director will choose among activities so that the disutility of effort is equalized; i.e., $u(e_{nc}) = u(e_c)$. Let $\pi(e)$ be the profit function written in terms of effort. Then $\pi_{e_c} > \pi_{e_{nc}}$ at the optimum; the manager forgoes some activities that are profitable due to the differing effort levels.

⁴⁷One might also consider here the costs of avoiding detection of non-cash activities. Some non-cash transactions must be hidden, and resources must be used to keep them hidden. This also is a tax on non-cash production.

⁴⁸Given the high degree of tax arrears among Russian enterprises this is a rather strong assumption. It may be more appropriate to interpret τ as the share of taxes that must be paid to avoid the Government pressing bankruptcy.

⁴⁹We would expect ζ to be very close to zero for most enterprises.

As the number of enterprises that are engaged in non-cash activities expands, the costs of these activities fall. It thus follows that the relative price of cash to non-cash sales, $\rho \equiv \frac{p(1-\tau)}{p(1-\eta)}$ is increasing in the number of enterprises, n , (or better, the share of economic activity) in the cash economy. That is $\frac{\partial \rho}{\partial n} > 0$. Greater n also implies that the effective tax rate on cash goods declines because aggregate tax revenues are higher. This means that a smaller n increases the likelihood that an enterprise will choose to participate in the non-cash economy.

Our analysis so far suggests that the ratio of cash to non-cash production will depend on the relative price of the two outputs, the current state of enterprise relations, and the current distance to the market. In addition, it will depend on the intensity of the cash constraint. Hence, we can write

$$\frac{y_c}{y_{nc}} = f(\rho, r_t, d_t, \phi_t) \quad (8)$$

An increase in the relative price (which could be due to a change in effective tax rates), poorer relations with governments, shorter distance, and a tighter cash constraint all operate to raise cash production relative to non-cash production.

Remark 2 *Notice that as the hidden economy expands $\frac{e_c}{e_{nc}}$ decreases. This is due to strength in numbers. If few enterprises engaged in informal activities then it would be much easier to detect, so more effort would be needed to hide them.*

Remark 3 *We would assume that non-cash production requires relatively more effort for new entrants and for new managers than for existing enterprises, since they have less relational capital. Consequently, we would expect to observe new firms to be more engaged in the production of cash goods.⁵⁰ This suggests that the current environment where cash production is costly relative to non-cash production amounts to an entry barrier to new firms. It also raises the cost of seeking out new customers and suppliers.*

Remark 4 *An improvement in corporate governance amounts to an increase in the tax rate on non-cash goods, η , because it weakens the ability of the director to divert income from shareholders by engaging in non-cash production. In economies where accountability is high it is much harder to earn informal profits. Hence, better corporate governance reduces the tax wedge, inducing a switch towards cash production.*

The point is that the potential for non-market activities reduces the incentive to restructure. Given market conditions, a firm with greater opportunities for non-cash production.

⁵⁰Note that firms do not enter if their d_i is large. Hence, one would expect them to be more engaged in cash production not only because of poorer relations but because of better opportunities, on average, as well. This is an important feature of transition. In developed market economies new entrants presumably are drawn from some distribution that resembles incumbents. In transition, however, the distribution of incumbents is heavily skewed.

5.2.1 Results

Our comparative statics indicate that policies which raise the cost of *non-cash* production relative to cash production leads directors to alter their effort mix towards market (cash) activities. Whether they succeed, however, depends on how far they must travel. Notice that there are two aspects to this. First, how far is the distance for a given enterprise. Second, if many enterprises must cover a large distance, this may have general equilibrium consequences.

How the enterprise will respond to a change in tax rates will depend on whether the cash constraint is binding or not. Our discussion so far has been based on the assumption that the cash constraint (4 or 7) was *not* binding; that is, the enterprise had more than enough cash to cover its minimum cash costs of production. Suppose, however, that the enterprise has not yet covered its cash costs, in other words, that the cash constraint *does* bind, i.e., that $py_c = m$. Then (6) becomes

$$\frac{p(1-\tau)}{\hat{p}(1-\eta)} < -\frac{\frac{\partial g}{\partial e_c}}{\frac{\partial f}{\partial e_c}} \quad (9)$$

The director would prefer to produce more non-cash goods but cannot because of the need to meet the cash constraint. As in the case of Tutayev, the enterprise produces cash goods beyond the point where it is profitable. If the cash constraint were relaxed, the enterprise would choose to switch production from cash to non-cash production.

This is illustrated in Figure 2 where we use 8 to plot $\frac{y_c}{y_{nc}}$ as a function of ρ , the relative price of cash to non-cash sales. Given the cash constraint, however, there is some minimum level of cash production below which the enterprise cannot go, $\left(\frac{y_c}{y_{nc}}\right)_{min}$. Hence if ρ falls below $\bar{\rho}$ the share of cash to non-cash production is unchanged.

It is useful to consider the response of an enterprise to a small decrease in the effective tax rate, τ , when the cash constraint binds. If the cash constraint was not binding then $\frac{e_c}{e_{nc}}$ (and hence, $\frac{y_c}{y_{nc}}$) would increase. But when the cash constraint binds this does not occur. The enterprise is already producing too large a share of cash goods,⁵¹ and will not respond to the decline in taxes by moving into the cash sector. For enterprises where the cash constraint is binding, there is a range of indeterminacy where changes in τ do not cause changes in effort allocation.

This analysis suggests that the response to tax policy will differ depending on whether the effort decision is interior or not. We can think of two types of enterprises: *Severstal*⁵² and *Tutayev*. At *Severstal* cash sales are profitable at the margin; what limits further cash sales is the tax wedge. For *Tutayev*, on the other hand, cash sales are unprofitable at the margin, but he sells for cash anyway because of the need to

⁵¹In the sense that it produces cash goods beyond the point at which it is profitable to do so.

⁵²An apparently successful metallurgical enterprise in Vologda oblast, which exports almost 100% of its cash production.

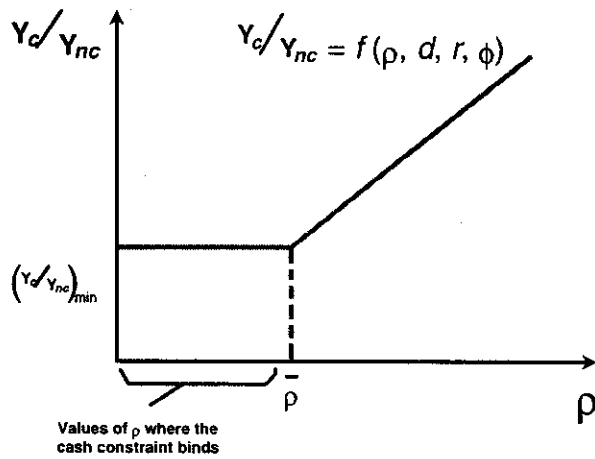


Figure 2: Supply of Cash Goods

have some cash. Clearly an enterprise like *Severstal* will be more sensitive to tax changes than a firm like *Tutayev*.

Portfolio of Activities Notice that whether the cash constraint is binding or not the enterprise typically engages in a bundle of activities. Enterprises engage in both cash and non-cash activities, because combining them is profitable. This means that the decision is not all-or-nothing.⁵³ It may also mean that it is more difficult to move enterprises completely to the cash economy. An enterprise may wish to pay for some goods with cash, but the seller may refuse to take cash. This suggests that the former enterprise must retain some barterable assets to use, even if the decision has been made to move to the market.

6 Dynamics

We have examined the static decision problem of the enterprise. The factors that govern the static decision to produce cash or non-cash goods are summarized in equation 8. The decision problem for the enterprise is more complex, however, because decisions taken today affect the severity of the constraints in future periods. In this section we begin to explore the dynamic problem of restructuring How do decisions taken today effect decisions in the future?

One key link is the effect of investment in tangible capital (as opposed to investment in relational capital) to produce cash goods. Such investment moves the

⁵³Thus our approach contrasts with [6], where the decision to engage in informal activities is a knife-edge.

enterprise closer to the market. But there are costs as well. Investment in tangible capital involves moving to formal production; it thus raises the visibility of the enterprise. But this raises the likelihood that cash profits will be detected. And by altering the division between cash and non-cash production, investment affects the likelihood that the cash constraint will bind in future periods.

The static model does not include investment. A dynamic model might consider the choice to invest in relations with officials and in capital. Capital investment is tangible and visible, so it makes tax evasion more difficult, but it also increases the productivity of the enterprise; in particular, we may assume that it increases f_1 , the marginal product of effort devoted to cash-good production.⁵⁴

Investment in tangible capital is costly. What is the opportunity cost of investment of such an investment for an enterprise? Whether or not investment is self-financed,⁵⁵ it is likely that investment requires cash profits.⁵⁶ The reason is that investment in moving to the market requires purchase of new equipment, often imported. Moreover, such investments are more visible an activity than developing relations. So the act of investment in distance reduction likely alerts the tax authorities, thus limiting the amount of income that can be hidden. Hence, it seems logical to assume that the decision to invest in tangible capital (i.e., $\Delta k_t > 0$) involves an increase in cash-good production; i.e., an increase in $\frac{e_c}{e_{nc}}$. The enterprise is thus trading off reducing the distance to the market with a higher cost of engaging in informal activities.

At each date the director must choose whether to reduce distance or enhance relationships. This decision will clearly depend on current levels of d and r , and how changes in these levels affect future profitability. For enterprises that are endowed with low distance and good relations (Igor) a risk-averse strategy may entail investing in both activities if this is possible. What about enterprises with less balanced conditions? An enterprise that has high d and high r is more likely to focus on enhancing relations, because if the current distance is very high the return to modernizing may be negligible. As d decreases (given r) the likelihood that the enterprise chooses to invest in modernization increases.

To explore this further we examine the decision to invest in distance reduction i_d and in relations, i_r . At first, we assume that the director knows the contributions of both types of investment for future productivity; the only source of uncertainty concerns relative prices in future periods.

⁵⁴One could assume that investment is neutral, i.e., it leaves $\frac{f_1}{g_1}$ unaffected. But this would make the decision problem of the enterprise less interesting, and presumably an enterprise adds machinery to increase productivity of market goods.

⁵⁵The evidence clearly shows that it is.

⁵⁶This is clearly true if investment must be financed externally. The greater the borrower's involvement in non-cash production the greater is the moral hazard problem facing the lender. To obtain external finance requires more transparent activities. This suggests that there is positive feedback in the investment decision. As the enterprise invests in distance reduction (and eschews informal activity) the cost of external funds may be reduced. Of course, the opposite happens for the enterprise that invests in relations.

It is natural to assume that investment is constrained by current profits. In transition most investment is self-financed, due to inadequacies in property rights and financial underdevelopment. We assume that i_r is constrained by current profits, while i_d is constrained by observable profits plus borrowing, B . Hence:

$$i_r \leq \pi_t \quad (10)$$

$$i_d \leq p(1 - \tau)f(e_c, d_t) - \phi(m_t + x_t) + B. \quad (11)$$

The director maximizes the present value of profits:

$$\max \Pi = \sum_{t=0}^{\infty} \beta^t \pi_t \quad (12)$$

subject to:

$$d_{t+1} = d_t + i_d \quad (13)$$

$$r_{t+1} = r_t + i_r \quad (14)$$

Clearly the choice of whether to invest in distance reduction or relations will depend on expectations about what will happen to the relative price of cash versus non-cash good production; i.e., ρ_{t+1} . Let ρ^e be the expected value of this relative price in the future. Given expectations, the director can calculate the return to investing in distance reduction and relations.

For example, the one-period ahead gain from investing in distance reduction is given by⁵⁷

$$p_{t+1}^e (1 - \tau^e) \frac{\partial f}{\partial i_d} \Big|_{E^*} \quad (15)$$

and that for investing in relations:

$$\tilde{p}_{t+1}^e (1 - \eta^e) \frac{\partial g}{\partial i_r} \Big|_{E^*} \quad (16)$$

where E^* is the optimal choice of $\left(\frac{e_c}{e_{nc}}\right)_{t+1}$ given ρ^e .

The director thus evaluates the effect on profits from investing in distance reduction and relations by comparing 15 and 16, that is, by comparing the effect on expected profits from each type of investment. There are two interesting cases to consider.

No Exclusivity Suppose that an enterprise can engage in distance reduction and informal activity simultaneously. There is no *exclusivity* in terms of actions. Then

⁵⁷ignoring the change in costs due to the endogeneity of the cash constraint.

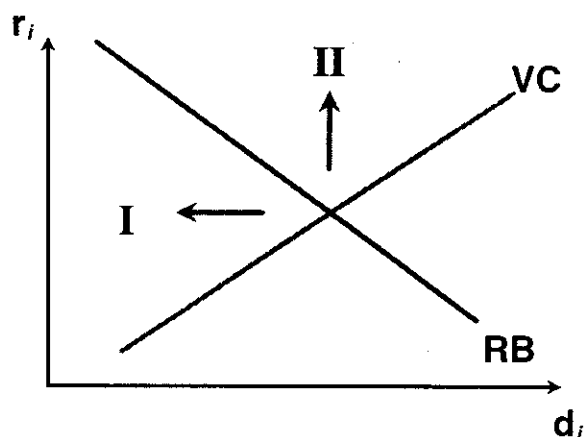


Figure 3:

the director will choose i_d and i_r so that the marginal returns are equated,⁵⁸ i.e., to the point where

$$p_{t+1}^e(1 - \tau^e) \frac{\partial f}{\partial i_d} \Big|_{E^*} = \hat{p}_{t+1}^e(1 - \eta^e) \frac{\partial g}{\partial i_r} \Big|_{E^*} \quad (17)$$

Because the return to each type of investment depends on current levels of distance and relations, this implies that there will be combinations of d and r such that the enterprise is indifferent between reducing distance and enhancing relations. If an enterprise has very high d the reward to distance reduction may be very low compared with investment in relations. Convexity of the production functions implies that enterprises will move along this boundary, investing in both distance reduction and relations, equating the marginal returns to these activities. Notice that with no exclusivity this result occurs even without risk aversion. What resembles hedging is simply a function of diminishing returns. Hence from expression 17 we derive the boundary that separates the regions where enterprises engage in reducing d and enhancing r ; this boundary is negatively sloped, as in figure 3. We refer to this locus of points as the restructuring boundary (RB).

Exclusivity Consider the other extreme in which an enterprise can either invest in distance reduction *or* relationships, but not both. This could occur, for example, if i_d requires external borrowing and this requires that the enterprise have fully transparent economic relations. Conversely, investment in relationships may preclude a visible effort to invest in cash production. For instance, an enterprise director who is lobbying government officials to accept tax offsets in lieu of cash may find no sympathy if

⁵⁸Notice that this expression considers only the changes in revenue. Below we consider how this decision affects costs, primarily through the endogeneity of the cash constraint.

they see him at the same time spending cash to import new income. Consequently, the choice of which type of investment to undertake is an exclusive one.⁵⁹

In this case the director once again compares expressions 15 and 16; now, however the director chooses to invest in only one of the two activities. That is, the director invests in whichever activity has the highest payoff, *exclusively*, up to the point where the marginal return equals the opportunity cost of funds. Hence, in the case of exclusivity the director's decision rule (in the case where some positive investment takes place) can be summarized as

$$i_d > 0, \text{ and } i_r = 0 \text{ if } p_{i+1}^e(1 - \tau^e) \frac{\partial f}{\partial i_d} \Big|_{E^*} > \tilde{p}_{i+1}^e(1 - \eta^e) \frac{\partial g}{\partial i_r} \Big|_{E^*} \quad (18)$$

$$i_d = 0, \text{ and } i_r > 0 \text{ if } p_{i+1}^e(1 - \tau^e) \frac{\partial f}{\partial i_d} \Big|_{E^*} < \tilde{p}_{i+1}^e(1 - \eta^e) \frac{\partial g}{\partial i_r} \Big|_{E^*} \quad (19)$$

The previous analysis ignores the endogeneity of the cash constraint. An important consequence of investing in distance reduction or in relations, however, is that this decision has consequences for the intensity of the cash constraint in subsequent periods.⁶⁰

Figure 3 provides a convenient way to think about how policy affects the restructuring decision. The important contrast is between enterprises that are in quadrants I and II. Enterprises in quadrant I invest to reduce distance, while those in quadrant II invest in relationships. In a formal sense policies that shift the *RB* line to the right increase the likelihood that enterprises will restructure. Notice that policies that harden the budget constraint shift the *VC* line up. This does put pressure on enterprises in quadrant II, but if it does not shift the *RB* line, then it will not increase restructuring. The key question for policy is thus how to shift the *RB* line.

6.1 Uncertainty

In the simple dynamic problem 12 the only form of uncertainty that the enterprise faces is with respect to future prices. This means that the enterprise *knows* the how investment in physical and human (tangible) capital affects d_i , and how investment in relations affects r_i . An alternative formulation would have the rate of return to investment be stochastic, and the enterprise learns this over time. In particular, it might be that an enterprise only learns about how costly distance reduction actually is through actual investment in tangible capital.⁶¹ Investment, however, increases the

⁵⁹Ericson [3] provides a complete analysis of the investment problem of an enterprise deciding whether to restructure when this may have irreversible implications for current activities. The enterprise has the choice of an efficiency-enhancing investment (similar to our distance reduction), but this may jeopardize the possibility of continuing to engage in rent-seeking activities (similar to our informal activities). Ericson is able to show that firms may decline to restructure so as not to jeopardize current outside opportunities.

⁶⁰This is clearly the case when there is exclusivity.

⁶¹The most complete analysis of this problem is in [3].

costs of engaging in informal activity. With finite investment resources, the enterprise may choose to invest in relations rather than tangible capital. A firm that perceives a high d_{it} and a low return to tangible investment may simply choose to continue with non-cash production.

The decision to invest and reduce distance involves a trade-off of present costs for future benefits. It is thus determined by the rate of time preference of directors. Two factors are important here. First, the high interest rates that result from the government's financing of deficits by selling GKO raises the opportunity cost of funds and offers an attractive, low-risk, alternative investment if earnings are available.

Second, the precarious nature of many enterprises must inhibit long-run planning. Uncertainty and fear of survival must increase the rate of time preference of directors. Note that if there were no alternative to distance reduction, i.e., if there were no non-cash production alternative, then the enterprise might still be tempted to reduce distance (or increase looting). When such opportunities are available, however, they provide the enterprise with a convenient way of maintaining a holding pattern.

Remark 5 *What does the enterprise learn about over time? The true distance, or the rate of return? For the model it would be nice to have the distance be known and the rate of return be stochastic. But in practice one suspects that enterprises have little knowledge concerning how far they are from becoming a viable market enterprise at the outset of transition.*

6.2 Multiple Equilibria

The enterprise's investment decision is governed by some expectations about where it is going. If the enterprise chooses to stay in the informal economy does this mean that it is myopic? To think of this another way, should not all enterprises expect to go eventually to the market? Clearly the answer to the latter question depends on whether transition is irreversible. If enterprises attach positive probability to reversals in the reform process then the market is not the certain destination.

A more important answer to this question, however, is that what matters for the enterprise is not just the final destination, but the pace of the journey as well. There is no point in getting there too fast, unless there is an important market that can be captured by first movers. The reason is obvious. Enterprises that move too fast to the market economy bear a disproportionate share of the tax load. Thus the decision to invest in distance reduction depends on expectations about what other enterprises will do. This is why multiple equilibria arise.

One suspects that there are multiple equilibria here. If all other enterprises choose to keep $\Delta k_t = 0$, then an enterprise that invests faces high taxes, which may make no-investment the dominant strategy for the enterprise. If all other enterprises are investing, however, informal activities may be very costly, and hence formal production may be the dominant strategy for the enterprise.

6.2.1 Irreversibility

There may also be an *irreversibility* issue. Shifting production to cash goods may make activities observable to the tax authorities. Moreover, an enterprise that shifts production to cash goods may lose credibility when it goes to government officials in request of tax offsets. These considerations may make it very costly to switch back to informal production. This adds an element of irreversibility to the decision to switch to cash production. An option value to waiting may thus increase the wedge between the two types of production.

6.3 Endogeneity of the Cash Constraint

The interesting point about the cash constraint is that it is endogenous.⁶² Clearly, how tough is the cash constraint will depend on the strength of the enterprise's relationships with other enterprises and local governments. The share of payments that an enterprise must pay in cash is a function of the extent to which it is in the cash economy. As the enterprise chooses between formal and informal activities it will determine the cash constraint for future periods. We might write, for example,

$$\phi_t = \phi\left(\frac{y_{c,t-1}}{y_{nc,t-1}}, r_t\right)$$

with $\phi_1 > 0$ and $\phi_2 < 0$. In other word, the greater is past involvement in the cash economy the tighter will be the cash constraint this period, while the stronger are relationships, the weaker it will be. The point is that past decisions about the extent of involvement in the informal economy will affect how tight the cash constraint will be this period.

The history of economic activity determines how tight the cash constraint will be in various ways. One way is through selection of the labor force. Enterprises that retain their paternalistic character obtain a labor force that becomes increasingly willing to accept such behavior. Workers who have strong preferences for cash wages or who have greater outside opportunities leave the enterprise; the remaining workforce thus becomes more passive in response to unpaid wages and wages paid in kind. This means that the cash constraint for the enterprise becomes much weaker over time. Compare this to an enterprise close to the market with a skilled workforce which has better outside opportunities or which has stronger preferences for cash.⁶³ For this enterprise, the cash constraint will be much tighter.

What this suggests is that the decisions that enterprises make concerning their involvement in the cash economy determines the costs and benefits of involvement in the future. There is persistence in these decisions.

⁶²The extent to which the cash constraint binds may also differ between existing and new enterprises. New enterprises may find informal relations harder to engage in.

⁶³On the negative selection process that occurs in a paternalistic enterprise, see [2].

One can think of the tradeoffs involved in restructuring more clearly if we make ϕ depend on investments to reduce distance.

$$\phi_t = \phi(\Delta k_{t-1}, r_t)$$

As we noted above, investment in distance-reducing activities implies a greater need for cash. Hence, the decision to invest has the direct implication that it tightens the cash constraint.

7 Policy Implications

7.1 Monetary Policy and Barter

The effects of monetary policy in a barter economy will differ depending on the causes of barter. The effects of credit expansion on economic activity will differ if barter is liquidity induced or tax induced.

A credit expansion in a liquidity-induced barter equilibrium implies that the financial constraint facing enterprises is relaxed. As barter is costlier than monetary exchange credit expansion should lead to an increase in output proportional to the real costs of barter.⁶⁴

A credit expansion in a tax-induced barter equilibrium has less clear-cut implications. If the cost of credit is reduced some enterprises may switch from barter to monetary exchange to economize on the costs of barter. But there is no primary effect of relieving the credit constraint in this case.

Consider, for example, a credit expansion that reduces interest rates. We would expect that this would lead to an increase in borrowing. This will be true for enterprises that are on the margin between reducing distance and improving relations. For other enterprises the only reason to borrow is to relax the cash constraint. An enterprise like *Tutayev* sell for cash at a loss. If interest rates fall sufficiently then they may borrow to earn cash rather than sell below cost. But once their cash needs are met they will not borrow further. An enterprise with a very high d_i has poor investment opportunities.

7.2 Tightening the Cash Constraint

We saw in section 5.2 that one factor that keeps enterprises in the cash economy – even those which survive primarily by virtue of their relational capital – is the need to satisfy the cash constraint. This suggests that one policy instrument that could be useful to push enterprises to reduce their distance to the market is to tighten the

⁶⁴If barter were no more costly than monetary exchange then credit expansion would lead, in equilibrium, simply to an increase in prices. In current-day Russia, however, a credit expansion leads to an increase in the production of unwanted output.

cash constraint. The question is how such a policy can be accomplished. As we have discussed barter is common precisely as a means of evading taxes, so simply changing laws to eliminate barter are unlikely to be effective.

It is interesting to reflect again on how the prevalence of barter in the economy can affect the decision to engage in informal activity. Presumably the cost of engaging in informal activity falls the more prevalent it is; the "strength in numbers" phenomenon. This suggests that when most enterprises use money the returns to non-cash production may be smaller than if most enterprises are in the barter economy.

7.2.1 Pressure on the "Three Fat Boys"

An important conduit for barter in the Russian economy is the willingness of the "three fat boys" (*tri tolstyaka*, Gazprom, UES, and MPS) to participate. This suggests that the cash constraint could be tightened by pushing the natural monopolies to accept only cash. One means of implementing this would be to pressure the payment of tax arrears by these enterprises, the idea being that if the natural monopolies need cash to pay taxes they will be forced to collect cash payments from their customers. The problem here is that this argument assumes that the customers would be able to pay if forced to. It is not at all clear that this is so. Without the ability to cut delinquent customers off, the monopolists may end up with arrears replacing barter.

The idea that pressure on the "fat boys" will increase the use of money in the economy rests on a particular understanding of the sources of non-monetary exchange. If barter is the result of the efforts of profitable enterprises to evade taxes then increasing the cost of such schemes may result in remonetization. If the "fat boys" are forced to accept only cash from their customers, it follows that the cash constraint for all enterprises will be intensified.

The result is very different, however, if lossmaking enterprises are an important factor in nonpayments. Enterprises that cannot cover their costs of production can only increase cash payments for utilities by reducing cash payments elsewhere. The primary use of cash, aside from wages, is to pay taxes. Hence, one consequence of increased pressure may be to increase tax arrears.

If the continued operation of lossmaking enterprises plays a crucial role in generating demonetization of the economy, the proper policy response would be to shut down these enterprises. Indeed, that is the indirect effect of successful pressure on the "fat boys." To some extent, this reflects a shifting of the burden of shutting down lossmakers from the government to the utilities; the latter take the heat. Ignoring the shifting of responsibility, this policy has the advantage of also tightening the cash constraint on profitable enterprises. The problem with this strategy, however, is that there is no good reason to assume that the utilities can cope with the political costs of shutting down enterprises any better than the government.

8 FIG's⁶⁵

Financial-Industrial groups (FIGs) have become an increasingly important feature of the Russian landscape. FIG's may alter the relationship between formal and informal activities. In this section we examine the implications of our theory for understanding the role of FIG's. Throughout this section our interest is with bank-led FIG's. Bank-led FIG's contrast with official FIG's, which are typically devices to maintain the tenure of the constituent directors; i.e., they are viewed as survival-enhancing mechanisms.

Consider the decision of a FIG to obtain control of some enterprise. If control is achieved the FIG replaces the old director with its own personnel. New owners do not possess the connections that old director possesses, but they have relationships with other enterprises within the FIG, and perhaps, by extension, greater political influence.⁶⁶

An enterprise that engages in informal activities earns a *public* rate of return to capital that is low relative to what it could earn, since the unofficial income is not measured. In the context of 2 cash profits exclude informal revenue, $\hat{p}g(e_{nc}, r)$. The return on equity depends on cash profits, so that shareholders only own the *measured* rate of return. Let $V(x^o)$ be the per-share discounted value of the profits generated from official activities. Hence, (under some natural conditions) the minimum acceptable price for which a shareholder would sell his or her shares in the enterprise is $V(x^o) + \varepsilon$.⁶⁷

If the FIG obtains control it replaces the director, and reduces the scope of informal activities. FIG's have a preference for cash income as opposed to in-kind transfers.⁶⁸ The FIG also introduces high-powered incentives and control mechanisms to reduce director expropriation.⁶⁹ This causes $\frac{e_c}{e_{nc}}$ to increase, resulting in increased measured profits. And the enhanced monitoring capability of the FIG means that whatever informal activities continue to take place are appropriated by the new owners. Hence, $V(x^o)$ increases, and the value of the enterprises rises to

⁶⁵This argument refers to unofficial FIG's (bank-led, typically). Official FIG's are typically devices to maintain the tenure of the constituent directors; i.e., they are viewed as survival-enhancing mechanisms.

⁶⁶At the federal level. It is likely, however, that the old director has greater influence at the local level.

⁶⁷The idea here is that the shareholders cannot capture the value of the informal activities because the enterprise director is unaccountable to the shareholders. If the director continues to operate the enterprise the value of the shares remain $V(x^o)$. Hence, shareholders would be willing to sell to an outsider who is willing to pay a premium over $V(x^o)$. The determinants of the size of this premium is not examined here.

⁶⁸This is true for bank-led FIGs to which our argument refers. Notice that these organizations tend to borrow externally in dollars and hold ruble assets. Hence, they have greater needs for cash than an insider-dominated FIG whose debt is owed primarily to suppliers, workers, and the government.

⁶⁹One mechanism that is readily available is to require payments through FIG-owned banks.

$V(x^o + \theta x^n)$, where θ is the share of informal activities that are observed by the FIG's owners. Notice that if the scale of informal activities (x^n) is large then we may have $V(x^o) + \varepsilon < V(x^o + \theta x^n)$ even for rather small values of θ . Of course, this requires the FIG to pay off the incumbent management, unless control can come from purchase of government shares.

The key point is that the new management does not have to be more effective than the old for shareholder value to rise. Even if the new management is less competent share value can rise if $\frac{e_c}{e_{nc}}$ increases. Takeovers have positive effect on shareholder value through the change in the composition of effort that is induced.⁷⁰

Notice that the FIG may also alter $\frac{e_c}{e_{nc}}$ through the effect of increased credit availability. Direct ownership on the part of FIGs reduces the moral hazard problem that inhibits lending to enterprises by commercial banks. With a lower cost of credit the return to reducing distance may rise relative to that of investing in relations.

One might argue that FIGs may increase $\frac{e_c}{e_{nc}}$ through a tightening of the cash constraint of their constituent enterprises. The effect could go both ways. A FIG could act as a mutual payment mechanism, reducing the needs for cash of the constituent enterprises. The FIG would simply settle accounts between member enterprises. But the effect could go the other way, especially for the bank-led FIGs, when enterprises are purchased using funds borrowed from abroad. Many FIGs have floated Eurobonds and used the proceeds to purchase domestic assets.⁷¹ This increases the demands on the member enterprises to earn profits that can be translated into dollars to repay the loans, so it may, perhaps, tighten the cash constraint.⁷²

8.1 FIGs and Local Governments

FIGs are often opposed by local governments. Why? They threaten the tax offset schemes that the local governments and enterprises are involved with. FIGs push the enterprise into the formal sector, which reduces the local government's share of the tax take. This may also cause a fall in employment, which the local government disapproves of.

The local government, at the extreme, seeks to maintain a "natural" economy, while the federal government desires a monetary economy. The local government wants to keep as much income as it can within the jurisdiction, to maximize what it can capture.

⁷⁰An increase in shareholder value is *not* equivalent to an increase in social welfare, however. The rise in shareholder value is a pure transfer in the absence of any productivity increase.

⁷¹E.G., Alfa Bank in order to purchase Tyumen Oil Company, and Oneximbank with respect to Norilsk Nickel and with its partners in the purchase of Svyazinvest.

⁷²How this affects tax collection depends on whether the FIG can hide income via transfer pricing.

9 The Fiscal Paradox

What could end the bifurcation? One factor is to end tax offsets; to break the tie between local governments and enterprises. But how can this be accomplished given the importance of this relationship? The key would seem to be revenue assignment so that the local government would benefit from increased growth in the local economy. The federal government should be in favor of monetization since it increases their tax share. Local governments do not, for exactly the same reason. But if local governments could participate in local improvements then they might be willing to accept tax assignment.

The problem is that moving enterprises to the formal sector requires large restructuring expenditures when d_i is large, as it would be for these enterprises. In some sense the federal government needs to insure local governments against this, but it lacks the revenues.

A Appendix: Barter and Tax Evasion

In this appendix we consider two examples which demonstrate how barter can facilitate the evasion of taxes. The examples we construct use bilateral barter for ease of exposition. As we mention in the paper, most barter in Russia is multilateral. It would be easy to add enterprises to the barter chain without changing the force of these examples. But the bilateral case makes the source of the tax gains most transparent.

A.1 Example A

This example has two enterprises which use each other's output as input.

- Two enterprises: Gazprom, Norilsk
- Two goods: natural gas, metal products
- metal output, y_m is given by: $y_m = 0.5y_G$
- gas output, y_G is given by: $y_G = 2y_m$

The market price of gas (P_G) and metals (P_N) equals one ruble, so that the relative price is unity.⁷³ Under these conditions metal production is not actually profitable, since it takes 2 units of gas, with a market value of 2 rubles, to produce one unit of metals, which is worth one ruble. Suppose that the tax rate on profits is 100%, and that there are no labor costs of production.⁷⁴

We consider two cases. First, we have a monetary economy. Suppose for simplicity that there is an artificial trading company. It pays each producer the market price (one ruble) for its output, and sells the output to the other enterprise at the market price. For simplicity assume that it does this as zero cost. These transactions are carried out with money.⁷⁵ In the second case, the two enterprises engage in barter.

In the case of monetary exchange Gazprom's profits are equal to 1 ruble and taxes paid are one ruble. Norilsk loses money and pays no taxes. We can write Gazprom's and Norilsk's account:

Gazprom Account		Norilsk Account		
<i>Category</i>	<i>Amount</i>	<i>Category</i>	<i>Amount</i>	
Revenues	2	Revenues	1	
Costs	1	Costs	2	(20)
Profits	1	Profits	-1	
Taxes	1	Taxes	0	

⁷³If Norilsk were shut down Gazprom could import metals at a price of one ruble. So Gazprom is indeed profitable at initial prices and Norilsk is not.

⁷⁴We add labor costs in the next section.

⁷⁵Clearly nothing would change in the two firms just traded with each other at the market price and paid in rubles. The point of the artificial trader is simply to make the example clear.

Now we suppose that instead of engaging in monetary exchange, the enterprises barter with one another. In this transaction, the barter price (to Gazprom) of Norilsk output is raised to 2 rubles. The external price of Norilsk output is unchanged, but the price that is recorded in this transaction is doubled. The same physical transaction occurs. Norilsk receives two units of gas from Gazprom (valued at 2 rubles) and ships one unit of metals to Gazprom (now valued at 2 rubles). Our accounts now become:

Gazprom Account		Norilsk Account		
<i>Category</i>	<i>Amount</i>	<i>Category</i>	<i>Amount</i>	
Revenues	2	Revenues	2	
Costs	2	Costs	2	
Profits	0	Profits	0	
Taxes	0	Taxes	0	(21)

The effect of the increase in the price of metals is to reduce Gazprom profits and, hence, taxes. This one unit saving in taxes can be shared between the two enterprises. That is, a side payment from Norilsk to Gazprom that is less than one unit will make both enterprises better off.

A.2 Example B

Now we alter the example to include labor and make clear that barter can reduce tax incidence when there are lossmakers. Continue to assume that the price of gas and metal products are both one ruble. Further assume that each process requires use of the other good as input. Gazprom uses one unit of metal output, and Norilsk uses two units of gas. Each process requires labor, according to

$$y_G = \alpha_G L_G \tag{i}$$

$$y_N = \alpha_N L_N \tag{ii}$$

The wage rate is equal to unity, and each enterprise has two units of labor. Let $\alpha_G = 2$ and $\alpha_N = 0.5$, and let the tax rate on value added be $\frac{1}{3}$.⁷⁶ Gazprom thus produces four units of output, selling two units to Norilsk and another two to the market. Norilsk sells all its output to Gazprom.⁷⁷

As in the previous example we first consider monetary exchange and then barter.

⁷⁶We now assume that there is no tax on profits.

⁷⁷This is not essential.

In the case of monetary exchange we have:

Gazprom Account		Norilsk Account	
<i>Category</i>	<i>Amount</i>	<i>Category</i>	<i>Amount</i>
Revenues	4	Revenues	1
Labor Costs	2	Labor Costs	2
Material Costs	1	Material Costs	2
Profits	1	Profits	-3
Value Added	3	Value Added	-1
Taxes	1	Taxes	0

(22)

Now suppose that Gazprom and Norilsk engage in barter, and raise (set) the price of metal to two rubles. The accounts are now:

Gazprom Account		Norilsk Account	
<i>Category</i>	<i>Amount</i>	<i>Category</i>	<i>Amount</i>
Revenues	4	Revenues	2
Labor Costs	2	Labor Costs	2
Material Costs	2	Material Costs	2
Profits	0	Profits	-2
Value Added	2	Value Added	0
Taxes	0.667	Taxes	0

(23)

Now compare (??) and (11). It is apparent that Gazprom's taxes have declined by 0.33. Yet there has been no change in physical flows. The simple accounting of barter allows the two enterprises to reduce total tax payments by one third of a unit of output.⁷⁸

A.3 Comment

Why does this work? The asymmetry is due to the fact that Norilsk was a lossmaker. Clearly if Norilsk were not initially losing money then this change would cause its profits (and hence, taxes) to increase by the same amount as Gazprom's declines.

It must be emphasized that in both examples the comparison between the monetary and barter transactions has nothing to do with the "real world." Whether in barter or in money the same physical transaction between enterprises takes place, *the same physical transformation takes place in the production process, and the same physical output results.*

Notice that Norilsk also benefits from this transaction because it can use this inflated price to value the output it uses to pay taxes in kind that are not based on profits.

⁷⁸Obviously, the reduction is equal to $\tau \Delta R_N$ where τ is the rate of value added tax, and ΔR_N is the change in input payments from Gazprom to Norilsk.

In the first example (without labor) the two enterprises together have cut tax liability by one unit which they share (compare [20] with [21]). In both examples, both enterprises are better off from a barter transaction that uses a price that is higher than the market price. Notice that Norilsk is producing negative value added whether or not barter takes place, but in the barter transaction this is hidden from view. Federal government is clearly worse off because of the loss of taxes. Notice that industrial production is higher even though tax revenue decreases (sound familiar?).

This is not the end of the story. Hiding the reality makes it easier from a policy standpoint to allow Norilsk to continue to destroy value, therefore, making the country as a whole worse off.⁷⁹ The local government may be better off because of less unemployment in Norilsk.

Essentially, Gazprom is buying tax losses from Norilsk which are valuable to the former but not the latter. They share the benefit.

It is interesting to note that if Gazprom produced something that was not an input into domestic production, it could not get this benefit. It would export the good, value added in Russia would be higher. The survival of the lossmakers allows a privately beneficial transaction that is socially inefficient.

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⁷⁹Another way to think about this is that hiding reality through barter makes it harder for reform-minded policymakers to shut value destroyers down.

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