IMF Working Paper

WP/96/130 INTERNATIONAL MONETARY FUND

Statistics Department

National Accounts in Transition Countries: Distortions and Biases

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November 1996

Abstract

In this paper a number of problems are discussed concerning the introduction in transition countries of national accounts according to the *1993 System of National Accounts.* These concern the classification of government owned enterprises and their transactions, valuation problems, undercoverage of economic statistics, and the practice of cumulative reporting. Several of these issues create biases that presently probably result in an underestimate of gross domestic product (that is, to the extent that holding gains have been removed). The paper also discusses ways to adress these problems but concludes that they cannot be fully removed.[1]

JEL Classification Numbers:
C40, C41

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Summary

This paper surveys technical problems associated with introducing the *1993 SNA* in transition countries that distort the representation of these economies. Issues include the recording of stocks and flows of government owned enterprises, valuation problems, the undercoverage of economic statistics, and the problem of cumulative source data.

The unclear relationship between government and the enterprises it owns can result in uncertain classification of payments between government and these enterprises. Furthermore, it is not immediately clear whether some government units are market producers or nonmarket producers. The paper discusses the decisive criteria to be used in these instances and alternatives for recording output, financial flows, and income flows.

Market conditions and pricing practices in transition countries cause valuation problems. Including allowances for delays in payment into the valuation of output results in an upward bias in GDP estimates. The paper recommends a (partial) solution through the adoption of accrual accounting for retail trade, but concludes that it is impossible to correct production approach estimates fully and reliably.

The treatment of holding gains and losses, although explained in the *1993 SNA*, in practice poses a number of problems caused by the lack of data. The paper explores these problems and possible solutions. The undercoverage of economic statistics seriously affects the reliability of the national accounts data in many transition countries. The paper discusses the informal economy, the formal unrecorded economy, the hidden economy, and the illegal economy.

Finally, the paper looks at problems caused by cumulative accounting. Although this practice does not affect the annual estimates, it seriously hampers the usefulness of quarterly national accounts because it misrepresents developments during the year.

I. INTRODUCTION

1.   The transition of centrally planned economies to market oriented economies has exposed the countries involved in this process (transition countries) to a great number of challenges. One of these is the adaptation of the statistical system to the requirements of participants in the economy, themselves in a process of transformation. This applies to the whole area of statistics, but in this paper we focus on the effects on the national accounts.

2.   Over the past few years, in many countries in transition, great progress has been made with the introduction of the *1993 System of National Accounts (1993 SNA)*; in fact some of these countries may rightfully claim to be among the first in the world to have adopted the new system. Yet, in the period of transition a number of biases and distortions have emerged in the accounts that may take some time to remove. Some of these involve a misrepresentation of specific transactions or a spread of the elements of the transactions over time, while other distortions create an under or over estimation of levels of important macro-aggregates such as gross domestic product (GDP).

3.   Without claiming to be comprehensive, we feel that the most important issues to be addressed in this respect include (1) the recording of transactions and stocks of government owned enterprises, (2) valuation problems (i.e., the inclusion of allowances for anticipated delays in payments, and of holding gains in the value of output), (3) the coverage of the emerging private sector, and (4) the problem of cumulative source data.

4.   Because some biases result in an overestimate, and some in an underestimate of GDP, they cancel out to some extent. Although in view of the differences between the countries under consideration it is somewhat hazardous to venture an overall conclusion, it seems to the authors that at present the underestimates caused by the undercoverage of economic statistics outweighs the overestimates caused by the other biases. However, the magnitude of the biases may be expected to change over time. The effects of the inclusion of allowances for anticipated delays in payments in the value of output will be mitigated in a situation of lower inflation rates, as will be the effects of holding gains. Also, it is our impression that statistical authorities are aware of the latter problem, and endeavor to exclude the holding gains from estimates; the direction of the bias will be significantly influenced by their success in removing these holding gains from the estimates. Clearly, authorities are also aware of the problem caused by undercoverage; but this problem is much more difficult to tackle.

II. THE RECORDING OF GOVERNMENT-OWNED ENTERPRISES

5.   In many transition countries the relation between government and government owned enterprises is not clearly defined; as a result, there are a number of problems with the recording of the payments between government and these enterprises. The typical organization of the production process in many transition countries is that ministries administratively encompass units producing goods and services which are sold on the market. These units are often very substantial, employ large numbers of staff and produce huge

outputs (in fact, they are often the main domestic producers). Most often, these units have an independent legal status and should be considered independent institutional units (enterprises) in the sense of the *1993 SNA*. However, there may also be substantial production in units that do not have an independent legal status, and then it is not self-evident that they are institutional units in a national accounts sense; in fact, there may be cases in which the organization of the production process does not even warrant distinguishing a separate establishment.

6.   The producing units, even if they are legally independent, are strongly intertwined with the respective ministries; the fixed capital used by the producing units is typically financed through the ministerial budgets; prices are often decided by the ministries, and the ministries take usually also care of the operating results by compensating losses or appropriating surpluses. Payments from the respective ministries (and other government agencies and funds) to these units and *vice versa* sometimes have an identified basis (e.g., payments relating to the size of the labor force or the wage bill), but often seem on an as needed basis, resembling a "what the traffic can bear" approach.

7.   In this situation it is difficult to achieve a meaningful description of the economic process, certainly if countries move beyond the description of the production process to a sectoral presentation of income distribution and capital-finance. A basic problem concerning the description of the production process is the calculation of value added of these units because there may be doubts as to whether they are market producers or non-market producers; as we will see, this has major implications for the valuation of output and value added. A basic problem concerning the description of income distribution and capital-finance is that the intra-government payments are usually not well defined and are often not related to clearly identifiable economic actions. This may also influence GDP estimation.

8.   In many transition countries the situation is further compounded through the ongoing privatization process that entails changes of ownership and financial relations that may lead from one unclear situation to another, with all the multifarious effects on the transformation process.

9.   In this context, the three main issues to be decided on are (1) the status of the units, (2) the nature of the production and the producing units, and (3) the nature of the transactions and stocks; these will be discussed in the following sub-sections.

A.   The Status of the Units

10.   If units have an independent legal status; in general they should be recognized as separate institutional units [2]; this will be the case for the majority of units we are discussing

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[2]One of the authors has argued earlier that legal units that only serve administrative purposes

here. However, for units that do not have an independent legal status, the question concerning their statistical status should be considered. If government owned units engage in economic activities belonging to a non-government industry group it could be considered to distinguish a separate statistical unit: an establishment within government or a separate institutional unit (i.e., a quasi-corporation).

11. The *1993 SNA* recommends distinguishing an establishment if the activity of a local unit is different from the main activity, and if sufficient data are available to describe the production and income generation process (see paragraphs 5.21 through 5.27 for the general principles). However, for a unit to be considered a separate institutional unit, stronger criteria have to be met.

12. To be considered a separate institutional unit, the *1993 SNA* requires that a unit should be "capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities" (paragraph 4.2). Furthermore, it stipulates that there should be "Either a complete set of accounts, including a balance sheets of assets and liabilities,..., or it would be possible and meaningful, both from an economic and legal viewpoint, to compile a complete set of accounts if they were to be required" (same paragraph).

13. Obviously, in a situation where units do not have a separate legal status, strictly speaking the autonomy implied by the first criterion does not exist. However, the *1993 SNA* also mentions the possibility of quasi-corporations (quasies) that do not have to meet such strict criteria, and specifically mentions "Unincorporated enterprises owned by government units which are engaged in market production and which are operated in a similar way to publicly owned corporations" (paragraph 4.50). Following this line of reasoning, many government owned establishments producing for the market should be considered separate institutional units.

14. However, the *1993 SNA* is quite rigorous in these cases on the requirement to have a complete set of accounts: "Indeed, the existence of a complete set of accounts, including balance sheets, for the enterprise is a necessary condition for it to be treated as a quasi-corporation" (paragraph 4.51). In transition countries, applying this criterion may imply that producing units without an independent legal status would not be discerned as separate institutional units and remain within the government sector, because they may not have a complete set of accounts, and in particular may lack balance sheets. In our view, the accounting requirement should be interpreted more liberally, as paragraph 4.2 of the *1993 SNA* would allow; it is important to avoid inclusion in the government sector of units that do not belong in respect of their (market) orientation and product oriented management. This

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²(...continued)
without having a meaning for the description of the economy should not be considered separate institutional units (see Bloem, 1990).

would imply that a quasi-corporation be distinguished in all cases where there is enough basic information available to construct a complete set of accounts, even if such accounts are not established by the unit itself for its own purposes.

B. The Nature of the Production and the Producing Units

15.   The products of government owned units may cover a wide scope, from general government services to typical consumer products such as clothing and household textiles, and to basic industrial commodities such as steel. In many cases it is self-evident whether the production should be considered as market production or non-market production, but there are boundary cases, such as public transport and housing, for which criteria are needed. As Table 1 demonstrates, the market/non-market distinction is important because of its effect on the calculation of value added--i.e., from the output side or from the cost side--and as a consequence, on the measurement of GDP (we will come back to this issue later). In view of the magnitude of these payments in transition countries the effects of decisions in this respect can be enormous.

16.   An illustration of the magnitude of the problem can be found comparing two recent statistical publications on transition countries, viz., the OECD/CIS publication *National Accounts for the Former Soviet Union* and the World Bank/State Statistics Committee of the Russian Federation publication *Russian Federation: Report on the National Accounts*; in the first publication all housing services are considered market services, while in the second publication 80 percent of total output of housing services is considered non-market (see Table 3.3 and Table B-1 in the respective publications). The same applies to public utilities that in the OECD/CIS publication are all market, while according to the World Bank/State Statistics Committee of the Russian Federation publication some 45 percent would be non-market; and output of services that were provided both as market and as non-market services amounted to 11 percent of total output.

17.   The *1993 SNA* makes a clear distinction between the nature of the producer and its production: non-market producers may engage in (some) market production besides their (main) non-market production; and vice versa. The distinction between market production and non-market production has to be made on the basis of prices; "Market output is output that is sold at prices that are economically significant or otherwise disposed of in the market..." (paragraph 6.45). The decision whether units are market producers or non-market producers depends on the extent to which a unit produces for the market: "A market producer is an establishment or enterprise all or most of whose output is marketed" (paragraph 6.52).

18.   Eurostat's revised *Economic System of Accounts (ESA)* combines these criteria to a single criterion, viz., that "more than 50% of the production costs are covered by sales" (*ESA*, paragraph 3.32). This may simplify taking decisions in borderline cases, but the disadvantage of this criterion is that units that charge prices that are economically significant (in the sense that they have a significant influence on the amounts that producers are willing to supply and purchasers willing to buy) for most of their production, but do not cover 50 percent of their

costs would be classified as non-market producers. In particular, this may happen in a situation in which government decides on the prices to be charged by the producers it controls, which may result in a strongly reduced cost coverage. This could imply a shift over time from non-market to market production, as governments gradually release their hold on prices. As Harrison has convincingly argued, because of the difference in the valuation of output between market producers and non-market producers, this would lead to artificial and implausible growth rates (see Harrison, 1996).

19.   A disadvantage of the *1993 SNA* criteria that is sometimes mentioned in comparison with the *ESA* criterion, is that the *1993 SNA* criteria are somewhat vague. However, the vagueness of these criteria in fact was deliberate, because it very much depends on local situations at whether prices are economically significant. The authors consider that the *1993 SNA* criteria provide sufficient grounds to take decisions on a case by case basis. For this reason, and certainly in the situation of transition countries, the *1993 SNA* criteria are to be preferred.

20.   The market/non-market distinction applies both to the level of establishments, and to the level of institutional units. On the level of establishments it should be noted that, although in principle each economic activity can be performed on a market or on a non-market basis, in practice the number of industries including both market and non-market establishments is usually limited (most frequently, to services such as education and health care). On the level of institutional units evidently most market production is concentrated in the institutional units of the private sector, but government institutional units and private non-profit institutions serving households may also include establishments that are market producers (see Schedule 1).

Schedule 1. Institutional Units and Market/Non-Market Producers

		Institutional units	
		Government units and private non-profit institutions serving households	Financial and non-financial corporations and households
Establishments	Market producers	X	X
	Non-market producers	X	

C. The Nature of the Transactions

21.   The next question to be answered is what this all means for the recording of the transactions. In our view, there are two sets of problems; the first set concerns the estimates of value added and GDP, the second concerns the identification of payments between government and the units it owns. The valuation of output and value added is largely

determined by the classification of the production of these units: market or non-market. The application of the criteria concerning market/non-market production in the way we interpret the *1993 SNA*, would in the vast majority of cases result in labeling government owned units that produce for the market as market producers, both as establishments and as institutional units. However, because even non-market units that remain within government are likely to generate some market production, two cases can be distinguished, viz., (1) market production by government establishments that are predominantly non-market producers, and (2) market production by government establishments that are market producers.

22.   The classic example of market production by government units that are predominantly non-market producers, is the ministry of forestry that produces and sells some timber. The calculation of production and value added of such government units would follow the general rules for government, viz., production and value added would be derived from the costs side. Payments received from users (either within or outside government) for provision of goods and services should be included as part of the supply of the producing units, but not add to total production. The fundamental difference between this valuation and the valuation of production and value added of government owned units that are market producers, is that in the latter cases valuation has to be based on the market prices of the production. As a result, in principle it is possible that the market producing units (and in certain cases government itself) have an operating surplus.

23.   As has been mentioned before, for national accounts purposes a problem concerning the recording of payments between government and the units it owns is that these flows do not always have an identifiable economic basis. This problem has two aspects, viz., (1) identifying specific flows, and (2) deciding on a proper way to record them in the national accounts. Concerning the identification of flows, a first distinction that has to be made is between current transactions, capital transactions, and financial transactions. The main difficulty in identifying capital transactions and financial transactions that are not clearly labeled as such, refers to the provision of fixed capital assets to government owned enterprises and quasies through the government budget, and related payments of the government owned units to government. Because the outlays of government for the acquisition of fixed capital are usually identified, the main identification problem in this respect concerns the identification of the respective payments of the government owned enterprises and quasies to government. A solution to this problem may be found in the practice of establishing output prices on the basis of production costs including a contribution to the maintenance of capital stock. The related payments can often be identified from the naming of the government funds to which these payments are made that often are dubbed Investment Funds.

24.   Concerning the recording of these payments in the national accounts, four alternatives can be considered, viz. (1) to construct some kind of financial arrangements between government and government owned enterprises and quasies, (2) to ignore the provision of fixed capital by government to producing units in the accounts, and record the outlays involved as government outlays on fixed capital, (3) to record the government capital outlays on behalf of enterprises and quasies as expansion of equity capital, or (4) to impute these

outlays as capital transfers. Theoretically, it may be possible to construct some kind of financial arrangements (such as loans) between government and government owned enterprises and quasies to account for the provision of fixed capital by government to producing units, but if these arrangements are not actually made between partners this would involve a great number of imputations concerning loans, interest payments, and amortization. Clearly, this would result in an uncertain and opaque description of the financial process, and seems therefore not advisable. The second alternative, viz., to ignore the provision of fixed capital by government to producing units in the accounts, and record the outlays involved as government outlays on fixed capital, would entail that government balance sheets would include vast amounts of capital goods, that have nothing to do with government operations; while the balance sheets of the government owned enterprises and quasies would not show the fixed capital assets in use (if the fixed capital assets have *de facto* been activated on the balance sheets of the enterprises and quasies, this would also require them being removed for national accounts purposes, which would render the national accounts recording rather obfuscating). The third alternative, viz., to record the government capital outlays on behalf of enterprises and quasies as expansion of equity capital, would imply recording the payments received by government from its enterprises and quasies that relate to fixed capital as withdrawals from equity. This alternative seems relatively simple, as it would necessitate no imputed secondary flows or items on the balance sheets. However, this alternative can not be applied in the situation of incorporated enterprises financed through share-capital. The fourth alternative, viz., to impute the government outlays as capital transfers, could be applied in all cases and would also be relatively simple; concerning the payments received by government from its enterprises and quasies this alternative would imply recording as capital transfers.

25.   All other unidentified payments between government and government owned enterprises should be classified as current transactions. In this respect, distinctions have to be made between government purchases, taxes and subsidies on products, other taxes and subsidies on production, social contributions, taxes on income and wealth, and property income.

26.   As mentioned above, governments often decide on the prices that the producing units it controls may charge to its users. For policy reasons, these prices may be set below production costs, and if the unit is a separate institutional unit (i.e., a public corporation or quasi corporation) government has to compensate for the deficit in order to keep the unit in operation. These payments should be classified as subsidies (more precisely: as other subsidies on products). However, if the unit is an establishment within general government, there would not be any compensatory payment made to the establishment, and the treatment of its activities in the national accounts would depend upon whether it was classified as market or non-market producer. In the case of a market producer, the market output would be valued at its selling price and the operating surplus (that can be negative or positive) would be absorbed

by government in the income accounts of the system.[3] On the other hand, if the unit was a non-market producer, the output would be valued as the sum of its costs, and the difference between that value and the value of output at its selling price would be absorbed by government and classified as government consumption expenditure.

27.   The classification of units, therefore, deserves careful consideration, because the solution chosen directly influences the estimates of GDP. As demonstrated in Table 1, output, value added, and GDP would be lower if the producing unit were regarded as a non-market producer within general government rather than as a separate institutional unit (assuming a positive operating surplus). On the other hand, if the unit was considered a market producer within general government, the output and value added at basic prices would be lower than for a separate institutional unit, but GDP would be the same (value added at producer prices would also be the same, but this is not the preferred valuation of the *1993 SNA*).

28.   Concerning other current payments, our advice is to first classify payments that have some identifiable basis in the appropriate category (e.g., indications for payments to be identified as taxes can be found through reference to general tax-regimes that also apply to non-government enterprises, and to a relation to levels of income and wealth of the enterprises and quasies; and indications for payments to be identified as social contributions can be found in a relation with the size of the labor force or the wage bill), and to consider the remaining payments from public enterprises to government as property income (mainly withdrawals from income of quasi corporations), and the remaining payments from government to public enterprises as subsidies on production.

29.   A specific set of problems is caused by the privatization process that many transition countries have embarked on. This can refer to a simple transfer of property, e.g., if government transfers the ownership of a house to its occupant; or to more complex processes, involving distribution of ownership rights to employees of a quasi or the public at large. The arrangements of these privatization processes are numerous, e.g., they may or may not involve some kind of proof of ownership (such as coupons, shares etc.), entitle owners to property income, and be transferable (upon receipt or after an initial period). What all these arrangements basically boil down to is a capital grant from government to the beneficiaries, and a concomitant acquisition from the part of the beneficiaries of a title to the property (as in the case of the transfer of houses to occupants) or equity (as in the case the transfer of ownership of enterprises and quasies).

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[3]In principle, it is possible that market producers within government also generate some non-market production, in which case the value of the non-market production should be valued on a costs-basis and added to the market output to achieve an estimate of total output. However, it is doubtful that the data requirements to do this can be met; for simplicity reasons, we have not included this case in the example of Table 1.

**Table 1. Compilation of Value Added and GDP:
Effect of Classifying Goverment Producing Units**

		Separate institutional unit	Non-market establishment of government	Market establishment of government
(i)	Market output at producer prices	100	35	100
(ii)	Non-market output at producer prices	0	55 (=iii-i)	0
(iii)	Total output at producer prices	100	90 (=viii+x)	100
(iv)	Subsidies on products	50	0	0
(v)	Market output at basic prices	150 (=i+iv)	35	100
(vi)	Non-market output at basic prices	0	55 (=vii-i)	0
(vii)	Total output at basic prices	150 (=iii+iv)	90 (=viii+ix)	100 (=iii)
(viii)	Intermediate consumption at purchaser prices	60	60	60
(ix)	Value added at basic prices (gross)	90 (=vii-viii)	30 (=xi+xii)	40 (=vii-viii)
(x)	Value added at producer prices (gross)	40 (=iii-viii)	30 (=xi+xii)	40 (=iii-viii)
(xi)	Wages and salaries	20	20	20
(xii)	Consumption of fixed capital	10	10	10
(xiii)	Operating surplus	10	-	10
(xiv)	GDP: sum of value added at basic prices, plus taxes, minus subsidies	40 (=ix-iv)	30 (=ix-iv)	40 (=ix-iv)
(xv)	GDP: sum of value added at producers prices	40 (=x)	30 (=x)	40 (=x)

30.   As demonstrated in Table 1, output, value added, and GDP would be lower if the producing unit were regarded as a non-market producer within general government rather thqan as a separate institutional unit (assuming a positive operating surplus). On the other hand, if the unit were considered a market producer within general government, the output and value added at basic prices would be lower than for a separate institutional unit, but GDP would be the same. (Value added at producer prices would also be the same, but this is not the prefered valuation of the *1993 SNA*.)

III. VALUATION PROBLEMS

31.   The price policy in the Soviet Union implied that an intricate system of implicit subsidies and taxes was maintained, favoring certain industries, products, or production factors to the detriment of others. The instruments that governments used for these purposes might be termed *list prices*. These prices, usually set by the ministry overseeing a specific industry, or by state purchasing agencies, included a mark-up over costs to allow for the replacement of fixed capital and for new capital formation. The list prices also served as an instrument to contain inflation, basically by not allowing price increases. Note that once set, the list prices of the Soviet Union were not changed--they were the prices at which all transactions took place, and in that respect they were unlike list prices in market economies.

32.   Enterprises had some possibilities for working around these arrangements when list prices did not cover costs of production sufficiently or if they felt they needed higher values for their products for other reasons. For instance, slight modifications to the specifications of a product would allow its introduction as a new product, to be valued on the basis of costs of production, regardless of what the list price had been previously.

33.   In the liberalization process that has been in place in most transition countries for a number of years now, the grip of government on the production process has been relaxed over time. Nevertheless, vestiges of the former system still exist in many areas, not least in the practice regarding the valuation of production. In the Russian Federation, the liberalization of prices at the beginning of 1992 was accompanied by price increases that in some months were of the order of 300 to 400 percent, and that were clearly at the discretion of enterprises. Markups were raised to an average of 70 percent over costs, compared to pre-transition levels in the range of 15-20 percent. Nonetheless, the pricing mechanism resembled the one that had prevailed before: enterprises set their own list prices, but once established, list prices once again became the basis for the valuation of all transactions, and were not adjusted subsequently to reflect market conditions.

34.   Although it is usually the enterprises that are now setting their own prices, in a number of countries, governments retain control over prices for items such as housing, utilities and some food staples; and sometimes is unclear whether it is governments or enterprises that make price decisions. For example, in Ukraine governments still prescribe permissible levels of markups, sector by sector. But the situation is fluid and most countries are moving towards a liberalization of prices.

35.   Leaving aside the question of who at the end of the day has been responsible for setting the list prices, boosting markups to 70 percent appears to have been an overestimate of what the market would bear. The incomes of wage earners and of pensioners did not increase as rapidly as the prices set by producers, and retailers facing a collapse of demand were not able to pass on the price increases to their customers (increases in retail prices appear to have

had a three month lag by comparisons with increases in producer prices.[4]) In a real free-market setting, producers would have sought to adjust their prices, but the normal mechanisms for adjusting prices to clear markets were not in place--transactions continued to be recorded at the list prices.

36.   As a result, the revenues of retailers were not sufficient to cover the invoiced list prices of their suppliers, and retailers were forced to delay payment for their purchases, waiting to pay the agreed list prices for their purchases with the higher prices these would fetch on resale after some delay. In most FSU countries payments were made at the original list prices, without any compensation for the erosion in purchasing power involved in the inflation over the period of delay in payment.

37.   Recognizing the problem of eroding purchasing power involved in delays in payment, producers soon began to include allowances for anticipated delays in payment in the sales prices. In the following subsections we will examine what these problems in the valuation of output, and problems in the valuation of stocks also due to inflation, mean for the national accounts.

A.   The Valuation of Output

38.   The first valuation problem is associated with the practice of valuing output through list prices (as established at the moment of production), and incorporating in these list prices an allowance for anticipated delays in payment. The existence of this practice is indicated by considerable arrears in payments, with payment often at the original price despite the intervening erosion of purchasing power due to inflation, without an interest charge for the implicit short-term credit or a penalty for late payment.

39.   The principal mechanism through which an allowance for the anticipated delay in payment is incorporated in the list price seems to be an extra mark-up over full costs. Indeed, because this mechanism is indirect, one could question whether this markup now truly includes an allowance for the anticipation of a delay in payment. However, the magnitude of the markups is strongly suggestive. For instance, in the Russian Federation and in Ukraine, before the transition markups over full costs were of the order of 20 percent. They were intended to secure the funds that were to be set aside for the internal financing of capital formation. Over the past several years, markups over full costs have been very much higher. Some of this increase in markups probably reflects an allowance for the fact that inventories of materials are valued at historic cost and that, with inflation, markups need to be higher in

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[4]In the Russian Federation, producer price indexes used to be Sauerbeck indexes rather than Laspeyres indexes. As described in an IMF working paper by Lequiller and Zieschang, under the kind of inflation experienced in the Russian Federation, Sauerbeck indexes tend to overestimate price change (see Lequiller, 1994). Nevertheless, in 1992, the bias of the producer indexes due to the index formula could only account for a fraction of the difference between the producer and consumer price indexes.

order to compensate for the difference in material costs valued at historic versus current replacement prices; and some of the increase in markups may simply be gouging. But it is difficult to see how a markup of 70 percent could be due to these factors alone. Some of the increased markup must be in the nature of insurance against late payment, in a period of rapid inflation.

40.   According to the *1993 SNA*, allowances for anticipated late payment that are incorporated in the prices of goods or services should be viewed as interest paid on loans, the latter amounting to the value of the transaction excluding the allowance for late payment (see *1993 SNA*, paragraph 3.80). The rationale for this is that such allowances have no relation to the production process, and do not add to production of goods and services. Inclusion of such an interest component (on the implicit short-term loan) in the estimates of value of production would inflate the estimates of value added and gross domestic product (GDP), of incomes, and of expenditures.

41.   However, in practice these aggregates need not be overestimated by the full extent of the allowances for anticipated delays in payment included in output prices (and values) because the purchase prices of goods and services in intermediate consumption will contain the same allowances for anticipated delays in payment as the corresponding output prices, and these will be offsetting. Moreover, a system of inflated prices accommodated through delays in payment breaks down at the level of consumers. Consumers do not have the possibility of delaying payment on their purchases, and hence will only purchase when prices are commensurate with their incomes. For instance, in Macedonia in 1992, this meant that retailers sold out of inventory at prices lower than the current replacement cost reflected in current list prices (but not necessarily lower than historic cost, in the case of goods that had remained in inventory for some time).

42.   With accrual accounting, this would lead to losses (or rather, negative operating surpluses) in retail trade. And although value added in other sectors would be overstated, the value added in retail trade would show a compensating loss. For instance, the national accounts of Macedonia have shown a negative operating surplus for retail trade of up to seven percent of value added for 1990 through 1992 (see the Statistical Office of Macedonia, 1995). But negative operating surpluses for retail trade have not been found in the OECD/CIS publication *National Accounts for the Former Soviet Union* or the World Bank/State Statistics Committee of the Russian Federation publication *Russian Federation: Report on the National Accounts*. The reason is that in these countries retailers maintain accounts on a cash basis. Measured on a cash flow basis, purchases by retailers do not necessarily cancel the sales to retailers. There is virtually no distinction between the sales of retailers measured on an accruals basis and their sales measured on a cash-flow basis (because consumers are generally expected to pay at delivery). On the other hand, the value of the purchases of retailers on an accruals basis can be very different from the value of their purchases on a cash-flow basis, the difference governed by the duration of the delays in payments by retailers to their suppliers. This means that the value added of retailers will be overstated by the difference between the accruals and cash-flow measures of the purchases of such retailers. This is demonstrated in the

example described in the annex, which shows that retailers can have negative operating surpluses on an accrual basis but positive cash-flows.

43.   With accrual accounting throughout, although allowances for anticipated delays in payment will create an overstatement of GDP, the overstatement will affect estimates from production, from expenditures and from incomes equally.[5] On the other hand, if some of the estimates are based on cash-flow accounts, discrepancies among estimates from production, from expenditures and from incomes will emerge. In particular, if retail trade maintains its accounts on a cash-flow basis, the estimate of GDP from production will exceed the estimate from expenditures by the aforementioned difference between the value of the purchases of retailers on an accrual basis versus the value of their purchases on a cash-flow basis. Moreover, cash-flow accounting is also prevalent in the financial accounts of enterprises in most transition countries and is reflected in their financial surveys. Cash-flow accounting will introduce a further discrepancy between operating surplus measured directly from the cash-flow accounts of enterprises and operating surplus measured residually as the difference between value added and the components of the generation of income account other than operating surplus. Thus in these countries, direct estimates of incomes will differ from estimates of production and of expenditures.

44.   With accrual accounting, the estimates of GDP from incomes, from expenditures and from production will all be inflated to the same extent by allowances for anticipated delays in payment. The values of any transactions other than those concerning household consumption, i.e., direct sales by producers to government, sales to enterprises on capital account, exports, and finished goods routed to inventory, are likely to contain the allowances for anticipated delays in payment. Of course, it is possible that some products (particularly some capital goods and goods for export) will be produced with a specific customer in mind and on the understanding that payment will be immediate. In such cases, the list/sale price will not contain an allowance for anticipated delays in payment.

45.   The prices of some imports may also include allowances for anticipated delays in payment, especially because intra-FSU trade has also been characterized by endemic arrears. These will have the opposite effect, diminishing rather than inflating the size of GDP.

46.   The high proportion of capital expenditures to GDP suggest that capital expenditures are valued at prices that contain substantial allowances for anticipated delays in payment: in view of the decline in output of countries in transition, this proportion (currently running at between 20 and 40 percent of GDP) seems excessive, even allowing for the fact that the stock of capital is being replaced at a rapid rate.

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[5]It will also distort the calculation of value added across producing sectors, as shown in the annex.

47.   In summary, in a number of transition countries, the combination of prices that contain an allowance for anticipated delays in payment and the failure to use accrual accounting consistently combine to create not only inflated estimates of GDP but also discrepancies in estimates of GDP from incomes, expenditures and production. In the case of income, the discrepancy can be disposed of by estimating operating surplus as a residual. This is done in the Russian Federation, for example. But this does not solve the other problems.

48.   In a sense, in some transition countries the relevant market price is the list price adjusted for inflation over the period over which payment is delayed. But it is by no means clear that this period is known in advance, or even discussed in advance between seller and purchaser. Indeed, the period seems to be dictated more by the circumstances of the purchaser than by any action of the producer. In that sense, it is not clear that there is agreement on price, whereas agreement on price is the foundation of all market behavior in market economies.

49.   Stating the nature of the problem is one thing, doing something about it is another matter. All that can be done here is to outline a tentative approach. The main difficulty is that there are no data on the extent to which prices include allowances for anticipated delays in payment; as discussed below, there may be possibilities for adjusting the estimates to exclude allowances for anticipated delays in payment, but these will necessarily be crude.

50.   In principle, estimates of aggregate expenditure are less inflated than estimates of production (by the extent of the difference between the accrual and cash-flow values of the goods purchased for resale by retailers). The introduction of accrual accounting in retail trade would eliminate the discrepancy. Alternatively, the difference between estimates of GDP from production and from expenditures could be taken as a measure of the correction to value added in retail trade that should be introduced. The problem with this solution is that distortions in the estimates (e.g., downward biased estimates of household consumption due to reliance on household budget surveys suffering from underreporting) would then affect the estimation of value added in retail trade. In any case, on the production side, this would only improve the aggregate estimate of GDP, and not contribute to an adjustment of the distribution of value added by industry.

51.   Concerning estimates of the magnitude of the allowances for delays in payment, there are two possibilities. If we can obtain estimates by industry of average delays in receipts and in payments, we may be able to develop procedures analogous to the ones involved in adjusting inventories for holding gains. Alternatively, it may be possible to infer the magnitude of the allowances for anticipated delays in payment from information about rates of markup over full costs of production, available by branch of activity. For instance, in the Ukraine and in the Russian Federation, these rates of markup have been as high as 70 percent, a number which exceeds international norms by a very wide margin. An estimate of the allowance for late payment could be derived by subtracting from the value of the markup of each branch of activity a more or less arbitrary estimate for a normal markup.

52.   Because these estimated prices are not real transactions prices, adjusting the accounts would involve a modeling exercise within an input-output framework. This could provide important insights, but it should be noted that observed statistics and model estimates differ with respect to their reliability.

B.   The Valuation of Stocks

53.   Whatever the kind of stock, and whatever the method used by enterprises to value them, during periods of inflation, the change in the book value of stocks will incorporate holding gains. The higher the rate of inflation and the longer the stockholding period,[6] the larger the holding gains. The valuation of stocks, both of inventories and of fixed capital, can have a tremendous impact on the national accounts. The basic issue is that in times of rapid inflation the difference between historic prices and current prices can be enormous, and the effects of valuation at historic prices on the estimates of the withdrawals from stocks of inventories and use of capital stock can thoroughly distort estimates of value added and domestic product. In this paper we will focus on the effects of valuation of stocks of inventories, but it should be borne in mind that similar problems apply to the use of capital stock. The use of historic costs to value the stock of fixed capital understates the estimates of consumption of fixed capital. As a result, the output and value added of non-market producers (such as general government) is understated to the same extent, and national accounts aggregates presented on a net basis (such as net domestic product) are overstated. The use of the perpetual inventory method would help to overcome these problems.[7]

54.   The basic reason why valuation of withdrawals from inventories at historic prices distorts the estimates is that it introduces the results of price changes into the value of production. Most often, because of the secular and global presence of inflation, valuation at historic prices will imply the inclusion of a holding gain, but holding losses can also occur. As price changes do not relate to the production process itself, holding gains and losses should be excluded from production estimates and routed to the other changes in assets accounts.

55.   The basic concern that we are facing then is to exclude holding gains from estimates of production and value added. The standard practice that the *1993 SNA* prescribes is to value withdrawals and additions at the current price at the time of the withdrawal. This would ensure valuation of all transactions at the same price and thus prevent the inclusion of holding gains. However, if in practice this method of valuation is not applied in enterprise book

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[6] The stockholding period is defined as the average number of months during which items remain in inventory before they are withdrawn.

[7] In some transition countries, a requirement to annually revalue the stock of fixed assets has been introduced, which tends to reduce the extent of understatement in consumption of fixed capital. However, the factors used to revalue the assets are not based on current market replacement value but are mandated by the government.

keeping, it will be very difficult for the national accountant to achieve this later, because it would necessitate the availability of data on quantities and corresponding prices that are usually not even kept at the level of the enterprise.

56.   In general, statistical agencies collect information on the values of inventories at given points in time, usually at the beginning or end of each quarter, and estimate the book value change in inventories as the difference between the book value of inventories at two points in time. The information collected usually covers four kinds of inventories: finished goods, goods in process, materials, and goods purchased for resale.

57.   In view of the data situation, in the context of our technical assistance to transition countries we have advised a procedure for the estimation of the change in inventories in national accounts and the estimation of holding gains that involves the following steps: (1) the calculation of deflators for the opening and closing book value inventories, needed in order to convert book values to a common valuation at base-period prices; (2) the deflation of book value opening and closing inventories and the calculation of the change in inventories at constant base period prices; (3) the revaluation--to the average prices of the current period--of the change in inventories at constant base period prices; and (4) the calculation of holding gains, as the difference between closing and opening book values of inventories, less the change in inventories valued at average current prices. The only issue that presents any difficulty in this techniques is the calculation of the deflators for the opening and closing values of inventories. The remainder of this section suggests an approach to use.

58.   The deflation of the book values of inventories should be performed by branch of activity and by type of inventory, at the most detailed level of the classification possible. Inventories should be broken down between inventories of finished goods, goods in process, materials, and goods for resale. The price indices used to deflate the book values of inventories should be the price indices relevant to the type of inventory to be deflated: e.g., producer price indices of raw materials that can be stocked weighted by the commodity composition of the inventories in the case of inventories of raw materials, or the producer price index of the relevant industry in the case of finished goods.

59.   The procedure described above assumes a regular pattern of changes in inventories and a smooth pattern of changes in prices between the opening and closing dates. It is strongly recommended, therefore, that monthly or quarterly data rather than annual data be used whenever possible. The assumptions on the regularity of the pattern of changes in inventories between the opening and the closing dates are less unrealistic if monthly and quarterly data are used instead of annual data.

60.   The calculation of the price indices needed to deflate opening and closing values of inventories depends on which method of valuation of inventories is used by the enterprises from which the book values of the opening and closing dates are obtained. First, there are two main possibilities concerning the method of valuation:

(1) valuation at current prices; and

(2) valuation at historic prices.

61.   Valuation at historic prices corresponds to the business accounting practices in market oriented economies. In market economies, enterprises do not usually use current prices because they would go against the principle of caution used in business accounting: to price finished goods held in the inventory at prices of the current period is considered risky because the effective price at which these goods would be sold could be lower than the current price. Therefore, using caution, accountants will price the good at "historic" prices, i.e., at prices that have been recorded previously. Enterprises will price the inventory at current prices *only if current prices are lower than historic prices*. To be more complete, one should therefore say that enterprises price inventories at the minimum between historic and current prices. This latter remark is not relevant in the case of transition countries because it assumes that prices are decreasing.

62.   Second, there are several methods of valuation at historic prices. The methods most commonly used by enterprises to account for inventories are the first-in-first-out method (FIFO), whereby items withdrawn from inventory are valued at the prices of the oldest items in inventory, the last-in-first-out method (LIFO), whereby the prices used are those of the most recent items in the inventory, and, less frequently, a revaluation of inventories at the weighted average of the prices at which items in inventory were entered. All three methods value inventories at historic cost, but with a different assumption about their value. In the case of FIFO, it is presumed that the items withdrawn from inventory are the oldest items, so that the items remaining in inventory are valued at the most recent prices. In the case of LIFO, it is presumed that the items withdrawn from inventory are the newest items, so that the items remaining in inventory are valued at the earliest prices. Valuation at average prices produces a result somewhere between LIFO and FIFO. Even in the case of FIFO, if the stockholding period is more than one month, a portion of inventories are not valued at current prices, i.e., at the price of the latest month, but rather at historic prices.

63.   In the case of valuation (or revaluation) at current prices, the deflator of the book value is the price index for the period concerned, without any adjustment. In the case of valuation at historic prices, the deflator of the book value is a lagged function of the price index. It is important, therefore, when calculating holding gains to know what business accounting procedures are used by the enterprises and what are the different stockholding periods; and we think there is an urgent need to collect this type of information.

64.   In the absence of such information, the recommended methodology is premised on the use by enterprises of FIFO as it is the most usual method in market oriented economies. Under FIFO, an approximate stockholding period can be estimated, and an adjustment can be made for holding gains even when there is no independent information on stockholding periods. On the other hand, when LIFO is the practice, the estimation of holding gains requires independent information on the stockholding period (which cannot be estimated from

the available data) and requires information on the periods during which inventories have been accumulating and de-cumulating, in order to know whether there were holding gains and, if so, what prices (from which periods) must be used to adjust for them. However, when enterprises use LIFO, there need not necessarily be holding gains; if inventories are stable, or rising, none of the older items in inventory, i.e., those valued at historic prices, are withdrawn from inventory and all the withdrawals are valued at current prices. On the other hand, if inventories are de-cumulating, under LIFO the items withdrawn from inventory may be items that have remained in inventory over a long period, implying correspondingly high holding gains.

Inventories of finished goods

65.   Under FIFO, for any given inventory of finished goods, the average stockholding period can be estimated by calculating the preceding number of months' worth of sales represented by the inventory.[8] Given the stockholding period and a suitable monthly price index,[9] a deflator for the inventory of finished goods can be established, as a combination of the monthly prices preceding the date of the inventory, over a period corresponding to the stockholding period.

66.   To calculate a deflator for an inventory at book value, prices are combined by means of weights representing the proportion of the inventory consisting of goods of each vintage, the weights constrained to add up to 1. If the inventory contains goods that have a uniform stockholding period, then the weights can be approximated by assuming that the quantities in inventory are evenly distributed over the stockholding period (which is equivalent to assuming

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[8]The stockholding period is defined as the average number of months during which items remain in inventory before they are withdrawn. It is calculated in one of three ways: (1) either on the basis of monthly data on sales, in which case the stockholding period is calculated by counting the number of months worth of sales required to make up the inventory; or (2) on the basis of quarterly data on sales, in which case the stockholding period is calculated by estimating the average monthly sales over the quarter, and then calculating the number of months worth of these average monthly sales required to make up the inventory; or (3) on the basis of annual data on sales, in which case the stockholding period is calculated by estimating the average monthly sales over the year and calculating the number of months worth of these average monthly sales required to make up the inventory. Clearly, it is better to have monthly data on sales or, failing that to have quarterly data on sales, than to have to rely on monthly averages of annual sales.

[9]In the case of inventories of finished goods, for any given branch of activity, it is usually assumed that the commodity composition of the inventories is the same as the commodity composition of sales, and the same also as the commodity composition of the producer price index for that branch of activity.

that production does not vary over the stockholding period). For example, with a homogeneous stockholding period of 4 months the weights will be .25; .25; .25; and .25, and with a stockholding period of 5 months they will be .2 ;.2; .2; .2 ; and .2.

67.   The following hypothetical example examines an inventory containing five commodities with five different stockholding periods. As shown in Table 2, for commodity 1, the inventory represents 2 months' worth of sales, for commodity 2, it represents 3.75 months' worth of sales, and so forth. These stockholding periods are estimated from data on sales by commodity by month, as shown in Table 2. One simplifying assumption is made: it is assumed that these quantities are uniformly distributed over the stockholding period.

Table 2.   Inventories and Stockholding Periods

	Inventory	Stockholding period	Month			
			n	n-1	n-2	n-3
commodity 1	100	2	50	50		
commodity 2	282	3.75	75.2	75.2	75.2	56.4
commodity 3	128	2.67	47.9	47.9	32.3	
commodity 4	45	0.9	45			
commodity 5	173	2.4	72	72	29	
total	728		290.1	245.1	136.4	56.4
weights	1		.399	.337	.187	.077

Table 3. Inventories and Sales by Month

	Inventory	Stockholding period	Sales by month			
			n	n-1	n-2	n-3
commodity 1	100		55	45	37	31
commodity 2	282		95	80	65	56
commodity 3	128		53	48	40.3	35
commodity 4	45		50	45	40	35
commodity 5	173		80	70	55	50
total	728		333	287	237.3	207

68.   In Table 2, the weights for the entire inventory are estimated by adding, for each month, the assumed quantities of individual commodities in inventory and dividing by the total (for example, 290.1/728 = .399). Although, for any given commodity, the assumed quantities are evenly distributed over the corresponding stockholding period, for the five commodities taken together, a larger proportion of the quantities (and weights) is found in the more recent months, and a smaller proportion in the earlier months. If the inventory is not homogeneous but instead contains goods that have different stockholding periods, a larger proportion of the inventory will be of recent vintage, and the weights will rise from the earliest to the most recent month. This pattern will be dictated by the fact that all items in an inventory containing goods with different stockholding periods are at least one month old, a subset of items are at least two months old, a smaller subset are at least three months old, and so forth. This explains the pattern of some aggregate lagged functions that one can find in use in several countries. However, this calculation requires a breakdown of the total inventory by commodity, as is assumed to be available in this hypothetical example.

69.   If, in practice, all that is available is the bottom row of Table 3, it is only possible to estimate an average "aggregated stockholding period" for the whole inventory: 728 = 333 + 288 + .45x237.3, i.e., a stockholding period of 2.45 months. Moreover if, in the absence of information on the commodity composition of sales and of the inventory, it is assumed that the inventory is homogeneous, i.e., that the stockholding periods of all the commodities in inventory are the same, then the weights corresponding to a stockholding period of 2.45 months will be (.408 .408 .184).

70.   This appears to be quite a different result from the weights shown in Table 2, calculated with knowledge of the commodity composition of the inventory and of sales, i.e.,

(.399 .337 .187 .077). Apparently, the use of the same method at an aggregate level tends to underestimate the length of the stockholding period, or to underweight the most recent months, or both.

71.   Using the result shown above--i.e. that the use of the method to estimate the lag function at an aggregate level tends to underestimate the length of the stockholding period--it is possible to adjust the aggregate lag function. The lag function associated with a longer stockholding period and less weight in the recent months can be assumed to be represented by an arithmetic progression of the form: nA, $(n-1)a$, $(n-2)a$, ..., $2A$, a, where: $nA + (n-1)a + (n-2)a + ... + 2A + a = 1$. For example, if $n = 2$ the weights would be (.667 .333), if $n = 3$ the weights would be (.500 .333 .167), if $n = 4$ the weights would be (.4 .3 .2 .1), and so forth. Corresponding to each set of weights, there is an *average age of the stock* calculated as follows: $a1x1 + a2x2 + a3x3 + a4X4 + ...$, where $a1, a2, ... an$ is the set of the weights. Between the different possible forms of the arithmetic progression, depending on n, we suggest choosing the form corresponding to approximately the same average age that obtained from the aggregate data.

Inventories of raw materials

72.   Procedures analogous to the ones used for finished goods should be used to calculate weights for the price indices that are needed to deflate the book values of inventories of raw materials. However, there are two differences: (1) stockholding periods are established by comparing the book values of inventories with the purchase of materials rather than with the sale of goods; (2) producer price indices must be combined into materials price indices, usually on the basis on input-output coefficients that define the structure of intermediate consumption for each branch of activity.

73.   The first difference requires no further discussion, the procedure for materials being exactly analogous to the procedure for finished goods. However, the estimation of material price indices is more problematic.

74.   In the absence of up-to-date information on the structure of intermediate consumption by branch of activity, it is difficult to perform the inventory valuation adjustment for materials at a more disaggregated level. However, at the level of the whole economy, it should be possible to calculate an index based on producer prices, that combines the price indices of those branches of activity that produce goods for intermediate consumption, including branches that produce fuels. In calculating such an index, the only industries that should be excluded are those that produce goods clearly destined for final consumption or for capital formation.

Inventories of goods in process

75.   A number of countries collect information on costs of production, by branch of activity. For such countries, the stock-holding periods of inventories of goods purchased for

resale can be estimated by comparing the inventories of goods purchased for resale with costs of production. The procedure is identical to the procedure used in the case of finished goods, except that costs of production are used in the place of sales.

76.   If there is no information on costs of production, there will be no method analogous to the one discussed in the case of finished goods for deflating the book values of inventories of goods in process. In that case, the national accounts staff should assume that the book value of inventories of goods in process is valued at current costs, in which case the procedure of deflating the inventory by the price of the preceding month, is appropriate.

Inventories of goods for resale

77.   There are several possibilities regarding the data available on sales: (1) the data distinguish sales of goods of own manufacture from sales of goods purchased for resale, (2) the data refer only to sales of goods of own manufacture, or (3) the data combine the two categories together.

78.   If the first case obtains, then a procedure exactly analogous to the procedure for finished goods can be used to calculate stockholding period and weights for inventories of goods purchased for resale. In the absence of more specific information, the producer price index for goods should be used as the deflator. However, it should be noted that more specific price indices will be available for wholesale and retail trade.

79.   In the second case, there will be no information on the sale of goods purchased for resale by branches of activity other than wholesale and retail trade, and the procedure used should assume that the inventories are valued at current prices.

80.   In the third case, inventories of goods purchased for resale should be combined with inventories of finished goods, and the procedure described for finished goods should be followed. In this case, the price indices to be used are the producer price indices pertaining to each branch of activity.

IV. THE UNDERCOVERAGE OF ECONOMIC STATISTICS

81.   The statistics used to compile the national accounts must cover all economic activity, but complete coverage is bound to remain an ideal rather than a realization. There are several kinds of undercoverage of economic activity in statistical surveys and in the other sources used to compile the national accounts: (1) there is the "informal economy"--those small-scale, private activities, which present special difficulties for statistical coverage; (2) there is the formal unrecorded economy, i.e., businesses that belong to the formal economy for which statistical reports are not being received and whose activities are not being inferred; (3) there is the "hidden economy," which may overlap with the informal and unrecorded economies, but which includes activities of formal enterprises that are hidden or misrepresented although the enterprises are covered in statistical surveys and other sources; and (4) there are illegal

activities (such as drug production and trafficking) that are productive in an economic sense but difficult to capture in statistics. In the following paragraphs we will discuss these kinds of undercoverage and their effects, with a focuss on the latter (the terminology we use here is chosen for reasons of convenience, rather than to evoke a terminology discussion).

The informal economy

82.   The informal economy is made up of small-scale businesses that operate from private homes, in streets or markets, or without a fixed base, and activities include small scale farming, small-scale transport, small scale-construction, street selling, repairs, herding, and other small-scale trading. Probably, in most countries there exists some informal economy; if circumstances are favorable the informal economy may increase rapidly and become a source of economic growth. This may well be the case in economies in transition; however, substantial evidence is scarce as statistics about the informal economy are evidently poor in terms of coverage and accuracy compared with those for the rest of the economy.

83.   While probably not insignificant, it seems unlikely that the lack of information on informal activities would largely distort GDP estimates in transition countries. Informal activity is mostly retail trading activity, service activity, small scale construction, small-scale trucking and agricultural activity. In the case of trading, the value of output is a markup over the value of the goods that are being traded, less the costs involved in engaging in the informal trade. Usually, the contribution of retail trade to GDP is not large, and the contribution of informal trading activity is bound to be even less. The same is true of trucking, personal services and repairs. Informal agriculture may well be more significant than trade or services, but estimates on this activity often include estimates of informal activity.

84.   These observations can be matched by equivalent observations regarding the incomes from informal activity. Those available to engage in informal activity are some of the non-participants in the formal labor force (e.g., housewives, retired persons, handicapped, unemployed), and those with jobs who are motivated to supplement their income and who have the energy and the opportunity to do so (farmers being an example of people with both the opportunity and the motivation). Relative to the number of person-hours devoted to formal activity, any reasonable estimate of the number of person-hours likely to be devoted to informal activity is bound to be modest.

The formal unrecorded economy

85.   The formal unrecorded economy relates to inadequate coverage of the activities of private sector business firms that belong to the formal sector; this may occur for two reasons: (1) the absence of business registers or the under-representation of private sector firms in business registers; and (2) low rates of response on the part of such private sector firms as have been captured in the statistical net, without appropriate imputation for non-response. In economies in transition, rates of response may be low because of (a) a concern that responses to statistical surveys could find their way into the hands of taxation authorities or into those of

organized crime, (b) an attitude that statistical surveys may be an instrument of recidivist control by the government and (c) a perception that the government is powerless to enforce compliance, or that sanctions against non-compliance are not significant compared to the risks that might be involved in complying. In some countries, the undercoverage of activities in the formal sector may be a more important gap in the estimation of the national accounts than the informal economy.

The hidden economy

86.   In economies in transition, enterprises of any size, including the largest, may contribute to the under-coverage of economic activity while they are included in statistics. The two main reasons for this are (1) that of part of their activities may concern outside-the-books transactions, and (2) under-reporting to avoid taxes. Examples of outside-the-book transactions that allegedly take place concern state enterprises that sell to private enterprises at low prices and receive kickbacks. Under-reporting to avoid taxes may be committed by firms that understate their revenues or their wages and salaries to taxation authorities; in order to avoid the possibility of inconsistencies coming to light they may decide to do likewise in statistical surveys. For instance, in a number of countries rates of taxation on payrolls are higher than rates of taxation on profits; firms are therefore motivated to understate rates of pay and to provide bonuses to employees taken from net revenue instead. This source of economic activity can also be important.

The illegal economy

87.   The three categories of economic activities causing under coverage mentioned thus far, are mostly legal; although misrepresenting data to avoid taxes of course as such is not legal, the activity it concerns usually is not criminal. However, in most countries there are also criminal activities that have economic significance. Examples of these are production of drugs, drug trafficking , prostitution, illegal copying of music and books, and abuse of brand names.

88.   Statistical capture of these activities is evidently a difficult issue; direct observation is obviously often out of the question, and statisticians may be ill advised to try. Nevertheless, these activities can be of significant importance; not only for a reliable representation of the production process, but also because of the effects on income distribution, consumption, saving and fiance. Therefore, if significant illegal production may be surmised in a country, efforts should be made to cover these statistically one way or the other.

Effects on statistics

89.   As was mentioned earlier, ideally statistics should cover the economic activities in a country comprehensively. This does not only apply to the statistics covering specific economic activities, but also the total economy as covered in the national accounts. Although the national accounts compilation offers some possibilities to enhance coverage where source statistics suffer from lacunas (we will come to that later on), these possibilities are limited and

comprehensive source statistics of major importance. Nevertheless, we have to recognize that this in practice this is not likely to be achieved, given limitations of staffing and equipment that statistical offices often face. Therefore, it is useful to develop a view as to where scarce resources could be best employed. For instance, with relatively small efforts it may be possible to enhance the coverage of government owned enterprises and large enterprises; while it may take huge efforts to cover the illegal economy.

90. For countries in transition, the improvement of source data for the national accounts is likely to require three separate strategies. The first strategy will involve the improvement of standard survey processes, including of the registers of potential respondents to surveys, with a view to capturing a greater proportion of private sector and informal activity, through direct response and through imputation. For reasons that will become apparent, this is likely to be a long-term strategy. The second strategy, more medium-term in character, will seek to use household surveys as a means of capturing activity not now captured through business surveys, as a means of correcting for bias in business surveys. The third strategy will involve the development of methods for estimating activities that are not likely to be measured directly or for which direct measurements are likely to contain large errors and omissions.

A. The Improvement of Standard Survey Processes

91. One of the fundamental requirements for surveys of business activity in a market economy is the statistical office's business register, i.e., a list of businesses, their addresses, component units, and other information such as industrial classification, size, or kind of ownership. The business register defines which businesses will be covered in each survey and, therefore, how comprehensive the resulting statistics will be. In a planned economy, identification of businesses is a relatively minor task, because there are a small number of large enterprises, and only a few enterprises cease operating or new enterprises are created. In a market or transition economy, the number of enterprises is very much larger, and there is a continuing process of births and deaths of enterprises. A considerable amount of statistical effort is required to keep the register current.

92. One of the advantages of a business register is that it can serve as a sampling framework Sampling can also be used to reduce the collection and respondent burden (especially for smaller firms). With scientific selection, sampling errors will be relatively small and more attention can be devoted to non-sampling error (e.g., poorly completed forms). Where respondents have problems in completing forms, field interviews are a likely to improve reporting. Field surveys may also serve to tackle problems of under reporting as discussed above.

93. The sources of information used to update the statistical office's business register depend on the legal and economic conditions of each country. Some of the sources will include business licenses, taxation registers, business bank accounts, and telephone line connections. In some countries, businesses are required to register with the statistical office. However, it should be recognized that despite the statisticians' best efforts, many enterprises

may still not be detected. Moreover, it will be difficult to identify businesses that have ceased operating and to maintain up-to-date addresses and codes on type of activity and size of business. Thus the up-dating of registers requires not only adequate processes of registration, but also a continuous process for confirming the information in the register.

94.   It must be recognized that the development and maintenance of business registers that are comprehensive and up-to-date is likely to be a long term objective. For this reason, but also because of the very nature of the units involved, it is also useful to look at other means to provide a sampling framework. One possibility would be the application of a technique widely used in social statistics, but not so often applied in economic statistics, namely area sampling. For example, one can use the random walk method, according to which surveyors are given starting points randomly chosen on a map and instructions to go to the nearest building near each starting point and then every nth building in that street.

95.   To enhance response, a number of approaches can be followed, of which we would like to emphasize four. First, confidence should be build up in the statistical office as an independent agency, safeguarding confidentiality. Second, a statistical law, among other things requiring enterprises to supply data should be adopted; however, reliance on penalties to force compliance should be limited and statisticians should use cooperative techniques as much as possible. Third, a reputation should be established for being politically independent, and producing useful, publicly available data. Fourth, content and design of survey forms should be maximally user friendly. After all efforts to achieve response are unsuccessful, there should be procedures to estimate data for non-respondents using the information received from similar enterprises.

B.   The Potential Use of Household Surveys to Correct for Under-Coverage, for Non-Response, and for Bias in Business Surveys

96.   Many small businesses cannot be identified for inclusion in the business register. An alternative approach is to do a survey of households and ask them about their involvement in business activities. At their most simple, such surveys would ask only about hours of work and kind of activity. These surveys could also capture the part-time involvement of housewives and other individuals in informal activities. (The results could be converted to money terms using an estimated average hourly rate of return from the formal sector.) Such surveys would probably be nested in more general surveys of the labor force.

97.   Suitably designed, labor force surveys might be used as substitutes for business registers, in cases where the latter are not thought to be reliable or are in process of development. To be used for such purposes, labor force surveys would have to ask questions about kind of activity, hours worked and the size category of the employer(s) (in both primary and secondary jobs). If business surveys then also incorporate questions about the number of employees and the number of hours worked, the results from the labor force survey could be combined with the available business responses to impute, at one and the same time, for under-coverage in the business register and for non-response in business surveys.

98.   It may be possible to identify respondents to surveys whose reported profitability lies significantly below the normal range for businesses of similar size that are engaged in the same kind of economic activity. On the assumption that such outlier behavior would be due to misreporting for covert reasons, it may be possible to use the average relationship within the normal range of businesses between hours worked and the various elements of revenue and cost to correct the responses of the outlier enterprises. It remains to be seen whether such a suggestion turns out to be practical.

99.   In a number of countries, there are household income and expenditure surveys which collect data on household incomes and on household purchases of consumer goods and services. The estimates provided by these surveys could be compared with the estimates of sales reported by retailers. Provided that errors and omissions are negligible, the difference between the two could be taken to represent purchases by households from the informal sector. However, for economies in transition, errors and omissions are likely to be large both because of non-response in retail surveys of the formal sector, and because of bias in household income and expenditure surveys. The bias in such surveys tends to have two sources: (1) the sensitivity of information about incomes, which determines that few of the well-to-do ever respond to such surveys; and (2) the onerous nature of the very detailed questions on household expenditures, questions included in order to provide information needed to estimate the weights for consumer price indexes. While it would be possible to design surveys supplementary to the ordinary household expenditure surveys, that collect a modest amount of aggregate information on incomes and expenditures, and thus reduce the bias due to the onerous nature of the ordinary surveys, the bias due to the sensitivity of information on income would remain. Thus, although they may be suitable for estimating weighting patterns for consumer price indexes, data from household expenditure surveys are not likely to be the best source for estimates of aggregate household expenditures on consumer goods and services.

C. Coverage of Illegal Productive Activities

100.   As we mentioned above, direct observation of illegal activities is often not practicable, with possible exclusion of illegal activities that authorities turn a blind eye on. Nevertheless, these activities are likely to be taboo and participants both at the supply and the demand side will be difficult to identify.

101.   This means that statistical agencies facing the exacting task to cover illegal activities have to turn to indirect information, such as police reports, medical records, tax reports (in some countries illegal activities are subject to taxation), ans so on and so forth. Agricultural production of drugs can be estimated through aerial surveys, and for some production the use of key intermediate inputs can be indicative. Often, the available information is only anecdotal, and estimates based on incidental information should be interpreted very carefully. Nevertheless, the remark that an estimate of zero value added is also wrong, although maybe a cliche, is no less true.

D. National Accounts Adjustments

102.   Despite the best efforts of statisticians, direct collection of data pertaining to the informal, formal unrecorded, and hidden economies, or imputations based on data collected directly, may still be incomplete. Statisticians, especially national accountants, can use other methods to check the coverage of the estimates and, if necessary, make adjustments.

103.   One method of checking data is to analyze the results for consistency with expected physical relationships. For example, agricultural output data from surveys can be compared with other information about areas and average yields. Another example is comparing data on food supply with knowledge about per capita dietary patterns. These methods are not precise, but can be used as a check on other data, and are sometimes used when no other information is available.

104.   However, care must be exercised in formulating assumptions about the correspondence between physical relationships and the national accounts, basically because no strong evidence is available to support a specific choice of relationship, (e.g., assuming a linear relation because there is no evidence to the contrary seems no more warranted than choosing an exponential, or log-linear relationship). For example, it will be misleading to use changes in electric power consumption as a proxy for changes in the GDP of countries in transition[10] for at least two reasons; first because there are components of the use of electricity which are not affected significantly by changes in output of rpoducers, including the use of electricity for lighting and heating by households, enterprises and other institutions (schools, hospitals, public buildings) [11], and second because the price of electricity, although it has increased faster than the prices of most other goods and services, has increased very much more slowly that the price of petroleum; there have been observable substitutions of electricity generated by hydroelectric or thermonuclear facilities for electricity generated by fossil fuel plants.

105.   Data from the suppliers to the informal sector can sometimes be used to estimate the extent of the informal activity. For example, the building industry may include many small enterprises. It is usually possible to obtain reliable data about the production of building materials such as bricks, cement, and pipes. From a sample of builders, a relationship could be developed between the value of building materials used and the total value of work done. This

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[10] See I. Dobozi and G. Pohl: "Real Output Decline in Transition Economies--Forget GDP, Try Power Consumption Data," *Transition Newsletter*, the World Bank, Volume 6, January-February 1995.

[11] In the case of heating, there may be substitution in the medium term between electricity and other sources of energy, the direction and magnitude of which will depend on changes in relative prices.

would then be applied to estimates of the total value of building materials to obtain estimates of the total value of work done.

106. The most systematic and comprehensive national accounts adjustments are made in the process of compiling input-output tables. This involves commodity flow studies, whereby the domestic and imported supply of particular commodities (goods and services) is compared with available information on their disposition, including, in the case of consumer goods and services, intermediate consumption, the change in inventories, exports and consumption by households. Discrepancies between estimates of supply and estimates of disposition then lead to imputations of the difference to the items whose estimation is least firmly based. These adjustments (to estimates based on data collected through surveys and other sources) can also be applied to estimates of the national accounts over the interval following the compilation of the most recent input-output table. Of course, the effectiveness of such methods of estimation depends on the extent to which corrections have been made to the source data for non-response and bias. Moreover, commodity flow studies will not capture aspects of economic activity which fail to be captured in measurements both of supply and of disposition.

107. If both supply and demand equally escape statistical coverage, input-output compilation and commodity flow methods will not help. However, other aspects of national accounting may provide further insights into the adequacy of estimates. In the framework of the accounts not only supply and use of goods and services have to be balanced, but also incomes, use of incomes, saving, investment and finance. Although all these variables may have intrinsic weaknesses, bringing them together in a consistent framework will further help to uncover data deficiencies.

108. In statistical publications, it may be desirable to show data for public, large-scale private, and small-scale private enterprises separately. It could also be useful to show the official sector separately from the adjustments for the informal sector. This will assist users in assessing the coverage of the data and in analyzing the sources of growth by sector.

V. CUMULATIVE COLLECTION AND COMPILATION OF DATA

109. In many transition countries the collection of data from enterprises is conducted using forms that were designed during the era of central planning. The forms require enterprises with employment above a given threshold (often 5 employees) to report monthly on a cumulative year to date basis, as a means of monitoring conformity with the plan. Other enterprises report annually. As a result, the national accounts for these countries are compiled and presented on a cumulative year to date basis, and they are analyzed by comparing the estimates with the same period of the previous year.

110. Monthly and quarterly estimates of the accounts are often obtained by subtracting the cumulative figure for the previous period from the cumulative figure for the current period. For example, the estimate for the second quarter is obtained as the difference between the cumulative figure through March and the cumulative figure through June. This procedure is

subject to error for two reasons. Firstly, any revisions to data for a previous period will be captured only in the cumulative figure for the later period and, therefore, would be incorrectly included in the later monthly or quarterly estimate. Secondly, changes in the coverage of enterprises reporting between the two periods will distort the estimates obtained as the difference. The estimates for December and the fourth quarter are particularly affected by the latter issue because the annual estimate includes the data for the smaller enterprises which only report annually. Similarly, whenever a new enterprise is included in a statistical collection the monthly and quarterly estimates to which it contributes are distorted because the activities of the enterprise are incorporated into the series on a cumulative year-to-date basis in the latest period.

111.   Since the beginning of 1996, some transition countries have begun to collect separate monthly data in addition to the traditional cumulative figures. Preliminary results show some substantial differences between the sum of the monthly data and the equivalent cumulative figure. Investigations are being conducted into the cause of these discrepancies.

112.   The usefulness of presenting monthly and quarterly economic information as a time series, for the purposes of analyzing trends and turning points in the data, has been emphasized during missions and seminars conducted for transition countries. In the absence of seasonally adjusted time series, it is common practice among these countries to present annual rates of change, for example the rate of change from Quarter I of Year I to Quarter I of Year II, instead of period-to-period changes. As shown in the following numerical example, these rates of change can be quite misleading, indicating, for example, that an economy is still in recession when economic activity has actually been recovering for some time. If annual rates of change, based on the change between a quarter and the same quarter of the previous year, are used, turning points in the data show up with a substantial delay. Moreover, if the annual growth rates are based on the cumulative data, the delays in picking the turning points are even longer. Consequently, this form for analysis can have a severe impact on the assessment of macroeconomic policy.

113.   This example illustrates the importance of recording data and rates of change on a period by period basis, rather than cumulatively or compared to data from a year earlier. A numerical example, using hypothetical data, is presented in Table 4.[12]

114.   The example contains two turning points. The first turning point occurs in Quarter I of 1992, while the second occurs in Quarter I of 1993. These turning points can be distinguished clearly from the discrete quarterly data presented in the first column or from the quarter-to-quarter rates of change presented in the third column. The first turning point is indicated by the change in quarterly rates of change from a negative rate in Quarter IV of 1991 to a positive rate in Quarter I of 1992. Similarly, the second turning point is indicated by the

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[12] This example was developed as a teaching tool by a colleague, Mr. Nils Maehle.

change from a positive to a negative rate of change between Quarter IV of 1992 and Quarter I of 1993.

115. In the absence of seasonally adjusted time series it is common to present annual rates of change, for example the change from Quarter I of Year I to Quarter I of Year II, instead of period-to-period changes. In the example, these annual rates of change are presented in the fourth column and show the second turning point as having taken place in Quarter III of 1992, that is two quarters after it actually occurred. If the annual growth rates are based on cumulative data, as shown in the final column, the analysis gives the impression that the turning point took place three quarters after it actually occurred.

Table 4. Hypothetical Data

Quarter	Discrete data	Cumulative data	Quarter to quarter rate of change, discrete data	Change from the same period in the previous year	
				Discrete data	Cumulative data
Q1 1991	100	100			
Q2 1991	94	194	-6.0%		
Q3 1991	90	284	-4.3%		
Q4 1991	86	370	-4.4%		
Q1 1992	90	90	4.7%	-10.0%	-10.0%
Q2 1992	93	183	3.3%	-1.1%	-5.7%
Q3 1992	97	280	4.3%	7.8%	-1.4%
Q4 1992	100	380	3.1%	16.3%	2.7%
Q1 1993	97	97	-3.0%	7.8%	7.8%
Q2 1993	95	192	-2.1%	2.2%	4.9%
Q3 1993	90	282	-5.3%	-7.2%	0.7%
Q4 1993	87	369	-3.3%	-13.0%	-2.9%

116. These results are presented graphically in Charts 1 and 2. The turning points show up clearly in Chart 1, and show up in Chart 2 at the points where the respective lines cross the zero point. Lags in identifying the turning points are evidenced by a shift to the right in lines in Chart 2.

Chart 1

Chart 2

Growth rates
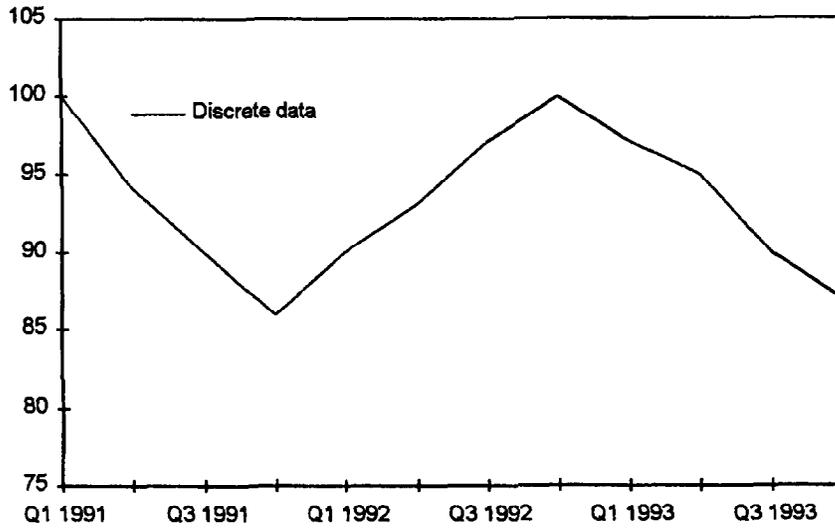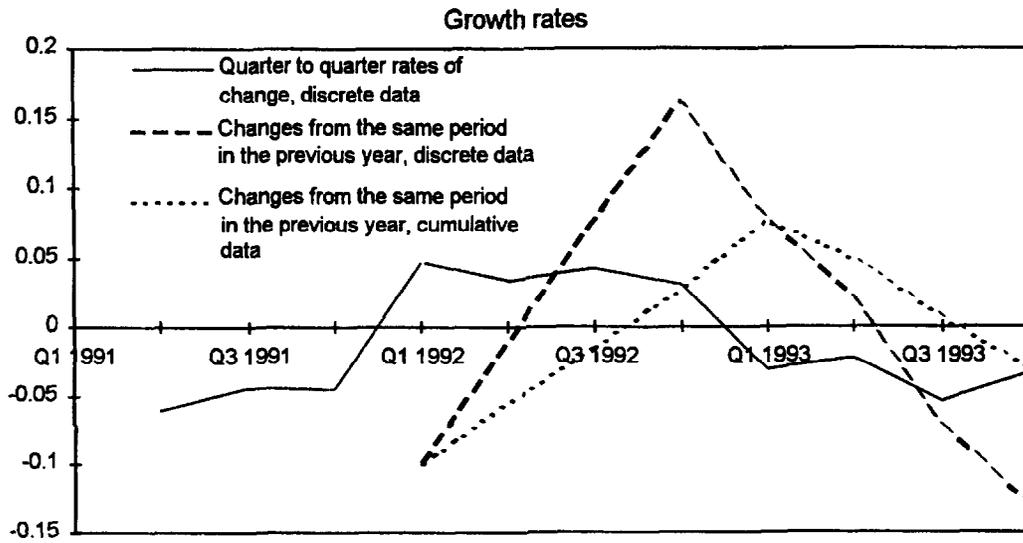
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Valuation of Output: Numerical Example

This example demonstrates the effect on the measurement of GDP of producers including an interest component in the price of their output to cover late payment during periods of rapid inflation. It demonstrates, also, the effect of recording transactions using a mixture of accrual and cash based transactions. The example uses a simple economy with only two enterprises (a producer and a retailer); the intermediate consumption of the producer is all imported, while the retailer has no intermediate consumption; and there are no inventories. The scenario underlying the example is that the producer sells all its output each period to the retailer for distribution to households for consumption. In period 1, the retailer charges a price sufficiently above its purchase price to enable it to pay on time. In period 2, however, the producer doubles its price and the retailer delays payment for some purchases, and starts to build up arrears. The producer had included an element of interest in its price in anticipation of late payment by the retailer. In period 3, the producer again doubles its price (including a greater element of interest), the retailer repays the arrears accrued in the previous period but delays payment for most of the goods purchased in the current period. The arrears build up at a greater rate. In period 4, the situation is similar to period 3, except that the retailer is able to increase its price more than the producer and slow down the rate of increase in arrears. The example is presented in four tables.

Table 5 presents the basic data underlying the example. It shows for the producer the quantity produced and sold, the invoiced price and the price adjusted for interest, the resulting values of sales, the materials used in production (all imported), and the wages paid. Similarly, for the retailer it shows the quantity sold and its price, the cash payment made to the producer for the goods sold, and the wages paid. This table shows, also, the cash flow for each enterprise. It should be noted that the retailer is not able to increase prices sufficiently to cover the cost of the goods sold and, therefore, delays payment to the producer. As a result, arrears build up between the retailer and the producer as shown, and both enterprises have a positive cash flow.

Table 6 converts the basic data into enterprise profit and loss statements, presented on an accrual basis. Two statements are presented for each enterprise reflecting the different valuation that could be given to sales by the producer to the retailer. In the "invoiced prices" statement, sales by the producer (purchases by the retailer) are valued at the invoiced price. In the "adjusted prices" statement they are valued at the price excluding interest. As a result, the latter statement for each enterprise records the interest component separately and differentiates operating surplus from overall profit.

Table 7 presents the national accounts that would be compiled if the invoiced prices were used to value the sales from the producer to the retailer. In the accrual accounting section the data are recorded on an accrual basis, and provide a common estimate for GDP by each of the three standard approaches. This is because the overstatement in the value of the producer's value added that results from the use of inflated prices is offset exactly by an understatement in the retailer's output and value added, resulting from overstating the value

of purchases. For example, in period 2, the value added of the producer equals 1000 and is derived from Table 6 as output at overstated invoiced prices (1600) minus cost of sales (600), while value added for the retailer equals -240, derived as sales (1360) minus cost of sales at overstated invoiced prices (1600). The mixed accounting section shows the effect of recording the producers transactions on an accrual basis while recording those of the retailer on a cash basis. As the latter overstate the value added and operating surplus of the retailer, the estimates of GDP from the production and income accounts overstate the true level of GDP by the value of arrears. For example, in period 2, the operating surplus of the retailer on an accrual basis is -540 (Table 2, invoiced prices) while the surplus on cash basis is 60 (Table 5, cash flow). The difference of 600 between these estimates is the change in arrears in period 2 (Table 5).

Table 4 presents the national accounts that would be compiled using the adjusted prices; i.e., accounts that remove the interest component from the value added of the producer and from the purchases of the retailer. For example, in period 2, the value added of the producer is 840, derived as output at adjusted prices (1440) minus cost of sales (600), while for the retailer the value added is -80 and is derived as sales (1360) minus cost of sales (1440). The difference between the value added on an accrual basis in Tables 3 and 4 for each enterprise is the interest component of 160 (Table 6, adjusted prices). Similarly, the operating surplus of each enterprise on an accrual basis differs between Tables 7 and 8 by the interest component of 160.

In this example, the overall GDP in Table 8 is identical with that of Table 7, suggesting that the inclusion of an interest component in the producer's price only leads to a distortion in the measure of value added by activity. This result occurs because of the simplified nature of the example where all the output of the producer goes to final consumption via the retailer. If some of the output was sold directly to final use by the producer at prices that included an interest component then the adjusted value of GDP would be lower than the invoiced price value to the extent of that interest. The simplified nature of the example also results in the expenditure approach producing the correct estimate of GDP in both Table 7 and Table 8.

Again, a mixed accounting presentation is provided which shows that GDP would be overstated by using cash-based accounting records, but that the overstatement would be less than is shown in Table 7 because the accrual based figures for the producer exclude the interest component. The cash based figures for the retailer in Table 8 are identical with those of Table 7 because they record the payments by the retailer and cover indistinguishably the purchase price and the interest component.

Table 5. Basic Data

	Period 1	Period 2	Period 3	Period 4
I. Transactions data				
a. Producer				
Production (quantity)	1000	800	600	500
Sales (quantity)	1000	800	600	500
Price (invoiced)	1.00	2.00	4.00	5.00
Price (adjusted for interest)	1.00	1.80	3.00	4.50
Sales value (invoiced)	1000	1600	2400	2500
Sales value (adjusted)	1000	1440	1800	2250
Imported material	700	600	450	350
Wages	200	200	200	200
b. Retailer				
Sales (qty)	1000	800	600	500
Price	1.50	1.70	2.80	5.50
Payment to producer (cash)	1000	1000	1200	2000
Wages	300	300	300	300
II. Cash flow				
a. Producer				
Sales and interest	1000	1000	1200	2000
Purchases	700	600	450	350
Wages	200	200	200	200
Net cash flow	100	200	550	1450
b. Retailer				
Sales	1500	1360	1680	2750
Payment to producer	1000	1000	1200	2000
Wages	300	300	300	300
Net cash flow	200	60	180	450
III. Arrears (change)	0	600	1200	500

Table 6. Enterprise Bookkeeping
(Accrual basis)

	Period 1	Period 2	Period 3	Period 4
I. Profit & Loss (invoiced prices)				
a. Producer				
Sales	1000	1600	2400	2500
plus inventories	0	0	0	0
OUTPUT	1000	1600	2400	2500
Cost of sales	700	600	450	350
Purchases	700	600	450	350
less inventories	0	0	0	0
Wages	200	200	200	200
Operating surplus	100	800	1750	1950
Interest income	0	0	0	0
Profit	100	800	1750	1950
b. Retailer				
Sales	1500	1360	1680	2750
Cost of sales	1000	1600	2400	2500
Purchases	1000	1600	2400	2500
less inventories	0	0	0	0
Wages	300	300	300	300
Operating surplus	200	-540	-1020	-50
Interest expense	0	0	0	0
Profit	200	-540	-1020	-50
II. Profit & Loss (adjusted prices)				
a. Producer				
Sales	1000	1440	1800	2250
plus inventories	0	0	0	0
OUTPUT	1000	1440	1800	2250
Cost of sales	700	600	450	350
Purchases	700	600	450	350
less inventories	0	0	0	0
Wages	200	200	200	200
Operating surplus	100	640	1150	1700
Interest income	0	160	600	250
Profit	100	800	1750	1950
b. Retailer				
Sales	1500	1360	1680	2750
Cost of sales	1000	1440	1800	2250
Purchases	1000	1440	1800	2250
less inventories	0	0	0	0
Wages	300	300	300	300
Operating surplus	200	-380	-420	200
Interest expense	0	160	600	250
Profit	200	-540	-1020	-50

Table 7. National Accounts
(Using Invoiced Prices)

	Period 1	Period 2	Period 3	Period 4
I. Accrual accounting				
a. Production approach (value added)				
Producer	300	1000	1950	2150
Retailer	500	-240	-720	250
Total GDP	800	760	1230	2400
b. Income approach				
Wages	500	500	500	500
Operating surplus-producer	100	800	1750	1950
Operating surplus-retail	200	-540	-1020	-50
Total GDP	800	760	1230	2400
c. Expenditure approach				
Consumption	1500	1360	1680	2750
Inventories	0	0	0	0
less Imports	700	600	450	350
Total GDP	800	760	1230	2400
II. Mixed accounting				
a. Production approach (value added)				
Producer (accrual)	300	1000	1950	2150
Retailer (cash)	500	360	480	750
Total GDP	800	1360	2430	2900
b. Income approach				
Wages	500	500	500	500
Operating surplus-producer	100	800	1750	1950
Operating surplus-retail	200	60	180	450
Total GDP	800	1360	2430	2900
c. Expenditure approach				
Consumption	1500	1360	1680	2750
Inventories	0	0	0	0
less Imports	700	600	450	350
Total GDP	800	760	1230	2400

Table 8. National Accounts
(Using Adjusted Prices)

	Period 1	Period 2	Period 3	Period 4
I. Accrual accounting				
a. Production approach (value added)				
Producer	300	840	1350	1900
Retailer	500	-80	-120	500
Total GDP	800	760	1230	2400
b. Income approach				
Wages	500	500	500	500
Operating surplus-producer	100	640	1150	1700
Operating surplus-retail	200	-380	-420	200
Total GDP	800	760	1230	2400
c. Expenditure approach				
Consumption	1500	1360	1680	2750
Inventories	0	0	0	0
less Imports	700	600	450	350
Total GDP	800	760	1230	2400
II. Mixed accounting				
a. Production approach (value added)				
Producer (accrual)	300	840	1350	1900
Retailer (cash)	500	360	480	750
Total GDP	800	1200	1830	2650
b. Income approach				
Wages	500	500	500	500
Operating surplus-producer	100	640	1150	1700
Operating surplus-retail	200	60	180	450
Total GDP	800	1200	1830	2650
c. Expenditure approach				
Consumption	1500	1360	1680	2750
Inventories	0	0	0	0
less Imports	700	600	450	350
Total GDP	800	760	1230	2400