Barter in Russia[*]

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Abstract

Barter has become an important survival strategy for Russian enterprises. We consider the implications of the fact that enterprises may wish to use barter rather than monetary payments. In the process we examine empirically the relationship between barter and its potential causes, such as financial stringency. We also study the implications of barter for restructuring. Our empirical work employs a data set of Russian enterprises that matches information on barter with the financial status of the enterprise that is independent of the barter transaction. We find that in the pre-crisis period barter was not related to enterprise liquidity. Barter is common across all types of enterprises. We do find a positive relationship between barter and market concentration. We also study the relationship between barter and restructuring.

1. Introduction

One of the striking features of Russia's economic transition has been the enormous growth in the use of barter. What was a passing phase of transition in Central Europe has become an endemic feature of the Russian situation. The Russian economy has experienced redemonetisation [13]: in 1992 barter accounted for some 5% of enterprise transactions, but by 1997 this had increased to at least

47%.[1] Estimates of barter turnover vary from 30% to 80% of inter-enterprise transactions [1], [4]. Barter is also used in paying taxes to local, regional and even federal governments. Even wages are occasionally paid in kind [7].

The emergence of barter as a stable institution of exchange is a challenge to modern economic theory. Introductory textbooks in economics point out that barter is inferior to monetary exchange in terms of transaction costs. This is why barter is so rare in modern economies. Russian reality, however, is diametrically opposed to the conventional wisdom. As we argue below, Russian enterprises prefer to use barter even when they have a choice to pay in cash. Why is the Russian economy demonetized? Is it good or bad? Is it possible to remonetize it and if yes, how? Is Russia especially vulnerable to barter or can its demonetization disease spread over to other countries? Such are the questions we are going to address in this paper.

2. Endogeneity

Popular discussions of barter in Russia typically assume that barter arises from factors outside the control of enterprise directors. Barter is often seen as the outcome of forces external to the enterprise, and over which it has little control. This is not a useful assumption, however. Barter is, in fact, a choice variable for enterprises; it is a strategy that an enterprise can employ to reduce the total costs of procuring inputs. To understand why enterprises may prefer to use barter it is necessary to understand the choices facing enterprises.

We begin with the premise that barter is a *choice* that enterprises make.[2] Whether an enterprise engages in barter or not depends on an evaluation of the costs and benefits of barter. While employing barter involves the usually noted transactions costs, it also affords the buyer the opportunity to pay an effectively lower price.[3] Many papers that analyze barter in Russia study this tradeoff to understand why enterprises engage in barter. In this paper, we want to take a further step and ask what actions enterprises will take if they find that barter is to their advantage.

If we suppose that the effective price of purchasing inputs is cheaper using barter, it follows that enterprises will prefer to pay with barter than with money.

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[1]See [1] and [12] for time series evidence on barter. [12] points out that barter is prevalent across Russian regions, with Moscow being the relative exception

[2]This premise is a recurrent theme of the papers in this volume.

[3]This still begs the question of why the seller is willing to accept lower priced goods. Presumably, the key reason is the ability to pass these off for payment in taxes. This begs the further question of why governments are willing to allow tax offsets. The prevalence of tax offsets, especially at the regional level, is an accepted fact. But the motivation is more complex. See [8] for discussion.

There must be some way for sellers to limit the use of barter. One method would be to limit barter to enterprises with which there are good relations.[4] Alternatively, it may be thought that barter will only be used by enterprises that cannot afford to pay with cash; that is, barter is the result of a liquidity constraint.[5] Notice, however, that if enterprises receive a discount for being in financial stringency, it will pay to *pretend* to suffer from financial stringency. In other words, enterprises will have an incentive to signal that they are liquidity constrained.

The insight that enterprises may pretend to be liquidity constrained has important implications for studying barter. Consider, for example, one standard approach to understanding the causes of barter in Russia: enterprise surveys. A number of papers [1], [4] use this approach and find that directors consider liquidity to be the major determinant of barter. Enterprise A's director says that his enterprise delivers output to enterprise B in exchange for goods rather than money because enterprise B does not have cash. Notice, however, that the response of the enterprise director may be biased. This is not to suggest that he is being dishonest, but it is quite possible that even if enterprise B had cash *he might have preferred to use it for other purposes*, given the knowledge that enterprise A would accept payment in kind. So enterprise B does not have any incentive (and probably has a disincentive) to show its cash, and, the lack of cash, if any, may be endogenous: the assumption by the director of enterprise A that cash is lacking is a large part of the reason why it is lacking.[6] Respondents to surveys may thus overstate the liquidity problems of their counterparts.

Notice that this bias is not due to dishonest reporting on the part of respondents. Rather it is due to the respondents' incorrect information about the liquidity situation of their partners. Moreover, this incomplete information is the result of the *strategic* decision of the partners: to be able to use barter it may be necessary to conceal the true financial state of the enterprise in order to qualify for non-cash settlement. Hence, not only is barter endogenous – a point recognized by much of the literature (though not necessarily the general public) – but the *apparent* liquidity position of the enterprise is as well.

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[4]See [8].

[5]As argued in [17], where barter is a means of cutting the price to enterprises that cannot pay the nominal amount with money. See also [6].

[6]It is important to understand that microeconomic arguments rely very much upon the structure of monetary and barter prices, and that these prices arise in turn as outcomes of enterprises' decisions to involve in monetary and barter transactions. See [11] for a general equilibrium model with money and barter where prices are endogenised and show that barter may partially crowd out money in equilibrium.

2.1. An Alternative Approach

To cope with the potential for bias – due to incomplete information possessed by sellers and the strategic use of financial information by buyers – we have taken an alternative approach to analyzing the role of liquidity. We start with directors' estimates of how much of their enterprises' revenues took the form of cash and barter. We then match this data with information on the enterprise's financial accounts collected by *Goskomstat*. Because the latter data is not transaction-specific, we presume that it is less likely to be contaminated by the bias discussed above. We then use this matched dataset to study barter in Russia, and to find out what characteristics of an enterprise make it use barter.[7]

2.1.1. The Data

The dataset we use was put together as part of a research project at the New Economic School on "Non-Monetary Transactions in Russian Economy." This dataset was created by matching the surveys of managers of Russian industrial firms conducted in 1996-98 by Serguei Tsoukhlo of the Center for Business Trends (Institute of Economies in Transition, Moscow) with a *Goskomstat* database of Russian enterprises (Federal Committee of Statistics of Russian Federation).This database includes compulsory statistical reports that all medium and large enterprises must submit to the Russian Federal Statistics Committee. There are over 16,000 enterprises in the database. Since the *Goskomstat* data were most complete for 1996 and 1997 we focused our empirical work on these two years.

Our data on the proportions of revenues in cash and non-cash form are taken from a survey of directors conducted in the Autumn of 1996, 1997 and 1998 by the Center for Business Trends at the Institute of Economy in Transition. The sample is fairly representative and includes large industrial enterprises in all industries.[8] The barter data are answers to the following (eight) questions: "how much of your firm's inputs (outputs) were paid in rubles, in dollars, in kind and in promissory notes?"

The barter data included six to seven hundred enterprises for each year. After matching these with the *Goskomstat* data we ended up with 987 observations, made up of 475 enterprises (52%) in 1996 and 512 enterprises in 1997. Among these, 264 enterprises appeared both in 1996 and 1997. Some information on the enterprises in the sample is given in table 3.1.

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[7]This approach is also used in [4].

[8]Ferrous metallurgy, chemical and petrochemical industries are slightly over-represented. As for the regional variation, the Far East is underrepresented while Western Siberia and the Volgo-Vyatka regions are overrepresented.

3. Empirical Results

3.1. The Prevalence of Barter in Russia

The dramatic growth in barter in Russia has been widely noted (e.g. by [4], [12]) Our concern here is with its prevalence across enterprise types, industries, and other characteristics. As a measure of barter we use the share of barter in total sales. We also have data on the share of barter in payments for the enterprises' inputs. As one can imagine, the latter two statistics are very highly correlated. Table 3.1 shows the average share of barter in sales for various industries.

The share of barter differs across industries but the differences are not statistically significant.[9] One of the stereotypes regarding the Russian economy is that it is clearly split into 'real' and 'virtual' (or 'market' and 'non-market') economies.[10] The idea is that some enterprises use only money while others use only barter. However, the data are inconsistent with this picture of a sharply segmented economy, suggesting rather that Russian enterprises use a mixture of monetary and non-monetary means of payment. Some enterprises are indeed always paid in money, but the vast majority of enterprises are paid both in barter and in money. This is quite evident in Figure 3.1, where we observe that the share of barter in sales is distributed rather uniformly over a broad range. The largest numbers of enterprises fall in a range of 50-70% of barter. But the data indicate that shares of 10-20% are as common as 70-80%.

One implication of the broad variety of barter experience is that the choice of whether or not to use barter is an element of strategy for the enterprise. Because the effective price paid depends on the means of payment, enterprises try to pay with goods when they can, reserving the expenditure of money for those transactions where cash is essential. The resulting shares of barter across industries reflect the opportunities facing enterprises and market conditions.

This suggests that a central issue in understanding barter in Russia is the question of why the effective price of products paid for in goods is typically less than that of cash. That is, why under current Russian conditions is there an effective discount for barter? There are two aspects to this. First, there may be factors such as the tax system which penalize the use of money.[11] If cash receipts are more heavily taxed, then parties to a transaction may split the surplus generated by barter. Second, sellers rarely offer cash discounts, primarily due to legal restrictions. The same nominal value of receipts are received whether the

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[9]With the exception of electricity where barter is significantly higher than in other industries.

[10]This 'dichotomy' conjecture has probably been inspired by stylized models (such as [9] and [16]). Yet, as is evident from Igor's Rules (see 3.1.1) below) most enterprises attempt to have a foot in "each market."

[11]See [8] for a discussion of the cost of using cash in the Russian economy.

Table 3.1: Share of barter in sales, November 1998.

Industry	Number of enterprises in the sample	Share of barter in sales in November 1998 weighted avg (std.deviation)	
Electricity	4	0.67	(0.12)
Fuel	6	0.21	(0.23)
Ferrous metals	32	0.50	(0.19)
Non-ferrous metals	6	0.26	(0.19)
Chemical and petro-chemical	44	0.46	(0.21)
Machinery	307	0.48	(0.23)
Pulp and forestry	75	0.47	(0.23)
Construction materials	71	0.51	(0.22)
Textile	164	0.43	(0.25)
Food	82	0.28	(0.21)
Other	15	0.17	(0.18)
Total	806	0.44	(0.24)

payment is made in cash or coal. If it were possible for the buyer to sell the coal for the nominal price there would be no reason (aside from tax considerations) to use barter. Hence, the use of barter suggests that the market value for the goods used to pay in kind is below the nominal market price. Hence, the costs of barter are disproportionately born by the seller. This is why sellers typically restrict barter transactions to close trading partners.

We explore several of these explanations below.

Another important finding from our data is that there are economies of scale in barter transactions. Controlling for market concentration,[12] a 1% increase in the enterprise's size (measured as sales revenue) results in 0.025% increase in the share of barter in sales. The explanation for this is straightforward. The barter market is so comprehensive in modern Russia that everything can be bought for payments in kind and therefore virtually every product can be used as a means of payment. But in order to join the barter network, an enterprise has to pay a fixed entry cost - most commonly to hire a 'barter broker'. It could also, be that larger enterprises are more likely to be older, and involved in inherited barter chains. New, smaller enterprises cannot afford to joint the barter network or cannot find a vacant niche in it. Hence the size-barter relationship.

A key empirical finding is that, in addition to the static economies of scale, there is also a dynamic economy of scale in barter: *ceteris paribus*, an enterprise

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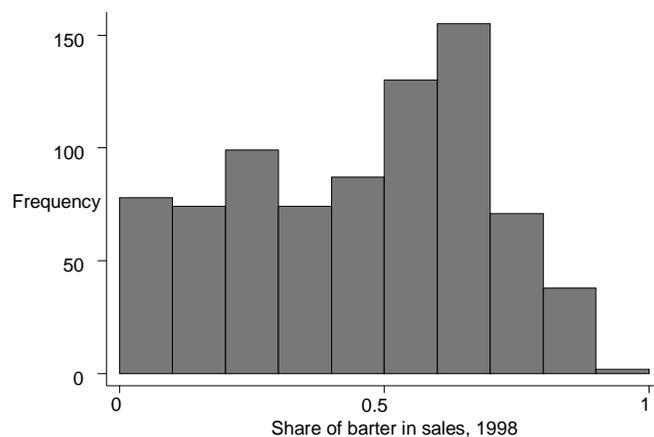[12]We discuss the effects of concentration in section 4 below.

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Figure 3.1: Distribution of Enterprises by Share of Barter in Sales, 1998.

that uses more barter today is more likely to use barter tomorrow. This is a robust finding that stands up to the inclusion of all types of independent variables. Indeed, our empirical analysis suggests that barter today is by far the variable that best explains barter tomorrow. This could be due to learning by doing, or simply to fixed costs associated with forming barter relationships: once formed, the marginal cost of maintaining barter is much lower.

Barter has become so common in the contemporary Russian economy that even exporters and foreign-owned enterprises have become involved in it. As Table 3.2 shows, barter is employed by all types of enterprises: public or private, and whether it has domestic or foreign owners. Although the share of barter in sales appears to differ according to ownership type in table 3.2, these differences are not statistically significant. When we include enterprise size in a regression of barter share on ownership type, differences among the latter do not matter; all ownership types use barter to roughly the same extent. This may be due to the fact that our classification of ownership types is very rough. We are not able, for example, to distinguish between insider-dominated and outsider-dominated private enterprises. Hence, the degree of outside ownership may matter in ways that we cannot capture given our ownership data.[13] It is important to note,

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[13]Unfortunately, our data does not allow us to test for differences between inside and outside ownership. Using standard survey data, Ickes and Ryterman found that barter was greater in enterprises with more outside ownership. The presumed explanation is that barter is a method for concealing income from outside owners. It would also be interesting to see if there is a difference between *privatized* and *de novo* private enterprises, but our data set does not allow us to distinguish between these. Notice that such a test would have to also control for the likelihood that *de novo* firms are more likely to be found in consumer goods industries, which

Table 3.2: Barter Shares and Enterprise Types.

Ownership	Share of barter in sales weighted avg (std. deviation)	
Federal	0.26	(0.22)
Regional	0.22	(0.17)
Municipal	0.21	(0.21)
Public organizations	0.45	(0.29)
Private	0.41	(0.23)
Mixed private and public (Russian only)	0.39	(0.23)
Mixed foreign and Russian	0.51	(0.10)
Total	0.37	(0.24)

however, that once barter becomes widespread we would expect any differences introduced by ownership type to diminish.[14]

We have also found that access to global markets has a little impact on barter. One would expect that an enterprise exporting one more ruble of its output abroad would sell one less rubble for barter. However, then the enterprise would have to pay cash for its own inputs, which is more costly. The data support this hypothesis: an increase of one rubble in exports leads to a decrease of roughly 20 kopecks in barter sales. One may suspect that these are the 'wrong' exports, i.e. exports to cash-constrained CIS countries, but the distinction between CIS and non-CIS exports turns out to be insignificant.

3.1.1. Explaining Differential Use of Barter: Igor's Rules

What explains the variety of barter experiences across enterprises? Gaddy and Ickes [8] suggest that the behavior of Russian enterprise directors can be described by *Igor's Four Rules of Management Planning*:[15]

I₁ *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.

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are likely to deal more in cash. See section 4.1 below.

[14]This would follow as long as enterprises of different types interact with each other. If enterprises of similar ownership only interacted with each other the story might be different.

[15]Igor had a final injunction: Whatever you do don't make a profit: the government will take it all in taxes. Of course what Igor really means is do not make a profit that can be observed.

I_2 *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.

I_3 *Set up some barter operations for the rest of your inputs, especially fuels, electricity and so on.* 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.

I_4 *Export something to a paying, hard currency market.* You need some cash for your operations, mainly for wages and for urgently needed non-wage inputs. Exports need not be of your major product.

Igor's Rules describe behavioral rules for an enterprise director. The degree to which they can be followed, however, will vary across enterprises. There are two important aspects to this. First, there are industry and enterprise characteristics that are critical. For example, enterprises will differ in their ability to follow I_1, because not all enterprises have federal orders. Similarly, the ability to supply municipal services is easiest for those with large construction crews. Even within the same industry the ability to follow the various rules will differ due to particular characteristics of the good and the nature of production.

Consider the implication of I_3. Enterprises that follow this rule will employ barter to at least the extent of their purchases of material inputs. An enterprise that was in complete compliance with this rule would use barter for all non-wage inputs. Cash would be used only for paying wages (if the enterprise also followed I_1 and I_2). This suggests that the share of barter in total sales will depend on the nature of the production process itself.

The second factor is perhaps even more important. Even controlling for enterprise and industry characteristics, the ability to follow these rules will depend on the quality of relationships that enterprises have built up with officials. This is especially true with respect to I_1 and I_2. The ability to pay taxes using offsets is heavily dependent on the quality of relationships that an enterprise has built up with key officials.

3.2. Tax Evasion

One important factor contributing to the growth of barter in Russia is tax evasion.[16] Barter in some cases allows enterprises to avoid declaring some income. By avoiding money altogether, the transaction is not recorded in the banking sys-

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[16]See, for example, [18].

tem.[17] But a more important reason than tax reporting is tax collection. Barter allows the enterprises to avoid the first line of tax collection in Russia today: the banking system. Any enterprise that is in arrears to the government for unpaid taxes is by law subject to having its bank accounts blocked. All 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 with tax arrears to avoid using the banking system, as the effective tax rate on revenue is 100 percent.[18]

Enterprises can use various approaches to circumvent blocked accounts. They can hold multiple accounts, open new ones and close old ones at a rapid rate, and generally try to stay one step ahead of the tax inspectors. Offshore accounts is another alternative. Using cash—that is, banknotes—is a third. But clearly, another way to avoid using the banks is to avoid money altogether—i.e., barter or veksels.

Legally, barter transactions are taxable. And many, though far from all, barter transactions are recorded for the tax authorities, the statistics agencies, and others to see. Enterprises thus incur a tax liability on sales for which they are paid in barter goods. But the burden then falls on the tax collection end. Since no money is deposited on the enterprise's bank accounts, the convenient and automatic mechanism of direct deduction does not work. The enterprise never received cash from the sale and thus has no cash with which to pay taxes.[19]

Evidence on the role of tax evasion as a motivation for barter is mixed. Some studies (e.g. [12]) find survey evidence in favor of the tax-evasion hypothesis while others do not ([4]).[20] But in most cases these studies focus the question too narrowly. They typically ask whether enterprises use barter to evade taxes. A more appropriate question would ask whether enterprises use barter to reduce the *effective* tax burden. Enterprises often use barter not to *evade* taxes but in

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[17]A more preferred method is to use off-shore payments to hide transactions from the tax authorities, but this is hard for enterprises to accomplish if they are not engaged in international trade.

[18]This is discussed at length in [12].

[19]If it were the case that barter constituted only a relatively small percentage of enterprise sales, with the rest in monetary form, then the tax authorities might realistically expect the enterprise to be able to pay enough in cash from its other sales to cover the taxes incurred on the barter transaction. But when barter and other related nonmonetary payments constitute as much as 90 percent of all sales for some enterprises, enterprises simply do not have the cash and will not pay. The same goes for other obligations of the enterprise—to suppliers of material inputs, utilities, etc.

[20]Commander and Mummsen ([4]) also point out that tax rates did not increase dramatically in 1995 which makes it hard to understand how tax evasion could account for the rapid growth of barter since then.

order to *pay taxes.*[21]

Consider, for example, an enterprise that is in position to follow Igor's second rule. The enterprise could pay its tax liability in money, but this would require selling its output for cash. Alternatively, the enterprise can negotiate with the government to supply some service as an offset for taxes. If the enterprise has resources that are not fully utilized the latter alternative is likely to reduce the effective tax burden on the enterprise. This would not be the case if the enterprise faced a perfectly elastic effective demand for its output. In that case it could use the resources to produce and sell the output to obtain the cash with which to pay taxes. But most Russian enterprises face a highly inelastic demand curve with respect to cash sales: to increase cash sales requires a steep discount on the price. In that case negotiating an offset with the government is often the preferred option.

Notice that once the government is willing to engage in tax offsets the options open to enterprises expand. Now the enterprise can potentially use the receipts from barter transactions to pay taxes. This reduces the cost to the seller of accepting goods rather than cash. This is especially true when the non-cash receipts take the form of *veksels* from the natural monopolies, such as *Gazprom* or *UES*.

The essential point is that once the government is willing to engage in tax offsets enterprises face two effective tax rates, depending on whether taxes are paid in money or goods. This, in turn, alters the return to barter sales.

3.3. Liquidity Hypothesis

Many authors, most notably [4], argue that the proliferation of barter is due to a lack of liquidity. The question of cause is difficult to explore. Because of the network aspects of barter there is an important element of hysteresis involved: a factor that initially pushes enterprises into barter may not be the main factor that causes it to persist. It could be that initially some enterprises were pushed into barter by a lack of liquidity but then the widespread use of barter results in enterprises using it regardless of their financial position.[22]

As we have noted, most surveys find that liquidity problems are the leading explanation for barter in Russia ([4]). This is a rather robust finding, but it suffers from the problem that sellers may not know the true liquidity situation of the buyer. Buyers may claim lack of liquidity in order to pay with goods. Hence,

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[21] This point was first noted in [8]. Commander and Mummsen [4] refer to this as tax bargaining.

[22] Commander and Mummsen [4] also argue that the factors that initially cause barter may not be the same as those that cause it to persist.

Table 3.3: Liquid Assets as a Function of the Level of Barter.
standard errors in parentheses

Share of barter in payments for inputs	Average liquid assets / annual sales	
0-10%	0.028	(0.02)
10-20%	0.024	(0.02)
20-30%	0.037	(0.03)
30-40%	0.014	(0.01)
40-50%	0.004	(0.003)
50-60%	0.024	(0.03)
60-70%	0.047	(0.09)
70-80%	0.200	(0.54)
80-90%	0.006	(0.005)

the standard empirical analysis of this question suffers from a potential source of bias due to the fact that perceived liquidity is an endogenous variable.

The approach we take to test the liquidity hypothesis does not suffer from the same problem as previous approaches. This is because we obtain data on the financial position of the enterprise directly,[23] rather than from reports of sellers. Of course we do face the general problem that enterprises may wish to under-report their true financial position, but that would make lack of liquidity appear to have a larger effect on barter.

Formally, the liquidity hypothesis states that enterprises engage in barter due to a lack of liquidity. Therefore they cannot maintain transactions balances at a sufficient level to pay for their inputs with money. Some portion of their transactions must be paid for in alternative means.[24] However, the endogeneity problem mentioned in section (2) makes it difficult to test. The very fact that Russian firms' liquidity holdings are low on average does not mean that the firms are liquidity constrained. In order to test the liquidity hypothesis we need to check whether the *variation* in liquidity explains *variation* in barter across firms.[25] One way to see this is in Table 3.3, which compares the frequency of barter by an enterprise with its financial position. The table shows that there is no significant

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[23]That is, from *Goskomstat*, as described in section 3.

[24]There is also the related assumption that the lack of liquidity cannot be resolved through borrowing from financial markets. Some enterprises do manage to borrow from suppliers by delaying payment – arrears – a phenomenon that is often associated, but is clearly different from, barter.

[25]Ideally, we could also check whether change in liquidity over time leads to more or less barter in the same firm. Unfortunately, we still do not have good data on firms' balance sheets for 1997.

Table 3.4: Barter and Liquidity in 1996.

standard errors in parentheses
***-significant at 1%level, **-significant at 5% level, *-significant at 10% level.

Liquid assets/sales	$-.02$	(.12)
Log sales	.014	(.011)
Export/sales	$-.18^{**}$	(.07)
Constant	.13	(.23)
Number of observations	350	
R^2	0.16	

correlation between barter and availability of liquid assets.

The results in table 3.3 are only illustrative. They do not control for other (potential) determinants of barter. Consider then equation 3.1, where B_i is the share of barter in sales for enterprise i, L_i is a measure of the enterprise's financial position, and X_i is a vector of enterprise characteristics such as size, share of exports in sales, labor productivity, regional and industry dummies etc:

$$B_i = \alpha_0 + \alpha_1 L_i + \alpha_2 X_i \tag{3.1}$$

The financial position is measured as stock of liquid assets divided by annual sales.[26] Our results suggest that there is no relationship between the financial position of the enterprise and the likelihood of barter. This is evident in table 3.4 which reports the results for a typical estimate of equation (3.1). Using export shares and size as control variables, we can reject the hypothesis that barter can be explained by the current liquidity problems of enterprises.[27]

These results indicate that the only variable that has explanatory power for the decision to barter is the share of export sales. Presumably this reflects the fact that exporters have lower costs of acquiring cash than non-exporters, so their optimal choice between barter and cash is different.[28]

It appears that enterprises, which have a choice to pay either in cash or in kind,

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[26]One might argue that enterprises have an incentive to under-report their actual financial positions. But it is hard to see why the frequency of under-reporting would be correlated with the prevalence of barter.

[27]The regression also included industry dummies for 11 categories. Data on liquid assets for enterprises in 1997 are still very incomplete, hence the regression only covers 1996 data.

[28]This also explains why the devaluation of the ruble after August 1998 has led to some reduction in barter intensity. The ruble value of export earnings has increased further, moving the optimal barter-cash choice for exporters, and increasing the relative size of export industries in the Russian economy.

prefer to keep the cash and pay in kind.[29] This is consistent with the hypothesis that the transaction cost structure in the contemporary Russian economy is upside down: monetary transactions are more costly than barter. One can offer numerous explanations for the high costs of monetary transactions in Russia ([11]): high taxes, insecure property rights, imperfect credit markets, rent-seeking by banks and other intermediaries.

4. Barter as a means of price discrimination

We believe that a discussion of barter in Russia is incomplete without taking into account at least one more aspect of the problem; namely role of market power. The anecdotal evidence suggests that the natural monopolies – *Gazprom* (the natural gas monopoly), *RAO UES* (the electricity monopoly), and *MPS* (the railways) – known as the "three fat boys (*tri tolstyaka*) – are heavily engaged in barter transactions. Gazprom and RAO UES frequently complain that they collect only about 10% of their revenues in cash. The rest is paid in veksels, coal, metal, machinery and even jet fighters. It is often argued that the natural monopolies continue to supply for barter because political pressure is exerted on them to do so.[30] However, as we argue below, there may also be an economic rationale behind barter sales in concentrated industries. The natural monopolies can use barter to price discriminate among customers, collecting cash from rich ones and payments in kind from poor ones.[31]

The model we have in mind is rather simple.[32] The model considers N sellers selling a unit of good to a continuum of buyers who can use the good to produce certain output. The value of buyers' output is their private information. In the model of [5] buyers are liquidity constrained. In our model they are not. Each seller chooses how much to sell for cash or for the buyer's output. In the equilibrium, buyers who produce output with a value greater than the cash price of the input will select to pay in cash, while those who produce output of lower value will choose to give up their output.

Barter is inefficient: with positive probability there is no double coincidence of wants and the seller (recipient of barter goods) throws the payment in kind away. Nonetheless, since barter allows them to sell to customers who would not otherwise buy the sellers' good, sellers sometimes prefer to sell for payments in

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[29]This is an application of Gresham's Law. Barter drives out monetary transactions, to some extent.

[30]For example, in [9].

[31]Woodruff makes a similar argument[17]. The key issue, of course, is how to identify who can actually afford to pay more.

[32]See [10] for a rigorous formulation of the model, and for proofs.

kind. The other inefficiency comes from the fact that barter allows even value-subtracting buyers to keep producing since they are pooled with more efficient ones in the barter market.

Certainly, such price discrimination can only exist in a world of imperfect competition where the cash price is above sellers' marginal cost. Otherwise the sellers are not interested in selling to customers who cannot afford to buy at the cash price.

Figure 4.1 presents the structure of equilibria as a function of number of sellers. First, there can be barter equilibria in which buyers who produce high-value output buy for cash at the price p^b while all others trade in their output for the input. This equilibrium can only exist when the average value of payments in kind is higher than sellers' marginal cost. It turns out that this condition only holds when the industry is sufficiently concentrated.

The other equilibrium is a no barter equilibrium which is identical to conventional Cournot equilibrium. It exists when the industry is sufficiently competitive. If the Cournot price p^{nb} is sufficiently low then sellers infer that the buyers who do not want to buy at this price, produce poor quality output. There is no point in selling to such customers.

It turns out that these two equilibria co-exist at certain intermediate levels of concentration. Moreover, at these concentration levels there exists another (unstable) equilibrium. In the latter equilibrium, average quality of payments in kind is exactly equal to marginal costs and sellers are indifferent whether to sell for barter or not sell at all.

The structure of equilibria is rather intuitive.[33] First, both in the barter and the no-barter equilibrium, cash prices go down if number of sellers increases. Second, for a given number of sellers, the cash price in barter equilibrium is greater than price in no-barter equilibrium. This is also intuitive. In the barter equilibrium, sellers have more incentives to charge higher prices because the marginal buyers who would leave the market in case of the no-barter equilibrium, now simply switch to the barter and are therefore contributing to the profits from barter sales. Third, in barter equilibria the cash price should be above some level p^* otherwise the average quality of payments in kind is below marginal cost and barter is not profitable. Similarly, in no-barter equilibria price should be below p^*.

The intuition for multiplicity of equilibria is as follows. Whenever one seller chooses to sell more for cash, it increases the supply in the cash market and therefore the cash price of the good goes down. The additional cash sales are purchased by buyers who were initially the most efficient ones among those buying for barter. With these buyers leaving the barter economy, the average quality of payments in kind goes down. Thus other sellers will have incentives to sell more

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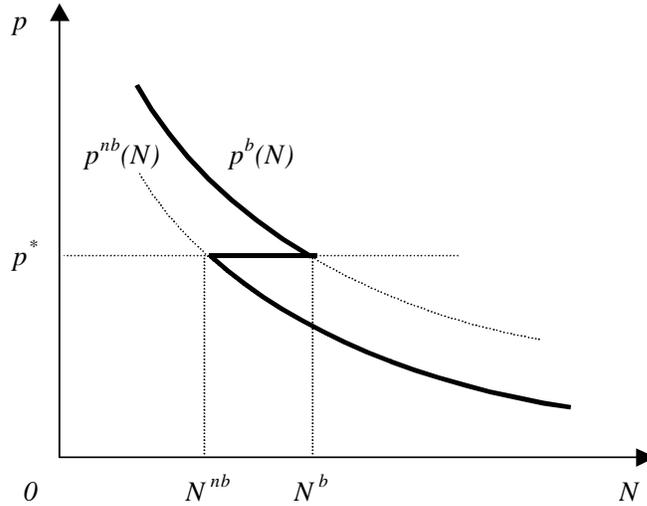[33]See Guriev and Kvasov (1999) for a rigorous proof.

Figure 4.1: Oligopoly price p as function of number of sellers N.

for cash and less for barter. This externality is somewhat similar to aggregate demand externality in new Keynesian macroeconomics.

The share of barter in sales as a function of number of sellers N is shown in Figure 4.2. If the industry is highly concentrated $N < N^{nb}$, there can only be a barter equilibrium and share of barter in sales is positive though declining with N. If the market is very competitive, there is no barter at all. Thus, at some $N \in (N^{nb}, N^b)$ there must be an abrupt jump from barter to no-barter equilibrium.

4.1. Empirical Analysis of the Price Discrimination Model

The model implies the following empirical predictions. First, the greater the degree of market concentration $1/N$, the greater the level of barter in sales, $b = R/(R + Q)$. Second, if the market is sufficiently competitive ($1/N < 1/N^b$) then barter disappears altogether. Third, there should be a structural break in the range $1/N \in [1/N^b, 1/N^{nb}]$ where a small decrease in concentration results in an abrupt fall of the share of barter down to zero.
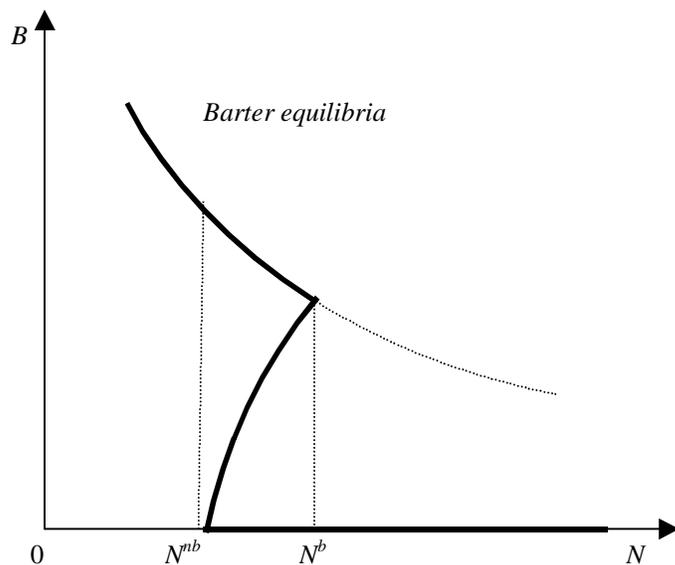
Figure 4.2: Share of barter in sales as a function of number of sellers in the industry.

4.1.1. The data

We employ the dataset described above, augmented with information about market structure. The concentration ratios CR4 (share of the four largest enterprises in total sales of the industry) were calculated for 5-digit OKONH industries (more than three hundred industries) using the Goskomstat database.[34] In our sample, not all industries are present so that we have on average 4 enterprises per each industry, with up to 30 enterprises in some industries. An alternative approach would be to calculate CR4s for 4-digit industries. However we believe that such concentration ratios are less informative. In Russia's OKONH classification many 4-digit industries include 5-digit industries that use each other's outputs as inputs in their production and therefore do not compete with each other.

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[34]We thank David Brown and Annette Brown for providing us with the concentration ratios they have calculated. The CR4s they have obtained coincide with ones that Federal Antimonopoly Committee has included in its annual report.

4.1.2. Empirical results

The main regression we run is an OLS regression of the share of barter in sales (y) on the concentration ratio in the enterprise's industry $(CR4)$ and a proxy for size ls (logarithm of sales). We have included the proxy for size into our regression because there should evidently be economies of scale in using barter. In terms of our model, the greater the size of the enterprise the less the transaction costs of barter $(1 - \alpha)$ are.

Since our model applies to inter-enterprise transactions we need to control for sales to foreign and retail customers. The former is easy to measure: we shall use the export share in sales ex.[35] It is less clear how to control for retail sales. To proxy for sales to consumers we have used a dummy variable (CGI) that is associated with sales in the industry. We set $CGI = 1$ for consumer good industries and $CGI = 0$ otherwise. In our sample, 28% enterprises are in consumer good industries. Unfortunately, CGI is a very crude estimate of enterprise's exposure to the consumer market and is, in fact, industry-specific rather than enterprise-specific. Moreover, even producers of consumer goods are not necessarily selling directly to consumers or even to retail trade. Hence, one should be careful with interpretation of regressions with CGI. Nevertheless, we include CGI into the regression because it can help us control for an alternative explanation of the positive correlation between concentration and barter.[36]

This alternative explanation is related to the so-called "distance to market." The idea is that in consumer good industries there are many small enterprises, and all enterprises receive cash from individual consumers (or retail trade). In the intermediate good industries, the minimum efficient scale is high, there are fewer enterprises and they supply to other enterprises (or wholesale trade) who are willing to pay in kind. Thus, if we assume that the farther upstream an enterprise is the less cash is paid, there should be a positive correlation between distance from the market and barter. Since there is also a positive correlation between distance and concentration, barter and concentration should be correlated.

To control for any year-specific effects, we include a dummy variable, $year97$ which equals 0 if the observation belongs to 1996 survey and 1 if it is from 1997 survey.

The summary statistics for the key variables are as follows.

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[35]We have also tried the share of non-CIS exports in sales and obtained similar results.

[36]We have not included any other industry dummies into regressions. The main idea of our theory is that all industries are alike and the only thing that matters is the market structure.

Table 4.1: The Effects of concentration on barter. *** significant at 1% level, ** 5% level, * 10% level.

y					
$CR4$	0.07**(0.03)	0.08**(0.03)	0.04 (0.03)	0.06**(0.03)	0.05* (0.03)
ls	0.017***(0.007)	0.020***(0.005)	0.018***(0.005)		
CGI			-0.11***(0.04)	-0.10***(0.02)	-0.10***(0.02)
ex		-0.11**(0.05)	-0.15***(0.05)	-0.10**(0.05)	
$yr97$	0.05***(0.02)	0.05***(0.02)	0.05*** (0.02)	0.05***(0.02)	0.05***(0.02)
$const$	0.05(0.08)	0.02 (0.08)	0.08(0.08)	0.38***(0.02)	0.38***(0.02)
N	987	987	987	987	987
R^2	0.03	0.04	0.06	0.05	0.05

Variable	Mean	Std.Dev	Min	Max
y	0.39	0.25	0	0.83
ls	17.13	1.76	9.10	22.27
$CR4$	0.38	0.26	0.04	1
ex	0.07	0.16	0	0.97
CGI	0.28	0.45	0	1

The correlation matrix is as follows (*** denotes significance at 1% level).

	y	ls	$CR4$	ex	CGI	$year97$
y	1					
ls	0.14***	1				
$CR4$	0.11***	0.25***	1			
ex	-0.02	0.28***	0.20***	1		
CGI	-0.18***	-0.16***	-0.28***	-0.20***	1	
$year97$	0.10***	0.00	0.02	-0.07	0.02	1

The signs of pairwise correlations are intuitive. It is more barter in larger enterprises and in concentrated industries who sell less to foreign customers and consumers. There is more barter in 1997 than in 1996 (see Guriev and Ickes (1999) for analysis of dynamic economies of scale in barter). Consumer good industries are less concentrated.

The results of the basic OLS regression are shown in Table 4.1.

In most specifications, the share of barter depends positively and significantly on concentration. When we include CGI into the regression, both the magnitude and the significance level of this relationship tends to fall. Therefore, the 'distance-to-market' explanation of the correlation between barter and concentration is also consistent with the data.

Table 4.2: Barter, Concentration, and Structural Breaks. *** denotes significance at 1% level, ** 5% level, * 10% level.

y					
$CR4$	0.12***(0.04)	0.13***(0.04)	0.14***(0.04)	0.14***(0.04)	0.13***(0.04)
$D*CR4$	0.99***(0.22)	0.67***(0.22)	0.95***(0.22)	0.67***(0.22)	0.93***(0.22)
ls	0.019***(0.005)	0.018***(0.005)		0.020***(0.005)	
CGI	-0.11***(0.02)		-0.11***(0.02)		-0.11***(0.02)
ex	-0.16***(0.05)		-0.11**(0.05)	-0.11***(0.05)	
$yr97$	0.04***(0.02)	0.05***(0.02)	0.05***(0.02)	0.04***(0.02)	0.05***(0.02)
$const$	0.02(0.08)	0.00(0.08)	0.33***(0.02)	-0.03(0.08)	0.33***(0.02)
N	987	987	987	987	987
R^2	0.08	0.04	0.07	0.05	0.06

We also test for the presence of a structural break based in terms of concentration. We introduced a dummy variable, D, that takes the value of 1 if $CR4 < 0.15$ and 0 otherwise. We have tried a few cutoff points including different cutoff points for 1996 and 1997. We have chosen the cutoff 0.15 as the best fit in terms of significance of coefficients. In our sample, 26% observations have $CR4 < 0.15$. The results of the regressions with the structural break are presented in the Table 4.2.

The results are fully consistent with our model. If concentration is greater than the cutoff level, the coefficient on $CR496$ is positive and significant but small (0.12). If concentration is below the cutoff level, the coefficient on concentration is positive, significant and much greater. Indeed, it is equal to $0.12 + 0.99 = 1.11$. In terms of Figure 4.2, the coefficient 0.12 is the slope of barter equilibria curve (mapped into $(1/N, y)$ coordinates) while 1.11 represents the abrupt jump from barter equilibria curve down to no-barter equilibria curve. Above the cutoff, there is a unique barter equilibrium where barter increases with concentration. Below the cutoff, there are stable equilibria. Since at very low concentration levels, the barter equilibrium disappears, there must be a discontinuous change from the barter equilibrium curve to the equilibrium without barter. We interpret the fact that the coefficient on concentration below the cutoff is very large as an evidence of such a discontinuity.

Another way to test the prediction that barter disappears with an increase in competition is to estimate a probit model. We have generated a binary variable b_0 that takes the value of 1 whenever $b > 0$ and zero if $b = 0$. In our sample, only 12% enterprises have zero barter, thus the mean of b_0 is 90%. The results are reported in Table 4.3. The probability that an enterprise is involved in barter increases with concentration.

It is also of interest to check whether concentration has any impact on the

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Table 4.3: Probit estimates.

	b	b	b1	b1	b2	b2
CR4	0.52***(0.20)	0.38*(0.20)	0.57***(0.17)	0.36**(0.18)	0.34**(0.14)	0.10(0.15)
CGI		-0.24**(0.11)		-0.37***(0.10)		-0.47***(0.08)
const	1.11***(0.08)	1.23***(0.10)	0.89***(0.07)	1.08***(0.09)	0.50***(0.06)	0.73***(0.08)
N	1267	1267	1267	1267	1267	1267

probability to have a very low barter share. Indeed, occasional barter deals occur in OECD economies as well. We have looked at two cutoff points 0.1 and 0.2. In our sample, 13% enterprises have share of barter in sales below 10% and 27% of the enterprises have the barter share below 0.2. We have introduced two binary variables $b1$ and $b2$. The binary variable $b1$ is 1 whenever $b > 0.1$ and 0 otherwise. Similarly, $b2 = 1$ when $b > 0.2$ and $b2 = 0$ otherwise. The results of probit estimates with cutoff levels are also shown in Table 4.3. The probability to have very low barter decreases with concentration as well as the probability to have no barter at all.

We have, once again, included CGI into the regression. The purpose is to check whether exposure to the consumer market deters barter which, in turn, results in a positive relationship between concentration and the probability of being involved in barter. Again, it turns out that enterprises in consumer good industries are less likely to use barter. However, the coefficient on concentration remains positive (though becoming smaller and less significant) even if we control for CGI. We have also tried to check effect of exports but found no significant relationship.

4.2. Multiple Equilibria and Path Dependence

Our discussion of the liquidity hypothesis raised an important question about the notion of causality in analyzing barter: the initial cause of the phenomenon may not be the critical variable explaining its current existence. It may be that a liquidity squeeze was the key factor that caused enterprises to switch to barter, but our evidence indicates that financial stringency is not the key factor explaining its current use. The cause – a liquidity squeeze – may be the shock that pushes the economy into a new, barter equilibrium. Once the economy is in that equilibrium the absence of the initial cause may be irrelevant for barter's persistence.

Our results concerning the relationship between barter and concentration – barter is more likely with higher market concentration – raises a similar issue. If barter is explained by a high concentration of market power, why is it observed in Russia and is virtually non-existent in other economies? One answer to this question would be that in Russia markets are more concentrated than in other

economies. This claim is well-accepted by the general public and policymakers but it is not supported by data (see [3] and [2]). Our model may offer another explanation. As we have seen, for some levels of concentration there may be two stable equilibria: one with barter and one without barter.

Therefore we may have path-dependence or the so-called hysteresis effect. In 1995, a liquidity shock has thrown the economy into a high barter state. Since that time, price flexibility should have restored equilibrium level of real money stock. However the real money supply is now two-three times as low as it used to be. In terms of Polterovitch (1998), Russian economy is in the institutional trap of barter.

The multiple equilibria argument is rather common in modern literature on transition and development. It is basically the essence of so-called 'post-Washington consensus' that is gradually replacing the Washington consensus on economic transition. The post-Washington consensus states that institutions matter a great deal for transition and may fail to emerge spontaneously. Government should intervene to promote good institutions, otherwise the economy will find itself in a low-level equilibrium. However, what our model suggests is not simply a restatement that Russia may be in a low-level equilibrium. We have shown that at some level of competitiveness the barter equilibrium disappears and industry jumps to the no-barter equilibrium. This argument suggests non-trivial policy implications. In order to reduce barter, government should promote competition. Moreover, even if competition policy may have had little effect on barter so far, this does not mean that the government should necessarily give up. Our model (and the empirical analysis) suggests that barter may fall dramatically when a certain threshold level of competition is achieved.

5. Networks

One of the most interesting aspects of barter in Russia is its multilateral nature.[37] Most barter is not bilateral. Rather, enterprises are typically embedded in a network [15]. As an incisive report from a leading Russian economics research institute, the Institute for the Economy in Transition (IET), noted:

> The barter chain itself turned out to be a special kind of consumer of the output. But its needs differed from the needs of liquid demand. The barter chains frequently reminded one of the 'production for production's sake' of the [Soviet] planned economy, when a quasi-cooperation gave rise to closed autonomous systems that served only themselves. In a number of enterprises which we surveyed, the share

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[37]This point was first emphasized in [12] and [13].

of output necessary simply to support the viability of the chain itself
was as high as 30 percent.

The IET went on to conclude that the growth of barter, especially multilateral
barter, had not only quantitative but also qualitative features. "In several of the
enterprises we studied in the past two years [1995-1996], we saw a growth in
production not of liquid output [output that could be sold for cash] but of output
that enjoyed demand in the barter schemes." The task of finding products that
would be acceptable to the power companies became paramount. It compelled
many enterprises to shift the structure of their output not towards the real market,
but in the attempt to satisfy directly or indirectly the rather specific needs of the
natural monopolies. This created the conditions for the exact opposite of market
restructuring—an adjustment away from the market.

As barter spread outside of traditional multilateral chains and began to em-
ployed with non-traditional customers, the quality of the goods exchanged dete-
riorated. Enterprises face two prices for their product: a barter price and a cash
price. Given the bias in Russian law against cash discounts, enterprises choose in-
stead to provide lower quality goods in exchange for barter, while reserving better
quality products for cash sales.

One result of the proliferation in barter was a curious investment "boom"
among the least likely candidates. One economics weekly wrote: "One can ob-
serve a paradoxical pattern: the worse the enterprise's economic condition ..., the
higher its level of investment 'activity'." The solution to this apparent riddle,
they explained, was that these weak enterprises, surviving through the system of
barter and offsets, ended up receiving huge amounts of some of the most popular
barterable goods—construction materials of various kinds—which they then had
to put to use by building something or other. As a result, around 60 percent
of capital investment is construction of new residential and production buildings.
But they are never finished. "Under conditions of the traditional Russian practice
of construction delays, [these investment projects] have a zero or even negative
economic effect." In terms of economic efficiency, the only consolation is that
a substantial portion of the construction materials delivered to the construction
sites do end up in socially useful projects, albeit through illegal channels, since
they are pilfered by workers and used to build garages or dachas for themselves
or their friends and neighbors.

An important implication of the *network character* of barter is that a history
of relationships is important to support these transactions . Because restructuring
often involves changes in suppliers and customers, barter may weaken incentives
to restructure [13]. Barter may thus be a force "conserving" relationships among
enterprises. Aukutsionek [1] also finds that old links play a significant role in
barter relationships. The emergence of specialized intermediaries and the survival

of Soviet industrial links could add up to a "lock-in" effect, which helps perpetuate barter.[38] The empirical evidence is consistent with this hypothesis.

6. Implications of Barter

Barter is clearly chosen by enterprises to reduce the cost of making transactions. Nonetheless, the widespread use of barter has implications for the economy. This is especially true if barter is used as a means of evading budget constraints, as in the virtual economy argument.

The model in Gaddy and Ickes [8] implies that some managers will choose to invest their effort and capital in restructuring while the others will invest in relationship capital. The latter pays off in better network capital and therefore lower costs of barter. The choice between the two types of investments depends on the nature of the enterprise's initial conditions. Since managerial effort (time) is scarce, the model implies that we should observe a negative correlation between restructuring and barter. This would be an important implication of barter: it enable enterprises to delay restructuring.

The hypothesis that we wish to test is that enterprise directors, such as Igor, invest in relational capital or restructuring, and that barter is used as an strategy to avoid restructuring. At any point in time, the enterprise has an inherited level of relational capital. Given that, there is some optimal level of barter for the enterprise. If the director now chooses to invest in relational capital the optimal level of barter should increase.[39] But greater investment in relational capital means less investment in restructuring. So restructuring should be associated with a decrease in barter. Hence, the empirical prediction is that restructuring is inversely related to the change in barter.[40] We offer some empirical evidence on this relationship.[41] As a proxy for restructuring we take the change in labor productivity in the firm in 1997 relative to 1996. We then regress this proxy on the change in the level of barter from 1996 to 1997. Our basic equation is:

$$llp97_i = \alpha_0 + \alpha_1 llp96_i + \alpha_2(b97_i - b96_i). \tag{6.1}$$

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[38]This is studied, among others, by [14].

[39]In terms of the model in [8] the cash constraint of the enterprise would bind at a lower level of cash sales if the amount of relational capital increases.

[40]A more ideal test, perhaps, would regress the change in labor productivity on the change in barter from an earlier period, say 1992. Enterprises that invested in relational capital would have a large increase in barter since then, compared with other enterprises. Lacking data for this earlier period, we estimated the equation in the text.

[41]Note that we are not testing whether increased barter *causes* less restructuring. Rather we are analyzing whether increased barter and less restructuring are associated.

Table 6.1: Restructuring and Barter. The dependent variable is the log of labor productivity in 1997.

standard errors in parentheses

	(1)	(2)	(3)	(4)	(5)
$llp96_i$	0.78***	0.88***	0.80***	0.78***	0.78***
	(0.05)	(0.04)	(0.06)	(0.06)	(0.06)
$b97_i - b96_i$	-0.42**				
	(0.17)				
$b97_i$		-0.12		-0.33	-0.52**
		(0.12)		(0.23)	(0.20)
$b96_i$			-0.15	0.32	0.35*
			(0.16)	(0.21)	(0.19)
$profit96_i$	0.83***	0.38***	0.54***		0.84***
	(0.13)	(0.09)	(0.11)		(0.13)
$size96_i$	0.09***	0.08***	0.08**		0.09***
	(0.03)	(0.02)	(0.03)		(0.03)
$const$	0.91**	0.06	0.86	0.79*	1.03**
	(0.41)	(0.33)	(0.45)	(0.47)	(0.42)
N	150	344	261	150	150
R^2	0.83	0.80	0.72	0.77	0.83

We also estimate the equation with size and the ratio of gross profits to sales as regressors.[42] As is evident in Table 6.1 the results are robust to the inclusion of these variables.

Our base specification for equation (6.1) is given in column (1) of Table 6.1. It is interesting, however, to check whether it is the level, rather than the change in the level, of barter that is critical. We test this in the remaining columns of the table. The estimates indicate that levels of barter are not statistically significant when introduced separately, and that it is the difference that matters.[43] This presumably follows from the fact that we are measuring productivity in 1997 relative to 1996. Our results suggest that it is precisely those enterprises

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[42]We measure size by the log of sales. This presents a problem because if barter is useful in inflating revenues our measure of productivity will be overstated. But notice that the direction of this bias goes against our maintained hypothesis, making it harder to reject the null. A similar problem may be present with respect to profits. We also estimated the equation with profits replaced by costs. This did not change any results, as in our data set the correlation between (the log of) sales and (the log of) costs is very high (0.989).

[43]Thus when we enter $b96$ and $b97$ separately, the coefficients take the opposite sign and are statistically significant.

where barter has increased over this period which have had the poorest economic performance measured by labor productivity.

We have also tried to control for industry and regional effects by introducing appropriate dummies into our regression. Some of the industry and regional dummies were significant but there was no change in the coefficient on the change in barter, and the R^2 increased by only a negligible amount. Hence, the effect of a change in the level of barter on the change in labor productivity appears to be robust.

The results of the analysis are consistent with the argument that barter is associated with a lack of restructuring. In our sample, labor productivity falls by 7% per annum. The variation from this trend is negatively correlated with change in barter level. On average, an increase of share of barter by 1% decreases productivity by 0.3%.

In a general equilibrium model of the virtual economy Ericson and Ickes [6] show that a "virtual economy trap" may exist, where enterprises refuse to restructure. This arises when restructured enterprises do not achieve sufficient improvements in efficiency to overcome the cheaper price of energy that results from using barter. As a result of government incentives that induce *Gazprom* to subsidize energy to certain customers, there is just too large a surplus generated by barter to be overcome by restructuring, at least within the bounds placed on the restructuring parameters. Notice that this type of argument is implicit in analyses that presume that barter is used as a means to price discriminate among users.[44] To avoid having to pay the higher price the customer may refuse to signal the ability to pay a higher price.[45] This is accomplished by refusing to restructure.

There would seem to be many other equilibria also. But the result, that firms gaining from barter would refuse to restructure, seems robust. Only if the government removes its incentives for barter, and/or *Gazprom* loses the ability to discriminate among users, would the incentives to restructure become dominant for firms in barter networks. This then poses a substantial barrier to the successful transformation of the Russian economy.

7. Conclusion

Barter has important implications on the *transparency* of the economy. The proliferation of barter in Russia has increased the difficulties for outsiders to monitor enterprise behavior. This weakens corporate governance by making it easier for managers to hide income from the shareholders of the enterprise. It also weakens the process of tax collection, and thus contributes to the fiscal crisis of the Russian

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[44]For example, [10] and [17].

[45]This is another example of our argument about the endogeneity of barter.

state. By making transactions less transparent it weakens the role of the budget constraint in governing enterprise behavior. Indeed, it may be argued that this is an important motivation for participants to use barter. In this way barter has had an insidious effect on one of the key goals of market reform: to harden budget constraints and create a focus on the bottom line.

What is clear is that demonetization of the Russian economy involves an increase in *idiosyncratic* exchange. The terms of transactions depend more on who the parties are then on the items exchanged. That is why networks are so important to the institution of barter. This is another tendency that is opposite to a central goal of market reform: to increase the scope of "arm's length transactions." Barter at one level appears to be a survival mechanism used by enterprises to avoid the costs of restructuring. Once it has become widespread, however, it also becomes a strategy used by enterprises to improve their financial (interpreted broadly) position. This is why the barter equilibrium may be so difficult to break out of. Once the economy settles into a barter equilibrium it cannot be broken simply by shutting down the lossmakers.

Our empirical results are consistent with both aspects of barter: as a survival strategy and a strategy to reduce the payment for inputs. The inverse relationship between barter and restructuring points to the role of survival.[46] But the widespread nature of barter is also supported by our inability to find a relationship between barter and liquidity. Moreover, our results on market power and barter demonstrate how barter can become an instrument used to increase profits from transactions. The fact that multiple mechanisms are at work in generating barter suggests that there are no simple means of extricating the economy from this predicament.

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