THE CIRCULAR FLOW OF DEBTS AND BARTER IN A TRANSITION ECONOMY: THE CASE OF UKRAINE[1]

Much has been written about the economics of transition in the former Soviet Union. In the early 1990's debate centered on the nature of the economic policy and institutional changes that were required to convert economies built on State ownership, central planning and bureaucratic control into ones relying on private ownership, market relationships and individual choices. While all of the transition economies have made impressive strides in creating market supporting institutions and introducing needed policy reforms, the results of these combined efforts by the end of the 1990's have been disappointing in many respects, and surprising in others. As one indicator of unsatisfactory economic performance, restoration of respectable rates of economic growth has taken longer and proven to be far more difficult than was envisaged at the beginning of the transition period. On the other hand, hardly anyone predicted the emergence of highly barterized economies bearing faint resemblance to the workings of a well organized market economy.

In the context of transition in Ukraine, this paper attempts to explain the prevalence of barter transactions in a transition economy and identifies the sluggishness of structural adjustment as the source of these transactions. Part one briefly describes the goals and requirements of successful transition. Part two presents a brief portrayal of the transition progress Ukraine has so far achieved and outlines its extensive reliance on barter mechanisms in both budget and non-budget spheres of the economy. Part three presents a simple, stylized model that probes the underlying causes for the proliferation of barter. Part four provides illustrations of the opportunities for and "necessity" of barter transactions in Ukraine. A concluding section discusses the policy implications of this model for reform of the fiscal sector and the economy in general.

A. THE MANY CHALLENGES OF SUCCESSFUL TRANSITION

The essential task of transition is to convert initial, supply driven, economic structures into demand driven economies in which producers strive to satisfy the demands of consumers rather than the dictates of a central plan and are motivated by the desire to make profits rather than meeting production quotas. In this new economic environment both firms and households would be subject to hard budget constraints, paying for what they get and getting what they were willing to pay for. With few exceptions, there would be no bailouts, soft loans, soft subsidies, soft taxation or administered prices.

At the outset, it was recognized by most that the use of resources would have to eventually adjust to a radically realigned structure of relative prices. The arbitrary pre-

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transition prices of goods and services would be replaced by a price system reflecting the influence of world prices for tradeable goods and services and the strength of consumer demand for nontradeable products. In a number of cases, the size of the required relative price adjustment was striking. Energy prices, for example, needed to rise by a multiple of ten or more to reach world price levels, placing a considerable adjustment burden on energy intensive sectors of the economy and allowing super profits to be earned by energy suppliers. This is just one example of how a new relative price structure would define distinct groups of winners and losers and raise the prospect of large adjustment costs for the whole economy.

Faced with significant adjustment costs and inadequate social safety nets, policymakers in many transition economies refused to impose hard budget constraints by using explicit and implicit subsidies to either tamper with the realignment of relative prices or allow unprofitable state owned enterprises to continue to operate. This decision, as discussed in greater detail below, created the basis for a thriving barter economy in part insulated from the harsh rigors of a market economy. Equally, this decision has also retarded the pace of privatization in several transition economies.

The standard litany of reform in transition economies has embraced four critical requirements, privatization, liberalization (of prices), macroeconomic stabilization and formation of a new market infrastructure through reformed legal, accounting and regulatory systems. Depending on the priority accorded to each of these requirements, the transition experience has been different in different countries. Moreover, because this set of requirements introduces a large number of simultaneous changes or shocks, the adjustment path that a particular transition economy would be expected to follow has been hard to predict, the more so because there was no historical precedent to draw upon.

While there is universal agreement on macro-stabilization as a necessary condition for successful transition, there is a gathering debate on the appropriate sequence in which the other changes should have occurred in different economies. As in Russia, early reform advocates stressed the primacy of rapid privatization and linkage to world prices. Critics of this transition strategy point to the emergence of arbitrage based wealth, creation crony capitalism, monopoly structures, large capital outflows and weak and nontransparent corporate and public sector governance as telling defects of this approach. Joe Stiglitz, former chief economist at the World Bank, has alleged that many of these undesirable features of transition could have been avoided if the institutions needed to make markets work properly had been built prior to widespread privatization.

B. ON WHICH TRANSITION PATH IS UKRAINE TRAVELLING?

Since independence in 1991 the transition in Ukraine is best described as an economic free-fall. According to official statistics, GDP has declined by about two-thirds over this period. Policymakers initially attempted to brake the plummeting economy by incurring large fiscal deficits financed by central bank credits. Budgetary loans and subsidies were extended to numerous State owned enterprises to ease their adjustment to

a new price regime. This fundamentally flawed response to the transition challenge not only failed to arrest the general downturn in activity but had fueled conditions of hyper-inflation by 1994. Only with the introduction of a new currency in 1996 accompanied by tight central bank controls on monetary growth and the development of an internal T-bill market to finance ongoing budgetary deficits in a non-inflationary manner did the economy regain some semblance of macro-stability by reigning in rampant inflation. By 1998, while annual economic growth continued to be negative, there were even some signs that the general output decline might have touched bottom. First quarter results for 2000 indicate that GDP growth has become positive for the first time since 1991.

The precipitous plunge of total output has not been accompanied by a corresponding sharp increase in the recorded unemployment rate. Official unemployment rates, measured by the number of people registered at State employment offices, have remained suspiciously low, below 5 per cent. These rates, however, ignore the steep increase in part-time employment and unofficial estimates of unemployment that take into account labor force under-utilization suggest that the effective unemployment rate is closer to 25 or 30 per cent.

Regardless of how unemployment is measured, the simple explanation of why more has not been observed is that real wages have been astonishingly flexible during the transition period. Since 1990, average real wages in Ukraine appear to have fallen by about two-thirds, mirroring the percentage decline in real output and serving to preserve jobs in every sector of the economy. A further explanation lies in the provision of explicit and implicit subsidies to loss-making firms and industries to prevent their collapse. While this subsidy policy has protected jobs and reduced social unrest, it has done so at the cost of retarding the momentum for privatization and restructuring and encouraging barter.

After ten years of transition experience, the Ukrainian economy is perhaps best described as having a dual structure, a juxtaposition of "new" economy and "old" economy elements. In the new economy, consisting mainly of privately owned small and medium enterprises, the basic requirements of a market economy appear to have been firmly implanted. These enterprises, often found in the burgeoning service and retail sectors, areas that were noticeably underdeveloped prior to transition, operate on strictly cash and carry commercial principles, expanding where profits can be obtained and contracting where they cannot. Many of them cater to Ukraine's nouveau riche who have escaped the hardships of transition and have prospered from the new opportunities that it has presented.

Participants in this new economy operate with hard budget constraints, accepting payments for the goods and services which they supply in cash or credit cards and paying their bills, including their tax obligations, entirely in cash or bank drafts. Arrears of customers and nonpayment to suppliers are relatively rare phenomena and the use of barter transactions to service debts is almost unheard of.

In contrast, enterprises operating in the old economy, dominated by state owned enterprises, are characterized by chronic nonpayments from customers and to suppliers, soft budget constraints, extensive use of barter to settle debts and persistent wage and tax arrears. These enterprises are typically awash in a sea of red ink but somehow find ways

to continue their operations, both through barter transactions, which severely weakens market disciplines, and explicit and implicit government subsidies.

In Ukraine, representative members of the old economy include the coal and agriculture sectors. Both sectors appear to be highly unprofitable and are kept alive by a system of covert, barter-based subsidies. In the case of agriculture, essential inputs are financed by direct government loans and government guaranteed bank loans most of which are not repaid. The government collects it debts from these loans in the form of bartered agricultural output which is deposited in the State Material Reserve.

Unable to meet its payroll from cash receipts, the coal sector has incurred extensive wage arrears and in 1999 protesting coal-miners staged a march on Kiev that resulted, after lengthy negotiations, in in-kind wage settlements in the form of food and other goods held in the Material Reserve. This form of nonmonetary wage payment, however, does nothing to satisfy the revenue needs of local coal communities that rely heavily for their "live money" on the proceeds from the personal income tax levied on wage receipts.

The supply rather than demand propelled nature of sectors such as coal and agriculture is attributable in large part to the absence of viable employment options for workers currently employed in these sectors. While labor markets have been extraordinarily flexible in terms of real wages, in other respects they are also remarkably rigid. Many local communities offer few employment opportunities outside of these two sectors. Moreover, geographical labor mobility is severely constrained by housing shortages and the capital loss incurred in selling a house or an apartment in a declining area and replacing it with another in a more prosperous area. Occupational labor mobility is hampered by both the dearth of investment in worker retraining and the seniority of many workers engaged in these sectors.

Because they are a common input supplier to both the new and old economies, potentially profitable sectors such as electricity share some of the characteristics and problems associated with the old economy. As documented in a recent study by Paquin (1999), the largest consumers of electricity are heavy industry producers in metallurgy, chemicals and machine building where state ownership of enterprises is the norm. Electricity companies are struggling because their industrial customers, together with agricultural producers and local governments, are only paying a little more than half of the electricity bills which they owe. In addition, what is paid is frequently in non-cash form. According to Paquin (1999), barter and doubtful payments accounts make up sixty per cent of total sales; cash collections comprise no more than 20 per cent of sales.

If they were able to disconnect their non-paying customers in the old economy, electricity companies could be restored to financial health. Despite promises from the government to take a tougher stand on delinquent consumers, to date a variety of government regulation has forced electricity companies to continue to supply power to users with longstanding records of arrears. Currently, total arrears owed to electricity companies amount to UAH 5 billion. In the presence of the large arrears they are owed, electricity companies often have little choice in accepting barter payments from their debtors and using these in part to finance their debts to their own suppliers.

The barter cycle is further reinforced by the tax debts that electricity companies end up owing to both State and local governments. Until recently electricity sales were zero-rated under the VAT, although this provision applied only to cash sales and barter transactions were taxed at the normal 20 per cent rate. Presently, all sales are taxed at the normal rate. Under the accrual method of accounting for tax liability, VAT obligations to pay are incurred the moment the power is supplied to customers who subsequently try to settle their accounts through barter.

In the case of the enterprise profits tax, application of the accrual rule plays havoc in measuring taxable profits. Sales for which there are either no payments or either doubtful payments are counted as taxable income and barter transactions are treated as if they have a value equivalent to cash sales. Although these rules are intended to encourage the use of cash for payment, when they are applied to sectors such as electricity which in fact receive little cash for their sales, they create an onerous tax burden and contribute to the tax arrears of these sectors.

With the creation of significant tax arrears, the circle of barter related debts is closed. Local government budgetary organizations may as a result of tax arrears receive insufficient funds to pay their electric power bills. A straightforward way of paying these bills is to cancel an equivalent value of tax arrears owed by electricity companies. Alternatively, if a local government required additional hospital supplies, it may arrange a mutual settlement that erases the debt of a qualified supplier to the power company and a corresponding amount of debt owed by the power company to the local government. Because so many different kinds of companies are likely to have power debts, the problem of the double coincidence of want posed by barter transactions may be overcome by using electricity companies as a medium for mutual debt cancellation.

No matter how complicated the web of barter transactions becomes, it is important to recognize that in the end they represent no more than a complex tax-subsidy scheme in the case of electricity. It is "as if" taxes were paid in full and from the proceeds subsidies were doled out to energy consumers who also paid in full. Instead, consumers don't pay in full, or pay in barter, and electricity companies as a result run up tax arrears that provide fertile ground for further barter transactions. Non-payment (subsidization) in this case leads to in-kind payment.

Table I shows the value of gross output sold in different sectors of the Ukrainian economy in 1999 and the percentage of those sales that were conducted in barter form. For all sectors, about one-third of total sales took the form of barter. This fraction is lower than in the two previous years when the proportion of barter was slightly higher than forty per cent. Not surprisingly, the percentage of barter is highest in the construction sector because the products of this sectors satisfy needs in all other sectors and can be used as a "real" medium of exchange.

Table I
Barter in Major Sectors of Ukraine

	Output of goods sold in 1999, mln UAH	Including on a barter basis	
		mln UAH	%
All sectors	98857.8	32331.2	32.7
Electric power	15308.2	4442.6	29.0
Fuel industry	11669.5	4555.7	39.0
Ferrous metallurgy	25749.7	8093.3	31.4
Non-ferrous metallurgy	2167.1	447.1	20.6
Oil and oil-chemistry	5957.5	2488.3	41.8
Machine building and metal works	13530.1	5538.3	40.9
Timber, pulp-and-paper	1800.4	659.6	36.6
Construction materials	2691.8	1847.2	68.6
Light industry	1442.3	480.4	33.3
Food industry	14728.6	2928.9	19.9

Source: State Statistics Committee, Kyiv, Ukraine

Table II distributes the same total gross output value as in Table I on a regional basis. All regions, with the exception of the city of Kiev and perhaps the Odeska oblast, engage in extensive barter operations and in some, such as Khmelnytska barter transactions comprise more than half of the total value of gross output.

It is interesting to compare the degree of reliance on barter with the extent of tax arrears on an oblast basis. For the country as a whole, tax arrears as a percentage of taxes owed were thirty per cent in 1998, the last year for which data are available. While the correlation is not perfect, the tendency is for oblasts with relatively low tax arrears to also have relatively low shares of barter. The city of Kiev and the oblast of Odeska, for example, have both the lowest rate of tax arrears and the lowest exposure to barter. A tentative explanation for this phenomenon is that these particular areas have been more successful in meeting the requirements of transition than the rest of the country, and therefore contain more agents of the new economy that are less reliant on barter than elsewhere.

Barterization also pervades Ukraine's public finances. By the end of 1998 the stock of tax arrears amounted to about 30 per cent of the total amount of taxes owed. This overhang of unpaid tax bills fuels the practice of mutual settlements in which firms pay down their tax debts by supplying inputs needed to provide public services. The rapid growth of barter and mutual settlements both date from the mid 1990's when the economy was purged of high inflation rates. In 1997 and 1998 in-kind revenues collected through mutual settlements accounted for about a third of all revenues collected. In 1999

this fraction declined to about 22 per cent but in some oblasts more than half of their revenue was received in the form of a mutual settlement.

Table II
Barter by Oblast

	Output of goods sold in 1999, mln UAH	Including on a barter basis	
		mln UAH	%
CRIMEAN REPUBLIC	1,629.9	667.4	40.9
VINNYTSKA	2,119.4	687.7	32.4
VOLYNSKA	573.2	183.3	32.0
DNIPROPETROVSKA	16,596.0	6,182.8	37.3
DONETSKA	20,271.9	5,817.0	28.7
ZHYTOMYRSKA	1,170.2	487.2	41.6
ZAKARPATSKA	436.6	70.4	16.1
ZAPORIZKA	9,074.3	2,863.3	31.6
IVANO-FRANKIVSKA	1,640.7	578.1	35.2
KYIVSKA	3,343.5	1,496.8	44.8
KIROVOHRADSKA	747.0	231.7	31.0
LUHANSKA	6,784.6	3,198.9	47.1
LVIVSKA	2,759.6	829.0	30.0
MYKOLAYIVSKA	1,963.2	395.0	20.1
ODESKA	2,246.7	340.8	15.2
POLTAVSKA	5,141.4	1,476.3	28.7
RIVNENSKA	1,645.2	713.1	43.3
SUMSKA	2,428.6	1,026.3	42.3
TERNOPILSKA	629.0	266.4	42.4
KHARKIVSKA	6,585.6	2,256.8	34.3
KHERSONSKA	701.7	310.4	44.2
KHMELNYTSKA	1,698.8	881.7	51.9
CHERKASKA	1,867.4	334.3	17.9
CHERNIVETSKA	428.0	134.7	31,5
CHERNIHIVSKA	1,434.3	432.8	30,2
KYIV	4,744.1	410.9	8,7
SEVASTOPOL	196.9	58.1	29,5
Total	98,857.8	32,331.2	32.7

To summarize this section, Ukraine seems to be following a two-track development during its transition. Some parts of the Ukrainian economy are cash propelled and show signs of successful adaptation to the challenges of transition. However, other parts appear to be mired in the murky world of barter that, while it may have eased the adjustment pains of transition, at the same time represents a type of adaptation that may be inimical to the long run health of the economy. The vital question of what sustains barter regimes and whether they can continue to survive in the longer term is explored next.

C. A SIMPLIFIED MODEL OF DEBT AND THE BARTER ECONOMY

Firms (governments) fall into arrears when their customers (taxpayers) fail to pay

In an important contribution to the economics of transition, Gaddy and Ickes (1998) introduce a three sector paradigm of a virtual economy intended to reflect current Russian reality. In this economy a value-subtracting (unprofitable) sector (manufacturing) "pretends" to add value by overpricing its output and this pretense is accepted by the profitable sector (energy) with which it interacts and the public sector which taxes the inflated output values posted by the value-subtractor. Through a series of numerical examples they show that the virtual economy makes promises to pay that it is unable to meet and, as a result, experiences substantial wage and pension arrears. While the results of the virtual economy model are in accordance with the transition experience of Russia, they rest on the hazy concept of pretense and a price formation mechanism that is alien to orthodox economics.

An alternative model, outlined in what follows, can achieve the same virtual economy results without the *deux ex machina* of conspiratorial pretense. This model emphasizes over-production rather than over-pricing although pricing issues come to the fore in the treatment of taxation. The economy is divided into two sectors, industry A, designated as I_A, which is assumed to be unprofitable in the sense that its cash sales are insufficient to cover its cost commitments, and industry B, designated as I_B, which is in principle profitable but whose profitability is masked by non-payments from industry A. Both industries utilize each other's output as inputs, employ labor and are liable for tax payments to a government sector (G) which uses its tax proceeds to purchase labor and outputs from the two sectors in order to provide public services. Households (H), in turn, use their labor income to make purchases from both industries.

This model attempts to describe a dynamic disequilibrium process rather than the ultimate resolution or outcome of this disequilibrium. This process is outlined in three consecutive stages, the creation of initial debt by industry A, the diffusion of this initial debt to all parts of the economy and the discharge of these debts through barter transactions.

The purpose of this modeling exercise is to show that wage and tax arrears, barter and mutual settlements are all symptoms of the same underlying cause: weak supply adjustments to conditions of non-profitability or the inability of weak market structures to impose hard budget constraints on producers who are unable to pay for their inputs out of cash sales. Unless this basic source of disequilibrium is "corrected", the model suggests that this process can continue indefinitely and what is by its nature a disequilibrium process can begin to take on the characteristics of a reproducible "equilibrium".

To simplify the discussion, some consistent notation is introduced. The variable D^j_i is used to denote the debt that the i'th economic agent owes to the j'th creditor. For example, $D^H_{A,}$, D^G_A, D^B_A, represent the debts owed by industry A to, respectively, workers (households), the government and industry B. Similar notation is used to portray the structure of debts owed by other economic agents.

To motivate the discussion, suppose the transition shock is initially felt in the form of a rapid disappearance of captive markets formerly provided through central planning. The sudden collapse of demand triggers a contraction in all parts of the economy but industry A, unlike industry B, is unable to make smooth adjustments to the new demand climate. Industry B, as well as households and the government sector are assumed to have initially balanced cash budgets. In industry A, on the other hand, when output is priced at average cost, supply exceeds demand. Thus, the value of output produced by industry A, and the value of its expenditure commitments to its input suppliers, exceeds the value of its cash sales. The difference between commitments and revenues is measured by the cost based value of unsold output, or "bartlets" and represents the ex ante cash debts industry A owes to workers, industry B and the government. In notational form,

$$D_A = D^H_A + D^B_A + D^G_A$$

The initial injection of industry A's bundle of wage, inter-enterprise and tax debts into the economy has subsequent "knock-on" or multiplier effects that ripple through the rest of the economy and are felt by all other agents in the form of unbalanced budgets. Industry B, potentially profitable, will experience a shortfall in revenue as a result of A's non-payment and will itself incur similar debts to its workers, industry A and the government.

Governments will find that their expenditure commitments exceed the revenues available to finance them and this revenue shortfall will express itself in the form of government debts to workers and industry. Households will similarly find themselves short of cash to pay for the bills they owe to industry and government. In short, the initial non-payment by industry A induces subsequent rounds of non-payment on the part of all of the other sectors that have income claims on industry A.

The most salient feature of the process described thus far is that at no point does non-payment necessarily reduce either the supply of goods or labor and that a cash shortage to pay bills shows up in every sector. In this model workers still report for work even if they are unpaid and industry continues to supply nonpaying customers largely on the strength of the promise or expectation that sooner or later these customers will themselves be paid. Workers, for example, are neither evicted from their premises nor without power because they fail to pay their electricity and communal service bills. Nor will firms be shut down through seizure of their assets because of accumulating tax bills.

In short, the outcome of industry A's behavior and the inertia of supply in the wake of non-payment is a seeping infection of non-payment and mutual debt creation that spreads within the industrial economy and from the industrial economy to the public sector. Eventually, even industry A, the original debtor, will find that it too has acquired some claims on the rest of the economy.

At some point during this process of mutual debt creation, as long as non-payment of incomes is matched by a corresponding amount of expenditure arrears, a snapshot of who owes what to whom would reveal the following configuration of debts:

	OWED BY	OWES TO	NET DEBT
Industry A	$D^{A}_{B} + D^{A}_{H} + D^{A}_{G}$	$D_{A}^{B} + D_{A}^{H} + D_{A}^{G}$	D_A
Industry B	$D^{B}_{A} + D^{B}_{H} + D^{B}_{G}$	$D_{B}^{A} + D_{B}^{H} + D_{B}^{G}$	0
Households	$D^{H}_{A} + D^{H}_{B} + D^{H}_{G}$	$D_{H}^{A} + D_{H}^{B} + D_{H}^{G}$	0
Government	$D^{G}_{A} + D^{G}_{B} + D^{G}_{H}$	$D_{G}^{A} + D_{G}^{B} + D_{G}^{H}$	0

In this debt matrix the original non-payment of its bills by industry A triggers a series of induced non-payments to all of the other sectors of the economy that create, within each sector, an equivalent amount of expenditure arrears. Because of this equivalence between what is owed and what is owing, the net debts of all sectors except industry A are zero. Aggregate or gross debts appear to be large but when mutual debts are cancelled in this matrix, the net debt of the economy shrinks to the amount of net debt originating in industry A.

The debt outcomes shown in the matrix represent a situation in which every sector is indebted to every other sector. Households owe both firms and government. Government in turn owes both firms and households. Finally, firms owe each other as well as both households and government. Nothing prevents this chain of mutual indebtedness from swelling in the absence of a debt resolution mechanism. However, lying behind the debts of both industry A and B is an amount of unsold output which, if it were valued at production cost, matches the value of the outstanding debts owed by these industries. If this output is accepted as a means of settling debt obligations, the rich web of mutual indebtedness offers abundant opportunities for barter transactions to take place and wipe out most of the gross debts that are shown in the debt matrix. When this barter mediated debt cancellation occurs, the stage is reset for further rounds of mutual debt creation.

Some of these myriad channels for barter propelled debt cancellation are outlined next using observations gleaned from a collection of Ukrainian experience during the past several years. Before turning to these illustrations, however, it is worth briefly describing some aspects of debtor adaptation that are not captured in this simple model. When firms are not paid for some of the output they produce and households are not paid for some of the services they provide, they must choose between which debts to honor in cash and which to defer. Households adapt by marshalling their scarce cash to pay for necessities such as food which cannot be obtained on promises to pay later. For other items where the prospect of debt foreclosure is unlikely, such as electricity and communal services, an increase in indebtedness is a natural response. Firms likewise face a similar choice in deciding which debts have priority for payment. Because the consequences of not paying wages may be more severe than not paying taxes, firms may endogenously restructure their total debt by incurring larger tax arrears.

Another feature of this model that is not clearly described is how tax liabilities are assessed in the presence of both non-payment and barter. A simplifying assumption in the model is that tax debts are incurred before barter occurs. A more realistic portrayal of tax

assessment is provided in the appendix to this paper where it is shown that many of the firm's tax obligations occurs simultaneously with barter rather than prior to it. Moreover, it is shown there that, for tax administration reasons, tax assessments in the presence of barter are inflated and lead to systematic over-estimation of the economy's "true" tax base.

D. MUTUAL DEBTS AND THE BARTER ECONOMY IN ACTION IN UKRAINE

The recent history of Ukraine is replete with examples of how in-kind payments have been used to resolve the chain of debts created by non-payment. Paying wages in kind is prevalent in both the public and private sectors. A public sector employee's debt for communal services may be canceled in exchange for a portion of the employee's wage debt. Alternatively, public sector wages may be paid in the form of goods from local enterprises that owe taxes to local authorities. In other cases, firms may provide goods or services to local governments in exchange for a reduction in the communal service charges owed by the unpaid workers of these firms.

Outside of the public sector, firms frequently pay their workers in the form of the output they help to produce. For example, in the city of Bila Tserkva workers in the dominant enterprise, a tire factory, are paid largely in tires and can be seen in large numbers on the side of the roads entering the city attempting to sell their wage settlement for cash. They are usually joined by workers from an adjacent sugar factory selling bags of sugar.

As noted earlier, paying taxes in kind is widespread. For example, the tire company in Bila Tserkva also supplies heat from its boilers to a local utility company that provides heating services to local budgetary organizations. Because the company does not have cash to pay its tax bills, it settles this debt by canceling the debt owed to it by the utility company which then writes down the heating debts incurred by local budgetary organizations. This type of mutual settlement is typical of the way energy and other companies satisfy their tax obligations to local governments.

Paying pensions in kind, while not a widespread practice, has also been observed in Ukraine. From time to time, the government advertises in newspapers that it will satisfy pension claims by allowing unpaid pensioners to come to a designated site where certain goods, accepted in lieu of payroll taxes, will be offered for "sale" at prices that are published in the newspaper.

Barter transactions occurring at the State level were described above in the case of the coal and agriculture sectors but other examples abound. In 1999 a portion of the State debt for gas imported from Russia was settled by sending surplus bombers to Russia. More recently, Russian gas debts have been reduced by canceling Russian debt owed for the lease of Black sea ports. Under article 45 of the 1999 State budget, oil from the State Material Reserve was supplied to energy companies and when budgetary organizations failed to pay in full for their power consumption, their debts were canceled in exchange for the debts owed to the Reserve by the energy companies.

Inter-enterprise arrears are frequently settled through complex multi-lateral barter arrangements. A shirt factory, for example, may not earn enough from cash sales to fully pay the fabric firm which supplies it with raw material. The barter task confronting the shirt factory is to unearth a chain of barter transactions that will ultimately send some good or service to a firm that is a creditor of the fabric firm. To continue this example, the shirt factory may trade some its unsold shirts to an auto factory that will use the shirts to outfit its employees. The auto factory in turn may ship some cars to a concrete factory in exchange for some cement utility poles that can be used by the electricity company to which the fabric firm owes an unpaid power debt. The commodity exchange circuit is completed when the fabric firm cancels the debt of the shirt factory in return for the paid power debt. How exchange rates or relative prices are determined to facilitate these kinds of trades is still a largely unfathomed mystery.

No matter how ingenious the trade network that may be created, barter arrangements risk foundering on the rock of the double coincidence of wants. To circumvent this problem, money normally serves as a medium of exchange. In Ukraine, a flourishing market in wechsels has emerged to lubricate barter trade and address this problem. Formally general promises to pay, wechsels are in fact a form of quasi-money with restricted liquidity that is valid only for the purchase of specific goods. They have been used by governments in Ukraine, particularly local governments, as financial instrument for reducing tax debts and by enterprises, particularly State owned enterprises, to overcome cash shortages. Government issued wechsels are redeemed in the form of tax relief and enterprise issued wechsels, sold through the Stock Exchange (PFTS), are redeemed for goods.

For both types of wechsel, the supply price at which goods are provided exceeds their demand or market price. As explained in greater detail in the appendix, the result of this difference in valuation is that both kinds of wechsel trade at a substantial discount. On the PFTS exchange in Kiev, enterprise related wechsels may be sold for less than half of their face value because the value of the goods that are promised would fetch far less if they were resold in the market. Government related wechsels, on the other hand are not marketable but still contain a significant discounted value. In this case, the value of the taxes that are cancelled through issuing wechsels exceeds the "true" value of the public services received because the price paid for the bartered good or service is higher than the price that alternatively would have been paid in cash (O'Connell, 1999; Thirsk, 1999). Use of these wechsels is concentrated among State owned enterprises; their use by private sector companies is relatively low (O'Connell,1999) lending further support to the notion of a dual economic structure in Ukraine.

The Pension Fund of Ukraine regularly auctions off promissory notes that it has accepted from companies as satisfaction of their payroll tax obligations to the Fund. These notes also trade at a sizable discount. In a recent auction (May 4, 2000), 19 bills with a face value of UAH 578,620 were bought for UAH 381,924, implying a discount of 34 per cent for the value of the goods that would be received from the redemption of these bills.

E. POLICY IMPLICATIONS FOR UKRAINIAN PUBLIC FINANCE

Two contentious policy issues in Ukraine concern the appropriate policy stance towards mutual settlements and the sustainable size of the public sector. This paper offers strong views on both of these matters. On the first of these, there has been considerable pressure on the Ukrainian government, in part exerted by the IMF, to ban mutual settlements because of their non-transparency and potential for public sector corruption. While mutual settlements are clearly unattractive on these grounds, it is argued here that banning mutual settlements only treats the symptoms of the problem and not its underlying cause.

The source of mutual settlements is neither aberrant public sector behavior nor a propensity to over-spend; rather, the roots lie in the slow structural adjustment of State owned enterprises to the disciplines of a market economy. As long as these enterprises, labeled here as the old economy, continue to issue net debt to the rest of the economy and use barter to discharge these debts, the economy will experience significant tax arrears and it is these which fuel expenditure arrears and create the breeding ground for mutual settlements. Although mutual settlements validate and accommodate barter to some extent, they are more a result of, rather than a cause of, barter.

What to do then? The clear-cut first best response is to quicken the pace of structural adjustment and convert tax arrears payable only in kind into cash based tax collections. To make this happen, Ukraine at a minimum needs to adopt stricter bankruptcy laws and a more permissive environment for foreign investment. If this were to happen, the rest of Ukraine would begin to resemble the city of Kiev with low barter, low tax arrears and low mutual settlements. Until this happens, however, it is probably best to tolerate mutual settlements and try to curb their worst abuses. This view rests on the conclusions drawn from the simple debt model that mutual settlements are not a close substitute for tax payments in cash.

An alternative view, espoused by the IMF, contends that firms, faced with a choice between in-kind and cash tax payments, have a strong preference in favor of the former method of payment because it is relatively cheaper than paying in cash. According to this view, banning mutual settlements would force firms to replace barter with cash and total tax revenues would be unaffected. While such an outcome is not implausible, there is no evidence to support it. From the perspective given here, more ever, it is not likely to occur. If cash constrained, indebted firms are forced to pay their taxes in cash, the likely outcome is an increase in other types of in-kind payment, for example wages.

Prohibiting mutual settlements is more likely to result only in a higher volume of uncollectable tax arrears. Some evidence for this outcome can already be seen. In the 2000 State budget the enterprise profits tax, which lends itself to mutual settlements, became an exclusively State revenue source and the government promised to abstain from mutual settlements. For the first quarter of 2000 the State budget has experienced an unexpected revenue shortfall and, according to a statement from the Minister of Finance, the cause of the shortfall is an unforeseen climb in tax arrears of UAH 1.4 billion, an increase of 13.2 per cent.

A second reason to continue mutual settlements is that local governments, even without the enterprise profits tax at their disposal, rely on them in the case of other taxes to provide a reasonable level of public services for health and education. Without the opportunity to tap these revenue sources through mutual settlements, there is a danger that the quality of these important local government services will be severely impaired. Although far from ideal, mutual settlements provide some temporary basis for a marriage between unmet needs and unused resources.

On the second question of sustainable government size, the analysis suggests that some further compression of total government spending is required. This is because barter, as outlined in detail in the appendix, artificially elevates the measured tax base and gives the appearance of more realizable revenue than is fact the case. This is especially true if mutual settlements are either curbed or eliminated and it is no longer possible to settle tax arrears in kind.

It is no accident that the introduction of accrual concepts for measuring important tax bases in late 1997 coincided with the explosive growth of tax arrears that occurred in 1998. For barter driven enterprises, the application of accrual concepts based on administered prices leads to exaggerated measurement of their tax base. More generally, in a culture rich in non-payment, the application of the accrual principle in Ukraine is currently inappropriate because of the stringent provisions that exist for recognizing doubtful payments. Presently, if a firm is not paid for its services, it can claim a deduction under the profits tax only if it either initiates an expensive court claim or waits three years after the non-payment occurs. No deduction of any kind is allowed under the VAT. Both measures further exaggerate the size of the economy's true tax base and cause effective tax rates to be higher than statutory rates.

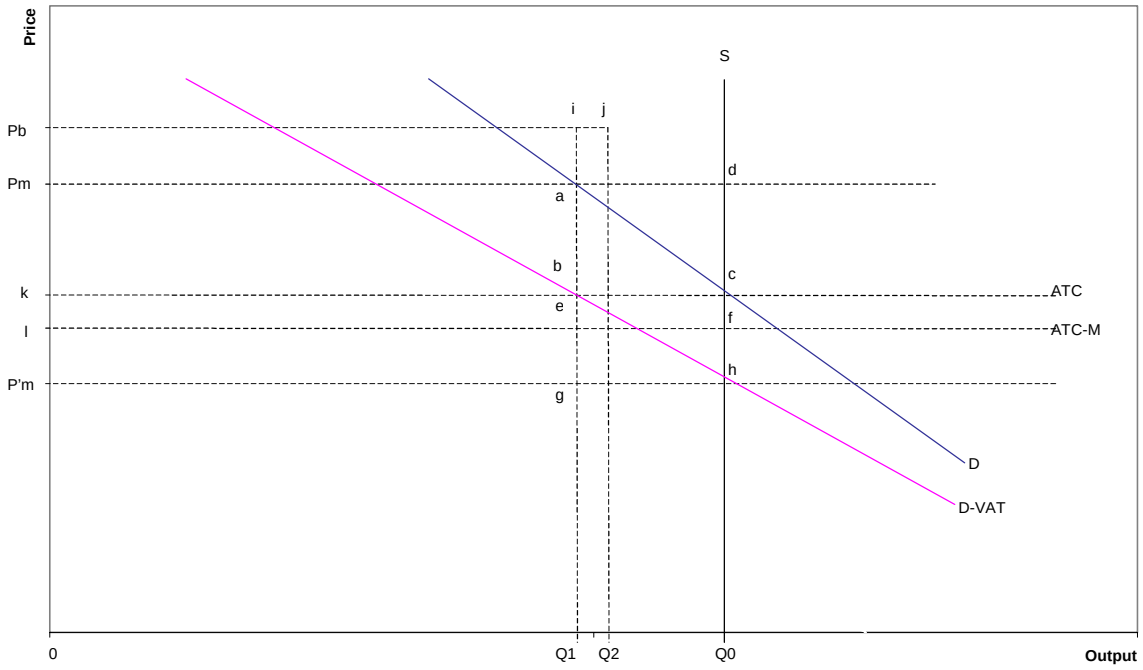
Although the government has restructured some tax arrears and written off others, it appears to behave as if the bulk of the remaining arrears can ultimately be recovered at their full nominal value. However, if these tax debts were monetized through an auction mechanism like that used by the Pension Fund, tax indebted enterprises would likely settle these debts in kind and their market value would be substantially less than their nominal value. The difference in value would provide one measurement of the extent to which the economy's tax base is systematically over-estimated on account of barter and a quantification of the need for further expenditure contraction.

On a broader policy front, barter, tax arrears and mutual settlements represent the transitional elaboration of an inefficient social safety net designed to keep the old economy operating and unemployment down. Through these means the social and political costs of the transition have been kept to a minimum. However, without greater effort at restructuring and privatization, there is a considerable risk that the economy will settle into a low level equilibrium capable of reproducing itself indefinitely and that what we observe today is in fact the transition. More energetic restructuring, the imposition of hard budget constraints and privatization, on the other hand, may have to be accompanied by a more effective formal safety net and measures to improve labor mobility. Otherwise, the adjustment costs may appear too high to policymakers and limited structural adjustment, and therefore little or no economic growth, may be the likely output for the

foreseeable future. Accepting barter mechanisms as a way of cushioning economic collapse promises to prolong the agony of a no, or low, growth transition period.

APPENDIX: BARTER BASED SURVIVAL OF THE INEFFICIENT

This appendix presents a somewhat stylized diagrammatic depiction of how barter is used as a tool by large inefficient State owned enterprises to ensure their economic survival. As shown in the diagram below, the enterprise is subject to two kinds of taxation, a value-added tax (VAT) and a profits tax. Demand for the output produced by the enterprise is represented by the curve labeled as D. The curve denoted as D-VAT indicates the producer's demand curve, or the receipts received by the firm after it has paid its VAT liability. The dotted line ATC represents the firm's average costs of production, assumed to be constant for all output levels. This measure of average cost includes an allowance for a uniform profit margin, M, and is therefore a measure of the normal costs of production. Given this demand and cost configuration, the firm is shown as producing at an output level of Q_o. This output level is determined by the firm's capacity to produce output given its current control over resources and does not take demand conditions into account.



If the firm were to sell all of its output the market price would be P'_m and the firm would incur a unit loss on its sales measured by the vertical distance c-h. Under these conditions of non-profitability the firm could not continue to long survive unless it were

either subsidized by the government or restructured by shedding resources and reducing output to a profitable level of Q_1. This analysis assumes that neither life saving subsidies nor restructuring are forthcoming. Facing limited competition from other suppliers, the firm may instead opt for another pricing strategy that hides its unprofitability and increases its survival chances.

The firm may choose to price its output at the level P_m, at which all of its cash sales are profitable, and sell an amount of output Q_1 that is less than the amount if produces, Q_o. This decision has several consequences both for the firm and the economy. First, the difference between what is sold and what is produced represents the firm's barter pool which operates as the collateral for the debts that the firm cannot finance from its cash sales. On its cash sales the firm earns enough to pay both its VAT and profits tax obligations, shown, respectively , as the areas $P_m$abk and a fraction of the area kbel. From a financial reporting perspective, however, the firm reports losses as its total revenue is less than its total expenditures by the area Q_1efQ_0. According to the State Statistics Committee, over half of the firms in Ukraine are in this position.

Because the firm has insufficient cash to meet all of its expenditure commitments, it will draw on its barter pool to satisfy these unpaid debts. A portion of this pool will go to pay workers and other input suppliers and another part will be used to settle the tax claims on these barter transactions. Barter, however, raises intractable valuation issues for tax administrators who must rely on some kind of barter rules to make tax assessments.

In Ukraine, it seems that tax administrators are guided in their evaluation of barter by "cost-plus" rules of thumb. Both the VAT and profits tax legislation require that barter be valued for tax purposes at "market value". Market value, however, is an elusive concept when firms produce a variety of products which they may sell at different prices. As a proxy for market value, average total cost plus a presumed profit margin is thought to be taken by tax authorities to represent the value of barter transactions since it is relatively easy for the authorities to get access to this information from the financial records that a firm is required to keep.

Given this sort of barter rule, the firm depicted in the diagram will be assessed VAT liabilities on its barter transactions in the amount shown by the area abcd. In addition, the firm will be assessed further profits tax on its imputed profits from barter indicated by the area bcef. These additional tax claims, however, in combination with the claims from input suppliers, exceed the value of the barter pool if it is valued at average cost. The only way for the firm to satisfy all of these claims at the same time is to artificially inflate the value of its barter output.

For the firm this is most easily done by over-pricing the value of the mutual settlements which it will make with the government to settle its tax debts. From an economic perspective, the firm is over-taxed on its barter transactions. Since the "true" market price of its output is P'_m , an accurate measurement of the firm's VAT liability is indicated by the area bchg, significantly less than the amount assessed, the area shown as abcd. Moreover, the firm in fact makes no "true" profit and should in principle pay no profits tax on either its cash or barter sales. However, because the firm has no cash with which to pay tax on its barter sales it will incur tax arrears and settle these arrears through

a mutual settlement which over-values the output received by the government. In the diagram, the firm is shown as setting a barter price of P_b on the amount of output Q_1Q_2 which it provides to the government in the form of a mutual settlement. The value of the mutual settlement, the area ijQ_1Q_2, is drawn so that it equals the value of the taxes levied on bartered output. In this way, inflated tax payments counterbalance inflated tax assessments.

Because the firm has to use a portion of its barter pool to clear its tax debts, it will lack sufficient "bartlets" to satisfy its other creditors if these residual "bartlets" are valued at average cost. The firm, therefore, will have to value this amount of barter at above average cost in order to satisfy its remaining debts. Through barter the firm can obtain higher effective prices for its total output and shelter itself from the market pressures for contraction.

In the text, it is suggested that the difference between these inflated barter prices and the market prices for this output explain the size of the discount on firm's promissory notes and, in the case of the Pension Fund, the difference between the face value and the market value of the promissory notes (wechsels) that it auctions on the Stock Market. Based on recent quotations in this market, the discount appear to have a value, on average, of about one-third. This discount also provides an indirect measurement of the extent to which real tax revenues gleaned from barter transactions may be over-estimated.

Although the diagrammatic analysis offers only a streamlined depiction of the complex behavior observed in most firms, it does offer a rational explanation of the basis for barter in a transition economy and a rationale for the appearance of inflated barter prices. It shows that barter is a powerful coping technique for defeating market discipline and avoiding contraction or closure.[2] Unlike Gaddy and Ickes (1998) who argue that high prices lead to barter, this simple model leads to the opposite conclusion that it is barter itself which generates high barter prices.

In the end, however, barter can hardly be considered as one of the triumphs of transition. Judged by its effects, barter is a barrier to restructuring and privatization because it offers unprofitable State owned enterprises a convenient escape route from closure or restructuring. Barter not only functions as a substitute for restructuring, it masks and distorts the measurement of profitability in the economy, even for potentially profitable firms, and renders financial accounting, if not meaningless, at least a less useful instrument for measuring the health and prospects of the economy's firms.

[2] Barter may disrupt as well as defeat market pressures. Oleksander Svyryda, a well-known Ukrainian businessman and one of the founders of the successful foodstuff company Torchyn Product recounted an anecdotal story to the author that illustrated the price mischief caused by barter. The company has never agreed to supply goods on a barter basis but on one occasion relented and very much lived to regret it.

Any barter transaction involves setting relative prices for two products. In accepting over-priced "bartlets" from its barter partner, Torchyn Product effectively bartered its mayonnaise at a lower than market price. Within days of making this transaction, a refrigerator with mayonnaise arrived one Eastern Ukrainian oblast city and undersold the same mayonnaise being offered by regular retail outlets. It has taken the company several years to stabilize the price of its product in this city.

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