NON-MONETARY TRANSACTIONS
IN UKRAINE. THE PRINCIPAL-
AGENT APPROACH.

by

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Abstract

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In this paper we use a case study investigation of non-monetary activities in transition economies. Our results suggest that current empirical researches use inappropriate methodology and thus provide us with questionable results. The evidence does not support macroeconomic instability, low availability of cash, poor legal protection of creditors and tax evasion as main driving forces of barter in investigated transactions. Our alternative explanation of non-monetary transactions in Ukraine is that barter is a device for hiding large-scale profit-diverting activities by management of state or weakly corporate governed enterprises. Both empirical case-study investigations and theoretical analysis of the transactions in Principal-Agent framework provides support for this hypothesis.

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Introduction

During the last eight years non-monetary payments in Ukraine and Russia have come to play an ever increasing and damaging role in both the formal and informal economies. According to the State Statistics Committee of Ukraine, barter transactions constitute approximately 40% of all industry sales and in some industries this figure approaches 80%[1]. Consequently, there is a justifiably high level of interest among professional economists studying the area of the former Soviet Union in this problem. The essential question that is raised in the literature is why do enterprises use non-monetary means instead of cash?

Various studies on barter produce mainly the following hypotheses for the significance of non-monetary transactions in Ukraine: macroeconomic instability and especially the high credit rate in the banking, the low availability of cash, the poor legal protection of creditors, the existence of Kartoteka #2[2] and tax evasion. In the economic literature dealing with this topic, the majority of economists analyze non-monetary transactions and barter on a macro level, without a microanalysis of the real transactions taking place. Despite the fact that most of the barter deals have many more than one or two steps, researches generating the samples for econometric analysis in the current literature ignore all but two participating parties. Moreover, current literature most often examines two enterprises with direct exchange of goods even though most contracts involve multiple parties in a complicated structure of payment. Additionally, econometric models use official data, which is admittedly highly distorted for most barter transactions. Thus, produced results are questionable at best.

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[1] Data produced by the State Statistics Committee (source HIID working files).

[2] Rephrasing the legislature Kartoteka #2 was such a state in which an enterprise has inadequate monetary resources to pay its debt. Because of this inadequacy all cash entering account of enterprise should be transferred immediately by the bank to the creditors of enterprise in a fixed order (tax debts have priority).

In contrast, in this paper we apply micro level, multiple case study research. This allows us to overcome some drawbacks of contemporary researches. This study is based on five real-life non-monetary transactions, data were received not from the management but from those who developed and facilitated them. The empirical results suggest the inability of current models to capture behavioral pattern, in particular corruption by public officials and profit-diverting activities of management of enterprises during non-monetary transactions. On the basis of the first case an alternative hypothesis is developed which explains most of the features of described barter transactions. Subsequent analysis of other cases suggests that the behavior of agents can best be captured in the context of principal-agent theory.

To apply the approach developed in Principal-Agent literature to the study corruption and profit-diverting activities, a theoretical model capturing non-monetary activities is developed. The model supports the position that non-monetary activities are mostly used as a way to hide profit-diverting activities by opportunistic management.

An implication of the results is that owners could decrease the level of bartering activities by increasing the probability of being caught taking profits through improved auditing of such activities. But this would incur additional costs. Another strategy would be prohibiting such activities on budgetary and government run enterprises and treating non-monetary activities as signals of either bad performance by agents of their functions or as an indication of profit-diverting activities thus applying strict sanctions in case of detecting. Finally, we argue for use of multiple case study approach in conditions of highly, purposely distorted data.

Chapter 1 will provide brief theory overview of the contemporary theoretic and empirical studies, Chapter 2 will present empirical investigation in the form of

real life case studies, Chapter 3 will provide the formal model of the problem and then conclusions and implications follow.

LITERATURE REVIEW

Various theoretical studies on barter produce different hypotheses for the significance of non-monetary transactions. One hypothesis cites macroeconomic instability and especially high credit rate in the banking sector (Ritter, 1995; Nuti, 1998; Banks, 1983, Poser 1998, Engineer and Bernhardt 1991, Hayashi and Matsui 1994). If money demand in economy is contracted it is less costly to use non-monetary means than otherwise (Ritter 1995), and barter exchange (or autarky in this type of model) is chosen. Non-monetary equilibrium exists in such models only if growth of monetary resources is sufficiently small (Engineer and Bernhardt 1991). Also, barter takes place if there is a coincidence of wants and cash-in-advance constraint. Therefore money exchange is costly due to the cash-in-advance constraint, in the case of positive inflation (Enginer and Bernhardt 1991, Hayashi and Matsui 1994). The high interest rate and non-availability of credits argument developed in Nuti (1998) and Gary Banks (1983) also could be attributed to the opportunity cost of money. It should be noted that most of those models present a highly abstracted environment, with no financial institutions, nor production and commodity money (Engineer and Bernhardt 1991, Ritter 1995).

A competing explanation is a micro level argument, which is the low availability of cash (Prendergast, 1998; Ellingsen, 1998; Marin and Schnitzer, 1999). Non-monetary transactions provide liquidity to firms which otherwise are constrained from trading (Prendergast 1998). This approach models barter as trade between two firms, one of them credit constrained. Trade is a multistage game. Liquidity constrained firms are better off doing barter transactions than otherwise.

Additionally, firms can extract profits from different valuations of goods. The non-constrained firm is also made better off by providing good credits and receiving payment in the form of goods, than by not entering transaction (Ellingsen 1998). An additional element that can be introduced into liquidity and credit constraints is the hold up argument, which through changes in bargaining positions provide more equality between credit provider and debtor (Marin and Sshnitzer 1999).

Another set of arguments on non-monetary transactions is based on institutional failure, such as poor legal protection of creditors (Ellingsen, 1998), frozen bank account (Hendley, 1998) and tax evasion (Hendley, 1998).

Poor legal protection arguments develop as follows. There are two returns – "pledgeable" and "unpledgeable. The return is called pledgeable if "a debtor can credibly promise to pay a creditor" (Ellingsen 1998). A firm has several sale options constrained by its credibility: to sell (and to buy necessary product with credit) or to barter. Barter is a possible outcome, f returns are unpledgeable. Because of poor legal protection of creditors most returns appear to be unpledgeable; therefore barter evolves (Ellingsen 1998).

An alternative explanation is that there is a tax-related reason for demonetization, and, consequently, barter, such as the existence of "kartoteka #2" in Ukraine. "The marginal tax rate on all of its [firm] revenues flowing through the banking system is 100 percent of revenues" (Hendley 1998). Because there is a positive probability of write off of tax penalties enterprises are better off not paying taxes at all. But the creation of a frozen bank account eliminates the possibility of the transactions on the bank account of enterprise; as a result the enterprise turns to non-monetary transactions.

A simple model for the unofficial economy is provided in Johnson, Kaufman and Shleifer (1997). An important motive at work in the unofficial sector is tax avoidance. Since tax liabilities are due only when firm receives payments[3], barter is a useful means of avoiding taxes (Gaddy and Ickes 1998).

Most of empirical studies do not provide solid grounds for supporting one or other hypothesis and often provide us with conflicting conclusions. Macro instability and high credit interest rates are found to cause an increase in barter and liquidity constraints are found to have an important influence on the level of barter (Brana and Maurel 1999). In other study tax evasion as a reason for barter was weakly supported by data (Marin, Kaufmann and Gorochowskij 2000). Additionally liquidity and credit constraints were found significantly influencing the level of barter of enterprise, despite the fact that: "The coefficient on bank debt is positive and highly significant suggesting that firms with access to bank credit were also successful in getting inter-enterprise credit"(Marin, Kaufmann and Gorochowskij 2000, 32).

In the study of Commander and Mumssen (1998) it was found that the tax avoidance explanation was not supported by the data. It was also found that there was a weak link between access to credits and the level of non-monetary activities: "For the 70% of firms that had difficulty gaining bank credit, the mean share of money transactions in total sales was lower – by around 4 percentage points- than for firms that experienced no such difficulty" (Commander and Mumssen 1998, 26).

Another study found that access to long term bank credit and high interest rates do not have significant effect on the level of non-monetary transactions in

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[3] This is not the case according to current Ukrainian legislature, both monetary and non-monetary transactions are taxable; firms should pay taxes on both monetary and non-monetary transactions in the end of tax period.

Ukraine (Carlin, Fries, Schaffer and Seagright 2000). On the other hand tax arrears, frozen bank accounts and tax offsets were found to have positive and highly significant effect on non-monetary transactions. Cross-country analysis produces the conclusion that financing problems and a poor investment climate strongly linked to the presence of barter (Carlin, Fries, Schaffer and Seagright 2000).

The covered empirical literature does not analyze particular transactions, and mostly works with aggregate data from surveys (Commander and Mumssen 1998; Brana and Maurel 1999; Marin, Kaufmann and Gorochowskij 2000; Carlin, Fries, Schaffer and Seagright 2000). Despite the fact that most of the barter deals have many more than one or two steps those authors undertaking an econometric analysis did not take into account participating parties that matter for those transactions. Rather they examined two enterprises with a direct exchange of goods. Additionally, in econometrics models they used official data, which was admittedly highly distorted during most of barter transactions (Gaddy and Ickes 1998). Most of surveys which were collected were surveys in which managers of enterprises replied to the questions (Commander and Mumssen 1998; Brana and Maurel 1999; Marin, Kaufmann and Gorochowskij 2000; Carlin, Fries, Schaffer and Seagright 2000). We believe that this procedure greatly distorted the results and the conclusions of studies because management is an interested party to the non-monetary transactions[4].

An important point that is neglected in most studies is that the parties conducting barter receive different outcomes. There are transactions in which one side is better off conducting non-monetary transactions then otherwise others are worse

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[4] Another reason for misunderstanding of non-monetary activities is the sensitive nature of such activities, which are difficult for a formal empirical analysis. It is rare that enterprises would tell the real side of the transactions even for independent researchers, and they never do this for tax and statistical authorities.

off[5]. In this case aggregate analysis of transactions, which is the most common method (Commander and Mumssen 1998; Brana and Maurel 1999; Marin, Kaufmann and Gorochowskij 2000; Carlin, Fries, Schaffer and Seagright 2000) does not seem to produce reasonable results.

METHOD SECTION

It becomes clear from the theory overview that traditional methods of research have serious drawbacks. In order to address them we have applied a different methodological approach, which is multiple case study research. Such research is widely used in social science, but are criticized for providing little basis for generalization.

> "A case study is an empirical inquiry that: investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin 1989, 23).

Because of disagreement within most of current literature as to hypotheses and inconclusive empirical findings we are considering boundaries between barter cases and context which are not clearly evident.

Case study research can potentially address both problems arising in current empirical studies: myopic analysis of cases and low data quality. Applying the case study methodology we could perceive whole transactions rather than only two sides of it, an important point since non-monetary transactions are often highly complex and often have more participating parties than a single buyer and seller. Whole chains of transactions can be scrutinized using the case study approach.

Additionally, using case study methods we are addressing the problem of bad data. The bias in macroeconomic data pointed by Gaddy and Ickes (1998) would

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[5] See next chapter for some evidences.

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not influence the research. Finally the fact that all steps of transactions are analyzed allows us in most cases to collect evidence from sources other than management which, we think is critical.

On the basis of the arguments above we think that we have sufficient justification for using the case study methodology in this particular research. But before that we would like to address the generalization issue. We think that critique of the generality of the data is coming from misunderstanding the difference between 'statistical generalization' and 'analytical generalization'[6].

In statistical generalization, inferences about populations are based on evidences collected from the sample. This method is highly recognized because of ready formulas for determining the level of confidence based on sample size and variance within sample and population.

But cases in case study are not "sampling" units. Cases should be chosen in a similar way to experiment choices in laboratory conditions. Multiple cases in such case could be considered as multiple experiments. "Under these circumstances, the method of generalization is 'analytical generalization', in which a previously developed theory is used as template with which to compare the empirical results of the case study. If two or more cases are shown to support the same theory, replication may be claimed. The empirical results may be considered yet more potent if two or more cases support the same theory but do not support an equally plausible, rival theory" (Yin 1989, 38). Moreover we could not consider the quantity of case studies with the "sample" logic. Rather in investigation the quantity and variety of cases is depend, like in experiment, on ability of different cases to capture as much different conditions as possible.

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[6] This part is mostly based on Yin (1989).

EMPIRICAL INVESTIGATION

All data used in study were taken from actual case of non-monetary transactions, which took place during 1997-1999 in Ukraine. Data were collected through individual unofficial interviews with accountants and financial managers of different companies. Cases presented here were selected to represent as more variation in initial conditions as data allows us[7]. Our first case involves a Hospital which is provided with needed medical equipment, machinery and medicine. Case 1 (Figure A1) represents possible transactions, with increasing level of complexity.

CASE ONE

Description. On the one side of this transaction we have the Hospital, which was not financed in full by the State or Local budget and thus could not pay cash for needed equipment. On the other side, there are firms, which have equipment needed by the Hospital. Firms do not want to give credit to the Hospital, because there is uncertainty as to both the time of non-payment for delivered goods and the possibility of payment by the Hospital.

Transaction presented on the Figure A1 has the following parties:

- The Hospital, which is financed by the Municipal Budget and which needs machinery for the proper functioning;

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[7] Unfortunately we could provide no formal evidence because of the illegal nature of transactions. Thus data verification is impossible in our case other than legal investigation.

- The Firm, which have machinery and needs to sell it (Firms A and B, technically one firm, separation is needed for putting the Envelope Firm[8] in between).

- An Envelope Firm, created for several days and then ceasing to exist without paying any taxes. All transactions are created in such a way that all profits are transferred through price changes to the Envelope firm. During the closure, all profits are cashed in and transferred to the creator of the firm.

- Financial Company, which makes transaction possible by connecting together the needs of all subjects and smoothing transaction by providing consulting on legal and finance issues, in addition, it governs the Envelope Firm;

- Firm C, which could cash Bill of Exchange[9] (BoE) of the Municipal Budget and pay for the veksel (synonym for BoE) in cash at the same time[10].

- Not presented in the scheme, but implicitly assumed, the Municipal Budget.

As additional information on the case A1, for analysis purposes, we have to take into account that the duration of the transaction was one week or five working

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[8] An Envelope firm is an officially registered firm that exists for the purpose of cashing and tax evasion, duration of usage of such firms differs from several hours to several days. Hundreds of different enterprises use them duri ng the time they are functioning. Mostly banks establish such firms and there is even some specialization in the banking industry on providing of such facilities.

[9] Bill(s) of exchange or veksel(s) - is an unconditional order to pay a determinate sum of money by a drawee or *maker* (person who is to pay) to a *payee* (person who is to be paid).

[10] Only some firms with close relations with LG (local government) could provide such services.

days[11].

Important facts:

- Since in the deal we have mainly sales of medical goods, and sales and swaps of BoE, no VAT taxation is present in the deal[12].

- The veksel or BoE of the LG has a discount in real terms of 35%.

- The interest rate, which is paid by the LG during this operation, is **7200**%[13].

- The Financial Company is paid for services 5. Money is spent for creating all necessary documents and providing with the high quality consulting during the transaction on the legal and financial issues.

- The Envelope Firm is a necessary mechanism for conducting this transaction, as we can see it buys equipment for 50 and ends up with profit of 45. Therefore, with a profit tax of 30%, it should pay to the government 15. In this case, if one of the companies would pay such amount of money to the government, the deal would have no profit for either side. However, we have to remember that the transaction is carried out, taking into account that the taxes would not be paid. In the case of paying taxes, firms would include those taxes in the price of a good.

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[11] Rate of the commercial banks for amount of money from 50 to 100 was 80% for the five commercial days. For calculation purpose, the number of days in the year is taken to be 360.

[12] Ukrainian VAT Law. Art. 3.2.1 and 5.1.7.

[13] For calculating credit interest rate, which paid by the LG, we divided nominal value of BoE of LG on two parts. The first is the market price of equipment (50Hrn.in particular case). The second is a payment above the market price, which could be considered as interest payment to Firm B for providing credits to LG in the form of equipment (50 Hrn.) and only after five days it receive cash. Calculation of the interest rate in percent based on the sum of credit (50 Hrn.), interest rate payment (50 Hrn.) and duration of loan, which

- The BoE of firm C is never used in reality and with use of virtual transaction is cancelled (step 10).

The real mechanism of this operation is quite simple:

- Firm B, which has needed machinery for the Hospital provides it to the Hospital through Envelope Firm and Firm A (steps1,2,3).

- Hospital buys machinery which cost 50 in the market terms[14] and pays for it 100 in a form of BoE of Local Government (LG) (step 4) to Firm A.

- Firms A pays with its own bill to the Envelope Firm (steps 5) for the provided equipment. Then the Envelope Firm sells it with a help of the Financial Company to firm C (steps 6,7). Firm C pays for it 65 in cash and 35 in BoE (step 8).

- Firm A sells BoE of LG to the firm C (step 12) and receive for it its own BoE (step 11).
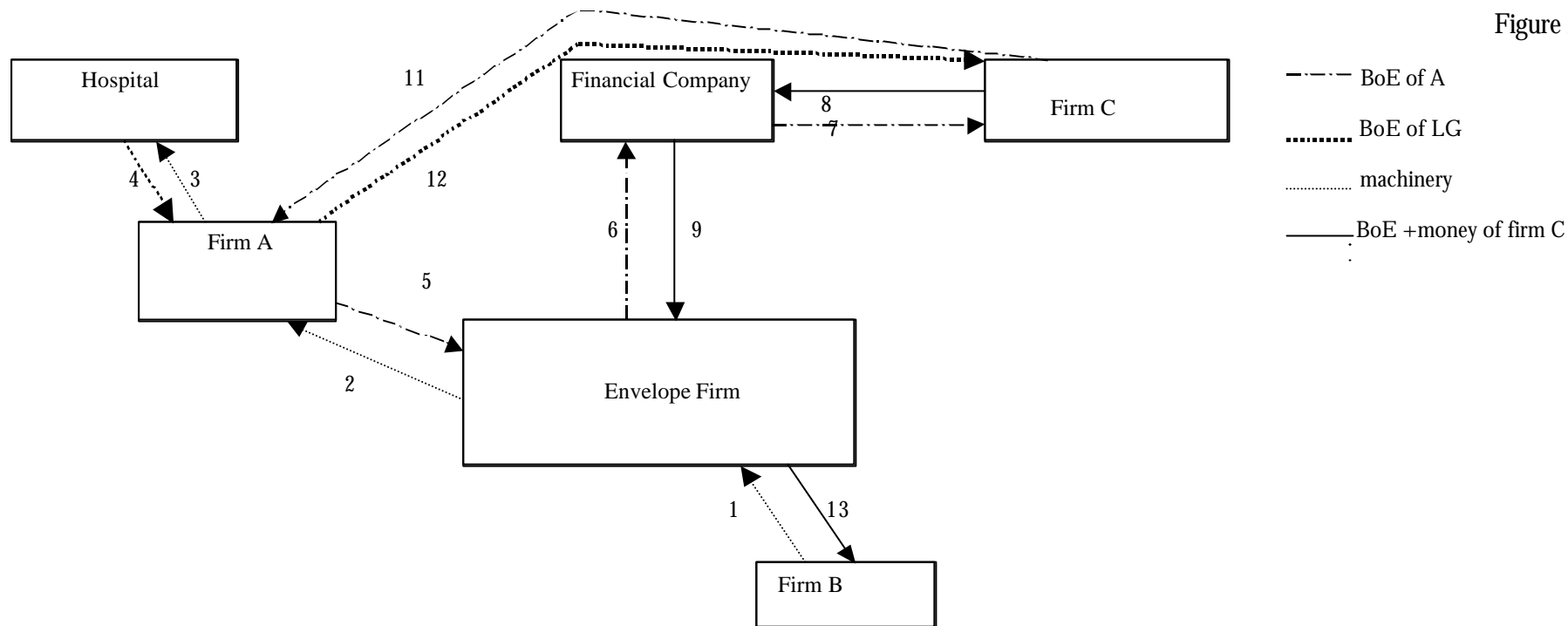- Money is transferred from the Envelope Firm to the Firm B (step 13).

Parties of the transaction, represented on the Figure A1, have both official and real results of the transaction. The official results are the following:
- Hospital ends up with machinery with a price of 100;
- Municipal Budget spends 100 on the hospital financing with BoE;

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is 5 days is simple task ((50∕50)∕5)*360=72 or 7200%). Calculation is conducted taking 360 days as a quantity of days per year.

[14] Here and below we refer to market terms or market price as a price of the good when payments made in cash without delay.

Figure A1

Legend:
- —·—·— BoE of A
- ▪▪▪▪▪ BoE of LG
- ·········· machinery
- —————— BoE +money of firm C

1. Contract between firm B and Envelope Firm to provide the machinery to the Envelope Firm (sum of contract 50).
2. The same machinery provided from Envelope Firm to the firm A (sum of contract 100)
3. Providing the hospital with a machinery by the firm A (sum of contract 100)
4. Hospital, because of the lack of money in the budget pays with a BoE of LG (sum of contract 100)
5. Firm A pay for the equipment to the Envelope Firm with its BoE in the amount of =100
6. Envelope Firm and the Financial Company make a contract in which Financial Company promise to sell the BoE of firm A =100
7. Financial Company as an execution of the contract sell the BoE of firm A to the firm C (sum of contract 100)
8. Firm C pays to the Financial Company with money in the amount of 65 and with its own BoE (35)
9. Financial Company sent 60 in money and 35 as a BoE to Envelope Firm as a payment for the sold BoE of firm A
10. Envelope Firm in some virtual operation transfers BoE of firm C to the firm C, no money paid in this transaction (35)
11. Firm C makes BoE of firm A to cash (100)
12. As a payment for its own veksel firm A pays with a BoE of LG
13. Envelope Firm pays 50 for the equipment to the firm B (in a sum of 50)

- Financial Company earns 5;

- Envelope Firm has 45 in profits;

- Firm C pays its taxes to the Municipal Budget in the sum of 100 with BoE;

- Firms A and B have no profits at all.

The unofficial results are:

- Hospital ends up with equipment priced at 50 instead of 100;

- Municipal Budget pays interest rate for non-monetary payment which is 90 times higher than market interest rates of commercial banks;

- Financial Company ends up with official payment in the amount of five and some cash payment;

- Envelope Firm ceases to exist;

- Firm C pays 35 less into the Municipal Budget, than its tax bill;

- Firms A and B acquire 10 of profit, a substantial part of which they pay to the Hospital and to the budget officials as bribes.

Analysis. Lets now turn to analysis of hypothesis developed in the literature, which was covered in Chapter 1, in particular: macroeconomic instability and especially high credit rate in the banking, low availability of cash, poor legal

protection of creditors, existence of Kartoteka #2[15], tax evasion. Comparing the market interest rate which is around 80% a year and interest rate which we calculated in descriptive part of Case 1 (7200%) we could conclude that hypothesis about the high interest rate in the banking sector is rather weak in explanation of this particular deal. Only yearly delay in money transfer to the Hospital (Municipal Budget) and interest rate of 100% would produce the result which is similar to the Case 1 (interest payments 50).

Another hypothesis, which is lack of cash in the firms, seems to be supported in this particular case because the Hospital (Municipal Budget) does not have cash. However, cash can be available through banking credit[16], which will cost 90 times less than the non-monetary transaction and thus we can conclude that this case does not support this hypothesis.

In Case 1 we could treat creditor (Firm B) as having poor legal protection because there exists uncertainty on payment of credit by the Hospital in monetary terms. Such hypothesis could be at best only a partial explanation of the transaction. Including risk premium in the price of goods will make the price higher. Nevertheless, this hypothesis is unable to explain why creditors should pay the management during transaction.

No Kartoteka is present in Case 1. There is a tax evasion mechanism in the Case 1, which is an Envelope Firm. But if there are no an Envelope Firm no tax evasion would be possible as it present in the case. Thus we could conclude that

[15] Rephrasing the legislature Kartoteka #2 was such a state in which an enterprise has inadequate monetary resources to pay its debt. Because of this inadequacy all cash entering account of enterprise should be transferred immediately by the bank to the creditors of enterprise in a fixed order (tax debts have priority).

[16] "Motives for barter "no bank loan" 29,1%" (Marin, Kaufmann and Gorochowskij 2000,16),"The coefficient on bank debt is positive and highly significant suggesting that firms with access to bank credit were also successful in getting inter-enterprise credit (barter)." (Marin, Kaufmann and Gorochowskij 2000,16), "… for 70% of firms that had difficulty gaining bank credit, the mean share of money transactioins in total sales was lower – by around 4 percentage points – than for firms experienced no such difficulty" (Commander and Mumssen 1998, 26).

tax evasion hypothesis does not provide us with reasonable explanation of the Case 1.

None of the hypotheses provide us with a satisfying explanation of the origin of this particular non-monetary transaction. As we could deduce from description, there are two alternatives in Case 1. Alternative 1 is to have it in non-monetary form. As it follows from the descriptive part the Hospital and the LG would be clearly worse off in this case but the authorities would be better of because of profit-diverting activity. Alternative 2 is to receive the credit from the bank and to have transaction in monetary form. In this case the Hospital and LG would be better off but Hospital and LG authorities would not have any monetary benefits in this case. The decision-makers are LG or Hospital authorities. Their decision is vital for choosing the form of transaction. It appears that they choose the alternative that is better for management but not for the institution they manage. Since the government hires those managers and pays them wages, this situation falls in to the broad category of Principal-Agent problems.

A relevant question in this case is why the Principal-Agent problem produces profit-diverting on such a massive scale in Ukraine, while in more developed countries it is not the case. The answer to this question is a poor institutional environment, specifically, poorly protected rights of shareholders and weak corporate governance. Few of the constraints, which would prevent Agents from diverting profit on a massive scale, are effective in Ukraine. No takeover pressure is present in Ukraine. Turnover of managers is very low. And legal protection of shareholders is quite undeveloped. But these are broad issues for separate studies. From now on we would take the institutional framework of Ukraine as given and will address the non-monetary transactions in this given environment. Thus, we propose an alternative hypothesis that the Principal-Agent problem is the reason for barter in particular transaction.

CASE 2

Description. Another real-life situation is presented in Figure A2. In this case a University is not able to pay for heating services. The Heating Enterprise, which provides heating services to the University, has to pay for water provided to heating enterprise. The Water Enterprise does not pay its energy bills and the Energy-providing and Energy-generating Companies have to somehow generate energy as well as pay in this process to the private firms in cash for some services. Therefore, we have a situation of multiple firms unable to pay each other.

The parties to the transaction are the following:

- The University, which has to heat building during the winter;

- The Heating company, which provides the University with heating;

- During the heating process the Heating Company needs water so we have the Water Enterprise, which provides the Heating Company with water;

- The Energy-generating and the Energy-providing Companies, which provide the Water Enterprise with needed energy;

- An Envelope Firm;

- A Bank;

- The Local Government Budget;

- A Financial Company (not represented in the figure), which is both framework creator and holder of the Envelope Firm.
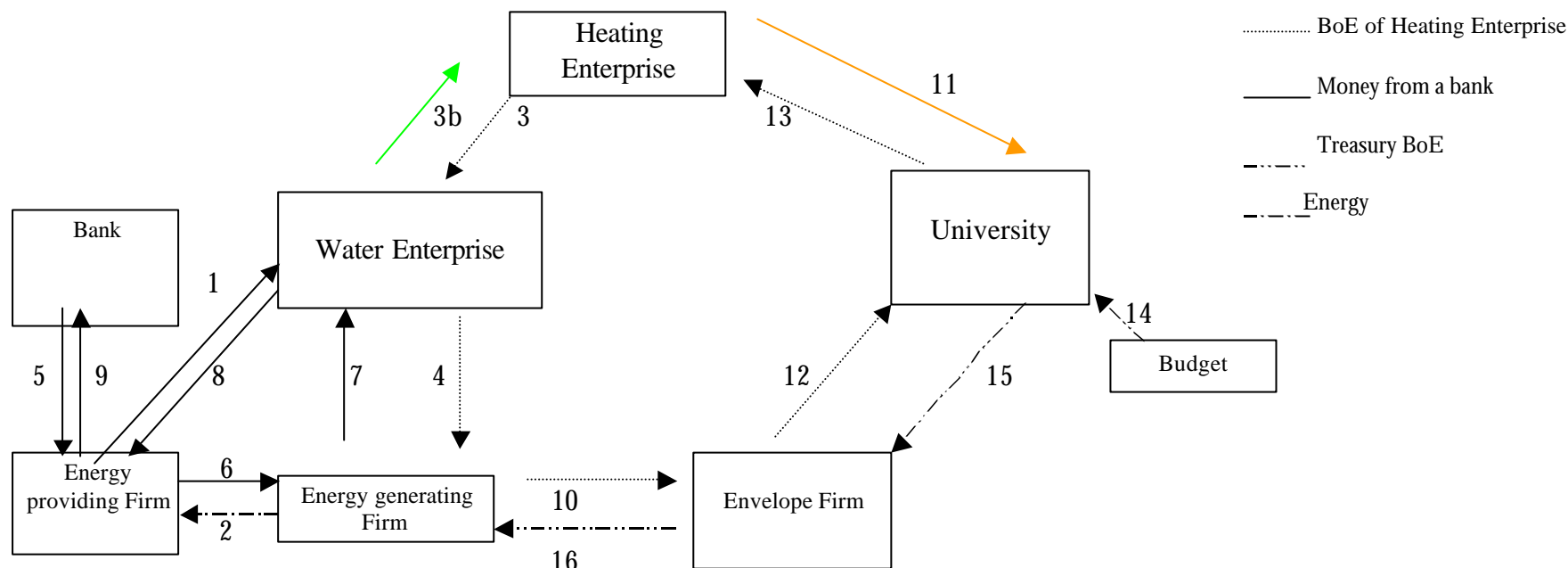
Additional information that is important for the analysis of the deal is that all parties except Bank, Envelope Firm and Financial Company are state enterprises or private enterprises with weak corporate governance (newly privatized firms). Furthermore, it is important to note that time of the transaction is two weeks or 12 working days.

The mechanism of transaction is the following:

1. Energy is transformed into heat and provided to the University, creating debtors and creditors during this process since no payments are made (steps 2,1,3b,11).

2. The Heating Enterprise issues its own BoE as partial method of debt repayment in one part of transaction (steps 3,4,13) and debt creation in other part (steps 10,12)

3. The Energy-generating Firm receives credit from the Bank for mutual debt payment purposes (step 5) and during one day the entire debt is paid (steps 6,7,8) and money returned to the Bank (step 9)

4. In the final part University should pay for providing BoE and it does this with help of a Treasury BoE (step 14,15)

5. The Envelope Firm pays for Heating Enterprise BoE (step 16).

Important facts:

Figure A2

1. The Water Enterprise gets from the Energy-providing Enterprise energy (sum of contract 1 925 000 including VAT 0).
2. The Energy-providing Firm acquires this energy from the energy generating enterprise (sum of contract 1 925 000, including VAT 0).
3. The Heating enterprise pays with its own BoE for water provided by the Water Enterprise (3b sum of contract 1 925 000, including VAT 32 089), discount on BoE is 45% (nominal 3 500 000).
4. The Water Enterprises sells BoE of Heating firm to Energy-generating Firm with discount of 45% (nominal value is 3 500 000).
5. The Energy-providing Firm takes credit from bank (sum of credit 1 925 000).
6. The Energy-providing Firm pays for energy to the Energy-generating Firm for energy in amount of 1 925 000 including VAT 0.
7. Energy generating firm pays for BoE of Heating enterprise to the Water Enterprise in amount of 1 925 000.
8. The Water Enterprise pays for the provided energy to the Energy-providing Firm (1 925 000 including 0).
9. Credit returned to the bank.
10. The BoE of Heating Firm transfers to the Envelope Firm nominal 3 500 000 with a discount of 45%.
11. Heating Enterprises provides University with a heating services in amount of 3 500 000 (including VAT 58 345).
12. The BoE of Heating Enterprises transfers to the University.
13. University executes its right to pay with a veksel of Heating Enterprise and in this way pays for a service provided (nominal of BoE 3 500 000 including VAT 58 345).
14. Budget provides University with a Treasury BoE in amount of 3 500 000.
15. University pays for BoE of Heating enterprises to the Envelope Firm (sum of contract 3 500 000)
16. 55% of BoE of Treasury paid by Envelope Firm to the Energy-generating Firm.

- For VAT calculations in this transaction it is important that energy sales are not taxable, University does not pay VAT tax, thus the only agents paying VAT are the Water Enterprise and the Heating Enterprise[17]. As a result Water Enterprise's VAT liability to the budget increases by 32,089 and Heating Enterprise's liabilities increase by 26,256.

- The services provided to University are overpriced and thus the Local Budget pays for the services 45% more than their market price.

- Importance of the use of commercial credit for mutual cancellation of debts lies in the ability of firms to make payments using credit of the bank. This operation takes one working day; hence, despite the huge sum the government pays 1,675% yearly[18]. Furthermore, because of using an Envelope Firm, gains of private enterprises are not taxable and the government does not receive revenue[19]. In transaction the credit rate is relatively negligible[20]. As seen in Figure A2 Energy-generating Company, Energy-providing Company and Water Enterprise have mutual debts. The Energy-providing Company takes a credit and with this sum of money, all debts are canceled (steps 6,7,8).

In the case the source of the gain is the budget and we have following results:

- All payments are made and no debt in the transaction is left;

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[17] Ukrainian VAT Law. Art. 3.2.1,5.1.3,7.4.2. and 11.6.

[18] Annual commercial credit rate for the amount of money 3 500 000 for the 12 working day were around 100%. For the calculation purposes the quantity of working days in a year is taken as 360. Calculations are similar to footnote 8.

[19] As in the previous case all profit in transaction is transferred to Envelope Firm, but it after the several days of transaction cash all profits, transfer them to the creator and cease to exist.

[20] Interest paid to the bank with credit rate of 100% would be 3,743 in absolute terms or 0.27% of the sum of contract 1,925,000.

- The Government pays, which a 1675% credit interest rate;

- The University, which ends up with services which are less than expected and thus will try to increase its budget expenses on heating next year;

- The Envelope Firm, in which all gain in the transaction is concentrated, and the Financial Company which manages this Envelope firm and then transfers the gains to the management of enterprises and to selected government officials.

Analysis: As in Case 1 the Municipal Budget (the University is a municipal property) cannot pay cash for services provided and thus it turns to using non-monetary means.

Comparing the interest rate paid during transaction (1675%) with a market interest rate on loans with similar duration and amount which is 100%, we could come to the conclusion the high interest rate in the banking sector is not the reason for the transaction to be non-monetary. Additionally this case demonstrates availability of banking sector credits in the case of mutual debt payment and quite low price for them (0.27%).

As it follows from the descriptive part the University (Municipal Budget) does not have sufficient monetary resources to pay for services. Again as in Case 1, it can use bank loan thus insufficient monetary resources, as a reason for non-monetary transaction seems unlikely.

Poor protection for creditors also is present in Case 2. However, it is unable to explain profit-diverting during transaction.

There is no Kartoteka #2 in this case.

Tax evasion in Case 2 as in previous case takes place through Envelope Firm. So the Envelope Firm is a profit-diverting mechanism in this transaction.

Nevertheless, the alternative hypothesis developed in the Case 1 perfectly matches Case 2. The decision-makers, authorities of the University and Municipal Budget, receive substantial bribes and are thus interested in having non-monetary transactions, but the University and Municipal Budget are worse off as a result. So management behaves not in the way it should according to the agreement between Agent (management) and Principal (Government).

CASE 3

The first scheme uses a real life situation where government lacks funds and generates barter transaction and is represented below in the Figure A3.

Description. In this case, a Vodocanal, budget-financing enterprise providing region with water is in need of gasoline (oil) for repairing its depreciated facilities. Since it is financed from the Local Budget it turns to it for financing. But there is no cash in the budget, so budget pays with a BoE of the Local Government(LG). On the other hand, there is a firm, which has gasoline and would like to sell it. But the problem is that it would not sell gasoline to Vodocanal on credit, because there is uncertainty about the time of payment for gasoline[21]. Thus we have a Financial Company which facilitates the transaction.

The parties of transaction are the following:

- Vodocanal, a government enterprise providing the oblast with water;

- Local Budget;

- Firm A, which has gasoline;

- Firm B, which has money or liquid goods as well as tax arrears;

- An Envelope Firm;

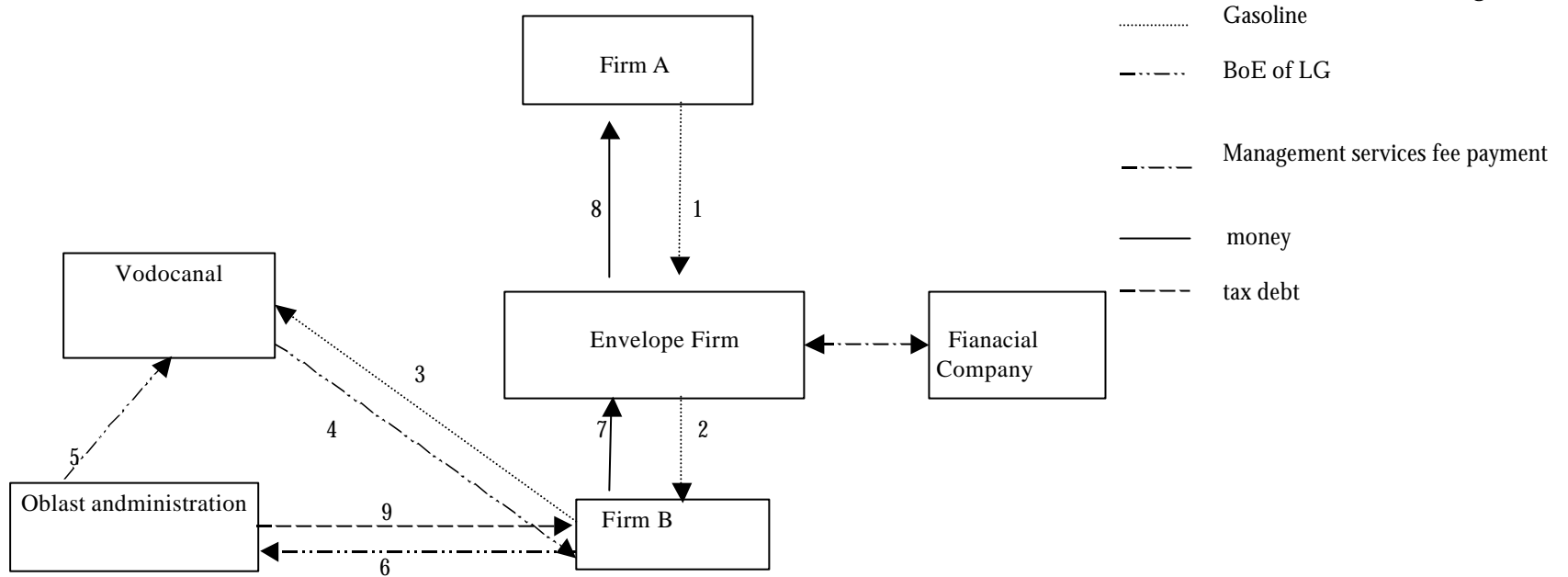- A Financial Company, which is the main coordinator of the transaction.

Additional information needed for transaction is that the duration of transaction is two-weeks or twelve working days.

The steps of the transaction are the following:

- Gasoline is transferred from Firm A through the Envelope Firm to Firm B, which in turns provides it to Vodocanal (steps 1,2,3 on Figure A1). Being unable to pay, Vodocanal as a budget enterprise turns to the Municipal Budget which provides Vodocanal with a BoE of LG (step 4).

- Vodocanal then pays for gasoline to Firm B, which executes the right on the BoE of LG and cancels tax arrears (steps 5 and 6 respectively).

- After the tax arrears cancellation firm B pays the Envelope Firm, which then pays to firm A (steps 7,8)

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[21] Even if firm will be paid with BoE of LG it still has a hard time to transfer it to cash. This is connected with non-formal rules are created by LG.

Figure A3

1. Firm A sells gasoline to the Envelope Firm (sum of contract 75, including VAT 12.5)
2. The Envelope Firm sells gasoline to the firm B (sum of contract 150, including VAT 25)
3. Firm B sells gasoline to the Vodocanal (sum of contract 150, including VAT 25)
4. The Local Government provides Vodocanal with a BoE of LG (nominal of BoE 150)
5. Vodocanal pays with a veksel of LG for gasoline (nominal 150)
6. Firm B executes its rights and cancel with a BoE of LG its debt on the profit tax (sum of tax 150)
7. Firm B pays to the Envelope Firm money in amount of 150
8. The Envelope Firm pays to the firm A for gasoline in amount of 75
9. Indicate the tax arrears, which have to be paid to the budget.

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- VAT liabilities in this case increase only in the Envelope Firm, which should pay 12.5 to the Budget[22]. Other agents ether not paying VAT or they have zero payments

- Market price of gasoline was 0.75 UAH.

Officially, this deal ends up with a perfect outcome. There is gasoline needed for Vodocanal for operational purposes. Vodocanal as result of fully financing by the Local Budget provided with needed gasoline. Moreover, tax arrears are paid in full. This official side is represented in statistics and in firm's documents.

The reality of the transaction is not so satisfactory. Firm A, in fact, sells gasoline to the Vodocanal twice overpriced[23]. The LG does not fully finances Vodocanal, which needs more gasoline. Municipal Budget pays 3600%[24] year interest rate for not paying in cash[25]. Profits extracted from transaction are concentrated in the Envelope Firm existing only for the purpose of particular transaction and disappearing after cashing the 75. Thus, no tax is paid during transaction. Profits cashed by Envelope Firm are passed then to the firm A, firm B, Financial Company and to the government officials.

Analysis: Case 3 is in it nature very similar to the cases 1 and 2. Again it is clear from the description that hypotheses of insufficient cash resources and high interest rates of the banks, initially seem plausible. However, alternative ways of financing the transaction through the banking loan provides us with strong

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[22] Ukrainian VAT Law. Art. 3.2.1. and 7.4.2.

[23] Vodocanal and LG officials explain such difference to local parliament and in case of investigation by inspecting authorities by the non-monetary nature of transaction. The logic is the following: market price of gasoline is a half of the paid price but since there is no cash for payment, this particular company agrees to provide it only for twice as much as it costs in reality. Having no choice, we agreed on the following conditions (**blame the barter!**).

[24] Calculations are similar to footnote 8.

[25] Annual commercial bank credit rate on this amount of money for a one week was 70%.

evidence for those hypotheses to be only descriptive rather than explanatory so we reject it. Since we have bribes in the scheme the poor legal protection hypothesis is still only partially explains the transaction. We do not have the Kartoteka issue in this case. Additionally, similar to cases 1 and 2 tax evasion mechanism in the transaction is not barter itself, but the Envelope Firm.

Similar also to the cases 1 and 2 the alternative explanation perfectly fits in the transaction represented in case 3. In this case management of state owned enterprise divert money with a help of non-monetary transaction from owner.

CASE 4

In previous cases, we considered transactions in which local government plays a significant role, but there are other kinds of non-monetary transactions, which are executed without LG influences and not originated by LG activities. Example of such transactions is presented on the Figure A4 and would be described bellow.

Description A Coal mine (state owned enterprise) needs to buy machinery needed for the process of coal extracting. Nevertheless, it has no money to pay for machinery because its contractors such as Power plants, enterprises owned by Municipal Budget such as some Heating facilities etc. are not paying their debts. Equipment producer does not need coal as a payment for its products. Therefore, technologically connected enterprises create a chain. In this chain the following parties are involved: Coal processing plant, Metal producing company, Metal selling company.

Main parties of the transaction A4 are following:

- The Coal mine, originator of the deal;
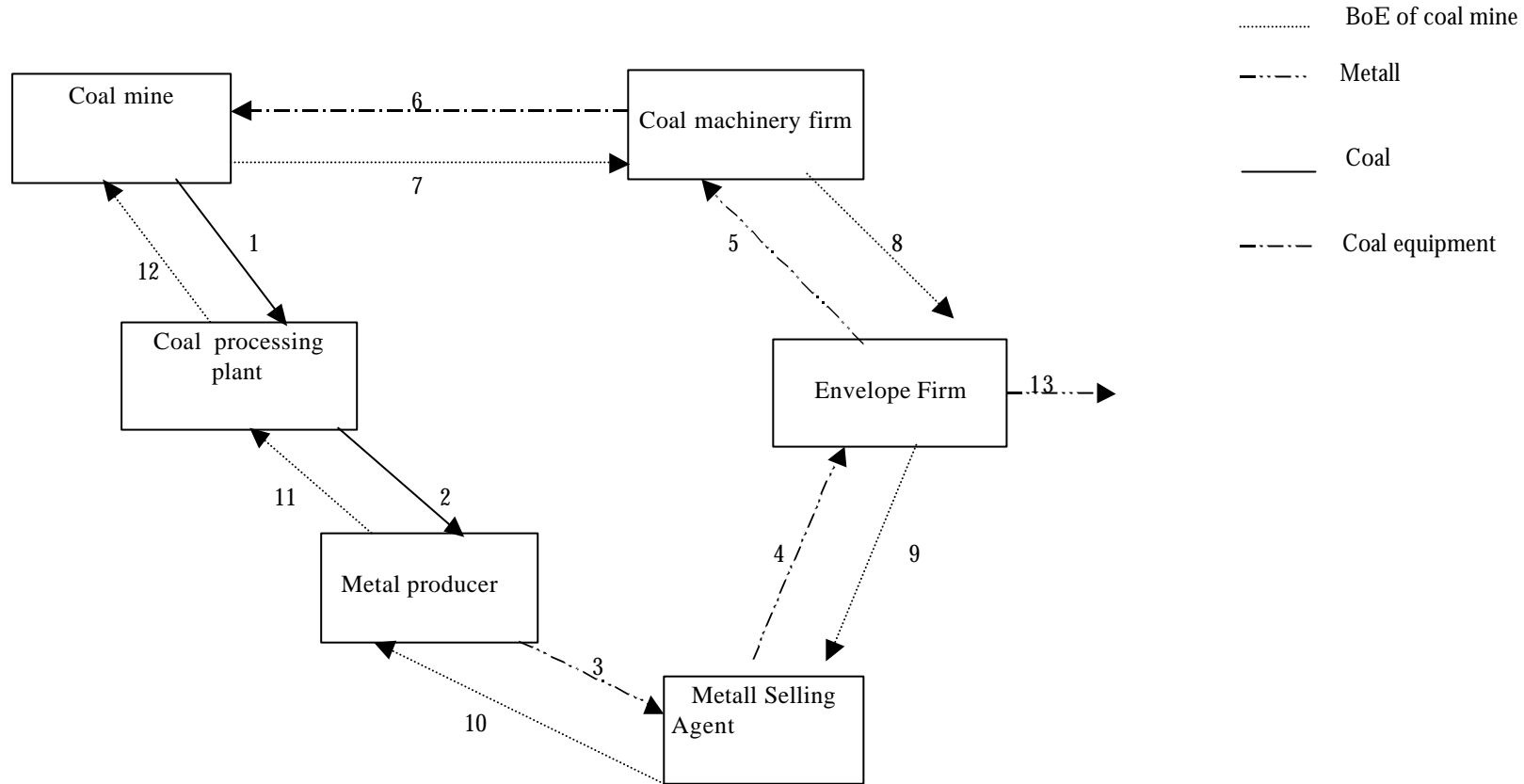
- A Coal processing plant;

- Metal producing enterprise and a Metal selling agent, which is usually works in a close association with Metal producing enterprises;

- A Producer of equipment for the coal extracting;

- An Envelope Firm;

- A Financial Company, which manages the Envelope Firm, creates and facilitates the whole transaction.

Steps of transaction are as follows:

- Coal goes from mine through Coal Processing plant to Metal producer (steps 1,2).

- Metal goes from Metal producer to Coal machinery firm through Envelope Firm (steps 3,4,5).

- Coal machinery firm sells machinery to Coal mine (step 6).

- All payment for goods are made with Coal mine BoE afterwards (steps 7,8,9,10,11,12).

Real and official sides of transaction are the same with the following results:

Figure A4.

1. The Coal mine sells coal to the Coal processing plant (sum of contract 100 including VAT 0).
2. The Coal processing plant sells processed coal to the Metal producer (sum of contract 100 including VAT 0).
3. The Metal producer sells its metal to the metal seller (sum of contract 100 including VAT 16,67).
4. The Seller of metal sells metal to the Envelope Firm (sum of contract 100 including VAT 16,67).
5. The Envelope Firm sells metal to the producer of equipment, the Coal machinery producer (sum of contract 30 including VAT 5).
6. The Coal mine buys machinery which it needs during the process of coal extracting (sum of contract 30 including VAT 5).
7. The Coal mine provides its BoE for equipment needed in extracting of coal nominal of veksel 100 discount on it 70%.
8. The Coal machinery producer pays to the Envelope Firm with mine BoE with a discount 70% (nominal of veksel 100).
9. The Envelope Firm pays to the Metal seller with mine BoE (sum of contract 100).
10. The Metal selling agent pays to the Metal producer with veksel of mine (sum of contract 100).
11. The Metal produces pays with BoE of the mine for processed coal to Coal processing plant (sum of contract 100).
12. The Coal processing plant executes its right on BoE of the mine and cancels in this way its debt for coal it bought from the mine in the amount of 100.
13. The Envelope Firm sells metal left from transaction.

- Net result of VAT payment of parties is that only the Metal producer should pay 16.67 to the budget, other enterprises paying zero VAT or not paying at all[26].Coal mine sells coal market price of which is 100 and receives in return equipment market price of which is 30, thus losing 70 during transaction;

- The Envelope Firm, after selling metal left from transaction, ends up with profit of 70%. This profit is cashed and then mainly transferred to the management of the coal mine (around 50) with a commission payment to Financial Company, which is around 5% of the amount of transaction, or, in this particular case, 5. Moreover, the amount of 15 is distributed as an incentive mechanism for management of all parties of transaction.

Analysis: Comparing the interest rates of banks we can conclude that the Coal mine could take a credit and money would go through all steps of transaction instead BoE of Coal mine as presented on Figure 6A (the similar transaction presented in case 2). This transaction can be made in a one day and so the interest rate, which mine will have to pay, would be around 0.19[27] or 0.2% of the sum of transaction (compare it with 70% discount). Thus we could say that hypothesis of high interest rates does not appear to be useful in explain this particular transaction.

In descriptive part of case 4 it was mentioned that Coal mine does not have cash or necessary liquidity for buying equipment. But as stated above Mine could use loan of commercial bank ending with a much lower payment than it in fact pays.

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[26] Ukrainian VAT Law. Art. 3.2.1., 7.4.2.and 11.6

[27] Annual Commercial bank credit rate on this amount of money for a one day taken to be 70%.

Poor legal protection hypothesis in this particular case does not explain personal enrichment of management of the Coal mine. So it misses very substantial part of the transaction and motivations of parties of transactions.

No enterprise in particular transaction is under kartoteka #2 thus, this hypothesis does not apply to the current case.

As in cases 1,2,3 for tax evasion purposes firms use Envelope Firm. Thus the Envelope firm is tax avoidance mechanism rather than non-monetary nature of the transaction.

We could conclude from above arguments of analysis that in this particular case the used hypotheses are not helpful in explaining the transaction. Thus we will try to apply the alternative explanation developed in previous cases.

The Mine ends up with quite poor results and additionally, if it is a private enterprise, this transaction should not exist or at least should be rare since an enterprise could not exist for a long time with such negative profitability. But since the mine is a government enterprise, it subsidized by the government, thus such transactions could happen often even while the mine is incurring losses. This situation could also occur in the case if mine would be collectively owned enterprise with weak corporate governance[28] instead of subsidies the source of financing diverting activities is capital owned by shareholders, wages of workers and etc. In both cases, state owned and collectively owned enterprise with weak corporate governance property rights are poorly defined on enterprises[29].

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[28] Shareholders cannot effectively control management. This is the most often case for enterprise that does not have effective owner, but a lot of small shareholders plus the big share in the hands of the government. This problem is common for recently privatized enterprises.

[29] On such enterprise management has rights similar to rights of owners, but is not controlled by any authority and is not official owner of enterprise. Such situation leads to the full control of enterprise by the manager.

Consequently, managers of enterprises have possibility to work not on enterprise but rather to maximize their own profit.

There are several sources of financing those profit-diverting activities. First is to receive subsidies from the government.   If the government finances the enterprise, it would provide enterprises with additional resources. The second way, if enterprise is not provided with sufficient financial resources from government or if enterprise is collectively owned enterprise with weak corporate governance, management of enterprise decreases cost of production. The easiest way to do this is not to pay wages to the workers[30]. Wage is an important part of the cost, so by not paying wages to the workers an enterprise can decrease the cost of producing goods or services significantly[31].   The third way of decreasing the cost of production is not to pay for components of production process such as electricity, coal, etc.

While this generate very poor results for a mine as an enterprise, the management of the mine ends up with personal enrichment around 50. Accordingly, this suggests that the main originator and driving force of non-monetary and barter transactions, in this particular case and similar ones, is incentive for personal gain by management of enterprises.

So developed in case 1 explanation captures most important points of this particular transaction. There is a clear case of personal enrichment of decision-makers in the case 4. There are the alternative means for conducting transaction,

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[30] A good example is a coal industry. Government provides industry with sufficient financing, but discounts on BoE of coal mines on the market are up to 80%. So in reality: mine gets much lower cash revenues than its expenses, coal miners do not receive wages and often protest to our Parliament and Cabinet of Ministers. Ministry of Finance officials keep telling that they transfer all money needed and management keeps telling that they do not have other opportunities to sell coal except in barter.

[31] Relative part of wages in the expenses is varying from industry to industry up to 70% in the coal industry, because of huge benefits and disability payment.

which appear to give better results for enterprise profitability. But the transaction method chosen gives higher personal profit, through bribes and profit-diverting activities to the management of enterprises.

Moreover, this transaction provides us with some explanation for the existence of barter in liquid industries the products of which could be easily turned into cash. In these industries barter schemes, which start in non-liquid, subsidized industries, finish in liquid ones. Thus we have on the base of this scheme at least a partial explanation for barter in the highly liquid industries.

Furthermore, we would like to point out that the presented transaction is very flexible. An Envelope Firm can be inserted between any enterprises in this transaction. Cash could facilitate some part of transaction; i.e. Metal selling enterprise could sell metal and buy BoE of Envelope Firm with cash. Thus, the volume of the real barter transaction could vary in dependence on the necessity of using it. Those steps of the transaction that could be facilitated by cash payment are taken into consideration by the enterprise on accounts of availability (Kartoteka or other problems with using bank account) in the different parts of transaction.

CASE 5

The previous transactions involve deals taking place in industry but agriculture is also an important generator of barter transactions. Because this transaction is simple we will not present figure but for consistency will call it A5.

Description: Collectively owned agricultural enterprise A needs. There is a private enterprise B which has oil and which is ready to accept grain as a payment

for oil. No problem could arise if both firms have cash; a transaction in this case would be straightforward.

However, there is one complication: firm A is on Kartoteka #2.

In such a case Enterprise A has no other ways to function except through non-monetary and especially barter transactions, since its bank accounts are frozen and all cash entering could not be used in other way, but only as an arrears payment.

- Enterprise A sells grain to enterprise B (sum of contract 80), market value of the grain 80;

- Enterprise B provides enterprise A with oil needed in the process of functioning. The market value of the oil is 50. Additionally it pays a bribe to the management of A in the amount of 5.

It would be useful to note that enterprise B is an enterprise that has an effective owner, so it operates in its own interests and since market price of oil is 50 it made profit of 30 (officially). Consequently, even after subtracting tax on profit, which is 9, paying 8.33 as VAT and paying 5 in cash to the management of enterprise A, enterprise B still has profit in amount of 7.67.

Analysis: In case 5 enterprise is on Kartoteka #2 and thus is unable to use cash resources or get credit from the bank. Neither hypothesis on high credit interest rates poor legal protection of creditor explanation incorporates personal enrichment of management of enterprise A.

No tax evasion is present in the case.

As it follows from the descriptive part the most appropriate hypothesis of prevailing transactions in non-monetary form is existence of Kartoteka #2. Enterprise B can sell its product for price much higher than market price because enterprise A has no cash, so it is unable to go to the market. This put enterprise A in such a state that it has no choice, except to buy oil for a price twice as much as market level prices.

But let's examine the reasons for firm falling into Kartoteka #2. For enterprises that could somehow offset their debts or have power to cancel them on the government level[32], it is a way to minimize their tax payments. There are also enterprises, which are on Kartoteka because they are badly managed or because of huge penalties for mistakes in tax payment are imposed.

In this particular case Firm A is collective enterprise with weak corporate governance but does it really matter? Could a privately owned enterprise be in such situation? Being on Kartoteka a private enterprise incurs significant expenses because of large penalties and highly improbable cancellation of taxes in case of private enterprises. Barter transactions, which are inevitable in case of being on Kartoteka, are much less profitable if profitable at all, compared with monetary transactions, since costs are increasing dramatically and alternatives of enterprise for extracting profit shrink. But an additional factor, which seems for us very important, is the ability of a firm under Kartoteka to change its activities to use opportunities for profit-diverting. Tax legislation also punishes barter transactions. If the bank account of an enterprise is closed its functional abilities decrease dramatically, thus causing shrinking of profits or losses for enterprises. Taking into account all above we could conclude that for privately owned

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[32] Government enterprises, enterprises with large stakes in the hands of government, or sectors with lobby in the parliament such as coal industry and agriculture.

enterprise to be on Kartoteka and consequently to have barter transaction because of it for an extended period is unlikely at best[33].

We can see on this example clearly that both sides--the owner of enterprise B and the effective owners of enterprise A--are better off.

So we again have the situation, in which management of enterprise is better off having Kartoteka#2 than in alternative (having transactions in pure monetary form with working account) and the owners of managed enterprise--in this case shareholders--are worse off. This is the exact description of explanation developed in case 1.

Additionally we would like to point out that the hypothesis of existence of Kartoteka #2 does not incorporate in predicted behavior the enrichment of management.

Summarizing findings from the presented transaction, we would like to highlight the following points. Firstly, presented situation is not limited to the agricultural sector and is very common in other industries. Second, presence of Kartoteka leads to the situation when indebted enterprise has no other choice but be engaged in barter or non-monetary operations. However, as it follows from more thorough analysis Kartoteka is rather a consequence of weak corporate governance when management that is maximizing its own utility function rather then enterprise profit.

Overall conclusions. The results of the empirical chapter could be summarized in the form of short evaluations of the hypotheses presented in introduction:

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[33] Realizing the need for more formal results to support our position during research, we (informally) interviewed workers of banks, financial companies and on enterprises. Despite of abundance of enterprises

- High credit rate of banking sector hypothesis was supported by none of the cases, on the contrary it appears to be much less costly for firms to use bank loans instead of barter transactions.

- In all cases enterprises did not have own cash resources, but in cases 1-4 there are an alternative sources, one of them being bank credits.

- Hypothesis of poor legal protection of creditors hardly can take into account the persistent phenomenon of personal enrichment of management of enterprises.

- In all cases there is only one case (5) of existence of Kartoteka #2, but it was shown that presence of Kartoteka could be an indicator of opportunistic management. Additionally this hypothesis has the same drawback as previous one since it does not explain the personal enrichment of management that is revealed in all studied cases (cases 1-5).

- In none of the case studies barter itself was a way to escape taxation. Instead, such mechanisms as Envelope Firm were mostly used.

On the basis of the first case the alternative hypothesis was developed which incorporates most of the features of described barter transaction. Subsequent analysis of the other cases suggests that Principal-Agent hypothesis may be the best explanation of observed behavior of agents of the study.

Rephrasing this result: we believe that driving forces of barter (at least the biggest part of it) have the following origin: the utility of manager, who effectively decides how to conduct transactions, does not depend on profit maximization for

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with Kartoteka #2, people interviewed could not provide us with example of effectively owned enterprise, which worked with frozen account for extended period.

the entity, which this individual manages. Moreover, we observe managers optimizing their own utility by converting means they have temporal ability to manage into means they will be able to command permanently, or transferring property which they effectively own to property which they own legally. In most cases such activity is illegitimate, but since this information is included in the process of deciding upon the set of alternatives by decision maker we additionally can conclude that barter process since it is chosen is the most effective way to cover these illegal activities[34].

In addition to those main conclusions we can provide some important results which can have specific significance for further analysis of non-monetary activities:

- The methodology of most previous empirical studies could hardly reveal the true relationships because of conflict of interests (managers of enterprises are interested in avoiding the revelation of truth).

- There are ways out of barter through using commercial bank loans, and two conclusions can follow: first, that barter is not inevitable; second, that high credit rates are not the cause of the non-monetary transactions

- Volume of barter transaction can vary in dependence of account availability of different enterprises.

- Barter exists in the highly liquid industries since they are provide low liquid industries in barter schemes with liquidity needed to evade taxes and finance originators.

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[34] To strengthen the conclusion we would like to mention that a current report of McKinsey Global Institute "*Unlocking economic growth in Russia*" analyses the problems of Russian economy, including barter problems and produces the results similar to results developed here. Similar conclusions can also be found in a recent book by David Woodruff (1999) "Money Unmade: Barter and the Fate of Russian Capitalism", Cornell University Press; 248p.

MODEL

Model 1.

We are using cases 2,4,5 as the starting point for our modelling the problems revealed in Chapter 2. We begin by assuming firm is a producer of output and it uses two factors in production: K, H. The output is produced according to the production function $F(K, H)$. Firm sells the output and buys factors of production. Let the price of investment good K be normalized to one and the price of factor H is w. Let p denote the market price of output, which is the price, that firm can get if it will sell its output on the market for cash and q denote the price of output in non-monetary transaction (when manager (Agent in our framework) tries to divert profit).

Let l denote the fraction of output that is diverted by Agent from Firm through the mechanism of changing of prices. In this case $(1 - l)$ denote the fraction of output that is sold by market prices $l \in [0,1]$.

We assume that $q<p$. This is what we observe in practice[35] and the official explanation we hear from managers is that the firm because of lack of cash could

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[35] This is what we observe in real case transactions (Case 3,4,5). Additional empirical evidence that could support this position could be market discounts on BoE (coal around 50%, energe around 30%), this means that interested buyer could buy products with BoE paying 50% or 30% less than it should pay in case of monetary transaction.

not buy needed inputs[36]. Thus to continue productive process it pays for the inputs with already produced outputs. The explanation for the difference in output prices is mainly bad bargaining position[37]. The profit of the Firm than becomes:

$$\boldsymbol{p} = p(1-\boldsymbol{l})F(\bullet) + q\boldsymbol{l}F(\bullet) - wH - K \qquad (1)$$

Let us assume that the Firm belongs to state executive body or is a weak corporate governance enterprise or belongs to shareholders (Principal) hires manager (Agent) to run the Firm. The Firm produces "liquid" goods which means that all the output produced by firm can be sold for money and then money can be used to buy inputs without barter operations. The hired Agent knows about this opportunity but the Principal does not know. Agent is paid salary $w(\boldsymbol{p})$ as a reward for his job. Let us also assume that Agent can be bribed to sell the output of the firm at a lower price. Because Principal executive body does not have effective monitoring of market conditions the Agent is able to give to the Principal authorities fake arguments for having to accept $q < p$.

Because the price of output in operations is less than the usual price the losses of the firm from such operations is:

$$L = (p-q)\boldsymbol{l}F(\bullet)$$

Agent is interested in conducting these operations because he receives bribe in amount $b = \boldsymbol{a}(p-q)\boldsymbol{l}F(\bullet)$, where $0 < \boldsymbol{a} < 1$ and $\boldsymbol{a}$ denotes the fraction that

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[36] The liquidity hypothesis mostly follows and is supported by this explanation (Commander and Mumssen 1998).

[37] Alternative explanation to this we built in chapter 2. We explain price difference by profit-diverting activities and using of barter as an instrument to lower the probability of being caught during illegal activities.

Agent is paid for engaging in profit-diverting operations. From practical point of view we rule out cases where $a = 0$ and $a = 1$. The case where $a = 0$ is not possible since we assumed that the Firm produces a relatively liquid good and can sell it for money and receive the higher price, therefore there is no incentive for the Agent to engage in profit-diverting operations if he does not receive a reward for it. The case when $a = 1$ is not likely since the other side, which bribes Agent will not be interested in engaging in such transaction. So the transactions, as we describe them, are nothing more than a convenient way to steal output.

In case of using money during all steps, a natural question concerning such price difference will arise from monitoring authorities. Because government has asymmetric information it regularly monitors activity of the Firm. We assume that the probability of firm to be caught during the audit is $\bar{y}$.

Let l denote the fraction of profit-diverting activities, which occurs in non-monetary form $0 \le l \le 1$, in this case probability of being caught in profit-diverting activities $y(l)$ is decreasing function defined on $y(l) \in [\underline{y}, \bar{y}] \subset [0,1]$. Function $y(l)$ is decreasing because it is much harder for auditors to control bartering agreements with multiple conditions and requirements influencing price of contract. It is much easier for auditors to compare prices of contract and market price when Firm use monetary transactions. Multiple and varied options in barter contracts can be used for creating price explanatory arguments.

Assumption (A.1). *Assume* $y'(l) < 0, y(0) = \bar{y}, y(1) = \underline{y}$

If the Agent is caught he faces a punishment. Agent should return all that he diverts from the firm plus a positive fine. Thus whole amount of payment back to

the Principal is $g(p-q)lF(\bullet)$, where $a+e<g<\infty$. The Agent pays nothing if he is not caught. Lets us consider risk neutral Agent first.

Proposition 1*. A risk neutral agent will choose to cover in full profit-diverting activities by barter* $(\hat{l}=1)$.

Proof: The Agent maximizes his expected utility and we ignoring for the moment the disutility the Agent receives from the effort he exerts. If the Agent is risk neutral then the problem of the Agent becomes in choosing $\hat{l}$ that maximizes his expected monetary payoff. So, the Agent chooses $\hat{l}$ such that:

$$\hat{l}\in\arg\max_{0\le l\le1}(1-y(l))[w(p)+a(p-q)lF(\bullet)]+y(l)[w(p)+(a-g)(p-q)lF(\bullet)]$$

(3)

subject to:

$$(1-y(l))[w(p)+(p-q)lF(\bullet)]+y(l)[w(p)+(a-g)(p-q)lF(\bullet)]\ge\tilde{w}$$

, where $\tilde{w}$ is reservation wage that will induce Agent to accept the job but. The problem (3) can be rewritten as:

$$\hat{l}\in\arg\max_{0\le l\le1}w(p)+a(p-q)lF(\bullet)-y(l)gl(p-q)F(\bullet)]$$

(4)

subject to:

$$w(p)+a(p-q)lF(\bullet)-y(l)gl(p-q)F(\bullet)\ge\tilde{w}$$

(5)

Since we are mostly interested in analysing behaviour of already working Agent we assume constraint (5) is satisfied.

Let $v(l)$ represent the value of objective function, i.e.

$$v(l) = w(\boldsymbol{p}) + \boldsymbol{a}(p-q)\boldsymbol{l}F(\bullet) - \boldsymbol{y}(l)\boldsymbol{gl}(p-q)F(\bullet) \tag{6}$$

Taking A.1 into account,

$$v'(l) = -\boldsymbol{y}'(l)\boldsymbol{gl}(p-q)F(\bullet) > 0 \tag{7}$$

Since $v(l)$ is strictly increasing function, thus the constraint $l \leq 1$ will be binding, or $\hat{l} = 1$. QED.

The result implies that Agent will use non-monetary transactions to cover 100% of profit-diverting activities. Unfortunately this model does not capture all cases presented in Chapter 2. To fill this gap we will try to see in the next model does cases 1 and 3 produce results different from acquired above.

Model 2.

Players are the same as in model 1. The only difference is that the Firm is buying inputs instead of selling outputs. A firm is a producer of goods or services and it uses two factors in production: K, H. The output is produced according to the production function $F(K, H)$. We normalize the price of output. Firm sells the output and buys factors of production. In this case Agent buying inputs for price which is much higher than market price. Let denote p as market price and q as price that Agent pays to acquire the inputs $p < q$. Justification logic is the same as in model 1. Let $\boldsymbol{l}$ denote the fraction of input that is bought at Agent at non-market price. In this case $(1 - \boldsymbol{l})$ denotes the fraction of input that is bought at market prices, $\boldsymbol{l} \in [0,1]$.

The profit of the Firm than becomes:

$$p = F(\bullet) - wH - p(1-l)K - qlK \tag{8}$$

Because the price of input in operations is more than the usual price the loss of the firm from such operations is:

$$L = (q-p)lK \tag{9}$$

The Agent is interested in conducting this operations because he receives bribe in amount $b = a(q-p)lK$, where a denotes the fraction that Agent is paid for engaging in profit-diverting operations. From practical point of view we rule out cases where $a = 0$ and $a = 1$. The same logic as in model 1 applies to this barter transaction. Let l denote part of profit-diverting activities in form of non-monetary payments $0 \le l \le 1$. In this case $y(l)$, the probability of being caught by auditors is a decreasing function defined on $y(l) \in [\underline{y}, \overline{y}] \subset [0,1]$. We will use A.1 from model 1.

The punishment we consider is that the Agent should pay a fine in an amount $gl(q-p)K$ back to the Principal, where $a + e < g < \infty$.

Let us consider risk neutral Agent. If the Agent is risk neutral then the problem of the Agent becomes that of choosing $\hat{l}$ to maximize his expected monetary payoff. So, she chooses $\hat{l}$ such that:

$$\hat{l} \in \underset{0 \le l \le 1}{\arg\max} \, w(p) + a(q-p)lK - y(l)gl(q-p)K \tag{10}$$

subject to:

$$w(\boldsymbol{p}) + \boldsymbol{a}(q-p)\boldsymbol{l}K - \boldsymbol{y}(l)\boldsymbol{gl}(q-p)K \geq \tilde{w} \qquad (11)$$

and $\tilde{w}$ is the minimum reserve wage that will induce Agent to accept the job but since we are mostly interested in analysing behaviour of already working Agent we again assume it satisfied.

Thus the present value $v(l)$ would be:

$$v(l) = w(\boldsymbol{p}) + \boldsymbol{a}(q-p)\boldsymbol{l}K - \boldsymbol{y}(l)\boldsymbol{gl}(q-p)K \qquad (12)$$

Taking into A.1.

$$v'(l) = -\boldsymbol{y}'(l)\boldsymbol{gl}(q-p)K > 0 \qquad (13)$$

Thus $v(l)$ is strictly increasing function, thus the constraint $l \leq 1$ will be binding.

The implication of this result is that a utility maximizing Agent will increase level of barter in profit-diverting activities until it will cover all profit deviation as in model 1.

Thus we can conclude that basically the situation described in model 1 and model 2 have very common nature and results from the model 1 could be applied to both cases.

Model 3.

Let's now see how the results change if we assume away the risk neutrality. In this case we need an additional assumption concerning the utility function of the Agent.

Assumption (A.2) *u is strictly increasing and twice continuously differentiable.*

Proposition 2 *An agent with the utility function defined in A.2 will choose to fully profit-diverting activities by barter ($\hat{l} = 1$).*

Proof. The problem the manager solves becomes:

$$\hat{l} \in \arg\max_{0 \leq l \leq 1} (1 - \boldsymbol{y}(l))[u(w(\boldsymbol{p}) + (p - q)\boldsymbol{l}F(\bullet))] + \\ + \boldsymbol{y}(l)[u(w(\boldsymbol{p}) + (\boldsymbol{a} - \boldsymbol{g})(p - q)\boldsymbol{l}F(\bullet))] \tag{14}$$

subject to

$$(1 - \boldsymbol{y}(l))[u(w(\boldsymbol{p}) + (p - q)\boldsymbol{l}F(\bullet))] + \\ + \boldsymbol{y}(l)[u(w(\boldsymbol{p}) + (\boldsymbol{a} - \boldsymbol{g})(p - q)\boldsymbol{l}F(\bullet))] \geq u(\overline{w}) \tag{15}$$

and $u(\overline{w})$ is the utility of minimum reserve wage that will induce Agent to accept the job but since we are mostly interested in analysing behaviour of already working Agent we assume it satisfied. Let,

$$a = w(\boldsymbol{p}) + (p - q)\boldsymbol{l}F(\bullet) \tag{16}$$

$$b = w(\boldsymbol{p}) + (\boldsymbol{a} - \boldsymbol{g})(p - q)\boldsymbol{l}F(\bullet) \tag{17}$$

represent the value of objective function, then $v'(l)$:

$$v'(l) = -\boldsymbol{y}'(l)(u(a) - u(b)) > 0 \tag{18}$$

This follows from $\boldsymbol{a} + \boldsymbol{e} < \boldsymbol{g} < \infty$ (and $a > b$) and A.2.

Thus $l \leq 1$ is binding and this leads us to conclusion that $\hat{l} = 1$.QED.

As we can see the results that we acquired in the model 1 are robust to risk properties of Agent thus conclusions of model 1 valid in more realistic assumptions.

Model 4.

Let us try to consider the problem in even more realistic assumptions. Now we assume that the Agent may exert different levels of effort, profit for Firm is stochastic. The stochastic nature of profit comes from the production shock that effects production function. In particular we assume that production function is $\widetilde{A}F(K,H)$ and we have the following assumption about the production shock $\widetilde{A}$:

Assumption (A.3): *$\widetilde{A} \sim f(\textbf{\textit{m}}, \textbf{\textit{s}}^2)$ stands for some discrete density function and $\widetilde{A}$ can take values $a_1 < a_2 < ... < a_n$. Depending on the shock that is realized $\textbf{\textit{p}}$ takes corresponding values $\textbf{\textit{p}}_1 < \textbf{\textit{p}}_2 < ... \textbf{\textit{p}}_n$.*

We assume that the Agent may exert two levels of effort in diverting profit $\{e_l, e_h\}$ where e_l may be interpreted as low level of effort (or low level of profit-diverting activities in our case) and e_h may be interpreted as high level of profit-diverting activities, i.e. $e_l < e_h$. Effort level that manager exerts is unobservable by the principal and is not effected by l.

If in previous example we considered only one side represented by Agent. Now we have to take into consideration the Principal and consider problem of moral hazard that arises between principal and agent due to the fact that Agent has to choose which effort level to exert and effort level of Agent is not observable by Principal.

The Agent's wage $w(\boldsymbol{p}_i)$ depends on the profit that is realized. Let us define expected utility of income that the manager can earn. His utility is now affected not only by the probability that his illegal operations are discovered, but also by the production shock. Define

$$U_i = (1-\boldsymbol{y}(l))[u(w(\boldsymbol{p}_i)+(p-q)\boldsymbol{l}F(\bullet))]+ \\ +\boldsymbol{y}(l)[u(w(\boldsymbol{p}_i)+(\boldsymbol{a}-\boldsymbol{g})(p-q)\boldsymbol{l}F(\bullet))] \tag{19}$$

where $\boldsymbol{p}_i$ is defined as in equation (1) and A.3. Let

$$a_i = w(\boldsymbol{p}_i)+(p-q)\boldsymbol{l}F(\bullet) \tag{20}$$

$$b_i = w(\boldsymbol{p}_i)+(\boldsymbol{a}-\boldsymbol{g})(p-q)\boldsymbol{l}F(\bullet) \tag{21}$$

Then expected utility of the Agent is just $E(R_i)=\sum_{i=1}^{n}U_i f(i/e)$. Manager receives disutility $c(e_i)$ from the effort he has to exert and therefore his total utility becomes $U_i = R_i - c(e)$. The Principal-Agent problem we want to look at becomes:

$$\max_{w_i} \sum_{i=1}^{n}(\boldsymbol{p}_i - w(\boldsymbol{p}_i))f(i/e) \tag{22}$$

subject to

$$\sum_{i=1}^{n}(U_i - c(e))f(i/e) \geq \overline{u} \tag{23}$$

$$e,l \in \arg\max_{0 \leq l \leq 1,e} \sum_{i=1}^{n}((1-\boldsymbol{y}(l)u(a_i)+\boldsymbol{y}(l)u(b_i)-c(e))f(i/e) \tag{24}$$

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where $\bar{u}$ is a reserved utility that manager should receive in order to accept the job.

We will not investigate here the possibility of deriving mechanism which will allow Principal to lessen level of profit-diverting activities. Our goal here is more modest. We will only concentrate on how barter would affect the decisions of players.

Proposition 3*: Agent with utility function defined in A.2 and with stochastic level of profits will choose to cover in full profit-diverting activities by barter ($\hat{l} = 1$).*

Proof:

As we could see from (1) the level of barter would not affect profits of enterprise since l is fixed. It will only affect the decision of manager. Therefore we will concentrate on (26). From the system (22) to (24), only (26) $(1 - \mathbf{y}(l)u(a_i) + \mathbf{y}(l)u(b_i)$ is influenced by l. Moreover, it is increasing in l as proved in proposition 2. Since changes in l do not affect any other variable or parameter Agent will always maximize this part by choosing $\hat{l} = 1$. QED.

In other words, since the Principal affects decisions of the Agent through w it cannot affect or change level of l with this mechanism. Thus Agent will use most beneficial for him level of $\hat{l} = 1$.

Again we see that introducing another level of complexity in the model will not change the prediction of simplest model we introduced. The major conclusions from this fact that is naturally follows are:

1. Principals should consider the use of non-monetary transactions as highly correlated with profit-diverting activity of management and should give much more scrutiny in investigating those transactions.

2. The best policy for the Principal in such conditions would be introducing a prohibition of non-monetary transactions or limiting their scope as much as possible.

3. If the Principal is a state, introducing tax penalties for using barter would not change the scope of barter since those penalties applied not on Agent but on the enterprises ran by Agent. Thus such penalties would not induce reduction in the use of non-monetary payments for the cases considered above.

Prohibiting barter would lead to the case where potential profit opportunities for a firm would be lost[38]. On the other hand if we want to better supervise our non-monetary activity this means that cost of supervising will increase. Taking into account possibilities of corruption on the supervisor level this would lead us to even more complicated problem. Thus we believe that only addressing problem of profit-diverting activity, which is subject to studies of other authors[39], we could effectively reduce level of non-monetary activities connected with profit-diverting activities.

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[38] This is not the case for state governed enterprises. We believe that the prohibition of barter on state enterprises in Ukraine would lead to positive results. This is what we currently observe in Ukraine, where prohibition of non-monetary transactions in budget sphere highly improved budget execution.

[39] You could find interesting results in Johnson, Kaufman, McMillan, Woodruff (1999), good survey of literature on this topic is Shleifer and Vishny (1992).

Conclusions

The major issue, as we see it, for current studies of barter is methodology. As was found in our study currently used methodology relies on data which, because of conflict of interests, do not reveal the true sources of non-monetary transactions. On the contrary the usual data support arguments used by Agents to cover the true relationships. We are proposing just a more careful collection of data. Proposed methodology overcomes the drawbacks of current empirical investigations. Moreover, it provides us with a quite different hypothesis on the reasons for non-monetary transactions, which is the Principal-Agent problem. Specifically using of barter to decrease the probability of being caught during profit-diverting activities. Both empirical and theoretical testing support this hypothesis.

It is important to avoid relying on macro economic aggregates when they are purposely distorted (Gaddy and Ickes, 1998). Our methodology in based instead on careful observational analysis of specific real-life case studies. We are not making a statistical generalization but an analytical one. Therefore, by saying that barter is a phenomenon caused by profit-diverting activities we would like to point out that we are not claiming that this is the only and ultimate explanation of all non-monetary transactions that taking place in Ukraine. Nor we claim to have of estimated the share of non-monetary transactions that caused by profit deviating activities.

We do believe that we have shown that Principal-Agent problems are potentially a powerful explanation for non-monetary transactions in Ukraine, and that standard methodology are inadequate to study this issue. Well financed research based on sufficient number of randomly chosen case studies analysed in a way we

did it is the only way to both provide sufficient evidence for statistical generalization and policy implications.

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