Barter in Russia: Liquidity Shortage Versus Lack of Restructuring

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BARTER IN RUSSIA: LIQUIDITY SHORTAGE VERSUS LACK OF RESTRUCTURING[1]

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ABSTRACT

Barter in Russia can be explained by firms liquidity constraint: it is strongly correlated with financial tightness. However a micro-economic analysis reveals that the rationale behind this liquidity constraint is different according to the firm situation. For firms in a good economic situation, but faced with adverse selection problem and having no access to bank credit, barter acts as a substitute for short term credit. While for indebted firms, barter, in the same way as external finance, is a way of avoiding costly restructuring.

Keywords: barter, non-monetary transactions, virtual economy, Russia, transition
JEL Classification Number: C22, C23, E5, P2

I INTRODUCTION

The rapid growth of barter is one of the most surprising phenomena in Russia: As a percentage of industrial sales it steadily increased from 5% in 1992 to nearly 55% in 1998. Unknown in CEEC's transition countries, barter is only one aspect of the Russian economy's demonetisation process, along with dollarisation, growing arrears, and the widespread use of veksels and offsets. Barter is often seen as the consequence of the lack of restructuring, but some authors argue that it is a mechanism used to avoid shutting down potentially viable firms, in a context of market imperfections. The implications differ depending on the analysis chosen: in the first case, an expansionary monetary policy might not be appropriate, while the contrary is true if the demonetisation process jeopardizes potentially good enterprises.

This paper aims to assess this phenomenon in the Russian economy. The paper's main contribution to work in this field (reviewed and documented in section II) is to highlight two different rationales for barter. Before studying the latter more closely, section III uses official monthly data collected by the central bank of Russia, the Goskomstat, and the *Russian Economic Barometer* (REB), to emphasize the macro-economic features of barter in Russia, and, more specifically, the link between monetary policy and bartering activity. It appears that macroeconomic policy and macroeconomic indicators are unable to explain the whole process. In section IV, quarterly statistics for 1995 and 1996 taken from the REB survey of roughly 200 firms make it possible to implement a more qualitative survey. The conclusion is striking: barter is used by potentially viable firms as a way of avoiding closure, while at the same time financing increasing inventories and soft goods in the case of indebted firms who use barter transactions, bank credit and choose to accumulate arrears in order to avoid restructuring.

II BACKGROUND

Two sets of explanations of barter can be drawn (see graph 1 below). The first one, which we call strategic barter, focuses on the inability of money to perform its function (Poser, 1998). This inability may be due to a process of demonetisation: in the prevailing context of high inflation in Russia, barter could be rational. It can also be the consequence of the growing informal economy: the decision to engage in barter is thus motivated mostly by managers' efforts to seek informal profit, and especially by a desire to avoid taxes (Ickes and al. 1997, Hendlez and al. 1997).

The second set of explanations focuses on liquidity constraints: firms use barter transaction to sustain operations in a cash constrained world (see for example Linz and Krueger (1998)). This cash

constrained world is imposed by the lack of payments at the firm level, and/or growing monetary restraint at the economy-wide level.

Graph 1: survey of barter explanations

Barter

Liquidity constraints

Strategic barter

Financial distress

Cash resources shortage

Demonetizations:
- opportunity cost of money
- malfunction of money

Informal economy:
- avoiding taxes

Microeconomic explanation:
- negative profit
- over-indebted enterprises

Microeconomic explanation:
- banking rationing
- type of industry

Macroeconomic explanation:
- tight monetary policy

2.1 Strategic Barter

i) avoiding taxation;

Johnson, Kaufmann and Shleifer (1997) provide a simple model which highlights the incentives leading firms to choose between operating in the official and the unofficial sector. Firms will enter the formal economy if the benefits exceed the costs. In the official sector, the government provides public goods that increase the productivity of firms, but it imposes taxes and regulations on firms. The smaller the potential network effects, the smaller the incentive for a particular firm to operate in the formal sector. An important motive for operating in the unofficial sector is the desire to avoid official taxes. As tax liabilities are due only once the firm receives payment for its deliveries, barter is a useful means of avoiding taxes. For Gaddy and Ickes (1998) tax evasion is the first and most obvious motive for barter in Russia.

However, this explanation of barter is not really convincing for at least two reasons. Firstly, the use of barter relies on creation of exchange chains and is very costly (Linz and Krueger 1998; Hendley, Ickes, Murrell and Ryterman, 1997). Barter requires a «double coincidence of wants» from the two

transaction agents. This supposes a time consuming search as well as inventory costs. In this context, it is not certain that the benefits of barter, in terms of tax avoidance, exceed the associated costs. Secondly, payment in cash can be seen as another successful way of tax evasion, as western experience proves. In these countries, cash transactions are the primary means used to avoid taxes. In Russia, the task of collecting taxes is still performed by banks, which have to inform authorities about all payment receipts and to debit the account of a tax debtor. In this context, firms have strong incentives not to effect payments through the banking system. But, this does not apply to cash payment.

The last explanation is based on more empirical grounds. A study carried out by the REB asked firms to give their basic reasons for using barter. If the tax avoidance motive is relevant for 20% of the companies, it is not the dominant factor (Aukutsionek, 1998). Commander and Mumssen (1998) show that most firms believe that barter rather increases their tax bill, partly because the barter prices almost always exceed cash prices.

ii) Demonetization: barter as a monetary substitute;

A second analysis focuses on payments systems failure, with the inability of money to perform its functions as a medium of exchange, a unit of account and a store of value (see Poser, 1998, for a detailed analysis). Enginer and Bernhardt (1991) consider a theoretical model in which barter competes with money. They show that barter takes place if there is a double coincidence of wants and the cash-in-advance constraint, limiting monetary exchange. In their model, there is a unique inflation rate below which the only means of exchange is money, and over which money has no value. Hayashi and Matsui (1994) found, in a similar analysis, that monetary exchange is costly due to the cash-in-advance constraint, in the case of a positive inflation rate.

In Russia, barter was initially considered a natural response to the high inflation that prevailed in after prices were liberalized. When inflation is high, the opportunity cost of holding money increases, and barter is used as a monetary substitute. However, if we calculate a simple correlation rate between barter and inflation rate variables, we find that this correlation is negative.

	Barter		
Barter	1	CPI inflation rate	
CPI inflation rate	- 0.69	1	PPI inflation rate
PPI inflation rate	- 0.82	0.88	1

Sources of data: Russian Economic Trend and Russian Economic Barometer.

Barter increases when inflation decreases. This statistical correlation reflects most notably the fact that barter has substantially increased in Russia as financial stabilization has proceeded. Hence barter cannot be considered a substitute for the depreciating currency, and the negative correlation between inflation and barter suggests rather an explanation in terms of liquidity constraints.

2.2 Liquidity constraint

i) Micro-economic explanation: barter expressing an unequal access to liquidity;

The lack of liquidity in good firms is bound to structural reasons. Linz and Krueger (1998) found that barter is used unevenly across firms and is correlated to the particular industry in which the firm operates. Barter should be especially used for purchases which are important compared to the firms' liquidity. For example, intermediate or equipment goods represent large purchases and are more common in barter transactions (Marin, Schnitzer 1995). For Linz and Krueger (1998), firms that have access to cash, such as food industry firms, appear less likely to rely upon barter and pay above average wages. Conversely, machinery industries appear more likely to rely on barter. The explanation is that the latter are removed from the final customer and must deal on a wholesale level. Non-access to retail customers reduces their ability to develop cash transactions. In the absence of well-functioning capital market which could improve the firms' liquidity position, these firms are obliged to use barter transactions.

Aukutsionek (1998) reinforces this explanation of barter by showing that the sector using barter the most produces intermediate goods (in this sector, the share of barter as an annual average has reached 55% in 1997), followed by the investment goods sector (42%) and finally by the consumer goods (32%) and agricultural (31%) sectors. Table 1 below reports the level of barter in our database depending on the branch in which the firm is operating:

Table 1: Barter by branch

	Share of branches in total sample	Share of barter in sales (%)
Consumer Goods	**41.9**	**25.3**
Foodstuffs	16.2	17
textile Goods	10.5	38
Paper, Wood	8.5	29
Others	6.7	21
Investment Goods	**33.8**	**32.1**
Machinery	28.7	33
Fuels	5.1	27
Intermediate Goods	**24.3**	**42.3**
Construction Material	13.7	44
Chemical (incl. Oil refining)	4.7	40
Energy, Electricity	3.1	35
Metallurgy	2.8	46

Source: quarterly REB survey, June and December 1995 and 1996, 819 enterprises. See Annex A at the end of the paper.

The regional breakdown (in Table 2) also suggests evidence of an unequal access to liquidity: the level of barter is strongly differentiated depending on the region in which the firm is located:

Table 2: Barter by region

Codes	Region	Number of observations	% in the Sample	Barter (%)
	Siberia	**118**	**14.2**	**39.2**
2, 32	East Siberia	43	5.2	35
3, 33, 34	West Siberia	75	9	41.7
	Urals	**96**	**11.6**	**43.2**
4, 35	South Urals	66	8	41
5, 36	North Urals	30	3.6	48
	Volga:	**182**	**21.9**	**32.8**
6, 42	Volga-Vyatka	45	5.4	33.7
7, 39	Volga	113	13.6	32.6
8, 40	Volga	24	2.9	32
	West	**85**	**10.3**	**34.8**
9, 41	Central Black-Soil	62	7.5	34
10, 43	Central	23	2.8	37
11, 44	**Central**	**42**	**5.1**	**27.2**
12, 45, 46	**Moscow region**	**47**	**5.7**	**14.8**
13, 47	**North**	**114**	**13.7**	**30.7**
14, 48	**St Petersburg region**	**77**	**9.3**	**21.6**
16, 38	**North Caucasus**	**68**	**8.2**	**27.6**
	Total	829	100	32

Source: quarterly REB survey, June and December 1995 and 1996. See Annexes A and C at the end of the paper.

ii) Micro-economic explanation: lack of restructuring versus liquidity shortage;

The worsening of the firms financial situation and the implied increase in barter over time is either linked to poor economic performance or to liquidity shortage, due to credit rationing : for Hendley and al. (1997), barter is an attempt by firms to sustain socialist production patterns. It can be interpreted as a bankruptcy-delaying tactic for firms and closely reflects the lack of restructuring. On the contrary, for Linz and Krueger (1998) or Aukutsionek (1998) barter is a mechanism used to avoid shutting down potentially viable firms.

In this case, barter is connected to liquidity shortage in a context of imperfect financial market conditions and, more precisely, of credit market imperfections (Ellingsen 1998; Linz, Krueger 1998). Three features may explain the existence of credit rationing, even for good firms. Firstly, some buyers are liquidity constrained because they are unable to pledge future returns. Furthermore, in the transition process, past performance is an inadequate indicator of future profitability (Bevan, Estrin, Schaffer, 1999). Secondly, as in Western countries, buyers have private information about liquidity. However, the informational asymmetries are stronger in transition economies, where problems of

adverse selection and credit rationing are more likely to occur. In Russia, opaque balance sheets foster the barter economy (OECD 1997). Finally, banks suffered from weak protection from creditors' rights.

The dilemma - lack of restructuring versus liquidity shortage - can be assessed at first glance by simply looking at barter, rate of capacity utilization, order books level, and profit variables. If barter is used to sustain the former socialist production patterns, then one can expect barter to be negatively correlated to profit. The reverse should be observed if barter is financing the lack of working capital in a context of credit shortage. As reflected in the following tables, the reality is far from that simple, barter is not clearly associated with an above average indicator of profitability, nor with an above average utilization of capacity rate (or order books level), while it is clearly differentiated by region (see Annex B) and/or sector and/or firms' size (as proxied by the number of employees: *labor*):

Table 3: Barter, rate of capacity utilization, order book level, and profit.

	%		Barter (*br*) %			
	Indebted	Not indebted	Indebted	Not indebted	Total	Labor
Consumer Goods	**62.9**	**37.1**	**23.4**	**27.5**	**25.3**	**479**
Foodstuffs	69.9	30.1	16	19	17	351
Textile Goods	67.4	32.6	38	38	38	569
Paper, Wood	60	40	27	32	29	685
Others	43.6	56.4	14	26	21	388
Investment Goods	**70**	**30**	**32.7**	**28.8**	**32.1**	**910**
Machinery	68.1	31.2	33	32	33	854
Fuels	81	19	31	11	27	1230
Intermediate Goods	**67.7**	**32.3**	**43.6**	**38**	**42.3**	**1087**
Construction Material	67.9	32.1	43	45	44	654
Chemical (incl. Oil refining)	73.7	26.3	49	16	40	1325
Energy, Electricity	52	48	35	35	35	1379
Metallurgy	73.9	26.1	47	44	46	2483
Total	**66.5**	**33.5**	**31.5**	**30.5**	**31.7**	**873**

	Rate of capacity utilization (*utc*)%			Order books level (*ord*) %			*Profit*
	Indebted	Not indebted	Total	Indebted	Not indebted	Total	
Consumer Goods	**55.9**	**54.7**	**55.5**	**66.3**	**70.6**	**67.9**	**1.78**
Foodstuffs	55	58	56	67	83	72	1.7
Textile Goods	51	46	50	59	62	60	2
Paper, Wood	59	54	57	72	63	68	1.8
Others	62	61	62	69	64	66	1.6
Investment Goods	**56.8**	**52.9**	**55.6**	**69**	**60.1**	**66.3**	**1.9**
Machinery	53	50	52	66	58	64	1.9
Fuels	78	69	77	86	72	83	2
Intermediate Goods	**55.7**	**54.5**	**55.3**	**62.8**	**63.5**	**63.1**	**1.67**
Construction Material	56	50	54	59	53	57	1.7
Chemical (incl. Oil refining)	44	55	47	56	72	60	2
Energy, Electricity	61	84	72	78	95	87	1.2
Metallurgy	68	43	61	76	66	73	1.5
Total	**56.2**	**54**	**55.5**	**66.4**	**65.3**	**66.2**	**1.8**

Source: Quarterly REB survey, June and December 1995 and 1996. See Annex C at the end of the paper.
Profit is set equal to one when the firm is profit-making, to «2», when the profit is zero, and «3», when the firm is loss-making. The average profit in the branch takes values between 1 and 3: the closer it is to «1» (or «3»), the more profitable (the less profitable) the branch. Averages are weighted averages.

Several interpretations may be drawn:

As far as the opaque balance sheets mentioned above are concerned, the perception by firms of their real situation and profitability is likely to be biased by the overall lack of restructuring in the Russian economy and overall uncertainty. A higher order books level, higher utilization of capacity rate, and higher profit may reflect for instance the maintenance of old ties and old production patterns. Consequently, the link between barter and profit is weak.

Moreover, the increase in barter over time suggests that increasing returns are at work: certain firms may be drawn to use barter regardless of their real and financial situation simply because the majority of firms in the region or in the branch are operating this way, and it would be costly to do otherwise. One important consequence of the implied externalities is that the correlation between barter and the other variables, if any, might be not significant by not taking into account the regional, sector, or whatever, component of barter. In section IV, fixed effects are used to cope with that problem.

Finally it is worth mentioning that barter appears positively correlated to firms' size. This result seems to contradict the theoretical reasons highlighted in order to explain the success of barter in market economies: that is the argument that barter eases the squeeze on cash flow that often plagues small business (see Prendergast and Stole, 1996). Yet, one of the major problems opposing barter is the challenge of finding a suitable trading partner. Barter, as an informal activity, requires great investment in relational capital (Gaddy, Ickes, 1998). So, we can expect that the average size of an enterprise governs the potential stock of relational capital. Aukutsionek (1998) showed that barter to a large extent replaces already existing trade links between enterprises. The more extensively an enterprise uses barter, the more connections it has maintained with old suppliers.

iii) Macro-economic explanation: tight monetary policy;

This explanation of barter is examined in the following section, where we look at whether tight monetary policy can explain firms' financial situations and the increase in barter over time. The idea is that a rise in refinancing interest rates, or a decrease in money issuing, while bringing inflation under control, may at the same time decrease firms' sales and liquidity.

III BARTER AND MONETARY CONSTRAINTS

In this section we look at the relationships between barter and liquidity constraints at a macroeconomic level. We use two methods: Granger-causality tests and cointegration analysis.

3.1: Granger-causality tests between barter and a battery of macroeconomic variables

From the negative correlation between barter and inflation mentioned in the previous section, it is tempting to attribute the growth of barter (or of arrears) to a shortage of liquidity linked to stabilization. This point of view relies upon two underlying hypotheses. First, firms are faced with shortage of liquidity and second, this shortage can be explained by macroeconomic policy.

We focused first on the link between barter and the financial situation of firms, as proxied by *goodfin*. This variable is set equal to one when the firm perceives its financial situation as good. Averaged over the REB sample each month, we find the share of enterprises perceiving themselves as being in a good financial situation. The *barter* variable is the share of barter in firms' sales. The correlation between these two variables is negative; barter decreases when the firm's financial situation improves. We also found a Granger causality relationship: a worsening of the financial situation explains the increasing use of barter (see table 4).

Next, we have to test whether the macroeconomic situation and, more precisely, tight monetary policy explain the evolution of firms' financial situations and the underlying increase in barter over time. A tightening of monetary policy reflected in a rising refinancing interest rate, or in the reduction of money issuing, can bring inflation under control. At the same time, it depresses demand, which decreases firms' sales and liquidity[4]. The test is done by computing partial correlation coefficients between a battery of monthly variables and the estimated causality in the sense defined by Granger (1969). These variables are: *barter*, the inflation rate, the real refinancing interest rate, and the liquidity rate (the liquidity ratio M2/PIB). One Granger causality relationship emerges (see table 4, columns 3 and 4); an increase in the real refinancing rate causes an increase in barter.

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[4] Alfanderi and Schaffer (1996), who focused on payment arrears in the Russian enterprise sector, found a similar negative relationship between the consumer price index (CPI) lagged one month and the ratio of overdue commercial receivables in industry to mid 1995. They found a strong negative correlation; when inflation is high (rising) in Russia, trade credit arrears are low (falling). For these authors, this close inverse relationship can be explained by the fact that tightening liquidity conditions drive these two variables.

Table 4: Correlation and Granger-causality test between barter and financial tightness

	Correlation with barter	Granger-causality test (Fisher statistic with 6 degrees of freedom)	
		Over the whole period 1992 (1) – 1998(1)	Beginning of transition 1992(1) – 1996(1)
Goodfin	- 59%	2.32*	3.49*
Inflation rate	- 82%	0.71	0.76
Real refinancing interest rate	41%	1.7	3.47*
GKO real yield	71%	0.66	0.82
Liquidity rate	49%	1.04	0.71

We used stationary variables for Granger-causality tests (variables I(1) are differentiated).
*, ** indicates significance at 95%, 99%
Sources of data: Russian Economic Trend and Russian Economic Barometer.

An increase in the real refinancing rate indeed causes an increase in barter: the decreasing inflation rate over the period raised the real interest rate which became positive in January 1991. In a context of cash-in-advance constraint and liquidity shortage, as the cost of obtaining credit increases, borrowers try to overcome these constraints. They use liquidity from other sources and increase their use of barter. High interest rates make it hard for firms to borrow.

We didn't find the same type of causality with real interest rate on GKO. These results might suggest that firms rely on barter because they do not want to borrow in a context of liquidity shortage and not because they prefer to invest their liquidity in GKO.

The decrease in money supply was not found to cause the increase in barter: this suggests that the shortage of money in the economy (the demonetisation process) does not, in itself, cause the barter phenomenon. We tried to find some other explanations; in terms of the distressed economic situation (causality tests between barter, evolution of production, and evolution of capacity utilization rate in industry are not conclusive) and of share of indebted firms. Results are disappointing (and are not reported here). At the macroeconomic level, barter does not seem strongly correlated with real indicators, but only partially with access to external financing. This suggest that a more careful analysis, at the micro level (see section IV), is needed to understand the exact nature of liquidity constraints.

3.2: Cointegration analysis

We now try to estimate long-run relationships between the different variables highlighted by causality tests. The different variables presented above being non-stationary, we have to rely upon a cointegration analysis. When two series are cointegrated, we can distinguish between a long run relationship between these two series, that is to say the manner in which the two variables drift

upward together and the short-run dynamics, that is to say the relationship between deviations from their long run trend. The Johansen maximum likelihood procedure consists in estimating an error-correction representation of a vector-autoregressive model of order k. We first estimated the rank of the matrix of the long-run responses using the maximum likelihood method developed by Johansen (1995) (cf. Table 5).

Table 5: Johansen maximum likelihood procedure (1993-7; 1998-11)

H0: rank=p	Maximum eigenvalue statistics	95% critical value	Trace statistics	95% critical value
p=0	37.63**	21	46.51**	29.7
p<=1	8.32	14.1	8.87	14.4
p<=2	0.55	3.8	0.55	3.8

Standardized eigenvectors		
Barter	*Goodfin*	Interest rate
1	0.5224	-0.1422
0.3429	1	1.363
-0.5096	0.07341	1

The number of lags (5) was chosen based on the Hannan-Quinn information criterion.
*, ** indicates significance at 95%, 99%.

Table 5 shows that there is only one cointegrating vector. This means that there is only one combination of the variables that produces stationary residuals. The long-run equation for barter is the following:

$$\text{Barter} = - 0.52 \ Goodfin + 0.14 \ \text{Interest rate}$$

Again we find that barter increases together with interest rates, but decreases as the financial situation of firms improves. In the short-run there will be deviations from the long run relations found above. The short-run barter determination can be explained by a dynamic error correction model, where changes in barter depend on prior deviations from the long-run equilibrium and on prior changes in all variables.

Table 6: Error correction Engle-Granger equation[5]

$$\Delta \text{Barter} = \quad 0.13 \quad - 0.19 \ \Delta \text{Goodfin}_t \quad - 0.15 \ \Delta \text{Goodfin}_{t-1} \quad + 0.11 \ \Delta \text{txRF}_t \quad - 0.68 \ \text{ECM}_{t-1}$$
$$\quad\quad\quad\quad (0.5) \quad\quad (-3.7) \quad\quad\quad\quad (-2.7) \quad\quad\quad\quad (2.7) \quad\quad\quad (-4.7)$$

$R^2 = 0.40 \quad$ DW = 2.13 $\quad$ AR (5, 55) = 1.69 $\quad$ ARCH(5, 50) = 0.30 $\quad$ Normality $\chi^2 = 2.3$

txRF is the refinancing interest rate and ECM_{t-1} represents the error correction term.

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[5] All variables, except the error correction term, are differentiated and thus are I(0).

Also in the short run, barter is correlated with indicators of financial tightness: barter increases when current real interest rates increase and decreases as the firm's financial situation improves (see Graph 2). No other variable (as liquidity rate, production, capacity utilization rate or inflation rate) appears significant, as confirmed by the Lagrange-multiplier tests for omitted variables[6].

Graph 2. Macroeconomic explanations of barter
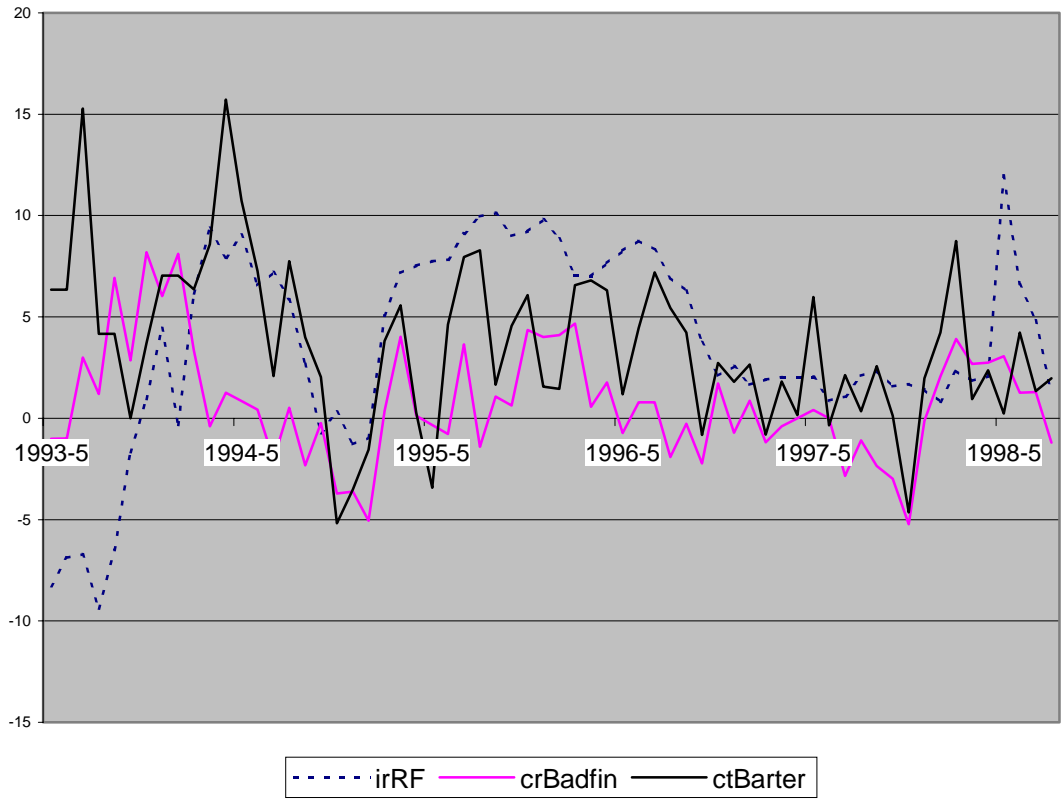
with irRF, the real interest rate of refinancing ; crBadfin, the three months moving average increasing rate of firms in bad financial situation ; and crBarter the three months moving average increasing rate of barter.

To summarize, firms seem to use barter transactions in order to sustain production in a cash-constrained economy[7]. Real interest rates have been found to cause fluctuations in barter over time, and the relationships between barter on one hand, and financial situation and interest rates fluctuations on the other hand, prove to be quite strong for the whole period. However, the liquidity ratio, although correlated with barter, does not exhibit any causality relationships with it. Thus, our

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[6] This allows tests for the significance of complete lag functions of excluded variables. Results are not conclusive and therefore are not presented here.

conclusion is that monetary policy tightness at the macro-economic level only partially explains the increasing use of barter, but we have yet to call upon explanations of the lack of liquidity at the firm level.

IV MICRO-EVIDENCE CONCERNING BARTER

As shown in the previous section, barter is positively linked to the firm's financial situation. In order to better understand the link between these two factors, we distinguish enterprises which have access to credit from those which do not[8]. We show that two different types of behavior can generate barter: for enterprises which are not provided with credit by banks, it acts as a substitute for short-term credit; for indebted enterprises, barter in the same way as external finance, is a way of avoiding costly restructuring. This approach is slightly different to that followed by Ickes and Gaddy (1998)[9], who emphasize that barter results from the supply of soft credit by the State to the State sector, and consequently barter should be lower in private firms. Here we look more closely at the micro-economic rationale for barter, by implicitly assuming that soft budget constraints hold only for certain enterprises, which benefit from bank credit, while other firms are obliged to adapt to market discipline.

4.1 Data and Methodology

The panel data base we use has been extracted from the REB (see Annex A). The data were collected in June 1995, December 1995, June 1996, and December 1996. There are a total of 736 observations on enterprises in the unbalanced dataset. The variable *ncr,* equal to 1 when the firm declares that it is not indebted and not going to be, divides the sample into two: those that are not financed through the banking system (484 enterprises), and those that are the main recipients of the banking credit (252, but 263 if we are considering a subset of explanatory variables). As suggested above, the Russian banking system is characterized by severe adverse selection problems. We argue that market discipline is more likely to be observed by non-indebted enterprises: in this sense, the *ncr* variable is well suited for distinguishing different types of firms.

By contrast, the *profit* variable, although available in the REB (see Annex A), does not turn out to be a good proxy for firms performance, as emphasized in most papers dealing with the transition process

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[7] This result confirms the REB survey: barter is primarily, for 61% of enterprises in 1998, a means of maintain production in a context of shortage of working capital. The second motive, for 41% of firms, is the desire to speed up sales of output (Aukutsionek, 1998).

[8] This distinction can also be motivated by the findings in Brana, Maurel and Sgard (1999), who showed that credit is mainly allocated towards loss-making firms, while profitable enterprises on the contrary are shut out of the banking system.

[9] For those authors, barter allows enterprises in Russia, often monopoly suppliers, to pay taxes in «soft goods».

in the former Soviet Union[10]. We nevertheless tried to estimate barter equations in Table 7 for profit makers and loss makers, using the *profit* variable, but the results, not reported here, were not satisfactory.

We could also test the assumption that ownership is a key variable in explaining barter. This variable was unfortunately not available in the REB; although Estrin and Rosevear (1999) do not find strong links with firm performance, they establish that barter in Ukraine is associated with lower profitability, and is less common in privatised firms[11]. However, the rational behind this result is not clear: in particular the assumption that outsider owned firms will perform better in terms of barter than all other ownership types is not supported.

To summarize, both the macro-economic framework in the previous section and the emphasis we place on bank credit towards already indebted enterprises (versus the role of the cash liquidity constraint for non indebted firms) brings out a sharp distinction between indebted and non indebted enterprises. This distinction is not simply a proxy for that between profitable and non-profitable firms. Our model (see equations 1, 1', 2, 2') of barter simply claims that certain firms, whatever privatised or not and profitable or not, are more subject to market discipline than are others. We suspect that this might be related to access to bank credit, whose allocation is distorted in the Russian context towards already heavily indebted enterprises or/and loss makers. If this model describes the Russian economy correctly, then one important implication is that enterprises excluded from the banking system are victims of the diffusion of barter (in the sense that they would prefer to use money), while other firms, which try to escape from the restructuring effort, are the cause of this diffusion of barter.

The panel structure of the REB allows us to take into account the strong regional and sector components of barter (as suggested in the huge discrepancies in Tables 1 and 2), and all other kinds of fixed effects, including the structure of property. The stress is thus put not on the average level of barter by sector, region, ownership, etc., but on the reasons for changes in its level.

Fixed effects are unable to capture all the heterogeneity in the sample. For example, for indebted firms, increased barter is correlated with inventories: it is a way of avoiding costly restructuring. For non-indebted enterprises, barter is used as a substitute for short term credit. We thus expect the determinants of barter to be different between the two sub-samples. Then we estimated two forms: form 1 contains the *fin* variable, while form 2 does not.

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[10] Measurement problem aside, in the transition period profits may yield a distorted picture if active restructuring leads to the writing off of bad debts or accumulated losses. What concerns the REB, this warning has to be moderated: Brana, Maurel and Sgard (1999) showed that firms with the worst indicator of profit have poor performances and bad financial positions. For profitable enterprises, on the contrary, profitability, order book level and capacity utilization rate are relatively high.

[11] This result is compatible with the model developed by Ickes and Gaddy (1998), as privatised firms are less likely to receive soft credit from the State, therefore less likely to engage in bartering activity.

$$br_{it} = a + b_1 inv_{it} + b_2 lma_{it} + b_3 fin_{it} + b_4 labor_{it} + t_1 Q1 + t_2 Q2 + t_3 Q3 + v_i + u_{it} \qquad (1)$$

$$\Leftrightarrow br_{it} - \overline{br_i} = b_1\left(inv_{it} - \overline{inv_i}\right) + b_2\left(lma_{it} - \overline{lma_i}\right) + b_3\left(fin_{it} - \overline{fin_i}\right) + b_4\left(labor_{it} - \overline{labor_i}\right) + t_1\left(Q1 - \overline{Q1}\right) +$$
$$t_2\left(Q2 - \overline{Q2}\right) + t_3\left(Q3 - \overline{Q3}\right) + u_{it} - \overline{u_i} \qquad (1')$$

$$br_{it} = a + b_1 inv_{it} + b_2 lma_{it} + b_4 labor_{it} + t_1 Q1 + t_2 Q2 + t_3 Q3 + v_i + u_{it} \qquad (2)$$

$$\Leftrightarrow br_{it} - \overline{br_i} = b_1\left(inv_{it} - \overline{inv_i}\right) + b_2\left(lma_{it} - \overline{lma_i}\right) + b_4\left(labor_{it} - \overline{labor_i}\right) + t_1\left(Q1 - \overline{Q1}\right) + t_2\left(Q2 - \overline{Q2}\right) +$$
$$t_3\left(Q3 - \overline{Q3}\right) + u_{it} - \overline{u_i} \qquad (2')$$

where:

- br is the current share of barter in sales (in percent), for each firm at each time (t is successively set equal to Q1= June 1995, Q2 = December 1995, Q3 = June 1996, Q4 = December 1996), and $\overline{br_i} = \sum_t br_{it} / T_i$;

- inv is inventory stocks, where the usual monthly level is set equal to 100, and $\overline{inv_i} = \sum_t inv_{it} / T_i$.

  We assume that this variable is a proxy for the lack of restructuring, inasmuch as an increase in inventories means that the market does not clear supply and demand;

- lma is set equal to 1 if the perceived main impediment to production is insufficient demand, and $\overline{lma_i} = \sum_t lma_{it} / T_i$. This is a proxy for firm sensitivity to demand conditions on the goods market;

- fin takes values 1 (good financial position), 2 (normal financial position), and 3 (bad financial position), and $\overline{fin_i} = \sum_t fin_{it} / T_i$;

- $labor$ is the number of employees, and $\overline{labor_i} = \sum_t labor_{it} / T_i$. As mentioned in Aukutsionek (1998), the more extensively an enterprise uses barter, the more connections it has maintained with old suppliers, while the network of old suppliers depends upon the size of the enterprise;

- $v_i + u_{it}$ is the residual, v_i being the unit specific residual, and u_{it} the usual residual assumed to be *iid*;

- Q1, Q2, Q3 are dummy variables equal to one when the observation corresponds to the first semester (June 1995), to the second semester (December 1995), to the third (June 1996), and to the fourth (December 1996). They are introduced in the equation to take into account the increase in barter over time.

<u>Assumption 1</u>: Barter allows indebted enterprises, responsible for the adverse-selection problem, to unload excess inventory. There should therefore be a positive correlation between *barter* and *inv*. These firms can continue to produce «soft goods», for which there is no effective demand. We thus expect the correlation between *lma* and *barter* to be positive (or not significant): when the lack of demand starts being identified as the main impediment to production, barter either increases or remains stable.

<u>Assumption 2</u>: For enterprises excluded from the banking system, barter is linked to the tightness of external finance. It is expected to decrease (increase), when the main impediment to production ceases to be the lack of demand (becomes the lack of demand). Here barter is seen as a substitute for financial resources, whose shortage acts as an impediment to the supplying of market demand. Under this assumption, the correlation between *lma* and *barter* is expected to be negative.

<u>Assumption 3</u>: The coefficient on *fin* reflects the extent to which a worsening of the financial situation increases barter. If assumptions 1 and 2 are correct, then a worsening financial situation is expected to increase barter, which indeed serves as a substitute for external finance. For non-indebted firms, barter allows the working capital required for production to be financed. For indebted firms, it finances the production of soft goods.

<u>4.2 Results</u>

Our findings are reported in Table 7 (columns I, II, III, IV). Each column reports the results of random effects and fixed effects regressions for equations of form 1 (columns I, Ia, Ib, IIIa, IIIb), including the *fin* variable, and 2 (columns II, IIa, IIb, IVa, IVb), excluding it. The equations are always significant at the usual level (coefficients in italics are not significant). Hausman specification tests prefer the equations without *fin*. Nevertheless, the coefficients are very similar across the different estimations, which means that the model specification is fairly robust.

Assumptions 1 and 2 are confirmed (see columns Ia to IVa, and Ib to IVb): in the group of indebted[12] firms (and/or going to be indebted), an increase in barter is associated with a positive variation in inventories, but it is insensitive to a jump in *lma* from 0 to 1, while the contrary is true for non-indebted enterprises. The empirical analysis thus supports the view that barter allows the former to unload excess inventory (Prendergast, Stole 1996) and to produce «soft goods», for which there is no effective demand. It offers some flexibility to managers and can be seen as the symptom of insufficient restructuring. Non-indebted firms, on the other hand, have hard budget constraints and suffer from a shortage of working capital. This cash constraint is less binding when the main impediment to production is the lack of demand: in this case the enterprise adjusts by decreasing its

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[12] In Brana, Maurel and Sgard (1999) again, these enterprises have been shown to be in serious financial difficulties: being chronic loss-makers, they are unable to pay in cash.

Table 7: Estimation of Equations 1' and 2'.

Total Sample				
column	I		II	
Barter	Random effects	Fixed Effects	Random effects	Fixed Effects
inv	0,036	0,037	0,040	0,038
lma	*-1,600*	*-0,922*	*-1,850*	*-0,962*
fin	3,517	0,527		
labor	0,00203	0,00152	0,00211	0,00155
Q1	-18,368	-18,034	-18,729	-18,093
Q2	-13,331	-13,284	-13,442	-13,289
Q3	-3,206	-2,986	-3,482	*-3,029*
intercept	26,728		36,215	
R^2	0,1488		0,1294	
number of observations		736		
number of groups		403		
Hausman Specification Test				
Chi( )	Chi(7) = 14,56		Chi(6) = 2,07	
Prob>Chi2	0,042		0,9128	

Indebted Firms ncr = 0								
column	Ia		IIa		IIIa		IVa	
Barter	Random effects	Fixed Effects	Random effects	Fixed Effects	Random effects	Fixed Effects	Random effects	Fixed Effects
inv	0,052	0,077	0,059	0,079	0,053	0,077	0,060	0,079
lma	*0,991*	0,823	*0,441*	0,648				
fin	4,674	1,536			4,567	1,454		
labor	0,00215	0,00050	0,00222	0,00053	0,00211	0,00047	0,00220	0,00051
Q1	-17,079	-17,330	-17,613	-17,528	-17,221	-17,448	-17,672	-17,614
Q2	-12,308	-12,398	-12,617	-12,452	-12,375	-12,473	-12,644	-12,509
Q3	-2,320	-2,709	*-2,587*	*-2,795*	-2,369	-2,736	*-2,606*	*-2,813*
intercept	19,368		32,166		20,179		32,400	
R^2	0,1544		0,1345		0,1538		0,1345	
number of observations				484				
number of groups				310				
Hausman Specification Test								
Chi( )	Chi(7) = 5,34		Chi(6) = 1,83		Chi(6) = 5,34		Chi(5) = 1,82	
Prob>Chi2	0,618		0,9346		0,5011		0,8736	

Non Indebted Firms (and not going to be); ncr = 1								
column	Ib		IIb		IIIb		IVb	
Barter	Random effects	Fixed Effects	Random effects	Fixed Effects	Random effects	Fixed Effects	Random effects	Fixed Effects
inv	*0,013*	-0,010	*0,015*	*-0,009*				
lma	-8,022	-6,575	-7,364	-6,174	-6,889	-6,498	-6,308	-6,112
fin	6,043	1,533			4,629	1,454		
labor	0,00413	0,01105	0,00434	0,01067	0,00457	0,00395	0,00470	0,00372
Q1	-22,790	-22,247	-23,094	-22,186	-21,161	-20,502	-21,387	-20,472
Q2	-15,259	-15,706	-15,152	-15,596	-14,691	-14,646	-14,420	-14,472
Q3	-5,012	-5,906	-5,938	-6,068	-4,669	-5,544	-5,401	-5,731
intercept	25,926		41,863		28,638		41,011	
R^2	0,1770		0,1453		0,1597		0,1339	
number of observations		252				263		
number of groups		175				181		
Hausman Specification Test								
Chi( )	Chi(7) = 3,56		Chi(6) = 1,70		Chi(6) = 3,04		Chi(5) = 0,84	
Prob>Chi2	0,8286		0,945		0,8043		0,9741	

use of barter. This result has to be put into light with that in Marin and Schnitzer (1999)[13], for whom the inversely U-shaped relationship between barter and output, that is, the positive effect of barter on output growth for low barter firms and the negative effect for high barter firms, indicates that high growth firms « showed a favorable growth performance because they used their credit constraint and barter activity effectively to avoid an input and financial shortage ». Low growth firms are faced with a « too large credit enforcement costs which makes it worthwhile for the input supplier to participate in the deal », hence barter cannot help to maintain production by getting trade credit from other firms. In our approach, although the emphasis is not put on the relative output growth performance, we would explain the negative correlation between output and barter for indebted firms by the lack of market discipline and the persistence of soft budget constraint, which explain the increase in credit enforcement costs.

In light of these results, one can interpret the coefficient of *fin* (columns Ia, Ib, IIIa, IIIb) in two different ways, depending on which objective is pursued when a particular firm uses barter as a substitute for external finance. If it is to maintain an artificial level of production (assumption 1), then barter reflects liquidity shortage due to the lack of restructuring; if it is to finance production in the context of a hard budget constraint (assumption 2), then barter merely reflects a cash liquidity constraint.

IV. CONCLUSION

The process of transition can be viewed as the transition from a centrally planned economy to a monetary economy, where money imposes hard budget constraints on firms (Poser, 1998). As the transformation from plan to market proceeds, and profitability becomes the main aim of enterprises, barter should decline. In this context, the growing process of barter in Russia since 1992 can be seen as the sign of a delaying process of transition and restructuring.

We showed, however, that barter is a complex phenomenon, which has different roots from firm to firm. For bad enterprises, barter can be seen as a bankruptcy delaying tactic, while in profitable enterprises it is used as an additional liquidity, in a context of credit rationing by banks. In both cases, the barter phenomenon reveals the importance of bankruptcy procedures. At the micro-economic level, barter lowers the ability of money to harden firms' budgets. It consolidates existing inter-firm relationships, reduces market competition, and tends to create artificial demand. Moreover, relative price changes become less meaningful. Consequently, the pace of economic transition is slowed down, and economic and financial valuation of firms becomes groundless. For good firms, lack of

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[13] For these authors, barter provides a mechanism to deal with disorganization when credit enforcement is

liquidity in a context of low retained earnings and low cash flows makes it impossible for them to invest and restructure effectively. In the presence of capital market imperfections, efficient firms may be forced to exit due to lack of funds[14]. At a macro-economic level, the barterisation process is an obvious impediment to effective macro-economic policy. It is a means of tax evasion (even if tax evasion is more a consequence than a motive of barter) and puts constraints on fiscal policy. At the same time, barter undermines monetary control and thus the stabilization policies. The implication of this paper is that the priority must be given to restructuring at the micro level. Notably, the implementation of efficient bankruptcy procedures appears a prerequisite for coping with barter and with the de-intermediation process. Thus, eventually monetary and fiscal policy could play their role.

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prohibitively costly. It acts as an institution, which efficiently solves moral hazard problem.
[14] See Zingales (1998) for a theoretical analysis of this exit problem due to capital market imperfections.

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ANNEX A
Russian Economic Barometer (REB) survey

The REB is a survey which has been conducted since 1992, on a monthly and quarterly basis. It is sent to between 170 to 210 enterprises considered representative in terms of geographic as well as sector localization. An important bias is the predominance of privatized firms, as opposed to new private firms. In the 1996 sample, 18% were State-owned, 26% had a mixed property structure, and 56% were privatized former State-owned-enterprises.

The econometric part of this paper focuses on the panel dimension of the database, while aggregated indicators, like monthly barter averaged over the whole sample or the percentage of firms which are in a good financial situation for a given month, are used for the macroeconomic analysis. The variables we used are either expressed in per cent of a monthly usual current level (*br*, *inv*, *ord*, *utc*), or are dummy variables:

br is the current share of barter in sales (in percent), for each individual at each time (t varies from t= first quarter of 1995 to t= last quarter of 1996).
inv is the stock of inventories, where the usual monthly level is set equal to 100.
ord is the order books' level, where the usual monthly level is set equal to 100.
utc: is the rate of capacity utilization, where the usual monthly level is set equal to 100.

ncr is set equal to 1 when the firm is not indebted and not going to be.
lma is set equal to «1» when the firm identifies insufficient demand as the main impediment to production.
lmb is set equal to «1» when the firm identifies a shortage of raw materials as the main impediment to production.
lmc is set equal to «1» when the firm identifies a shortage of financial resources as the main impediment to production.
fin takes values 1 (good financial position), 2 (normal financial position), and 3 (bad financial position). *goodfin* is set equal to 1 when the answer to fin is 1, and 0 elsewhere, in per cent it represents the share of enterprises in a good financial situation.

By averaging over the whole sample, or sub-samples, one gets the percentage of firms which identify insufficient demand (respectively the shortage of raw materials, the shortage of financial resources) as the main impediment to production, as well as the percentage of firms which are in a good, bad, or normal financial situation.

REGIONS CODES

(Code) Region	Components
(2, 32) East Siberia	Krasnoyarsk Territory Irkutsk region Chita Region Republic of Buryatia Republic of Tyva
(3, 33, 34) West Siberia	Altai Territory Kemerovo Region Novosibirsk Region Omsk Region Tomsk Region Tyumen Region
(4, 35) Urals	Kurgan region Orenburg region Chelyabinsk Region Republic of Bashkortostan
(5, 36) Urals	Perm region Sverdlovsk Region Udmurt Republic

(6, 42) Volga-Vyatka	Kirov Region Republic of Mari El Republic of Mordovia Republic of Chuvashia
(7, 39) Volga	Samara region Penza region Ulyanovsk Region Republic of Tatarstan
(8, 40) Volga	Astrakhan Region Volgograd Saratov Republic of Kalmykia
(9, 41) Central Black-Soil	Belgorod Region Voronezh Region Kursk region Lipetsk Region Tambov region
(10, 43) Central	Vladimir region Ivanovo Region Tver Region Kostroma Region Yaroslav Region
(11, 44) Central	Bryansk Region Kaluga region Orel region Ryazan Region Smolensk Region Tula region
(12, 45, 46) Central	Moscow Moscow Region
(13, 47) North	Arkhangelsk Region Vologda Region Republic of Karelia
(14, 48) North-West	St Petersburg Leningrad region Novgorod Region Pskov Region
(16, 38) North Caucasus	Krasnodar Territory Stavropol Territory Rostov Region Republic of Daghestan Republic of Kabardino-Balkaria Republic of Northern Ossetia Republic of Adigei Karachai-Cherkess Republic

The following tables in Annex B, C, and D, present the aggregate statistics from the quarterly surveys of June 1995 and 1996, December 1995 and December 1996.

Breakdown of barter, inventories, order books level, and rate of capacity of utilisation by Region

Region	Number of observations			share of barter (*br*) in sales %			Inventories (*inv*) % (usual monthly level =100)			order books level (*ord*) % (usual monthly level =100)			rate of capacity utilisation (*utc*) (%, usual monthly level =100)		
Code	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]
0	11	10	1	17	13	55	98	97	110	53	55	35	38	39	25
2	43	27	16	35	38	32	87	94	77	63	68	56	54	51	59
3	66	46	20	41	41	41	72	73	69	71	71	72	66	68	60
4	56	35	21	41	40	42	98	94	105	77	77	78	60	60	60
5	30	22	8	48	50	43	93	93	94	63	59	72	48	46	54
6	31	19	12	29	30	29	81	81	81	57	56	59	52	50	54
7	99	68	31	30	28	33	97	99	93	57	59	52	49	51	45
8	24	19	5	32	33	27	70	64	99	60	57	72	48	44	63
9	62	45	17	34	34	35	82	85	76	67	69	63	55	59	44
10	41	29	12	27	23	35	85	108	35	66	64	72	56	53	64
11	23	16	7	37	36	40	62	80	21	68	67	72	54	54	55
12	42	18	24	14	14	13	90	67	106	60	70	51	64	69	60
13	100	68	32	29	27	32	98	97	99	71	74	67	62	63	60
14	61	44	17	22	24	18	99	118	48	71	70	71	55	58	48
16	48	32	16	27	27	27	83	84	82	67	65	71	58	59	57
33	8	4	4	45	58	33	126	121	131	62	74	50	53	65	40
34	1	1		65	65		35	35		65	65		15	15	
37	20	12	8	29	39	15	98	98	98	59	49	75	49	46	53
39	14	11	3	51	56	34	111	111	112	68	62	85	47	49	42
42	14	6	8	44	45	44	115	127	107	85	78	91	53	53	53
43	1	1		35	35		215	215		65	65		35	35	
45	5	1	4	22	3	28	68	65	70	77	65	80	65	65	65
47	14	11	3	43	37	65	61	66	45	63	68	35	46	49	38
48	16	10	6	20	25	12	102	115	82	59	61	55	56	61	47

Total Sample: survey of June 1995 and 1996, December 1995 and 1996 ;

a: Total sample for *ncr*=0 (indebted and / or going to be indebted) ;

b: Total sample for *ncr*=1 (non-indebted and not going to be).

ANNEX B (followed)

Percentage of firms which identify demand, shortage of financial resources, availability of inputs, as the main impediment to production, by Region

Region	Number of observations			Limit to production : demand (*lma*)			Limit to production : inputs (*lmb*)			Limit to production : financial (*lmc*)		
Code	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]
0	11	10	1	0,45	0,50	0,00	0,09	0,10	0,00	0,82	0,80	1,00
2	43	27	16	0,40	0,52	0,19	0,28	0,22	0,38	0,70	0,67	0,75
3	66	46	20	0,38	0,39	0,35	0,26	0,28	0,20	0,85	0,83	0,90
4	56	35	21	0,38	0,43	0,29	0,21	0,17	0,29	0,79	0,77	0,81
5	30	22	8	0,50	0,50	0,50	0,17	0,14	0,25	0,80	0,86	0,63
6	31	19	12	0,65	0,74	0,50	0,23	0,26	0,17	0,71	0,63	0,83
7	99	68	31	0,67	0,65	0,71	0,22	0,28	0,10	0,57	0,54	0,61
8	24	19	5	0,46	0,47	0,40	0,25	0,21	0,40	0,79	0,84	0,60
9	62	45	17	0,48	0,47	0,53	0,23	0,16	0,41	0,61	0,62	0,59
10	41	29	12	0,66	0,72	0,50	0,15	0,10	0,25	0,61	0,59	0,67
11	23	16	7	0,35	0,38	0,29	0,13	0,13	0,14	0,57	0,44	0,86
12	42	18	24	0,40	0,39	0,42	0,07	0,06	0,08	0,57	0,67	0,50
13	100	68	32	0,59	0,62	0,53	0,24	0,19	0,34	0,63	0,63	0,63
14	61	44	17	0,62	0,68	0,47	0,13	0,09	0,24	0,64	0,68	0,53
16	48	32	16	0,75	0,72	0,81	0,25	0,25	0,25	0,52	0,47	0,63
33	8	4	4	0,75	0,75	0,75	0,13	0,00	0,25	0,63	0,75	0,50
34	1	1		0,00	0,00		0,00	0,00		1,00	1,00	
37	20	12	8	0,70	0,75	0,63	0,20	0,00	0,50	0,55	0,58	0,50
39	14	11	3	0,57	0,64	0,33	0,21	0,18	0,33	0,71	0,82	0,33
42	14	6	8	0,57	0,33	0,75	0,21	0,17	0,25	0,57	0,83	0,38
43	1	1		1,00	1,00		0,00	0,00		0,00	0,00	
45	5	1	4	0,60	0,00	0,75	0,40	1,00	0,25	0,60	1,00	0,50
47	14	11	3	0,64	0,55	1,00	0,14	0,09	0,33	0,86	0,82	1,00
48	16	10	6	0,31	0,30	0,33	0,13	0,20	0,00	0,88	0,90	0,83

Total Sample: survey of June 1995 and 1996, December 1995 and 1996 ;
a: Total sample for *ncr*=0 (indebted and / or going to be indebted) ;
b: Total sample for *ncr*=1 (non-indebted and not going to be).

ANNEX C: Breakdown of barter, inventories, order books level, and rate of capacity of utilisation by branch

Branches	Number of observations			share of barter (*br*) in sales %			Inventories (*inv*) % (usual monthly level =100)			order books level (*ord*) % (usual monthly level =100)			rate of capacity utilisation (*utc*) % (usual monthly level =100)		
	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]
Foodstuffs	133	93	40	17	16	19	68	70	66	72	67	83	56	55	58
Machinery	235	160	75	33	33	32	100	98	102	64	66	58	52	53	50
Fuels	42	34	8	27	31	11	83	87	71	83	86	72	77	78	69
Others	55	24	31	21	14	26	73	63	80	66	69	64	62	62	61
Construction Material	112	76	36	44	43	45	107	109	102	57	59	53	54	56	50
Consumer Goods	86	58	28	38	38	38	96	106	76	60	59	62	50	51	46
Chemical (incl. Oil refining)	38	28	10	40	49	16	90	98	69	60	56	72	47	44	55
Paper, Wood	70	42	28	29	27	32	92	101	79	68	72	63	57	59	54
Energy, Electricity	25	13	12	35	35	35	26	57	18	87	78	95	72	61	84
Metallurgy	23	17	6	46	47	44	88	83	100	73	76	66	61	68	43

% of firms which identify demand, shortage of financial resources, availability of inputs, as the main impediment to production, by branch

Branches	Limit to production : demand (*lma*)			Limit to production : inputs (*lmb*)			Limit to production : financial (*lmc*)			Labor		
	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]	Total sample	Indebted firms [a]	Non-indebted firms [b]
Foodstuffs	0,70	0,74	0,60	0,30	0,29	0,33	0,46	0,48	0,40	404	432	339
Machinery	0,50	0,51	0,48	0,16	0,16	0,17	0,71	0,73	0,68	858	1071	381
Fuels	0,29	0,24	0,50	0,14	0,18	0,00	0,71	0,71	0,75	2140	2262	1649
Others	0,56	0,67	0,48	0,24	0,13	0,32	0,69	0,71	0,68	371	439	317
Construction Material	0,80	0,83	0,75	0,14	0,11	0,22	0,67	0,64	0,72	576	591	547
Consumer Goods	0,53	0,48	0,64	0,27	0,26	0,29	0,71	0,71	0,71	672	684	647
Chemical (incl. Oil refining)	0,53	0,57	0,40	0,21	0,18	0,30	0,68	0,71	0,60	1457	1616	1014
Paper, Wood	0,27	0,29	0,25	0,19	0,14	0,25	0,70	0,74	0,64	641	829	348
Energy, Electricity	0,36	0,62	0,08	0,20	0,23	0,17	0,76	0,62	0,92	1358	1657	1005
Metallurgy	0,35	0,41	0,17	0,22	0,12	0,50	0,78	0,82	0,67	2167	2155	2204

Total Sample: survey of June 1995 and 1996, December 1995 and 1996 ; a: Total sample for *ncr*=0 (indebted and / or going to be indebted) ; b: Total sample for *ncr*=1 (not indebted and not going to be).