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Determinants of Barter in Russia: An Empirical Analysis

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Determinants of Barter in Russia: An Empirical Analysis

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Abstract

This paper analyzes the causes and consequences of non-monetary transactions in Russia, drawing on a large enterprise survey. We show that barter and offsets are linked to liquidity problems at the level of the firm and to arrears in particular. We find evidence that the state has channeled implicit subsidies to enterprises in the form of tax and utility offsets. The findings help explain the rise of non-monetary transactions during much of the 1990s. We show that non-monetary transactions inhibit enterprise restructuring. Our findings suggest that a policy solution to the non-cash problem would require the state and public utilities to phase out arrears and offsets.

JEL Classification Numbers: D43, G3, H25, L14, P31, P35

Keywords: barter, tax offsets, non-monetary transactions, arrears, trade credit, Russia, transition, subsidies, restructuring

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1. Introduction

Among the most puzzling aspects of the transition process in Russia has been the steady growth of barter and other non-monetary transactions (NMTs).[2] The Russian Economic Barometer panel of industrial firms indicates that between 1992 and 1998 the share of NMTs in industrial sales rose from under 10 to over 50 percent.[3] This includes four types of exchange. First, there is "pure" barter where goods are exchanged for goods, either bilaterally or in chains. Second, there are offsets or *zachety*, where debt is settled with goods. Offsets have commonly been used to clear obligations among groups of firms or between firms and the government. Third, there are money surrogates such as promissory notes or *veksels* issued by enterprises, banks or government. Fourth, there are debt swaps and cross-cancellations of debt.

What explains this proliferation in non-monetary transactions? As barter requires mutual coincidence of wants, it generally involves large search and transactions costs, especially in multilateral deals. Moreover, there are likely to be substantial negative externalities associated with NMTs, namely the loss of transparency in transactions, the associated spur to corruption, and constraints on enterprise restructuring. While there are a host of alternative explanations – reviewed below in Section 3 – no explanation can be complete without accounting for why NMTs have grown so persistently until the Russian crisis in 1998 and why it has been confined to a number of CIS countries, without playing an important role in other transition economies.

In this paper, we argue that the trigger for NMTs must be traced to two crucial factors affecting industrial enterprises: liquidity and credit problems on the one hand, and non-monetary payments of tax and utility bills on the other hand. We thus see the growth in non-monetary transactions in Russia as being driven primarily by a liquidity and credit squeeze on the industrial sector. This occurred alongside an expansion of tax and utility offsets, which are effectively implicit subsidies. The proliferation of NMTs can to some degree be explained by firm-specific motives and chain effects.

We test this theory using a large survey of Russian firms that was conducted in late 1998. The paper is organized as follows: Section 2 provides a short description of the data set. Section 3 then gives a brief overview of the different explanations for NMTs in Russia and outlines the arguments that we intend to test. Section 4 utilizes the data to investigate the causes of the recourse to non-monetary transactions, focusing on the relationship between liquidity, arrears and the use of non-money as well as analyzing the role of the state. Section 5 looks at the impact of non-monetary transactions on restructuring, as well as network and performance implications. Section 6 sums up and draws a few tentative policy conclusions.

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[2] In this paper, we shall use the acronym NMTs to signify the full range of non-monetary transactions, not just barter. Where appropriate, we will specify the precise transactional form.

[3] See Aukutsionek (1998).

2. Data description

This paper is based on a survey of Russian manufacturing and service sector firms. A total of 350 firms were surveyed in 34 *oblasts* or regions of Russia in a four week period stretching from mid-October through to mid-November, 1998. All firms sampled had some positive exposure to non-monetary transacting. Only 12 percent of firms were still in public ownership; the rest were either privatized or private firms. *Table 2.1* gives details of the regional, sectoral and size distribution of the sample. With respect to sectors and regions, sampling has been fairly evenly distributed but there are some significant departures from the distribution reported in the Goskomstat registry. In particular, sampling in the North and North West was very restricted in our sample. With respect to economic sector, both fuel and energy firms as well as metals and chemicals are heavily over-represented in the sample while consumer goods are significantly under-sampled relative to the Goskomstat registry shares. The mean employment size of the sample was over a thousand, under-representing small firms and over-representing firms in the size range 1,000-10,000.

Table 2.1. Sample structure

SAMPLE CHARACTERISTICS	NUMBER	PERCENT	GOSKOMSTAT REGISTRY (%)
REGION			
North	6	2	12
North-West	0	0	
Central Chernozyom	27	8	26
Central	89	26	
incl. Moscow	*42*	*12*	*9*
Volga-Vyatka	18	5	6
Povolzhye	47	13	11
North Caucasus	31	9	10
Urals	40	11	14
West Siberia	50	14	13
East Siberia	20	6	8
Far East	14	4	
Kaliningrad	7	2	0
SECTOR			
Electricity	28	8	
Oil extraction	11	3	2
Natural gas	4	1	
Coal	18	5	
Ferrous metallurgy	16	4	
Non-ferrous metallurgy	10	3	5
Chemicals, petrochemicals	41	12	
Machinery	77	22	24
Forestry, timber, paper	20	6	21
Construction and building materials	43	12	
Light industry	44	13	39
Transport	37	11	9
SIZE (EMPLOYMENT)			
<200	97	28	44
200-1,000	146	42	37
1,000-10,000	96	28	17
>10,000	8	2	2

Goskomstat Registry numbers relate to 1991 and are taken from Earle and Estrin (1998)

Table 2.2 gives an initial sense of the weight of non-monetary transactions, disaggregated by type, on both the revenue and costs side. With the exception of non-monetary payments to the federal budget and off-budget funds, the mean share of non-money in revenue and the key cost categories is consistently above 60 percent. Barter and offsets are the dominant non-monetary instruments. They are used in roughly the same proportion in inter-firm transactions, while offsets are clearly the main form of non-cash settlement with utilities and the budget at both federal and local levels. Although there is significant variation across firms with respect to the actual non-money exposure, nearly 90 percent have exposure to both barter and offsets.

Table 2.2. Average shares of NMTs in enterprise revenue and costs

REVENUE AND COSTS	OVERALL NON-MONEY	BARTER	OFFSETS
Sales revenue	.64	.26	.30
Input costs	.67	.32	.29
Utility payments	.69	.16	.49
Federal taxes	.38	.05	.29
Local taxes	.66	.07	.54
Off-budget funds	.29	.03	.22

3. Explanations for non-monetary transactions

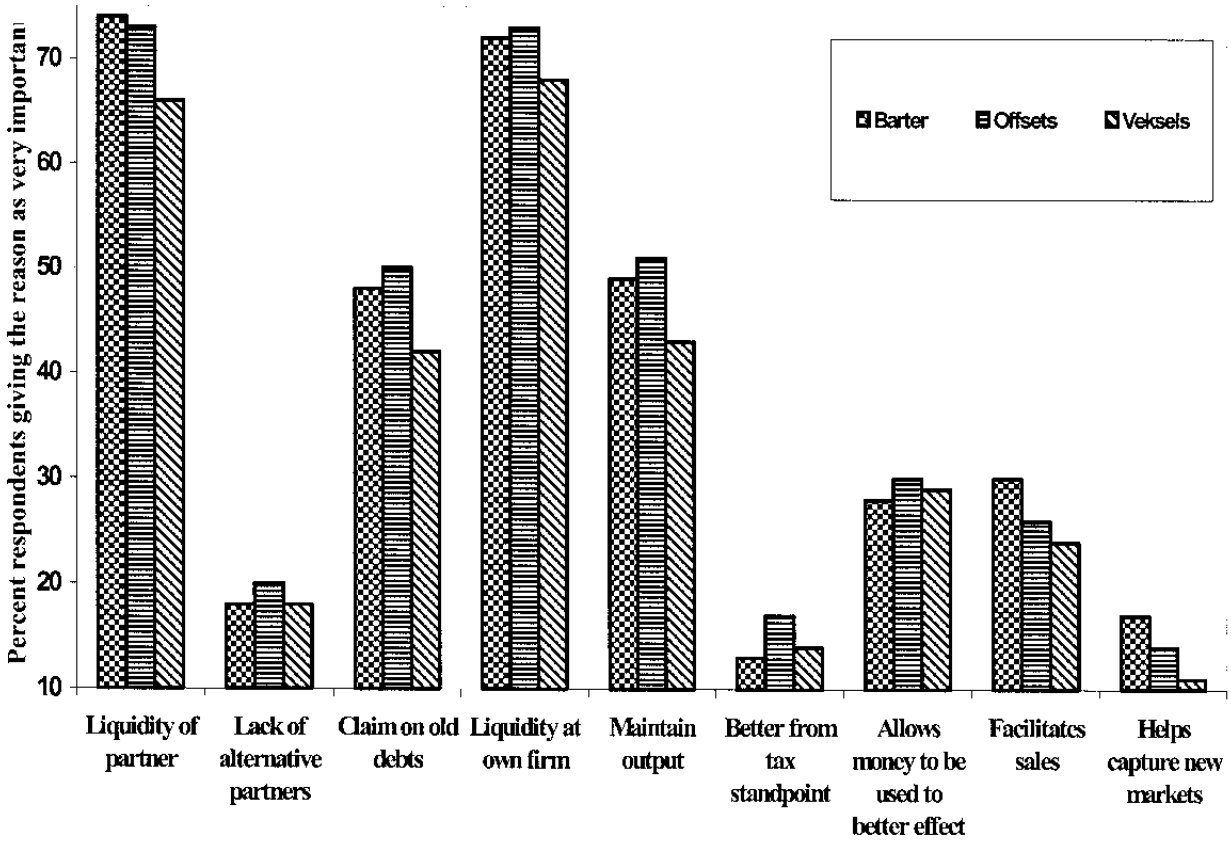
The emerging literature on barter has produced many different explanations for non-monetary transactions in Russia. There are four categories of causes that have received particular attention:

1. *Liquidity and credit squeeze* of the industrial sector, prompted by falling demand, monetary tightening, cuts in direct subsidies and directed credit, and a decline in bank lending to enterprises, inducing firms to pay suppliers in kind, run up arrears and settle these arrears subsequently with offsets;[4]
2. *Implicit subsidies* and credit channeled to firms in the form of late and non-monetary payments to tax authorities and public utilities, reducing pressure for enterprise restructuring;[5]
3. *Rent-seeking* by managers and state bureaucrats, made possible by the lack of transparency inherent in non-monetary transactions, including tax evasion and overpricing of goods in procurement, as well as distortions in the federal revenue sharing system;
4. *Network effects* arising from the persistence of historical relationships, thick markets in NMTs, as well as mitigation of contractual risk associated with the use of NMTs in a network context.[6]

[4] See Commander and Mumssen (1999).
[5] See Commander and Mumssen (1999); Gaddy and Ickes (1998a); World Bank (1999).
[6] See Marin and Schnitzer (1999).

How do these theories hold up empirically? *Figure 3.1* reports the responses of firms sampled in our survey when asked to list the most important reasons behind the use of the various non-cash forms of payments. Liquidity problems of the firm or its partners are mentioned as the predominant motive for NMTs. In addition, non-monetary transactions – offsets in particular – are seen as a way to settle outstanding arrears and debts. These results appear to lend some support to liquidity-based explanations. It should also be noted that many firms see NMTs as a way to maintain output levels. This may be indicative of non-profit motives and may reflect reluctance to enterprise restructuring.

Fig 3.1. Reasons for using non-monetary transactions



It is striking that the most frequent explanations given for NMTs are of a passive nature. Firms see NMTs as a necessity rather than as an instrument for maximizing profits or creating new business opportunities. This passive view of NMTs is further supported by evidence in the survey that network and thick market effects have supported the proliferation of non-monetary transactions (see Sections 4.4 and 5.2).

In this context, it is interesting to note the relatively low explanatory importance given to taxation.[7] Although this does not mean that tax evasion and tax minimization are insignificant as motives, it suggests that there must have been other factors driving the continuous rise in the scale and scope of NMTs over the past half decade. Indeed, many enterprises in the survey claimed that NMTs actually raise their tax bill, which is consistent with the observation that barter prices were generally found to be 20-50 percent higher than cash prices. Indeed, the practice of overpricing goods that are paid for in non-money points to a different type of tax motive, one that does not concern inter-enterprise barter, but the settlement of taxes in kind (see Section 3.2 and 4.3).

In this paper, we will devote most attention to two categories of causes. First, we investigate to what extent liquidity and credit factors have affected firms' exposure to non-monetary transactions. Second, we look at the role of the state in providing a stimulus to the use of NMTs. The following two sub-sections now review the theoretical foundations for these two types of explanations in more detail.

3.1 Barter and offsets as forms of trade credit

Over the course of Russia's transition, bank lending to the private sector declined sharply, falling to below 10 percent of GDP even before the crisis in August 1998, as banks shifted their portfolios to financing the government deficit.[8] In our sample, over 70 percent of firms reported difficulty in getting access to bank credit. This suggests an environment radically different from that existing earlier in the Russian transition when enterprise access to credits was relatively easy.[9]

Faced with a bank credit squeeze, Russian firms widely resorted to trade credits. Between 1995 and 1998 total payables jumped from under 20 to nearly 60 percent of GDP, while overdue payables or arrears moved from 15 to 40 percent of GDP in the same period.[10] By mid-1998, aggregate arrears in Russia were roughly four times larger than the stock of commercial bank credits to firms. It is notable that over half the firms in our survey reported overdue payables greater than 30 percent of sales and a third registered arrears greater than 60 percent of sales at mid-1998.

The growth in arrears until mid-1998 has been accompanied by rising non-monetary transactions and the post-crisis fall in arrears was mirrored by a decline in non-monetary payments, as shown in *Figure 3.2*. This lock-step movement of NMTs and arrears, we argue, reflects a link between enterprise credit and non-monetary transactions. Barter and other

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[7]Respondents were asked to indicate the reasons for non-money deals, one possible response for which was; "better from a tax standpoint". Of course, it is reasonable to assume that there would be a tendency to underreport tax motives, given the potential worry that survey results may not be treated confidentially.

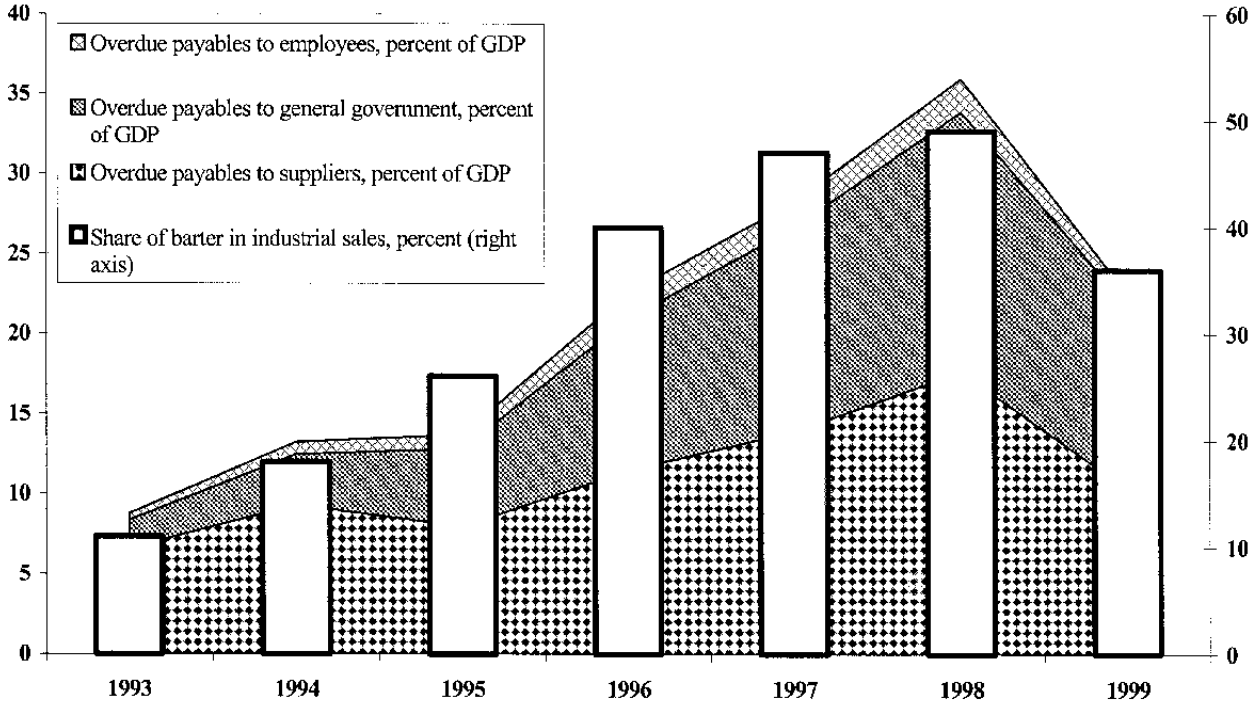
[8] For a fuller discussion, see Commander and Mumssen (1999).

[9] See Fan, Lee and Schaffer (1996).

[10] Trade credits involve the reallocation of credit and liquidity across firms. Arrears are essentially an ex-post extension of the initially agreed maturity of the trade credit, and hence another way of reallocating credit, although it is usually involuntary from the creditor's point of view.

forms of non-monetary payment usually involve an element of trade credit. This is most obvious for offset operations and time-lagged deals.[11] But even spot barter can act as a type of trade credit if one party does not have immediate use for the goods received. Similarly, settling a supplier's bill with a good (as an offset) implies an extension of further trade credit unless the supplier has immediate use for the good received. Barter, offsets, trade credit and arrears can thus be seen as alternative ways of providing working capital to firms.[12] These instruments can be used to get around high costs of borrowing from banks or to limit information asymmetries between banks and firms concerning creditworthiness. Barter and offsets can facilitate provision of trade credit with reduced credit risk which can be especially attractive in an environment where creditor rights are weak.

Fig 3.2. Dynamics of arrears and barter



In addition, in the presence of mounting arrears, accepting offsets is a way for creditor firms to accelerate payments of outstanding debts when debtor firms are illiquid but have unsold inventory. The idea is that it may be preferable from the point of view of the creditor to accept a good now, rather than cash later, if creditor rights are weak. Hence, we would expect to see a growing use of offsets in the context of rising arrears.

[11] The main difference between time-lagged barter deals and offsets is that the reciprocal delivery of goods is planned ex ante in the former, but not in the latter.

[12] Under certain conditions, these methods can be equivalent ex post. However, they are never equivalent ex ante, given different risk profiles and expectations associated with the different types transactions. See Commander and Mumssen (1999).

3.2 Offsets and arrears as channels of implicit subsidy

As the liquidity and credit squeeze was a shock common to most Russian firms, it is unlikely that the growth in NMTs is attributable to motives of inter-firm trade credit alone. Shifting liquidity from one firm to another can smooth individual liquidity problems, but does not improve aggregate enterprise liquidity.

In this context, it is important to note that overdue payables of enterprises increased far more rapidly than overdue receivables. This discrepancy essentially reflects an increase in overdue payables to the state. Arrears to the enlarged budget, as well as to off-budget funds, experienced the strongest rate of increase. Between 1995-98 such arrears went from just under 5 percent of GDP to over 16 percent, as seen in *Figure 3.2*. In addition, enterprise arrears to the state-controlled gas and electricity utilities – principally Gazprom and UES – increased substantially. These utilities accounted for about half of all inter-industry arrears, with receivables clearly exceeding payables.[13]

Notwithstanding the complex nature of arrears between various levels of government and the infrastructure monopolies, it is clear that the private sector has run up high net payables to the public sector as a whole, including the budgetary entities and the public utilities. This suggests that the principal asymmetry at work has been not so much the transfer of liquidity *across* firms, but the transfer of liquidity from the budget and utilities *to* firms. This points to an infusion of net credit and implicit subsidy to the private sector.

In addition to running up arrears to the tax authorities and utilities, enterprises resorted increasingly to tax offsets and other non-monetary means of settlement. Indeed, part of the increase in non-monetary revenues of enterprises in the mid-1990s appears to be a direct result of an increase in non-cash settlements of tax and utility bills. The share of tax offsets in federal tax receipts rose to almost 25% in 1997 before falling gradually.[14] At the local level, non-monetary tax collection remains widespread. The most dramatic fall of cash collection was experienced by the state utilities. The domestic cash receipts of Gazprom fell to no more than 15 percent of sales by 1997/98.[15]

There is much anecdotal evidence that non-monetary forms of tax and utility payments tend to overvalue the goods delivered by enterprises, implying a direct price subsidy and adding to the subsidy element embodied in tolerating arrears. In a recent World Bank study,[16] it is estimated that implicit subsidies by the general government grew from below 1 percent of GDP in 1994 to over 10 percent in 1998, with about 80% of the subsidy accounted for by arrears and 20% by inflated prices in tax offset deals and procurement. Total implicit

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[13] See World Bank (1999).

[14] See Pinto, Drebentsov and Morozov (2000).

[15] Non-payments or payments in kind to the utilities have been associated with substantial arrears to the budget (over 20 percent of total tax arrears in 1997), to each other, as well as more complex tax bargains with government that have offset these losses.

[16] See Pinto, Drebentsov and Morozov (2000).

subsidies channeled through the gas and electricity sector are estimated to amount to about 4 percent of GDP, with over half of the subsidy accounted for by overpriced NMTs.

We will investigate in Section 4.3 whether the overvaluation of goods in procurement and tax offset deals reflects a conscious choice by policymakers or simply reflects corrupt practices by managers and bureaucrats. Indeed, there are two potential "honest" motives for the state and the utilities to accept goods in lieu of cash. One is a pure subsidization motive, where the state tries to keep alive industrial enterprises by creating an additional market for their goods and paying excessive prices. The other is the need to collect revenues and avoid a build-up of tax arrears. As in the case of transactions between private firms, there is a case for accepting goods now rather than cash later. Either way, there is good reason to believe that the infusion of implicit subsidies in the form of offsets and arrears has been a crucial driver behind the growth in Russia's non-cash economy. We will scrutinize this proposition in the next section.

4. Empirical evidence: causes

We now examine the causes of non-monetary transaction by analyzing our survey data. Section 4.1 looks at sector-specific and other enterprise characteristics such as size, location and exports. We explore whether the evidence points to the existence of thick market and network effects which may play a role in explaining the proliferation of non-monetary transactions. Section 4.2 examines the empirical evidence for liquidity and credit-based explanations of NMTs. In particular, we test whether illiquidity – due to lack of access to bank credit, loss-making, or overdue receivables – is a determinant of non-monetary transactions at the firm level. In addition, we examine to what extent arrears have an impact on non-monetary transactions, distinguishing between barter and offsets.

Section 4.3 examines the role of the state and public utilities. In particular, we focus on the impact of price determination on the use of offsets with various creditors. We also test whether the federal and local governments and the public utilities engage in NMTs particularly with those firms that are loss-making, which may be an indication for implicit subsidization. Section 4.4 focuses on the secondary effects of tax offsets. In particular, we test whether there is evidence for multilateral offset chains and whether these may feed non-monetary transactions with the state into the wider economy. In Section 4.5, we try to establish relative importance of liquidity effects and implicit subsidies in fostering the non-cash economy.

4.1 Which firms engage in non-monetary transactions?

Although much has been written about the possible causes of barter, there is little empirical evidence on the characteristics of enterprises that are engaged in NMTs. In this section, we examine what type of firms are prone to barter, using simple cross-section regression analysis. The share of non-monetary transactions is modeled as a function of several firm characteristics (ownership, size, sector, etc.) and the share of non-monetary transactions in the region where the firm is located. The results are shown in *Table 4.1*.

Table 4.1. Enterprise characteristics: impact on NMTs

ENTERPRISE CHARACTERISTICS	SHARE IN SALES REVENUE			SHARE IN INPUT COST		
	Non-money	*Barter*	*Offsets*	*Non-money*	*Barter*	*Offsets*
Firm size (log employment)	0.03***	-0.01	0.02**	0.03***	0.01	0.02*
Share of output sold on domestic market	0.19***	0.06	0.09	0.11	0.05	0.04
State-owned enterprise	-0.08*	-0.06*	-0.02	-0.11**	-0.14***	0.03
Moscow location	-0.24***	-0.07**	-0.06*	-0.13*	-0.04	-0.06
Regional environment						
Average share of non-money/ barter/ offsets in sales of the other firms in the same region	0.08	0.34**	0.42**	0.38*	0.39*	0.38**
Industrial sectors						
Electricity	0.12***	-0.09*	0.25***	0.10*	-0.15***	0.26***
Oil extraction	-0.32***	-0.13**	-0.14***	-0.06	-0.07	-0.05
Natural gas	0.01	-0.24***	0.06	-0.11	-0.23***	0.07
Coal	0.11**	-0.00	0.17***	0.09*	-0.04	0.10
Ferrous metallurgy	-0.00	0.06	0.00	0.08	0.06	0.05
Non-ferrous metallurgy	-0.27***	-0.07	-0.12**	-0.35***	-0.22***	-0.10*
Machinery	-	-	-	-	-	-
Chemicals, petrochemicals	0.06	0.06	-0.00	-0.01	-0.02	-0.00
Forestry, timber, paper	0.08*	-0.03	0.16**	0.04	-0.10	0.07
Construction and building materials	0.11**	0.02	0.13**	0.11**	0.05	0.04
Light industry	-0.11**	0.01	-0.05	-0.07	-0.28	-0.02
Transport	-0.18***	-0.13***	0.02	-0.11*	-0.09*	-0.01
Constant	0.27*	0.21**	-0.09	0.16	0.20*	0.01
N	337	337	337	341	341	341
R2	0.30	0.11	0.20	0.21	0.10	0.13

** significant at 20%, ** significant at 10%, *** significant at 1% (heteroskedasticity corrected st. errors)*

The coefficients on the sector dummies show that exposure to NMTs is highly sector-specific. Oil, non-ferrous metals, light industry and transport have relatively high cash revenue ratios, while electricity, coal and construction display the highest levels of non-monetary transactions. Without an underlying theory of barter and other NMTs it is difficult to know what drives these sectoral effects, but some tentative explanations are possible nevertheless. For instance, the high degree of non-cash revenues (offsets in particular) in the construction sector could be explained by the fact that the state is the biggest customer and relies on tax offsets to procure construction services (construction materials are also known to be particularly popular as barter goods). Light industry and transport show low levels of barter as these sectors are relatively close to final consumers who generally pay in cash. Oil and non-

ferrous metals are internationally tradable commodities, thus producers always have an option to generate cash revenues.[17]

We also find that firms are likely to barter more if they are located in a barter-intensive region and less if they are located in Moscow.[18] This result is not surprising, but nevertheless important since it points to the existence of network effects and thick markets in barter. It implies that firms may not always have a choice of whether to engage in NMTs or not. Even profitable, market-oriented firms may find it too constraining to operate fully on a cash basis if most potential business partners are heavily engaged in non-monetary payments. This involuntary component in driving the recourse to non-money is important in understanding the propagation of NMTs.

The results also show that exports tend to generate more cash than domestic sales. Non-cash revenues are significantly higher for firms with a higher share of domestic sales. However, the cash raised in exports does not necessarily translate into significantly lower non-monetary expenditures of the firm. This underlines that even firms that would in principle be able to pay inputs in cash, may not do so, pointing again to thick markets and networks.

We also find that large firms have higher non-money shares than small firms. This is true for virtually all types of transaction partners: customers, suppliers, utilities and tax authorities. However, the size effect works almost entirely through offsets, while barter is not systematically related to firm size. One can only speculate why large firms should use offsets more frequently than small ones, controlling for sector and regional effects. One possible interpretation is that large firms have greater bargaining power to make suppliers accept non-money and greater political influence to pay taxes in kind.

The most startling result is the negative coefficient on state ownership. This could be explained if privatized firms were more prone to concealing their transactions (for tax purposes or to hide income from outside shareholders) than publicly owned enterprises. It could also reflect misreporting by state-owned enterprises. Another possible explanation for the phenomenon is that state-owned firms may already receive direct subsidies from the state, which would make them less reliant on implicit subsidies in the form of tax offsets and other non-monetary transactions with the state.

These simple regression results provide a preliminary picture of what types of firms are most likely to use NMTs, but we have not yet tested any particular theory on the causes of barter. The stylized facts found here do not disprove any of the four theories discussed in Section 3 and they appear to lend support to the existence of thick markets and networks, as seen in the strong sectoral and regional effects. In the following sub-section, we proceed to examine more systematically liquidity-based theories of NMTs.

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[17] Note that the regression controls for export share, however. This indicates that the *option* to generate cash through exporting leads to higher cash levels even in domestic sales.

[18] Note, however, that the Moscow effect is statistically more significant on the sales side, which may reflect the fact that companies located in Moscow usually tend to sell there, but source their inputs from other regions.

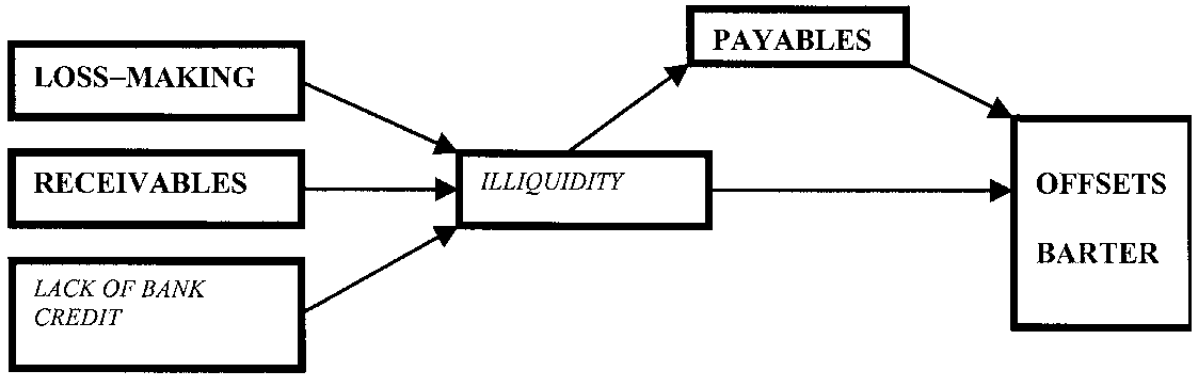
4.2 Liquidity and credit motives

The self-assessments of companies shown in *Figure 3.1* pointed to a strong liquidity rationale for using non-monetary transactions. Liquidity problems are indeed widespread across firms in our sample: over 70% of respondents report difficulty in obtaining bank credit, about 45% are loss-making, over 60% have overdue payables and/or receivables in excess of 30% of sales, and almost 90% suffer from at least one of the above. Liquidity problems at the enterprise level can arise for a number of reasons, including low operating margins, high receivables, high debt service, and lack of access to bank credit.

Once a firm's liquidity problems become critical, there are essentially two ways for the enterprise to continue operations in the absence of fresh bank credit. One is to run up overdue payables (arrears) and the other is to pay suppliers in kind, with the firm's own output. As discussed in Section 3.1, both arrears and NMTs are (imperfect) substitutes for conventional bank and trade credit. In addition, high levels of overdue payables and receivables are likely to foster further non-monetary transactions in the form of offsets. *Figure 4.1* provides a stylized picture of these effects. We would thus expect the data to support three key hypotheses:

- *Hypothesis 1:* Firms with greater liquidity problems are likely to run up higher overdue payables.
- *Hypothesis 2:* Firms with greater liquidity problems are likely to rely more heavily on non-monetary forms of payment.
- *Hypothesis 3:* Firms with higher overdue payables will use offsets with creditors more frequently.

Figure 4.1: Illiquidity effects



The data from the survey are generally consistent with this stylized picture. Not surprisingly, we find that overdue payables are positively correlated with illiquidity, in line with Hypothesis 1. Loss-making or credit-constrained firms have generally higher levels of arrears.

Thus, of firms reporting overdue payables in excess of 30% of their sales, about 60% were loss-making and almost 80% had difficulty in obtaining bank credit. Of course, there are also a number of feedback mechanisms that reinforce the positive relationship between sources of illiquidity and arrears. For instance, firms with observed liquidity problems (such as losses or arrears) will have greater difficulty in obtaining new bank loans.

We also find indirect support for Hypothesis 2, as the data show a positive correlation between NMT and low liquidity at the firm level (*Table 4.2*). Firms citing lack of cash as a reason for using non-monetary forms of payment were indeed more prone to barter than others. *Table 4.2* also shows that lack of access to bank credit is associated with non-monetary transactions in general and barter in particular. This lends support to the hypothesis that barter is to some extent a substitute for bank lending. Moreover, loss-making firms have generally higher levels of barter than firms that make profits or break even, although the difference is not statistically significant.

As conjectured in Hypothesis 3, there is also a clear positive link between arrears and non-monetary transactions (see *Table 4.2)*. This lends support to the notion that firms with high levels of arrears tend to use offsets to settle some of these debts.[19]

Table 4.2. Exposure to NMTs in liquid and illiquid firms

ILLIQUIDITY INDICATORS	Response	Frequency	Mean share of NON-MONEY in sales revenue	Mean share of BARTER in sales revenue	Mean share of OFFSETS in sales revenue
Difficulty with obtaining bank credit	YES	248	.65**	.28**	.31
	NO	100	.60**	.22**	.29
Currently loss-making	YES	157	.65	.27	.30
	NO	192	.62	.25	.30
Large overdue payables to suppliers	YES	102	.71***	.25	.41***
	NO	246	.61***	.27	.26***
Large overdue payables to utilities (power, gas, water)	YES	89	.67**	.27	.33**
	NO	259	.62**	.26	.29**
Large overdue payables to the budget (federal, local, off-budget funds)	YES	209	.72***	.29***	.36***
	NO	138	.50***	.21***	.21***
Lack of cash is a very important reason for barter/ offsets	Yes	262	.67***	.30***	.33**
	No	84	.53***	.20***	.27**

** significant at 20%, ** significant at 10%, *** significant at 1% (one-tailed t-test for equality of means)*

[19] Although this mechanism should not apply to barter, it must be noted that overdue tax debts are clearly correlated with inter-firm barter. This may be explained by the practice of blocking bank accounts and seizing bank assets of tax debtors.

Although the evidence in *Table 4.2* is thus generally consistent with liquidity-based theories discussed in Section 3.1, it is hard to be sure about the causal linkages since different measures of illiquidity are themselves highly correlated with each other. To test how liquidity-based theories stand up to closer scrutiny, we now run a number of simple regressions, controlling for the same firm-specific factors discussed in the previous section (size, exports, ownership, region, sector) and focusing on measures of illiquidity. Given the high degree of collinearity between various liquidity measures we begin by running regressions separately for each measure. We also construct a composite index of illiquidity for each firm from the information on loss-making, access to credit and receivables.[20]

Table 4.3. Effects of illiquidity on exposure to NMTs

ILLIQUIDITY MEASURES	Share of *non-money* in MATERIAL INPUT COSTS	Share of *barter* in MATERIAL INPUT COSTS	Share of *offsets* in MATERIAL INPUT COSTS	Share of *non-money* in UTILITY PAYMENTS	Share of *non-money* in BUDGET PAYMENTS
Illiquidity (a summary index of lack of bank credit, loss-making and large overdue receivables)	++	+		+++	++
Difficulty with obtaining bank credit ∇	++	+		+++	++
Currently loss-making		+		+++	++
Overdue receivables	+				
Overdue payables ∇	+++	+	++	++	

+/–significant at 20%, + +/– –significant at 10%, + + +/– – –significant at 1% (heteroskedasticity corrected st. errors)
∇: endogeneity tested by Hausman test; instrumental variables estimates reported if endogeneity is not rejected at 10% level (instruments: loss-making in previous year, overdue receivables)

The regressions, summarized in *Table 4.3*,[21] generally confirm that, controlling for sectoral and regional effects, an enterprise is more likely to make non-monetary payments when its liquidity position is worse.[22] However, the size and statistical significance of this effect depends on the exact nature of the liquidity problem.[23] The composite measure of illiquidity

[20] The index is constructed as the sum of three binary variables: being a loss-maker, having overdue receivables above 30% of revenues, and having difficulty in obtaining bank credit. The index thus takes values from 0 (none of the liquidity problems present) to 3 (all constraints present).

[21] Effects of the control variables are not reported in *Table 4.3*, but are generally not too different from those reported in *Table 4.1*. Detailed results from the individual estimations are available from the authors.

[22] In this and other tables where endogeneity seemed a concern, we ran instrumental variables regressions alongside OLS estimations, following the methodology described in Maddala (1983) for censored and dichotomous endogenous variables. We based our choice of the model on the Hausman test of consistency of the OLS estimates, as described in Davidson and MacKinnon (1993).

[23] It also depends on the type of non-monetary transaction. However, our results are somewhat blurred due to the fact that barter and offsets are very similar instruments and indeed possibly substitutes. Moreover, there is also a slight ambiguity in their definition since time-lagged barter and offsets are effectively the same transaction, apart from the fact that barter is always planned ex ante, while an offset may or may not be planned. One consequence of this substitutability is that illiquidity tends to explain non-monetary transactions better than any one component of non-monetary transactions, barter or offsets.

works well in explaining non-monetary payments to all types of creditors. Regarding the possible sources of illiquidity, the story is less clear-cut. Although problems in obtaining bank credit, loss-making and overdue receivables generally have positive coefficients, they are not equally significant.[24] Difficulty in obtaining bank credits appears to be a more important factor in explaining non-monetary transactions than overdue receivables. Loss-making has an effect on non-monetary payments to the state and state-owned utilities, but not to private input suppliers (we will revisit this issue in Section 4.3).

Overdue payables are clearly an important factor determining non-monetary transactions. The positive sign can be interpreted in two ways. First, overdue payables are a direct function of, and thus a proxy for, illiquidity. Hence, the result may reflect the impact of enterprise liquidity on both payables and non-monetary transactions (Hypothesis 2). Second, overdue payables may directly induce offset operations as enterprises clear their arrears by passing their own goods to trade creditors (Hypothesis 3). Since offsets are also directly correlated with liquidity problems, it is difficult to determine which of the two mechanisms dominates the link to non-monetary transactions.

Table 4.4. Illiquidity and arrears: effects on NMTs

ILLIQUIDITY AND ARREARS	Share of *non-money* in MATERIAL INPUT COSTS	Share of *barter* in MATERIAL INPUT COSTS	Share of *offsets* in MATERIAL INPUT COSTS	Share of *non-money* in UTILITY PAYMENTS	Share of *non-money* in BUDGET PAYMENTS
Illiquidity index	0.02	0.02	-0.00	0.08***	0.04**
Overdue payables	0.15**	0.05	0.14*	0.12	-0.01
Firm size (log employment)	0.03**	0.00	0.01	0.07***	0.03**
Share of output sold on domestic market	0.13*	0.06	0.06	0.20**	0.08
State-owned enterprise	-0.12**	-0.15***	0.02	-0.13**	-0.04
Moscow location	-0.08	-0.03	-0.04	-0.19	-0.05
Average share of non-money/ barter/ offsets in sales of the other firms in the same region	0.50**	0.45**	0.42**	-0.20	0.92***
Sector dummies					
N	330	330	330	175	265
R2	0.24	0.11	0.14	0.35	0.34
OLS/IV ∇	OLS	OLS	OLS	OLS	OLS

* significant at 20%, ** significant at 10%, *** significant at 1% (heteroskedasticity corrected st. errors)

∇: endogeneity of overdue payables is rejected at 10% level by Hausman test (instruments: loss-making in previous year, overdue receivables); ordinary least squares estimates reported in all cases

In order to disentangle this potential ambiguity, we now run regressions on illiquidity, while controlling for payables. The results in *Table 4.4* indicate that the arrears-offset mechanism

[24] Note that exposure to non-monetary transactions may in turn have an impact on availability of bank credit and on arrears. Banks may be reluctant to lend to firms heavily engaged in barter. Offsets can be used to clear existing arrears. In order to account for these potential endogeneity problems we ran instrumental variables regressions and found some evidence for endogeneity for access to bank credit.

(Hypothesis 3) is an important determinant of non-monetary transactions between private enterprises. This can be concluded from the fact that overdue payables have a positive effect on non-monetary material purchases (offsets in particular), while illiquidity does not have a statistically significant effect. However, with respect to non-monetary payments to the public utilities and the budget, the illiquidity effect dominates, indicating that offsets with the public sector may be a way to alleviate liquidity pressures on illiquid firms. We scrutinize this issue further below.

Summing up, the empirical analysis lends some support to liquidity-based explanations for non-monetary transactions. In particular, we find that illiquidity, lack of access to bank credit, and high overdue payables are explanatory factors for non-monetary payments. The cross-sectional survey results presented here can thus help explain why NMTs have grown alongside arrears during the 1990s when demand was falling, bank credit to enterprises was scarce, and arrears were rising. However, the results also indicate a number of subtleties in the transmission mechanism from illiquidity to NMTs. Non-monetary transactions between firms are largely related to illiquid firms that are settling their arrears through offsets. By contrast, non-monetary transactions with the state and the public utilities seem to be directly motivated by enterprise liquidity problems, going beyond the arrears-offset mechanism. The special role of the state is the topic of the following section.

4.3 Role of the state and public utilities

In this section, we examine the hypothesis that the state has played a critical role in fostering non-monetary transactions by implicitly subsidizing companies through accepting goods in lieu of monetary tax and utility payments. As discussed in Section 3.2, the subsidy can consist both of an implicit interest-free credit (if the good is not immediately useful for the recipient) and an implicit price subsidy (if the good is overvalued).

We find some indirect evidence for the existence of implicit price subsidies in our survey: 40 percent of respondents reported offset prices in excess of cash prices for both revenues and costs. This pricing would be difficult to explain for pure barter where inflating prices in a bilateral exchange of goods may have no effect on the relative price of the two goods.[25] By contrast, inflating offset prices tends to skew the relative price in favor of the debtor. In particular, offsetting a given tax debt with an overvalued good will amount to an implicit price subsidy to the tax debtor. The root of the observed overpricing may thus be transactions with the state, with this feeding through into purely private deals. *Table 4.5* shows that higher offset prices tend to be associated with more extensive use of offsets, in particular for paying local government, indicating that inflated offset prices are seen as beneficial by debtors.

Under the implicit subsidy hypothesis, it is reasonable to assume that the state would focus its support on loss-makers rather than on profitable companies. We can thus test the theory by running regressions of non-monetary forms of payment on two key variables: loss-making

[25] Indeed, we find in our survey that firms reporting higher barter prices in their revenues also have higher barter prices in their costs.

and large overdue payables to a specific creditor. If the conjecture of implicit state subsidies is correct, we would expect loss-making enterprises to have better access to non-monetary transactions with public entities, being able to settle their tax and utility bills in kind more frequently. If the conjecture is incorrect, we would expect non-money to be driven primarily by the arrears-offset mechanism with a particular creditor.[26]

Table 4.5. Relation of offset pricing to offsets with different parties

OFFSET AND CASH PRICES	Frequency	Share of *offsets* in MATERIAL INPUT COSTS	Share of *offsets* in UTILITY PAYMENTS	Share of *offsets* in FEDERAL TAX PAYMENTS	Share of *offsets* in LOCAL TAX PAYMENTS	Share of *offsets* in PAYMENTS TO OFF-BUDGET FUNDS
Offset price PAID						
Higher than cash price	163	0.35***	0.54**	0.35***	0.69***	0.29***
Same or lower than cash price	165	0.27***	0.46**	0.25***	0.43***	0.17***
Offset price CHARGED						
Higher than cash price	130	0.33*	0.55**	0.37***	0.69***	0.29***
Same or lower than cash price	198	0.30*	0.47**	0.25***	0.46***	0.19***

** significant at 20%, ** significant at 10%, *** significant at 1% (one-tailed t-test for equality of means)*

The results summarized in *Table 4.6* are quite striking. The simple arrears-offset mechanism (proxied by the large overdue payables variable in the regression) appears to be a good predictor of non-monetary transactions with suppliers and federal tax authorities (including off-budget funds). Although loss-makers generally pay a higher share of their federal taxes in kind, this effect is statistically not very robust, thus providing only weak evidence for the indirect subsidization of loss-making firms by the federal government. By contrast, there is very clear evidence that state utilities and local government engage in non-monetary transactions primarily with loss-making enterprises, irrespective of whether they have large overdue payables to them or not.[27]

This suggests that implicit subsidies are channeled to loss-making companies primarily by public utilities and local government rather than the federal government. The absence of the arrears-offset effect for utilities and local government may even imply that non-monetary transactions are used so frequently that arrears to these claimants are not being built up as rapidly as to other creditors.

The regressions reveal another potential channel of subsidization that is not linked to loss-making. Being able to pay federal taxes and utility bills in kind seems to be a function of firm

[26] It is reasonable to assume that any creditor (including in the public sector) faced with large overdue receivables would at some point prefer to receive non-monetary payment now, rather than monetary payment later or possibly never. Hence, overdue payables to a specific creditor should usually be an explanatory factor for the scale of offsets between the debtor firm and the specific creditor.

[27] Exposure to non-monetary transactions may have a negative feedback into the amount of arrears, since offsets are usually used to clear overdue debts. The OLS coefficients therefore tend to understate the true impact of the stock of payables on the use of non-money.

size, suggesting that pure bargaining power on the side of the firm may suffice to extract rents by inducing the state to accept offsets.[28] At the local level, firm size does not appear to matter, possibly because most loss-making firms are sufficiently large to be influential with local authorities.

Table 4.6. Determinants of NTMs: support of loss-makers versus clearance of arrears

LOSS-MAKING AND ARREARS CLEARANCE	Share of *non-money* in MATERIAL INPUT COSTS	Share of *non-money* in UTILITY PAYMENTS	Share of *non-money* in FEDERAL TAX PAYMENTS	Share of *non-money* in LOCAL TAX PAYMENTS	Share of *non-money* in PAYMENTS TO OFF-BUDGET FUNDS
Currently loss-making	0.05*	0.13***	0.07*	0.08**	0.04
Large overdue payables to respective party (suppliers/ utilities/ federal budget/ local budget/ off-budget funds)	0.68**	0.05	0.13***	0.31	0.17***
Firm size (log employment)	-0.01	0.08***	0.04**	-0.00	0.02
Share of output sold on domestic market	0.15*	0.12	-0.07	0.11	0.09
State-owned enterprise	-0.12**	-0.13**	-0.06	-0.13**	-0.04
Moscow location	-0.07	-0.19	-0.06	-0.32***	0.07
Average share of non-money/ barter/ offsets in sales of the other firms in the same region	0.25	-0.17	0.62*	0.72**	0.89***
Sector dummies					
N	331	180	285	310	314
R2	0.24	0.33	0.23	0.36	0.19
OLS/IV ∇	IV	OLS	OLS	IV	OLS

** significant at 20%, ** significant at 10%, *** significant at 1% (heteroskedasticity corrected st. errors)*
∇: instrumental variables estimates reported if endogeneity of large overdue payables is not rejected at 10% level by Hausman test (instruments: overdue receivables from customers/ utilities/ budget, total overdue receivables)

These findings lend some support to the hypothesis that implicit subsidies play a role in the non-cash economy. Public utilities grant offsets primarily to large loss-makers, federal tax authorities grant offsets to large companies, irrespective of profitability, while local tax authorities grant offsets to loss-makers, irrespective of their size.

4.4 Chains and multiplier effects

The analysis in Section 4.1 pointed to the presence of thick market effects within regions and sectors. Simply put, firms operating in markets where NMTs are widespread are likely to

[28] Bargaining power could be political importance and connections, but it could also reflect the size of bribes.

engage in NMTs themselves. Market thickness may arise simply for technological reasons or because tax offsets are used more often by some local authorities than by others. However, there may also be multiplier effects leading to market thickness. For instance, the widespread use of intermediaries in arranging NMTs points to possible network effects that can lead to the growth of barter. In this section, we focus on a specific kind of multiplier effect: offset chains.

While barter deals tend to be bilateral, 65 percent of respondents in the survey indicated that their offset transactions were mostly multilateral. Offset chains usually originate in budgetary organizations and can be both formal (explicitly organized) and informal (as non-monetary instruments such as tax offsets are fed through the system). Multilateral offset schemes were introduced back in 1994 in the form of treasury obligations (KO) and treasury tax offsets (KNO) that were used to clear enterprise tax arrears and budget payment arrears via chains of mutually indebted enterprises. In the following years, these schemes have undergone a number of transformations.[29] More recently, tax offsets have been phased out at the federal level, but are still widespread at the local level.

While the vast majority of enterprises have tax arrears, only few of them supply large amounts of goods or services directly to the government. Nearly 90% of sample firms reported having some overdue payables to the general budget, while less than 50% had any receivables from the budget.[30] One can interpret offset chains as a mechanism for spreading tax and utility offsets (and thus indirect subsidies) more widely across the enterprise sector as a whole.

Even though offset chains are hard to trace given the firm-specific nature of the survey, it is possible to find some indirect evidence for their significance. First, it is useful to consider the effects of a tax offset on other non-monetary transactions reported by an enterprise. In the simplest case, the firm receives a tax (or utility) offset in return for the delivery of goods to the state. The firm would record a revenue in offset form for the sale to the state. In addition, when it uses the tax offset to settle its tax dues, it would report an expenditure paid in offsets. In a simple tri-partite chain, a firm might sell goods to the state, receive a tax offset and pass on part of the tax offset to its own input supplier. In this case, the firm would record a sale for offset as part of its revenues, a tax expenditure paid in offsets, and in addition an offset-based input expenditure.[31]

This form of "pass-through" of tax offsets raises the aggregate amount of non-cash sales in the economy as the number of firms participating in the chain grows. A simple tax offset granted to a final goods producer can be passed on upstream in the production chain and lead

[29] See Tchaidze (1999) for an overview.

[30] Similarly, while 60% of sample firms had some overdue payables to utilities, just over 25% had any receivables from them.

[31] Alternatively, an explicit circular offset chain may be arranged, whereby the recipient of a tax offset supplies goods to another firm which in turn supplies goods to the state. In this case, the firm supplying to the state would record offsets in both its revenues and expenditures, while the firm receiving the tax offset would record a tax offset in its expenditures and an offset in its revenues. Since our data set does not identify specific types of customers, testing for the presence of such circular chains is problematic.

to an aggregate level of non-monetary transactions in the economy that is a multiple of the original offset.

At the enterprise level, the presence of chains in which firms pass on tax offsets upstream to suppliers, implies that there should be not only revenues in the form of offsets if tax expenditures are settled in offsets (this is a pure accounting identity), but also an additional offset operation with suppliers in the firm's expenditures. The data from the survey generally confirm that non-monetary transactions are highly correlated at the firm level. As anticipated, firms that use barter and offsets in their expenditures will generally record barter and offsets in their revenues. However, there is also a strong positive correlation between expenditure offsets, as one would expect for the types of chains discussed above. Non-money in input costs is positively correlated with non-money in budget and utility costs. The only key negative correlation is between barter and offsets for input costs which reflects the substitutability of barter and offsets.

The positive correlation of non-monetary payments across firms' cost categories may of course simply reflect the fact that illiquid firms rely more heavily on NMTs with all their creditors. These firms would generally run up arrears to suppliers, utilities and the budget, and then partly offset these debts with all parties, creating a positive correlation of offsets on the cost side. However, regression analysis shows that this simple "common cause" explanation is not sufficient to explain the empirical evidence. *Table 4.7* reports the results of a regression of the share of offsets with input suppliers on offsets with various state entities, while controlling for liquidity (via total payables) and the arrears-offset mechanism (via arrears to input suppliers), and the usual set of controls.

Table 4.7. Links from offsets with utilities and fiscal agencies to inter-enterprise offsets

UTILITY AND TAX OFFSETS	**Share of OFFSETS in transactions with SUPPLIERS**			
Share of offsets in utility payments	0.44***	...	...	...
Share of offsets in federal tax payments	...	0.07**	...	...
Share of offsets in local tax payments	...	...	0.21***	...
Share of offsets in payments to off-budget funds	...	...	...	0.09**
Large overdue payables to suppliers	0.07	0.10**	0.09**	0.10***
Total overdue payables	0.01	0.05	0.05	0.09
Control variables				
N	174	279	311	307
R2	0.38	0.18	0.22	0.18
OLS/IV ∇	OLS	OLS	OLS	OLS

** significant at 20%, ** significant at 10%, *** significant at 1% (heteroskedasticity corrected st. errors)*
∇: endogeneity of large overdue payables is rejected at 10% level by Hausman test (instruments: overdue receivables from customers/ utilities/ budget, total overdue receivables); ordinary least squares estimates reported in all cases

It emerges that firms that pay their tax and utility bills through offsets are also more inclined to pay their suppliers through offsets, even when controlling for liquidity and the arrears-offset mechanism. Offsets with utilities and local budgets exhibit the strongest link to offsets with suppliers. These findings can be interpreted as indirect evidence for the type of offset

chain discussed above and for a certain amount of pass-through of tax offsets. This helps to explain how non-monetary transactions, fuelled by the injection of tax and utility offsets, may have proliferated among private enterprises through chain effects.

4.5 Causes of NMTs: putting the pieces together

In the previous sections, we have presented evidence for both liquidity and subsidy motives behind non-monetary transactions, as well as for chain effects. We found that firms with weak liquidity positions generally tend to rely heavily on NMTs. It appears from the survey that this partly reflects the practice of offsetting arrears to suppliers and other creditors and partly reflects implicit subsidization via offsets granted by public entities, especially by local tax authorities and utilities. The latter effect is enhanced by a pass-through effect whereby tax and utility offsets are passed on from companies supplying the state to their own suppliers.

However, given the high degree of correlation between the various explanatory variables, it is difficult to assess the relative importance of these basic mechanisms. At the most general level, we did find that different types of non-monetary transactions appear to be based on different types of liquidity-related firm characteristics. For instance, we found in *Table 4.6* that losses at the firm level appear to affect non-monetary transactions with utilities and local tax authorities, while arrears tend to affect non-monetary transactions with suppliers and federal tax authorities.

Table 4.8. Tax offsets versus illiquidity as determinants of inter-firm NMTs

TAX OFFSETS AND ILLIQUIDITY	SHARE OF NON-MONETARY TRANSACTIONS WITH SUPPLIERS		
	Non-money	*Barter*	*Offsets*
Share of offsets in transactions with the budget (federal, local, off-budget funds)	0.34***	0.05	0.28***
Illiquidity index	0.04**	0.04**	0.00
Firm size (log employment)	0.02	-0.02*	0.02*
Share of output sold on domestic market	0.10	0.05	0.03
State-owned enterprise	-0.10**	-0.13***	0.03
Moscow location	-0.11	-0.01	-0.01
Average share of non-money/ barter/ offsets in sales of the other firms in the same region	0.12	0.48**	0.17
Sector dummies			
N	264	264	264
R2	0.34	0.16	0.22

** significant at 20%, ** significant at 10%, *** significant at 1% (heteroskedasticity corrected st. errors)*

In a further attempt to separate pure liquidity effects from subsidization effects, *Table 4.8* reports regressions that control for both illiquidity and tax offsets. The results are quite striking. Firm-level incidence of illiquidity and tax offsets are *both* statistically significant factors in explaining non-monetary transactions with suppliers. However, distinguishing

between barter and offsets, we see that barter with suppliers is primarily a function of illiquidity, while offsets with suppliers are highly affected by the use of tax offsets, indicating the pass-through mechanism discussed in Section 4.4.[32] Since barter and offsets make up roughly the same share in input costs (and make up 90% of all non-monetary input purchases), we can conclude that illiquidity and tax offsets are both important determinants of non-monetary transactions in Russia.

5. Empirical evidence: effects

There is a growing consensus in the literature that barter, offsets and money surrogates have generally been detrimental to competition and enterprise restructuring. Indeed, it has been suggested that barter should be viewed primarily as a mechanism for avoiding restructuring.[33] Several possible channels by which non-monetary transactions might be expected to inhibit restructuring can be identified:[34]

- by raising transactions costs and thus reducing investment,
- by reinforcing existing inter-firm relationships and networks and thus undermining competition and innovation,
- by creating 'artificial' demand for goods that may otherwise not be competitive,
- by camouflaging the underlying financial position of a given firm, making it harder for banks or other creditors to screen efficiently and fostering corruption and rent-seeking activities,
- by channeling implicit subsidies to loss-making enterprises, undermining allocative and dynamic efficiency in the economy.

However, there is also a school of thought that sees barter in a more benign light. It has been pointed out that barter may reduce contractual risk. According to one line of argument, barter deals are mechanisms for preserving existing networks in order to limit disorganization associated with the disruption of trade between firms that resulted from the collapse of the Soviet economic system.[35] In particular, barter could offer deal-specific collateral, thereby mitigating the risk of "hold-up" problems between firms.[36] In the absence of trust, barter may thus be a way to enhance creditworthiness through collateralized deals. It should be noted, however, that although there may be benefits from network preservation, this is more likely to be an effect rather than a cause of barter. We will attempt to address these issues in the following sections.

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[32] The difference in the impact of illiquidity on barter and offsets in these regressions reflects the intermediate nature of tax offsets in settling enterprise liquidity problems: we have shown (see Tables 4.3 and 4.4) that illiquidity is an important determinant of NMTs with the general budget, and that offsets with the general budget *in turn* foster inter-enterprise offsets (Table 4.7).

[33] See Gaddy and Ickes (1998a).

[34] For a fuller discussion, see Commander and Mumssen (1999).

[35] For example, Marin and Schnitzer (1999).

[36] The "hold up" problem refers to situations where parties undertake investments that affect their economic relationship ex post, but the inability to write complete contracts inhibits the parties to negotiate a jointly optimal level of investment ex ante. In these situations, parties may strategically overinvest or underinvest to improve their bargaining position ex post.

5.1 Impact on restructuring

In this section, we use our survey data to assess the impact of non-monetary transacting on restructuring. Respondents were asked to indicate changes over the past 2-3 years with respect to: (i) investment; (ii) use of new technology; (iii) product quality; (iv) marketing and (v) financial management. A composite restructuring index was constructed as an unweighted average of these five categories.[37]

Table 5.1 reports regressions testing the effect of non-monetary transactions on restructuring, controlling for the same regional and sectoral effects as in previous sections. Looking at the first column, we see that non-monetary transactions with input suppliers appear to have a negative impact on restructuring. However, the coefficient may be somewhat over-estimated due to possible endogeneity of the non-money variable with respect to restructuring. Indeed, the causality probably runs both ways. On the one hand, NMTs may inhibit restructuring as discussed above and, on the other hand, lack of restructuring may negatively affect the liquidity position of an enterprise (unless it is directly subsidized) and hence cause the use of NMTs.[38] In addition to the two-way causality, there may be common causes of NMTs and restructuring. For instance, we see that restructuring is positively associated with being located in Moscow, while high Russian market exposure is negatively signed, indicating that some enterprise characteristics have similar effects on restructuring and the use of money (compare to *Table 4.1*).

Table 5.1. Effects of NMTs on restructuring

NON –MONETARY TRANSACTIONS	RESTRUCTURING INDEX (1996-98)						
	all firms	liquidity constrained	non-liquidity constrained	active networkers	non-active networkers	survival oriented	non-survival oriented
Share of non-money in transactions with suppliers (1997)	-0.58**	-0.56**	0.11	-0.60	-0.55*	-0.93**	-0.08
Firm size (log employment)	0.12**	0.12*	0.06	0.21**	0.09	0.22**	-0.01
Share of output sold on domestic market	-0.98**	-0.80*	-1.22*	-1.18*	-1.06**	-0.91*	-0.88*
State-owned enterprise	0.01	-0.08	0.89*	-0.31	0.00	0.03	0.03
Moscow location	0.37*	0.43*	0.49	0.23	0.49*	0.30	0.40
Sector dummies							
N	340	255	82	120	220	179	157
R2	0.15	0.12	0.40	0.26	0.14	0.14	0.22

** significant at 20%, ** significant at 10%, *** significant at 1%*

[37] The following scores were attached to each response: increased a lot: +1.0; increased a bit: +0.5; remained the same: +/-0.0; decreased a bit: -0.5 ; decreased a lot: -1.0.

[38] We explored this issue by running various liquidity indicators on the restructuring index and found a robust negative association. However, our data set lacks suitable instruments to address this potential problem.

As the link between non-money and restructuring is likely to be complex, we re-ran the restructuring regression on separate sub-samples. Specifically, we divided the firms according to the presence of the liquidity motive, their networking strategies, and the presence of survival motives. We classified respondents as liquidity constrained if they cited "lack of cash" as a very important reason for engaging in non-monetary deals. We classified firms as "active networkers" or "non-active networkers" depending on how they establish links with their suppliers.[39] Finally, we classified respondents as survival oriented if they cited "maintaining production" as a very important reason for using non-money.

We find (see *Table 5.1*) that the negative link between non-money and restructuring is a feature of liquidity-constrained firms, while for the other firms the coefficient on non-money is not statistically significant. Restructuring is negatively associated with non-money for non-active networkers and survival-oriented firms. This suggests that the negative link between non-money and restructuring is strongest for firms that are in some way locked into a "suboptimal equilibrium" where barter becomes a necessity.[40]

Our findings show that non-monetary transactions generally tend to be associated with less restructuring, even if the precise causality is difficult to establish. We find evidence that the negative effect is pronounced for liquidity-constrained firms that are forced to use NMTs in order to maintain existing trading relationships and production.

5.2 Network effects

We now take a closer look at the impact of NMTs on trading networks. Given that barter requires mutual coincidence of wants, one would expect firms to rely on networks to exchange goods amongst each other. Indeed, our survey shows that almost half of all firms reported using intermediaries for arranging barter deals. In this context, an important question is whether barter creates a rationale for seeking new trading relationships or whether barter primarily preserves existing networks.

On the one hand, a barter-based economy may require large networks of non-monetary exchange in order to assure a flow of goods that matches demand. Hence, there may be forces that push the growth of networks. On the other hand, barter is also likely to lock enterprises into existing relationships since it may be difficult for a firm to seek new suppliers given that in-kind revenues are not liquid and may not be useful outside the context of the current

[39] Specifically, we regarded respondents that "establish direct links independently", "via a corporation, association or holding", "via exchanges, auctions or fairs" and "via commercial intermediaries" as active in search of suppliers (we return to the issue of networks in section 5.2 below).

[40] This is corroborated by another set of regressions, not reported in this paper, which split the sample according to whether firms see elimination of barter leading to a loss of suppliers or not. It turns out that non-money has a negative effect on restructuring for those firms that fear this negative effect, but not for the other firms.

network. In addition, intermediate goods producers will have difficulties finding new customers willing to pay in cash, given the concentrated industrial structure in Russia.[41]

In order to establish whether non-monetary deals are indeed network-preserving or rather network-enhancing, our first step is to look at the ways in which sample firms established links with their customers and suppliers. We separated the responses into active and passive means of networking by classifying positive responses for "mainly keep old links", "via a ministry or committee", "via local authorities" as passive, and "establish direct links independently", "via a corporation, association or holding", "via exchanges, auctions or fairs" and "via commercial intermediaries" as active. Using these distinctions, over a third of enterprises could be classified as active in networking and just under 20 percent were passive. All other firms effectively followed a mixed strategy.

Using the above definitions of active and passive networking, we now explore the link from non-money to search behavior. *Table 5.2* shows that firms with a high non-money share in revenues are more likely to be passive than active networkers, indicating that non-monetary transactions tend to be network-preserving rather than network-enhancing. Of course, the direction of causality is difficult to determine as a firm's networking behavior should also affect its exposure to non-money.[42]

Table 5.2. Network effects of NMTs

NON –MONETARY TRANSACTIONS	ACTIVE NETWORKING (1998)	PASSIVE NETWORKING (1998)
Share of non-money in revenue (1997)	-0.17*	0.12*
Firm size (log employment)	-0.08***	0.03**
Share of output sold on domestic market	0.14	0.15
State-owned enterprise	0.11*	0.10*
Moscow location	-0.22***	-0.12**
Sector dummies		
N	338	324
Pseudo-R2	0.11	0.12

** significant at 20%, ** significant at 10%, *** significant at 1% (probit marginal effects)*

If NMTs are indeed mechanisms for locking in trading relationships, what does this imply for the welfare effects of NMTs? Clearly, lock-in effects will tend to make the entry of new suppliers harder and thus undermine competition and restructuring. They are also likely to erode firm-level transparency and obfuscate risks, thus undermining access to outside finance. At the same time, there may be certain benefits from maintaining relatively rigid trading

[41] A third of respondents did indeed think that an inability to barter would imply a loss of either customers or suppliers. The non-monetary share in sales for these firms was unambiguously higher (by around 10 percentage points).

[42] In order to alleviate this potential endogeneity problem in the regression, we use non-money in 1997 rather than in the current period as the explanatory variable.

relationships. Given the absence of contractual security in Russia,[43] it may be useful to commit oneself to a particular trading relationship in order to reduce contractual risk.

5.3 Performance effects

Finally, we examine how NMTs affect enterprise performance as measured by output growth. The impact may be two-fold: on the one hand, the transactions costs associated with barter and other NMTs may be detrimental to sales growth, while on the other hand, the value of output produced may be inflated. Indeed, firms may be able to create artificial demand for their products by forcing their goods onto their suppliers, workers or even the tax authorities as payment in kind. If these cannot re-sell the output easily, they may just use it for their own consumption, thus de facto increasing the effective demand for their products. We explore these issues by relating the change in sales and the perceived change in demand to the restructuring variable, on the one hand, and to the share of non-money in sales, on the other hand. We thus compare the 'real' effect of restructuring and the 'virtual' effect of non-monetary transactions on enterprise performance.[44]

Table 5.3. Performance effects of NMTs

NON –MONETARY TRANSACTIONS AND RESTRUCTURING	Change in sales (1998)			Change in demand (1998)		
	all firms	survival oriented	not survival oriented	all firms	survival oriented	not survival oriented
Share of non-money in revenue (1997)	0.08	-0.09	0.30	0.32*	0.47*	-0.06
Restructuring index	0.19***	0.27***	0.12**	0.10***	0.05	0.17***
Firm size (log employment)	0.05	-0.01	0.13**	0.06*	0.06	0.14**
Share of output sold on domestic market	-0.24	-0.35	-0.19	0.01	-0.27	0.13
State-owned enterprise	0.14	0.17	0.05	0.17	-0.01	0.36*
Moscow location	0.35**	0.09	0.66***	0.24	0.08	0.41*
Sector dummies						
N	338	178	156	337	178	155
Pseudo-R2	0.04	0.07	0.04	0.04	0.05	0.08

** significant at 20%, ** significant at 10%, *** significant at 1% (ordered probit coefficients)*

In order to account for possible heterogeneity of the effects across enterprises, we ran our estimations separately for survival-oriented enterprises – those that cite "maintaining production" as a very important motive for non-monetary transactions - and the rest of the sample.[45] Survival-oriented enterprises are more likely to use NMTs to prop up their performance, and therefore the virtual effect may be stronger in this case. *Table 5.3* reports the results of these estimations. Predictably, restructuring is associated with better performance across all specifications. Firms that restructure are able to increase their sales and also increase demand for their products. The non-money variable has a significant

[43] See, inter alia, World Bank (1997); Frye and Zhuravskaya (1998).

[44] For a detailed discussion of Russia's virtual economy see Gaddy and Ickes (1998b).

[45] It should be noted that survival-oriented firms have unambiguously higher (by around 10 percentage points) share of non-money in sales.

positive effect in the demand regression, which dominates the effect of restructuring in the sub-sample of survival-oriented enterprises. This is consistent with the hypothesis that barter may create artificial demand for declining industries, thus preventing market-oriented restructuring. However, the lack of impact of NMTs on sales indicates that the perceived boost to demand fails to materialize in higher sales. This may be a consequence of over-pricing: resorting to NMTs is usually associated with higher product prices, which may offset the quantity effect.

6. Conclusion

This paper has shed some light on the extraordinary rise of barter, offsets and other non-monetary transactions in Russia. The analysis of an enterprise survey conducted in late 1998 suggests two proximate causes of the growth in non-monetary transactions and points to a number of multiplier effects. First, it appears that a liquidity squeeze on industrial firms with low profitability and little access to bank credit has played a role in pushing these firms towards non-monetary payments. Liquidity-constrained firms effectively created their own credit by running up arrears and resorting to barter and other NMTs to stay afloat, without undertaking serious restructuring. Arrears, in turn, encouraged offset operations to settle parts of the mounting debts, adding to the growth of non-monetary forms of settlement. The joint growth of NMTs and arrears before the crisis in August 1998 and their subsequent joint decline (but not elimination) can thus be partly explained by liquidity conditions in the enterprise sector: while enterprises were faced with scarce bank credit both pre- and post-crisis, liquidity was squeezed by the decline in aggregate demand for domestic products before the crisis and rebounded as demand picked up after the crisis (partly due to the real depreciation).[46]

Our empirical analysis points to a second proximate cause of NMTs, namely the practice by tax authorities and public utilities of accepting payments in kind, which has pulled both liquid and illiquid firms into the non-cash economy. At the time of the survey it was primarily local government and utilities that were subsidizing loss-making enterprises by granting them offsets and valuing enterprises' output at inflated prices. Federal offsets were granted to large firms with strong bargaining power, but irrespective of profitability. While inter-firm NMTs and arrears shifted liquidity *across* firms, the use of tax and utility offsets have extended implicit subsidy and credit *towards* firms. It is this injection of implicit subsidy that has allowed the continuous growth of NMTs and arrears before the 1998 crisis.

Inter-enterprise offsets have in turn been propagated through chain effects as tax offsets were passed upstream. Indeed, multilateral non-monetary transactions have been an essential mechanism by which firms that do not supply goods to the state have received *de facto* net credit from government and quasi-fiscal institutions. We also found evidence that such multiplier effects can lead to "thick markets" in non-money, which are manifested in sectoral and regional effects, as well as in the observation that NMTs are primarily a problem for

[46] The post-crisis decline in arrears and NMTs may also partly be due to reduction in real energy costs, which alleviated some of the liquidity constraints of enterprises.

firms that do not have the option to export. One implication of the findings is that non-monetary transactions cut across a wide variety of types of firms – good and bad – in terms of their underlying performance.

The survey suggests that NMTs tend to inhibit restructuring across a variety of dimensions, in particular by preserving existing production networks and by artificially inflating demand for goods of survival-oriented firms. Therefore, the use of barter and money surrogates exerts a generally adverse effect on firms' willingness to restructure – in effect by sustaining restructuring-inhibiting trading relationships as well as maintaining soft budget constraints. It can be conjectured that non-monetary transactions also have wider negative consequences in terms of loss of transparency in transactions, including the facilitation of corruption and illegal arrangements.

Our analysis leads to a number of policy implications. Not only is it clear that barter and other non-monetary deals have arisen as a result of absent bank finance and as a channel for *de facto* soft credits to firms from both fiscal and quasi-fiscal institutions. It is also important to note that multilateral offset chains have led to the proliferation of non-monetary transactions. This has led to an increasingly thicker market in non-money, with both profitable and loss-making firms locked into networks of barter. As a result, it has become very difficult to screen the viability of firms, placing further barriers to the resumption of bank lending to enterprises; itself a huge challenge after the August 1998 crisis.

An important implication is that any simple policy measures directly aimed at eliminating inter-enterprise non-monetary transactions will not be able to discriminate adequately over types of firms, thereby likely bringing down both good and bad entities. This points to the need for a more balanced approach aimed at reducing the infusion of non-money from the state, but allowing firms transactional freedom. For distressed firms who have come to rely on the soft credits that non-money offers, the approach must be to tighten the budget constraint and ultimately permit exit. The global efficiency gains – including through making resources available to the new private sector – could be expected to be large, but will require complementary policy actions if they are to be feasible. Provision of adequate fall-backs for those to be made unemployed will be an essential component.

At the same time, to move away from the regime of soft budget constraints requires a change in the fundamental objectives of government. Given the key role of the utilities in fuelling the non-money market, measures to improve corporate governance and transparency in the crucial natural resource sectors of the economy will be key. Attracting external resources and linking this to greater oversight would be one compelling, if politically difficult, option.[47] In addition, given the equally important role of local government in fuelling the non-cash economy, the federal government will have to find ways to induce sub-national authorities to phase out the use of tax offsets and barter schemes. This may necessitate a fundamental streamlining of fiscal relations between the center and the regions.

[47] This approach is spelt out in more detail in Aghion and Commander (1999).

I. APPENDIX I: VARIABLES

Non-monetary transactions

- Share of non-money/barter/offsets in sales revenue, material input costs, utility (gas, electricity, water) payments, federal taxes, local taxes, off-budget funds *

Controls

- Firm size (log employment) *
- Share of output sold on domestic market (within Russia) *
- State-owned enterprise: dummy for state and municipal enterprises
- Moscow location: dummy for Moscow enterprises
- Average share of non-money/barter/offsets in sales of the other firms in the same region (excluding the enterprise in question). Regions: North, North-West, Central Chernozyom, Central, Volga-Vyatka, Povolzhye, North Caucausus, Urals, West Siberia, East Siberia, Far East, Kaliningrad
- Sector dummies: electricity, oil extraction, natural gas, coal, ferrous metallurgy, non-ferrous metallurgy, machinery, chemicals and petrochemicals, wood and paper, construction and building materials, light industry, transport

Illiquidity indicators

- Difficulty with obtaining bank credit: dummy for firms reporting bank credit problems
- Currently loss-making: dummy for firms reporting losses
- Overdue receivables/payables: reported share in sales of receivables/payables overdue for more than three months. 0.1 = (0 – 10%), 0.2 = (10 – 20%), 0.3 = (20 – 30%), 0.4 = (30 – 40%), 0.5 = (40 – 50%), 0.6 = (50 – 60%), 0.7 = > 60%
- Large overdue payables to suppliers/utilities/the budget: dummies for firms reporting large respective debts
- Illiquidity index: sum of three dummies (loss-making, overdue receivables more than 30% of sales, difficulty with obtaining bank credit)

Restructuring, networks, performance

- Restructuring index: summary index of change over the past 2-3 years with respect to (i) investment; (ii) use of new technology; (iii) product quality; (iv) marketing and (v) financial management. Scores attached to each response: increased a lot (+1); increased a bit (+.5); remained the same (0); decreased a bit (-.5); decreased a lot (-1).
- Liquidity constrained: dummy for firms citing "lack of cash" as a very important reason for non-monetary transactions
- Active networking: dummy for firms which "establish direct links independently", "via a corporation, association or holding", "via exchanges, auctions or fairs" and "via commercial intermediaries"
- Passive networking: dummy for firms which "mainly keep old links", "via a ministry or committee", "via local authorities"

- Survival oriented: dummy for firms citing "to maintain production" as a very important reason for non-monetary transactions
- Change in sales revenue: reported change over the past year (1= decreased a lot, 2= decreased a little, 3= remained unchanged, 4= increased a little, 5= increased a lot)
- Change in demand: reported change over the past year (1= decreased a lot, 2= decreased a little, 3= remained unchanged, 4= increased a little, 5= increased a lot)

* As of mid-1998 in Section 4 regressions and as of 1997 in Section 5 regressions. Other variables are as of mid- 1998, unless otherwise indicated.

References

Aghion, Philippe and Simon Commander (1999), 'Some Proposals for Improving Corporate Governance while Reducing Barter and Fiscal Imbalances in Russia', EBRD and Harvard University, mimeo

Aukutsionek, Sergei (1998), 'Industrial Barter in Russia', Communist Economies and Economic Transformation, 10, 2, 179-188

Commander, Simon and Christian Mumssen (1999), 'Understanding Barter in Russia', EBRD Working Paper 37, January, and to appear in Paul Seabright, (editor),'The Vanishing Rouble', Cambridge University Press, Cambridge, 2000 forthcoming

Davidson, R. and J. MacKinnon (1993), 'Estimation and Inference in Econometrics', New York: Oxford University Press

Fan, Qimiao, Une Lee, and Mark Schaffer, (1996), 'Firms, Banks and Credit in Russia', in Simon Commander, Qimiao Fan and Mark Schaffer, 'Enterprise Restructuring and Economic Policy in Russia', World Bank, Washington DC

Frye, Timothy and Ekaterina Zhuravskaya (1998), 'Regulation and Firms in Russia', Russian Economic Trends, December

Gaddy, Clifford and Barry Ickes (1998a), 'To Restructure or Not to Restructure: Informal Activities and Enterprise Behavior in Transition', Brookings Institution and Pennsylvania State University, February, mimeo

Gaddy, Clifford and Barry Ickes (1998b), "Beyond a bailout: Time to face reality about Russia's 'virtual economy'", Foreign Affairs, Vol. 77, pp. 53-67

Maddala, G. (1983), 'Limited-Dependent and Qualitative Variables in Econometrics', Cambridge University Press

Marin, Dalia and Monika Schnitzer, (1999), 'Disorganization and Financial Collapse', University of Munich, mimeo

Pinto, Brian, Vladimir Drebentsov, and Alexander Morozov (2000), "Give Growth and Macro Stability in Russia a Chance: Harden Budgets by Dismantling Nonpayments", World Bank, Moscow Office, February.

Tchaidze, Robert (1999), 'Non-Cash Settlements of Expenditures in Baltics, Russia and Other Former Soviet Republics', IMF mimeo

World Bank, (1999), 'Russia's Nonpayments Crisis: A Real Impediment to Growth', Washington DC, mimeo