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Comprehensive Measures of GDP and the Unrecorded Economy

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Abstract

Comprehensive coverage of national accounts estimates is important; however, it is often thwarted by gaps in the recording of economic activity – the so-called "unrecorded economy". This paper sets out pragmatic statistical approaches for incorporating the unrecorded economy in the national accounts. It describes sources and methods to capture the unrecorded economy and discusses specific issues that arise from the use of indirect sources and techniques. Furthermore, the paper elaborates approaches for collecting data on the unrecorded economy, particularly on economic activities of the household sector.

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[1] A draft version of this paper was presented at the Workshop on the Measurement of Non-Observed Economy organized jointly by OECD, Eurostat, and the Russian State Statistical Committee in Sochi, Russian Federation (October 16–20, 2000).

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I. INTRODUCTION

For most of the uses of national accounts, comprehensive coverage is one of the most significant requirements; however, it is often thwarted by gaps in the recording of economic activity - the so-called "unrecorded economy". Several short-cut methods have been developed to achieve exhaustive national accounts estimates through a macro-modeling approach, but, as we explain in this paper, only a detailed examination of the data gaps and review of the possible sources and methods to cover them can result in estimates of decent quality.

The lack of comprehensive coverage of the national accounts is often attributed to several similar but not fully identical notions. This paper will focus on the unrecorded economy, but prominent competing concepts are the hidden economy, illegal activities, and the informal economy[2]. Undoubtedly, there are significant overlap between these concepts, but the differences are also substantial. These issues will be discussed in the next section of the paper. For the purpose of this introduction it seems sufficient to mention that these competing notions do not coincide with comprehensive coverage. Informal activities may well be recorded, activities hidden from tax authorities may well be reported in statistics, and illegal activities may well be included (directly or indirectly) in official statistics. Thus, when considering the completeness of the national accounts, the concept of the unrecorded economy seems most relevant, which is why this paper will focus on that notion.

In many countries, the lack of comprehensive coverage of the national accounts has drawn the attention of a wide audience, stimulated by authors such as Feige (1979) and Schneider and Enste (2000). Although lack of coverage is a problem for many national accounts variables, these authors have focused on GDP. Because this may be a valid focus in many countries, and because of the crucial role of GDP estimates for the national accounts system as whole, this paper also focuses on the comprehensive coverage of GDP estimates.

Implication of incomplete coverage of GDP

Lack of exhaustive coverage in the estimates of GDP results in severe shortcomings both for users and for producers of national accounts. The drawbacks for users relate to the distorted picture of the economy that is presented. Concerning GDP measures, failure to achieve a comprehensive coverage of all economic activities results in:

- Biased growth rates. A significant bias in growth rates can be expected if economic development in the unrecorded economy is very different from that of the recorded

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[2] The informal economy is often referred to as the "informal sector". However, in order not to create confusion with the concept of the institutional sector in the national accounts, we prefer informal economy or informal activities.

economy (for instance, if the unrecorded economy is an important source of economic growth).

- Misleading information on structural changes in the economy. The extent of poor coverage or non-coverage varies between activities and between variables. The structural changes shown by the data might be highly misleading because the underlying factors behind their evolution may differ and the causes for poor coverage or non-coverage may be different.

- Misleading information on the level of variables (such as the level of GDP). Obviously, the non-recording of parts of the economy will entail a downward bias with regard to the level of variables, which will thwart international comparability and the use of the data to determine shares (for instance, expenditure shares) and ratios (such as the trade balance as percentage of GDP).

- Distortions concerning the internal consistency of the national accounts. The national accounts are an integrated system, which requires that related flows be recorded consistently. Recording one part of a certain activity (expenditure on goods and services from household production) but excluding the other part of the activity (production of goods and services) introduces inconsistencies in the accounts and errors in the balancing items.

Lack of exhaustive GDP estimates has severe drawbacks for producers of statistics because, as mentioned, GDP plays a crucial role in the system of national accounts. In many countries the national accounts estimates are mainly based on estimates of GDP from the production side, and the breakdown by expenditure and income categories (if available) is derived using the production based estimate of GDP as a basis (this applies, in particular, to quarterly national accounts estimates). As well, the institutional sector accounts of the system of national accounts often have production based GDP estimates as their anchor, and production accounts are usually the point of departure for the compilation of the income, capital, and financial accounts.

Approaches to estimating unrecorded activity

Several approaches have been proposed to achieve complete coverage in GDP estimates. These can be classified into two categories, namely, (i) macro-economic modeling techniques, and (ii) statistical approaches. Macro-economic modeling techniques that have achieved some (sometimes passing) prominence include the monetary approach (for example, the approach proposed by Feige (1979)), and the global indicator approach. The fundamental idea behind the monetary approach is to study relationships between monetary developments and official GDP estimates using regression techniques with a few restrictive hypotheses and assumptions. These hypotheses and assumptions concern the velocity of money, the cash character of all transactions in the underground economy, tax burdens, the relation of cash holdings to deposits, etc. This approach essentially relates all monetary

developments that are not explained by a certain model to the under-coverage of official GDP.

A prominent example of the monetary approach is the one developed by Feige, which is based on Irving Fisher's formula that equates output with the stock of money and money velocity (MV = PT; M = money stock, V = velocity of money, P = the price level, T = total volume of transactions). Feige's approach assumes that there is a constant relation over time between the volume of transactions and official GDP. Assumptions have to be made about the velocity of money and the relationship between total transactions (PT) and total GDP (official GDP plus the part not included in the official GDP). The estimates of total transactions could be derived from estimates of money in circulation assuming some constant for the velocity of money. This method has several weaknesses. One of the main critiques to this approach has been that part of the money in circulation (in particular, bills of large denomination) is not really in circulation but kept as store of wealth. Also, the approach assumes a benchmark year with no unrecorded economy, and it is doubtful that any such year has ever occurred.[3] Furthermore, any variation in the ratio between total transactions and official GDP is attributed to the unrecorded economy. The assumption regarding a constant ratio of transactions to official GDP seems also heroic. Much of this critique could also be leveled at other monetary approaches.

A prominent example of the global indicator approach is the electricity approach proposed by Kaufmann and Kaliberda (1996). The electricity approach uses electricity consumption as a single physical indicator of overall economic activity and assumes a stable relationship between electricity consumption and total output. Major criticisms of this approach have pointed to the weak relationship between electricity consumption and output in countries where electricity is not a major source of energy in industrial production. Also, it has been observed that this relationship is nonexistent for other activities (such as agriculture). The relationship between electricity use and total output also does not remain stable. Similar criticism can be made for other global indicator methods.

One general problem with macro-economic modeling techniques is that they yield only a global estimate of GDP for the total economy while for many users a breakdown by expenditure categories and industries is vital information. Although such techniques have been useful in indicating some anomalies in the relationships between important economic variables, they can not be used in the compilation of national accounts estimates. Such approaches not only lack detailed and specific adjustments for a particular case, but also do not allow full use of available statistics that describe the current situation.

Alternatively, the statistical approaches focus on the nature of the gaps in the statistical observation, and on possibilities to fill these gaps using indirect information. In contrast to the macro modeling approaches, the statistical approaches focus on compilation of estimates

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[3] Feige uses the term "shadow or irregular economy."

based on directly relevant information; for this reason we will dub this approach the "compilation approach". A major difference with the global indicator approach is that the compilation approach operates at a detailed level, which makes the assumed relationships between indicators and output much more tenable.

Perspectives on measuring the unrecorded economy

The term "unrecorded economy" can be looked at from two perspectives, namely, (i) from the perspective of direct statistical observation, and (ii) from the perspective of compilation of national accounts. If looked at from the perspective of direct statistical observation, the unrecorded economy refers to all activities for which no regular dedicated source statistics are available that comprehensively cover those activities. From the perspective of national accounts compilation, the unrecorded economy refers to that part of the economy that is not included in the national accounts (i.e., gaps in the statistical observation from source statistics that are not filled in through indirect methods). Thus, the unrecorded economy from the perspective of direct statistical observation is more encompassing than from the perspective of national accounts compilation. It should be noted that the aim of this paper is not to make a conceptual delineation between recorded and unrecorded activities; rather its purpose is to apply practical tools to the measurement of the unrecorded economy in order to achieve a more exhaustive measure of GDP and its components. In that sense, the approaches and methods described in this paper can be used to improve the estimates for activities that are already captured in the existing national accounts compilation (activities for which dedicated source data are not available but that are nevertheless included through indirect sources and methods) and to extend the coverage to include activities that are not captured in the existing national accounts.

It should be noted that the extent of unrecorded activities could vary from one period to another depending on the statistical collection program of a country, and on the efforts of national accountants to estimate economic activities that are not recorded through dedicated source statistics. Furthermore, estimates of production for a certain activity (or part of an activity) may be unrecorded in the measurement of output and value added whereas its uses might be recorded in expenditures, though not separately identified.

This paper advocates that the core of the national accounts compilation is measurement of economic phenomena using statistical observations. Because comprehensive data from statistical observations are usually not available, national accountants have to rely on indirect sources and techniques, which implies, to some extent, a modeling approach. However, the purpose would still be to measure, as accurately as possible, a specific economic phenomenon at a detailed level using specific sources on other directly or closely related phenomena and pertaining, as far as possible, to the accounting period under consideration. Statistical compilation should follow a careful, case-by-case approach using all available sources and alternative procedures to obtain an exhaustive measure of GDP.

Structure of this paper

The structure of this paper is as follows. The next section discusses various related concepts of unrecorded economic activities in relation to the *System of National Accounts 1993 (1993 SNA)* and sets out a pragmatic approach for national accounts compilation. Section III outlines approaches for covering unrecorded economic activities. Sources and methods that can be used, and that in fact are used in many countries, are described in Section IV. This section also discusses general problems associated with available source statistics that can be used to cover unrecorded activities. It outlines general methods and also describes procedures that are applicable in specific industries. Section V discusses issues related to the development of new data sources. Section VI presents summary and conclusions.

II. UNRECORDED ECONOMIC ACTIVITIES AND THE *1993 SNA*

A. The *1993 SNA* Production Boundary

The *1993 SNA* defines the production boundary of the system and recommends that all economic activities that fall within the production boundary should be measured. The *1993 SNA* production boundary includes (a) the production of all goods whether for market or own use, (b) the production of all services that are supplied to units other than the producers, and (c) the production of housing services by owner-occupiers and domestic services produced by employing paid employees. [*1993 SNA* paragraphs 6.17–6.29]. The exhaustive measure of production refers to the comprehensive and accurate coverage of all economic activities that fall within the production boundary.
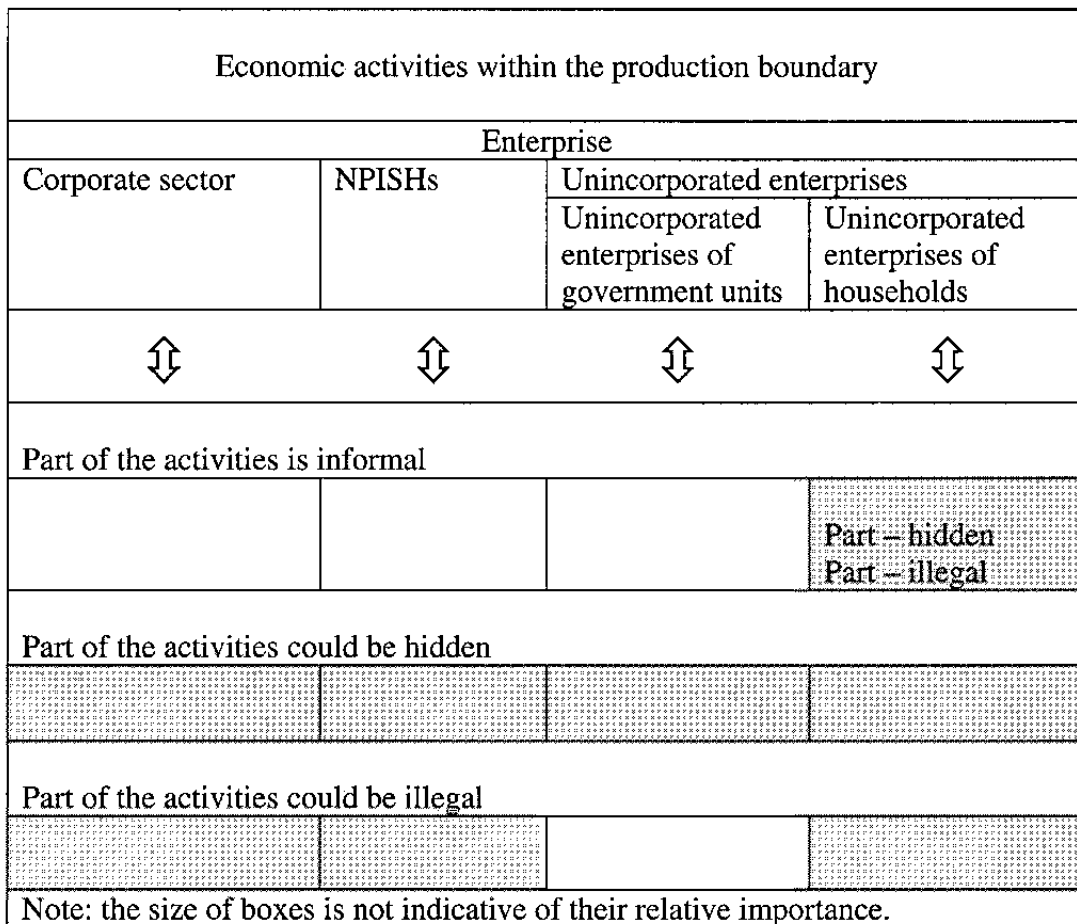
B. The *1993 SNA* on the Notions of Hidden, Illegal, and Informal Activities

As mentioned in the introduction, the concept of the unrecorded economy is often intermixed with the notions of hidden, illegal, and informal economy. The *1993 SNA* does not endeavor to delineate these concepts and they overlap, which limits their usefulness for measurement purposes. The *1993 SNA* describes production through both the concepts of activities and institutional sectors, and informal activities would generally be associated with the household institutional sector. On the other hand, illegal and hidden activities could occur throughout all sectors of the economy.

To get a better understanding of relationship between these various notions, it would help to understand how the *1993 SNA* delineates production units and then groups them into activities and sectors. The *1993 SNA* describes two main types of units, namely, enterprises and establishments. An **enterprise** refers to an institutional unit in its capacity as a producer of goods and services (*1993 SNA* paragraph 5.1). An enterprise may be a corporation (possibly a quasi-corporation), a non-profit institution, or an unincorporated enterprise. Unincorporated enterprises are exclusively found in government or household units; they do not form a separate sector but are classified together with the institutional unit owning them. An enterprise may have one or several **establishments** – a production unit (an enterprise or a

part of it) situated in a single location and carrying a single (non-ancillary) production activity. Grouping of institutional units provides a classification by **institutional sectors** and grouping of establishments results in a classification by **economic activity**. The *1993 SNA* distinguishes five institutional sectors, namely, financial corporations, non-financial corporations, government, non-profit institutions serving households (NPISHs), and households. Diagram 1 presents the relationships between units (enterprises) and sectors as well as the concepts of hidden, illegal, and informal economy. In order to highlight the issue in Diagram 1, the five sectors are combined into three groups (the corporate sector, NPISHs, and unincorporated enterprises.) As this diagram indicates, informal activities are associated with the production of households. It is also clear from the diagram that illegal activity hidden or unrecorded activity will occur in any sector of the economy.

Diagram 1: Enterprises, sectors, and hidden, illegal, and informal activities

Economic activities within the production boundary			
Enterprise			
Corporate sector	NPISHs	Unincorporated enterprises	
		Unincorporated enterprises of government units	Unincorporated enterprises of households
⇕	⇕	⇕	⇕
Part of the activities is informal			
			Part – hidden Part – illegal
Part of the activities could be hidden			
Part of the activities could be illegal			
Note: the size of boxes is not indicative of their relative importance.			

A major problem with the concept of **informal activities** is that it has been defined in different contexts with different meanings. The *1993 SNA* discusses this concept briefly in reference to the sub-sectoring of the household sector and suggests that a distinction between formal and informal, on a where relevant basis, might be useful (*1993 SNA* paragraph 4.159).

For further elaboration of the informal economy, the *1993 SNA* refers to the "Resolution concerning statistics of employment in the informal sector" adopted in the fifteenth International Conference of Labour Statisticians, ICLS (Geneva, January 1993). This resolution provides technical guidelines on the "informal sector" statistics. The "informal sector" is broadly characterized as consisting of production units with the primary objective of generating employment and incomes to the persons concerned, and as such forms a part of household unincorporated enterprises. The informal activity is defined in terms of characteristics of production units. As indicated in Diagram 1, the informal activity constitutes a part of the household unincorporated enterprises. However, there is no agreement (not even conceptually) on delineating informal activities within the household unincorporated enterprises. The 15th ICLS definition is relatively vague as it allows using several criteria in combination or separately (such as non-registration and/or employment size) according to "national circumstances" for defining informal activity. Furthermore, operational definitions for statistical collections vary widely across countries and studies on the informal economy. Specific studies targeted at particular informal activities may be useful for specific purposes. As well, the concept of "informal sector" is also of analytical interest. However, the concept of "informal sector" is not of direct importance for the central framework of the national accounts. For specific purposes, data on the informal economy, as defined according to the national circumstances but within the 15th ICLS guidelines, can be compiled as supplementary accounts.

The *1993 SNA* defines **hidden economic activities** as legal production deliberately concealed from public authorities to avoid payment of taxes and social contributions or compliance with administrative procedures and standards (*1993 SNA* paragraphs 6.34 – 6.36). **Illegal activities** are defined as productive activities forbidden by law or productive activities which are usually legal but carried out by unauthorized producers (*1993 SNA* paragraphs 6.30 – 6.33). The distinction between these two concepts in practice could be unclear. The *1993 SNA* recognizes this borderline problem and emphasizes that a precise delineation between them is not a primary concern as both activities fall within the production boundary.

As can be seen from Diagram 1, informal activities can also be hidden or illegal, which causes overlaps between these concepts, which makes it difficult to separately identify and estimate them. From the viewpoint of achieving an exhaustive measure of all productive activities, it is important to compile estimates of total production including hidden, illegal, and informal activities even if they can not be separately identified. Therefore, a more pragmatic approach for compilation purposes is to analyze what parts of the economy are not recorded and to focus on these major problem areas.

C. Recorded Versus Unrecorded Activities—A Useful Distinction for National Accounts Compilation Purposes

Although no definitions of recorded and unrecorded activities are readily available, these concepts provide a useful distinction for national accounts purposes. The *1993 SNA* does not deal with the measurement of unrecorded economic activities. Its discussion on the hidden

and illegal activities emphasizes that they fall within the production boundary, and hence they should be included in the national accounts statistics. The measurement of unrecorded activities involves compilation issues, and the *1993 SNA* emphasizes methodology and concepts rather than compilation.

Nevertheless, a distinction between recorded and unrecorded activities is critical for compilation purposes because it allows for highlighting the areas in which data gaps occur and developing compilation strategies to deal with these problem areas. Such a distinction also enables us to focus on the availability and reliability of source data -- an important consideration in developing approaches/procedures for compiling GDP estimates.

Diagram 2 shows one possible way of analyzing recorded versus unrecorded economic activities. This approach outlines the coverage of economic activities in a statistics collection system in relation to the institutional sectoring scheme in the *1993 SNA*. It, thus, advocates a data collection system geared towards fulfilling the compilation of the *1993 SNA* accounts, particularly the institutional sector accounts. The activities of government and non-profit institutions serving households are not included in Diagram 2, though they can also suffer from non-recording. Diagram 2 includes only the corporate sector and household unincorporated enterprises.

Diagram 2: Recorded versus unrecorded economic activities

Recorded – covered in statistical collections	Unrecorded – not covered in statistical collections	
Most of the corporate sector (or formal sector) included in the regular survey program of a country. Part of household unincorporated enterprises.	▪ Units within the survey scope	
	➤ but excluded due to outdated survey frames.	
	➤ but excluded due to their deliberate non-registration.	H I D D E N
	➤ Covered in the statistical collections, but that underreport or misreport.	
	▪ Part of corporate (formal sector) units not in survey scope (usually a small part, but may be important in some countries). ▪ Part of unincorporated enterprises not in survey scope (usually a significant part).	
Part of illegal activities misreported as other legal activities.	▪ Most part of illegal activities.	

The distinction between activities that are recorded in statistical collections and those that are not is important for compiling national accounts because the sources and methods for estimation of these activities will be different. Also, such a distinction is useful as it allows an assessment of the quality of the estimates (proportions of an economy estimated through solid data collections, data requiring several adjustments, fixed ratios, ad-hoc assumptions, etc.). At the same time, it indicates areas that require further efforts to develop new data sources for producing meaningful national accounts estimates.

The classification in Diagram 2 of unrecorded economic activities is made with a view to devising appropriate estimation methods and developing strategies for data collection. Within the scope of a country's regular survey program, non-recording may occur due to (i) inability of a statistical system to develop and maintain a comprehensive and up-to-date statistical register of business units, (ii) deliberate non-registration by units, and (iii) misreporting and underreporting by units actually covered in surveys.

There are always certain activities that are not included in the survey scope of a statistical system. In some countries only a part of household activities may be excluded from regular survey programs while in other countries (mostly in developing countries) even a sizeable part of corporate enterprises might be out of the regular survey scope.

Illegal activities, due to their illegal nature, pose special measurement problems. Therefore, they are grouped in a separate category for analyzing unrecorded economic activity. It should be noted that part of the illegal income may be misreported as emanating from legal activity.

III. APPROACHES FOR COVERING THE UNRECORDED ECONOMY

Improving the coverage of the unrecorded economy in the national accounts should ideally be achieved by expanding the coverage of source statistics, either by enhancing the efficiency of existing statistics, or by extending statistical observations to not yet covered areas. However, complete coverage of all economic activities through source statistics is an elusive ideal—even for the most endowed statistical offices—which necessitates the development of alternative approaches. It should be recognized that improvements in source statistics (particularly new collections) take time and may not always be feasible. However, national accounts compilation should have a comprehensive coverage of economic activities and if this cannot be achieved through enhanced source statistics, indirect methods need to be developed. Because of inherent weaknesses of indirect methods, a strategy for covering the unrecorded economy should first consider enhancing the existing statistical program with a long-term vision to broaden the statistical activities. Where this is not possible, compilation methods should be developed for uncovered activities. Institutional and resource issues should also be addressed and the strategy should be practical in terms of the capabilities of a country's statistical system. It is also highly important to secure sufficient support from users and government agencies playing key roles in the functioning of the statistical system.

The process for improving the comprehensive measurement of GDP should involve the following six activities:

- Assessing the existing national accounts compilation.

- Evaluating existing statistical sources.

- Analyzing the unrecorded economy.

- Increasing the efficiency of the existing data collection program to achieve proper representation of statistical units within the scope of existing surveys and to improve survey responses.

- Using available source data to derive estimates for unrecorded activities on the basis of indirect techniques and adjustments.

- Developing new data sources.

Assessing national accounts compilation

The starting point in determining programs and procedures for exhaustive measures of GDP is to make a thorough assessment of the existing national accounts compilation. The assessment should provide the identification of activities that are outside the existing national accounts compilation, activities which are covered through indirect compilation methods, and activities that have solid data sources.

Evaluating existing sources

An important step in improving the coverage of unrecorded activities should be an assessment of existing data sources (including both statistical inquiries and administrative sources). Assessing the accuracy and efficiency of the existing statistical collections is necessary to determine the extent of unrecorded activities. The evaluation should focus on the following aspects:

- Gaps in the statistical observation of the economy. A fairly simple but important first step is to list the economic activities that are not covered by specific statistics.

- Completeness of the existing sources. It is important to distinguish the part of the activities within the scope of the existing sources for which sufficiently accurate data are available. Sometimes source statistics may have a sufficient coverage from their own vantage point, without meeting the requirements for national accounts purposes. For example, statistics on manufacturing industries are often limited to enterprises above a certain cut-off size, which may be sufficient for industry specific uses but not for the national accounts (national accounts cannot be limited to larger enterprises only).

- Weaknesses in the existing sources. Each survey has a specific target population. Within the scope of a survey, the accuracy of the results may suffer from problems in coverage, data reporting, and survey design and operation. The various causes of the weaknesses should be investigated so that measures for their correction can be determined and implemented. The lack of an appropriate sample frame (such as a business register) is usually a major problem in ensuring the proper coverage of activities within the scope of a survey. The scope of a survey should be determined carefully, considering the importance of the activities and statistical capabilities. Survey results may also suffer from data reporting problems, such as non-response (whether complete or partial) and underreporting. Also, there might be scope for improvements in survey design and operation, including sample design, estimation procedures, development of questionnaires and instructions, field operations, and data processing.

Identifying unrecorded activities

The evaluation of existing data sources provides a picture that maps the extent and the incidence of the unrecorded economy. It reveals blank spaces on the map where no direct statistical observations are available, and reveals under-recording that may exist in areas for which source statistics are available. The prevalence and characteristics of unrecorded activities should be examined to allow choosing a suitable approach for their coverage in the national accounts in the short-run and for developing new sources in the medium- to long-run (for more discussion on this, see Bloem, Cotterel, and Gigantes, 1996).

Relevant considerations are feasibility and relative importance. For some economic activities improved coverage may be feasible with little extra effort, while in others huge extra efforts will bring little improvements. As well, some unrecorded activities may constitute a sizeable part of the economy, while others are of marginal importance only. Statistical offices would be well advised to prioritize their efforts on improvements that are relatively easy to accomplish, and that contribute substantially to the complete coverage required of the national accounts. However, it should be realized that economic activities that are relatively small in size may have an important impact on GDP growth rates, which implies that the size of an activity should not be the sole criterion for prioritizing efforts for increased coverage.

Increasing the efficiency of existing data collections

A high priority should be given to increasing the efficiency of existing data collection programs to generate accurate and unbiased data for activities within the scope of these programs. The statistical system should aim to eliminate shortcomings due to statistical reasons. Inevitably, there will still be shortcomings for non-statistical reasons, such as deliberate non-registration or underreporting. All of these shortcomings should be addressed. The improvement of existing collection programs not only increases the reliability of the estimates for that part of the economy but also provides a good basis for incorporating unrecorded activities as the existing collections are often used to derive ratios that are used in the indirect compilation methods for incorporating the unrecorded economy.

The accuracy of the statistical collections may suffer from problems in coverage, data reporting, and survey design and operation. A key to improving coverage within the scope of the surveys is to maintain an up-to-date sample frame. For business statistics, a statistical register of business units is needed. It is also important to increase response rates by improving overall survey design and operations, as well as the legal and institutional infrastructure for statistical collections. These issues are well described in the literature on survey statistics and will not be discussed in this paper.

Developing procedures for measuring unrecorded economic activities

Even with the best efforts of statisticians, data generated through statistical observations and administrative records may still be incomplete for measuring GDP. National accountants have to use various methods to check the coverage of the estimates and, if needed, make adjustments for unrecorded activities. The sources and methods used to incorporate unrecorded economic activities in the measurement of GDP by economic activity are discussed in Section IV below. General methods that can be applied to any economic activity (if the required data are available) are described in sub-section IV.B, and industry specific sources and methods are presented in sub-section IV.C.

Developing new data sources

Ultimately, the quality of national accounts depends on the quality of basic source statistics. Development of new sources may require significant efforts. A program of short- to long-term priorities for new collections should be set on the basis of the needs and capabilities of the statistical system in a particular country. The magnitude of various adjustments can provide a basis for priority setting. A discussion of issues related to the development of data sources for achieving a comprehensive measure of GDP is provided in Section V.

IV. SOURCES AND METHODS FOR ESTIMATING UNRECORDED ECONOMIC ACTIVITIES

A. General Remarks

As mentioned in the previous sections, comprehensive coverage of the economy through regular statistics is an elusive ideal, which necessitates the development of sources and methods for estimating the unrecorded economy. Data on production generated through statistical collections (including administrative records) usually cover only a part of the total economic activities falling within the *1993 SNA* production boundary. Furthermore, the statistical collections may be deficient in terms of coverage of units within their scope and due to problems in data reporting by respondents. Therefore, the national accounts compilation has to adopt procedures to deal with unrecorded activities that are appropriate to their circumstances. This section describes indirect estimation procedures and possible sources for incorporating estimates for unrecorded activities to achieve an exhaustive measure of GDP from the production approach.

There are no standard methods for incorporating unrecorded economic activities that can be applied in all cases and in all countries. The availability and quality of basic source statistics that can be used to make adjustments for unrecorded activities differ from country to country, activity to activity, and over time. For each situation an appropriate approach should be selected by investigating various possible alternatives. Care should be taken to evaluate, on a regular basis, the plausibility of the methods and the results. This will facilitate detecting any changes in data sources or in activities, and reflecting such changes in the estimation procedures.

The methods for covering unrecorded economic activities rely on indicators of these activities captured in available statistics. For measuring production, the indicators can be any economic variable that can be linked to production. The relationship between them can be strong or poor, which determines the quality of the adjustments.

B. Some Considerations for Using Indirect Data Sources

The process of incorporating unrecorded economic activities in the GDP estimates involves extensive use of available source statistics to obtain indirect indicators that can be linked to various types of unrecorded production. Against the background of the assessment of the incidence, extent, and nature of the unrecorded activities (as discussed in the previous sections), a broad range of available source statistics should be analyzed to determine how these statistics can be used to obtain indicators for the unrecorded economy. The prime objective is to use available data to produce an exhaustive measure of GDP, while avoiding gaps as well as double counting. Some general problems encountered in using various existing data may be summarized as follows.

Overlap in coverage: The existing data sources may have overlaps in coverage. If sources with overlapping coverage are used, careful efforts should be made to avoid double counting. It is important to note that some activities are usually left out of statistical collections while others have overlapping coverage. For example, if a manufacturing establishment survey covering establishments with five or more employees and an urban household non-agricultural production survey are available, they may have overlaps in coverage (household manufacturing enterprises with five or more employees) but exclude household manufacturing activity in rural areas.

Coverage is often partial: Each statistical collection has its own reference population. Some sources represent total activity, such as a nationwide household budget survey or a household labor force survey. However, many sources have a specific reference population. Therefore, indirect indicators of production derived from existing sources may still be incomplete, particularly where household unincorporated enterprises prevail. Thus, it is important to identify activities that are not represented in indirect source statistics.

Classifications in various sources may differ: The classifications used in existing sources may differ from each other, or from those used in the national accounts compilation.

Indicators are usually a by-product: It is important to determine whether an indicator of production obtained from a statistical source is collected as primary data or as a by-product. For instance, labor force information in a household labor survey or data on the stock of dwellings in a housing census are collected as primary data; whereas information on employment in a household budget survey or data on economic activities in a population census are usually collected as a by-product. Data collected as a by-product may have several shortcomings because the survey procedures are not primarily designed to collect them. Most of the indicators of production obtained from administrative sources can be considered as by-products of an official record keeping function, and may suffer from problems relating to coverage, time of recording, valuation, and consistency over time.

Partial information: Compilation of value added by economic activity requires data on output and intermediate consumption (current values and volume measures). Any single indicator of production (such as labor inputs, other inputs, demand for products) provides only a limited part of the information needed to estimate value added at current prices and in volume terms. Thus, even if a good indicator of production is available, appropriate procedures and supplementary data are needed to prepare the value added estimates. In some cases, ad-hoc supplementary surveys/investigations may be useful or needed to make efficient use of existing source data.

No clear distinction between incorporated and unincorporated enterprises: If existing information on informal activities is to be combined with regular business statistics, care should be taken to determine whether some informal activities might already be included in the regular business statistics. Production surveys usually have a reference population that may cover both incorporated and unincorporated enterprises (for instance, an industry survey may cover all units with more than 5 employees, whether incorporated or not). However, in many instances incorporated and unincorporated enterprises are not separately identified and classified. Informal activities (defined as part of unincorporated enterprises within a national specification) may be partially included in regular surveys.

Available irregularly: While some sources are available on a regular basis, others may be available only infrequently. While infrequent sources are valuable in establishing benchmark estimates, appropriate procedures need to be designed for regular compilation of annual or quarterly GDP estimates.

C. General Estimation Methods

General estimation methods are methods that, in principle, can be applied to any economic activity, provided that the required data are available. The choice of an appropriate estimation procedure depends on the availability and quality of source data that can be used to derive indicators of production. Such indicators may refer to total production including unrecorded production (such as total labor input, total capital stock, etc.), or to a part of the production including a part of unrecorded production (such as household purchases of various types of personal services), or to a part of unrecorded production (such as building

permits for private residential construction, taxes collected from individual entrepreneurs, etc.). Sometimes, indicators may refer to uses in production and other uses.

The process of incorporating the unrecorded economic activities into the GDP estimates involves complex procedures. The following points should be taken into account.

- Some procedures yield estimates of total production for a specific activity without separately identifying various types of unrecorded economic activities.

- Ad-hoc supplementary data are often required to make efficient use of existing sources (for example, value added estimates can be derived from output estimates obtained from a commodity flow method[4] combined with a value added/output ratio calculated from an ad-hoc study).

- The compilation should be based on detailed and specific adjustments using specific sources and known linkages/relationships.

- Where possible, alternative estimates should be derived, compared, and assessed for plausibility of the results. Data relating to similar aspects but from different sources should be compared and analyzed to identify errors or remaining gaps.

- The assumptions underlying the estimation procedures should be made explicit in the calculations and reviewed regularly for their plausibility.

General estimation methods that can be used include labor force survey-based adjustments, supply-based adjustments, demand-based adjustments, income-based adjustments, and adjustments through a supply and use framework. These approaches can be summarized as follows:

Labor force survey-based adjustments

The Italian National Statistical Office (ISTAT) makes an extensive use of labor force survey data to estimate the unrecorded economy. The essence of this approach is to determine the total labor inputs into a certain production activity. A suitably designed household labor force survey (HLS) can provide necessary information for measuring the extent of unrecorded activities. The procedures and requirements for implementing this method are:

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[4] The commodity flow method allows an estimate of output of a certain commodity by balancing supply and use of this commodity, using the equation [output = all disposition (intermediate consumption, final consumption, changes in inventories, gross fixed capital formation, acquisition less disposals of valuables, and exports) less imports].

Establishing total labor inputs: The total labor inputs in a certain activity are determined using HLS data that are supplemented, if needed and feasible, with demographic and administrative sources on labor participation. In order to allow estimation at a detailed level the HLS should ask questions about kind of activity, hours worked, and size of employer(s).

Establishing labor inputs underlying the production covered in business surveys: The business surveys that collect data on production should also collect data on labor inputs (number of employees/jobs, hours worked, etc.).

Ensuring that both sources provide comparable labor input data: The information about labor inputs collected in both the HLS and business surveys should allow for derivation of data in standard and comparable labor input units, such as hours worked or full-time equivalent employment.

Determining labor participation not covered in business surveys: The labor inputs data from business surveys are compared with the labor data from the HLS to determine labor participation not covered in business surveys. If a business survey does not cover the total activity (e.g., excludes establishments below a certain cut-off size) then, by definition, the HLS should have higher labor inputs. Any discrepancies should be evaluated for shortcomings/bias in the measurement of employment in both sources. The excess of total labor inputs derived from HLS compared to the labor inputs underlying the production covered in business surveys thus provides a measure of unrecorded production. However, employment that escapes both sources will still be left out.

Determining output and value added per labor unit: In order to convert the labor inputs into measures of output and value added, information on output and value added per labor unit is needed. The determination of these ratios depends on several factors. Some important steps are:

- Analyze the characteristics of production units to which the missing employment belongs. Investigate the causes of missing employment.

- Derive output and value added per labor unit on the basis of ad-hoc surveys/studies.

- If it is not feasible to conduct ad-hoc studies, use available data from business surveys.

- Determine the ratios at as detailed a level as allowed by the availability of data.

Supply-based adjustments

This method relies on information on the supply of inputs that are used in producing goods and services. Inputs may be a bundle of primary raw materials, just one major raw material, labor, land, fixed capital stock, etc. If data on supply of one or several inputs used in a certain production activity are available, the total production of the activity that uses these inputs can be estimated.

Input-output and input-value added ratios are needed to calculate output and value added estimates from the input data. Preferably, these ratios should be obtained for the current period through ad-hoc surveys to account for changes in productivity or relative prices of inputs and outputs. If ratios from the past are used, it is recommended to derive first the volume measures (or constant price measures) of output and value added. Fixed ratios from previous periods should not be applied to current values in a later period because of changes in the relative prices. The volume measures can be converted to current values by using appropriate price indicators.

If supply-based adjustments are made, several factors should be considered, including (i) changes in productivity, (ii) changes in capital utilization, (iii) the uses of certain inputs for purposes other than production, (iv) valuation differences between supply (time and place) and use (time and place), (v) creation and update of comprehensive benchmark estimates, and (vi) supplementary information to derive output and value added estimates from input indicators.

Demand-based adjustments

Demand-based adjustments aim at determining production by using information on specific uses of goods and services. This method relies on data on uses of goods and services. The indicators could be any uses of goods and services that can sufficiently describe their production. They could be household final consumption expenditures of a certain commodity (e.g., health and personal services), uses of major products as raw materials (e.g., processing of agricultural products), exports (e.g., major export commodities), or any administrative data indicating demand for a product (e.g., motor vehicle registrations, building permits, etc.).

It is important to note that demand indicators are usually segmentary. In most cases, only data on one or a limited number of major uses are available. The export value of a commodity that is mainly exported does not cover domestic uses of that commodity. Likewise, household consumption of personal services does not cover other uses, such as uses by producers and exports (but may include imports i.e., expenditures abroad by households). Therefore, compilers should take into account other uses of the same product. There are also differences between valuation of uses and output. All uses are valued at purchasers' prices, while outputs may be valued at basic or producers' prices. (For discussion on the concept of these prices, see *1993 SNA* paragraphs 6.204 – 6.217).

After a measure of output is derived, ratios (output/value added) are needed to calculate value added estimates.

Income-based adjustments

Data on some categories of income are available through administrative sources and can be used to obtain an indication of production covered by the administrative system. Income taxes paid by self-employed persons (or private entrepreneurs) or social security

contributions paid by self-employed persons are often readily available. However, further adjustments are necessary to account for activities outside the tax scope and underreporting of incomes in the tax files.

Supply and use framework

The supply and use framework provides a detailed basis for analyzing industries and products through integration and detailed and systematic breakdown of (i) the goods and services account, showing total resources (output and imports) and the disposition (intermediate consumption, final consumption, changes in inventories, gross fixed capital formation, acquisition less disposals of valuables, and exports) of goods and services; (ii) the production account, showing output, intermediate use of goods and services, and value added; and (iii) the generation of income account, showing value added and its component primary incomes generated in the process of production. The supply and use tables show two types of balances: (i) for each industry, output equals intermediate consumption plus value added, and (ii) for each product, total supply equals total uses. Supply and use tables are a comprehensive, systematic, and economy-wide application of the commodity flow method. Discrepancies between supply-use balances indicate missing items or components for which the estimates are least firmly based. These discrepancies and the analysis of their causes lead to imputation of missing items or adjustments to items with poor estimates. These adjustment factors can also be used in the national accounts compilation over the interval following the compilation of the latest supply and use tables. However, the effectiveness of such methods of estimation depends on the extent to which corrections can be and have been made to the source data for underreporting, non-response, and bias. Moreover, commodity flow methods will not capture aspects of economic activity that fail to be recorded in the measurement of both supply and use.

In recent years, the use of supply and use tables as a statistical tool in the compilation of GDP estimates has been increasing. Particularly, this framework facilitates (i) identifying gaps and inconsistencies in the basic data sources, (ii) filling gaps by calculating estimates as a residual, (iii) cross-checking and reconciling as well as improving the consistency, plausibility, and completeness of the estimates for supply and uses; and (iv) calculating estimates for periods for which less detailed and/or less reliable data are available by using coefficients and information from benchmark tables.

It should be emphasized that a supply and use framework improves the overall quality of the GDP measurement even if estimates for various unrecorded activities are obtained using the several adjustment methods described earlier in this sub-section.

D. Sources and Methods in Specific Industries

In addition to the general methods described in sub-section C, specific sources and methods are generally available to exhaustively cover specific industries in the absence of comprehensive source statistics. These sources and methods can be used to cover the whole industry, or to provide a complementary estimate if the regular statistics cover only a part of

the population and leave gaps. These gaps are most likely to concern small-scale activities in the household sector. As emphasized earlier, it is important to realize that using complementary sources and methods may result in additional overlaps and gaps, which also need to identified and eliminated.

Agriculture

Agriculture is an activity in which small-scale household production is pre-eminent. If no regular statistics are available that cover agricultural output, intermediate consumption, and value added, estimates can be based on data on areas under cultivation, yields, and costs. Data on areas under cultivation and average yield rates are often used to estimate the quantity of agricultural production. If a regular system of crop statistics exists, current data on areas under cultivation are available. Data on land use patterns obtained from agriculture censuses and/or land resource maps based on an aerial survey or a cadastral survey may be used to estimate areas under cultivation. Average yield rates are best established through harvest surveys (crop-cutting surveys). Agricultural surveys, farm management surveys, or studies on crop cultivation might also provide yield rates. These sources often also provide data on the cost structure, which can be used to derive value added estimates. These sources and methods usually provide estimates for total agricultural production. Care should be taken to account for the fact that such crop-based estimates may overlap with data from other industries that have agriculture as a secondary activity.

Nutritional statistics may also be useful. For major cereal products, government bodies may have prepared food balance estimates. The sources and assumptions used to prepare food balances may provide useful supplementary information.

Annual statistics on number of livestock, if available, are a good source for estimating the contribution of animal husbandry. If they are available only infrequently, the annual change may be extrapolated from the benchmark estimates using reproduction and slaughter rates, with adjustments for exports and imports as necessary.

Data on major inputs, such as seeds, may be applicable in some cases if data on distribution of such inputs are available (e.g., when seeds are distributed through a central channel). Industrial purchases of outputs (such as sugar cane, animal hides, wool, etc.) may be used as indicators if a substantial portion of output is processed in manufacturing industries. Data on sales to marketing boards or exports may also be of use.

Household surveys of income and expenditure may provide data on household production for own use as well as for markets.

Mining and quarrying

Mining and quarrying are usually capital-intensive activities performed by large enterprises that may be comprehensively covered in regular statistics. Nevertheless, some small-scale activity may be ongoing that needs to be covered. Data on minor mining and quarrying

activities undertaken by households are usually lacking. It may be possible to use information from the licensing system on production or employment. If employment data are available, average revenue per establishment is needed, which can be established through ad-hoc studies. Alternatively, reasonably comprehensive estimates for certain mining and quarrying products may be made on the basis of data on intermediate consumption of these products by manufacturing and construction (duly adjusted for exports and imports).

Manufacturing

Manufacturing, although often capital-intensive, is an activity in which households also engage, usually employing less capital-intensive technology. Often, surveys of manufacturing activity are conducted on a regular basis, but these surveys usually cover only enterprises above a certain cut-off size, which necessitates complementary estimates for small-scale production. Comprehensive benchmarks may be available from manufacturing censuses that usually cover also small scale operators. Data on employment, exports of manufactured products, imports of raw materials, and taxes may be used, where relevant, in combination with the benchmarks to derive estimates for current periods. Household manufacturing activity, particularly for own consumption, is difficult to capture. However, data on household manufacturing activity may be obtained from household income and expenditure surveys or occasional surveys of cottage industries.

Construction

Construction of private residential dwellings is often left out from regular statistical collections. However, infrequent or one-time survey data are usually available. Building permits or projections of housing demand can be used as an indication of housing construction. Additional details may be obtained from housing or population censuses.

In many cases, the activity of construction as a whole is measured through an indirect approach. In such an approach value of output of construction is estimated through the commodity flow method from which an estimate of the net supply of construction materials going into construction activity can be derived. This estimate is then used with fixed ratios obtained from benchmark or other comprehensive source data to estimate the volume of output. It should be emphasized that changes in the mixture of various types of construction affect the input-output ratios needed to derive output measures.

Trade

Trade is an activity in which small-scale operators are usually pre-eminent. If direct information on small-scale and household retailing activity is lacking (which is often the case) it may be possible to combine the supply of groups of products with information on the proportion of the total supply distributed through retail channels to derive retail turnover. Gross retail trading margin rates are needed to derive output estimates. Such margin rates are best established by conducting ad-hoc spot check surveys. The comprehensiveness of estimates obtained through such a commodity flow method depends on the coverage of the

supply statistics. It is often the case that import statistics do not properly include shuttle trade imports. Comprehensive supply data can also be used to validate and adjust retail trade survey data.

It should be emphasized that using such indirect sources can result in double counting because trade is often performed as a secondary activity, which may then be included in estimates of other industries.

Data on purchases of goods by households collected in household expenditure surveys may also be used to derive retail turnover. However, allowances should be made for retail purchases by other users (industries, governments, tourists, etc.).

Revenues from trading activity that is not covered in regular trade surveys may be captured through data on employment, if available. Tax administration systems and local government bodies may also provide useful information.

An estimate of trade margins can also be derived from the use table within a supply and use framework by applying estimated trade margin rates to various uses flows.

Restaurants and hotels

Information may be lacking for small restaurants, bars, cafes, other eating places, and for lodging and boarding houses that are common in many countries. Employment or taxes paid by producers or registration with local bodies or with business associations may be used as a basis for estimating value added. Household expenditure surveys can be used to estimate data on restaurants and hotel services consumed by households. However, adjustments should be made for other domestic uses (as intermediate consumption), exports, and imports of these services.

Transportation and communication services

Private transportation services, for which data are usually unavailable, can be covered using vehicle registrations and traffic statistics. The information on revenues and expenses per transport unit can be collected from ad-hoc surveys. An estimated demand may be available for certain types of transportation (e.g., freight data may be derived from foreign trade data).

Private communication services on a small-scale (such as e-mail, faxes, telephones services) are becoming important in many countries. Registration with government bodies or business associations may provide information on the number of business units.

It is useful to cross-check the output estimates of transportation and communication services against data on the use of such services, which can be obtained from household expenditure surveys, business statistics, government data, and balance of payments.

An estimate of transport margins can also be derived from the use table within a supply and use framework by applying estimated transport margin rates to various uses flows.

Business, professional, and technical services

Information on numbers of professionals involved in providing various business, professional, and technical services may be obtained from licenses issued by some regulating bodies or from professional associations. Population censuses or household labor force surveys may also provide information on the number of persons engaged in these activities.

Income tax data on the gross receipts of units or professionals involved in these activities can also be used to determine output. However, adjustments should be made for underreporting of incomes in tax declarations.

Education, health, and personal services

Data on private education, health, and personal services (where small-scale operators are often important) are usually not available. Several indicators may exist that can be used to prepare the estimates, to supplement the survey data, or to validate the estimates derived using a particular method. Various physical indicators of education and health services may be available from administrative sources. The number of establishments or professionals can be obtained from administrative registrations, issue of licenses, and professional associations. Population censuses or household labor force surveys may also provide information on the number of persons engaged in these activities. Similarly, tax records may also provide a basis for output estimates. Household expenditure surveys often supply data on consumption of these services by households, but these surveys may not be comprehensive in this respect because they will not capture the use of these services that is covered through government or insurance.

Domestic services

Domestic services are usually small-scale, although they are sometimes provided by enterprises. The small-scale activities in this area can possibly be covered through population censuses and household labor surveys, which often include data on the total number of persons employed in domestic services. Average income per employee could be estimated from small-scale ad-hoc surveys. It may also be possible to use household expenditure surveys to calculate average incomes of domestic employees.

Owner-occupied dwelling services

Estimates of the value of owner-occupied dwelling services cannot be based on direct observations since there are no market transactions for these services. Even if some information on the value of these services is found in household budget surveys, this concerns imputed values derived using some assumptions. In these cases, national

accountants should review the assumptions in order to be able to assess the reliability of the estimates and to make adjustments as necessary.

An estimation method that is often applied concerns an estimate of the number of owner-occupied dwellings (derived from housing or population censuses) and estimates of rental values (e.g., derived from housing censuses or real estate brokers).

An alternative method is the imputation of rents in terms of opportunity cost of investing in housing. In this method, net value added is derived by applying some interest rate to the estimated value of the housing stock. The consumption of fixed capital and intermediate consumption should then be added to calculate the gross output of owner-occupied dwelling services. It should be noted that this method might cause erratic movements in production and consumption of these services due to the volatility of interest rates; furthermore, in areas with a relatively undeveloped financial system, such as rural areas in developing countries, interest rates can be uncharacteristically high.

Estimates of owner-occupied dwelling services are usually prepared from benchmark estimates for a year for which detail source data are available with supplementary data for later years from various sources, such as price indices (e.g., a rent index included in the consumer price index). Construction statistics and statistics of building permits are often used to update the estimated stock of housing, particularly in the case of urban areas where building construction is regulated.

Usually the benchmarks are prepared with an urban/rural or some other regional breakdown. The benchmark estimates need to be updated periodically, and the indicators and assumptions used in the estimation should be reviewed regularly.

E. Specific Compilation Issues

It is important to note a few specific compilation issues that usually come up in the process of incorporating unrecorded activities in the national accounts. As described in the previous section, the adjustments for unrecorded activities are based on indirect indicators of production obtained from available data sources. The indicators may refer to output and/or intermediate consumption and/or other inputs. Furthermore, they may be in volume terms (such as dwelling floor areas, number of full-time equivalent employment, etc.) or in current price values (such as exports, taxes, etc.). However, the compilation of GDP by activity involves calculating output, intermediate consumption, and value added at current prices as well as in volume terms.[5] Therefore, even if an appropriate indicator of production can be obtained, the national accountants still have to use appropriate compilation techniques to derive value added estimates at current prices and in volume terms.

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[5] Because of definitional relationships, data can be considered effectively complete if two out of output, intermediate consumption, and value added are available; and two out of values, volumes, and prices are available.

If indirect sources are used, the national accounts estimates (output, intermediate consumption, and value added) are calculated by means of certain ratios that imply assumptions regarding the relationship between the estimated variable and the indicator. The quality of the estimates is improved by making the most realistic assumptions. Some guidelines that can be followed in using indicators to derive national accounts estimates are (i) explicit calculation of all items of the production account, (ii) supplementary information and fixed ratios, (iii) techniques for deflation or inflation, (iv) single or composite indicators, (v) benchmark estimates and regular compilations, (vi) sensitivity analysis of methods and results, and (vii) documentation of sources, methods, and results.

Explicit calculation of all items of the production account

Explicit calculation of all items of the production account (output, intermediate consumption, and value added) is needed because estimating value added directly suffers from severe disadvantages. The most important disadvantage is that value added itself does not have observable volume and price dimensions, which makes it impossible to appropriately derive volume measures data from current price data or vice versa. To get around this problem, often output or input prices are used to deflate current price value added or to inflate volume measures of value added. The implicit assumption of this procedure is that input and output prices develop in parallel, which is not often the case. Second, directly estimating value added means applying implicit assumptions about input/output ratios that escape verification. Also, applying a fixed input-output ratio to current value estimates may entail unacceptable deflators. Furthermore, directly estimating value added impedes applying a supply and use framework because such a framework requires separate data on supply, use, and value added.

Supplementary information and fixed ratios

Where possible, attempts should be made to gather supplementary information to derive ratios for the current period (such as input/output ratios, ratios of output per self-employed person, cost per square unit of dwelling construction). Ad-hoc supplementary data increase the efficiency of the use of existing sources (e.g., output can be derived from a commodity flow method, and the value added/output ratio might be calculated from an ad-hoc study). In cases where single indicators are used in combination with ratios from past periods, volume measures should be derived first. Using fixed ratios assumes unchanged technology, which seems reasonable for the medium term, although sudden changes may occur. However, using fixed ratios with current price data implies the additional assumption of parallel price movements of input and output prices, which, as previously mentioned, is not often the case. Once volume measures have been estimated, these then can be used to derive current value estimates through the use of price indices to inflate constant price values.

Techniques for deflation or inflation

Appropriate techniques should be used to derive volume measures from current values (deflation) and current values from volume measures (inflation). If indicators are available for both output and intermediate consumption, the double indicator method should be used to

calculate the volume measure of value added (as the volume measure of output less the volume measure of intermediate consumption). As mentioned above, if a single indicator is used in combination with a fixed ratio it is always desirable to explicitly calculate the volume measures of output and intermediate consumption, and to multiply them separately with relevant price indicators to obtain current price values.

Attempts should be made to match indicators with the concepts. For example, for output of personal services, the consumer price index (CPI) for these items is relevant, not the overall CPI.

Single or composite indicators

A composite indicator of production combines several indicators, particularly inputs to production. For example, a composite indicator of construction output would include all major raw materials and labor inputs. A single indicator may be based on either one major raw material (such as cement) or labor. Which method is better depends on the quality of the data and the correlation between the indicators and production. In general, composite indicators allow capturing the effects of several inputs, thus minimizing any potential bias caused by using a single indicator.

Benchmark estimates and regular compilations

Comprehensive and detailed data may be available only at a fairly low frequency, such as five-yearly or ten-yearly, or on an ad-hoc basis. Similarly, infrequent data may only be available for various unrecorded activities. This situation necessitates the use of a combination of benchmarks and indicators in the national accounts compilation in general and in measuring unrecorded activities in particular.

The benchmarks provide an estimate for a certain period as well as a basis (the benchmarks as well as the ratios derived from them) for regular compilations. The assumptions for benchmark-indicator adjustments should be made explicit and their suitability reviewed regularly. One way of assessing the indicator is to gather information about its coverage and definitions and identify the major differences with the benchmark. If benchmarks for more than one year are available, the change shown by the indicator over the period can be compared with the change in the benchmark series over the same period. The difference is a measure of the indicator bias. This kind of review may suggest priorities for improvements to the indicator.

The benchmark-indicator relationships may be changing over time due to several factors. When subsequent benchmarks show different benchmark/indicator ratios, the changes should be allocated over the period between benchmarks. The difference should not be left unadjusted because it causes a step problem in the period for which the new data were introduced (for a discussion of benchmark to indicator methods, see Bloem, Dippelsman and Maehle, 2000).

Sensitivity analysis of methods and results

Sensitivity analysis involves grouping the estimates by degree of reliability and assessing the effects of different assumptions of unrecorded activities on key aggregates. The grouping is made according to the incidence of unrecorded activities. Sensitivity analysis is useful in determining upper and lower limits. It would also be helpful in indicating priority areas for further improvements. (for further details on this approach, see Broesterhuizen, 1985).

Documentation of sources, methods, and results

The benefits of having all sources, methods, and results documented need little explanation. This will improve the transparency of the compilation process. It will help in mapping from the basic sources to the final national accounts estimates, showing all the adjustments made to the basic sources. Documentation will also facilitate the revision of backward series when new and more reliable data become available. Documentation is indispensable if responsibilities among staff change or when staff turnover occurs.

F. Issues Related to Hidden Activities

Hidden activities concern deliberate concealing of production activities from public authorities. It includes underreporting by producer units covered in statistical collections. Deliberate non-registration (hiding) of production units is also an aspect of the hidden activities. It should be noted that large production units that cannot be hidden (as they are visible), still may have hidden activities. An effective procedure for maintaining a business register is an important vehicle for capturing all statistical units within the scope of statistical collections.

Hidden activities in the form of underreporting should be corrected. In fact, the corrections for underreporting in the statistical surveys should be made before these sources are used for incorporating unrecorded economic activities in the GDP compilation. As described earlier, structural information and ratios are derived from existing sources. For example, the labor input method requires output and value added per labor unit, which are usually borrowed from existing business surveys. If there are biases in the business surveys, they should be corrected first. The ratios based on corrected business survey data should be used to adjust for under-coverage of economic activities. Otherwise, any bias in business surveys (or any data sources) used to make adjustments for under-coverage would cause further distortions.

There are several methods that can be used to correct for underreporting in statistical collections. The nature of the problems and the possibility to use various sources and methods determine a feasible approach. In several countries attempts have been made to conduct surveys of households, individuals, and businesses to collect information on their participation in the hidden economy. Development of such data sources will be discussed in Section V. Some indirect methods and sources that can be used to adjust for underreporting by producer units are (i) comparison of detailed data and ratios of revenues and various inputs for similar types of establishments from business surveys, (ii) fiscal audits, (iii) expert

judgements, and (iv) comparison of data relating to similar aspects of economic activities but from different sources.

Comparison of detailed data and ratios of revenues and various inputs for similar types of establishments from business surveys

An adjustment for underreporting in the statistical inquiries submitted by business establishments can be made by performing a detailed analysis of ratios of revenues and various inputs (per unit of output and/or labor) for similar establishments. Physical relationships may also be useful. The comparison of various indicators may be done at some group level appropriately classified to yield homogeneous units (sub-activities further classified by size class and ownership status). The anomalies in the reported data should be investigated, and appropriate corrections should be made. The corrections would involve judgements on what ratios can be considered normal. Therefore, careful examination should be made of any divergence from an established relationship (from reported data or other sources).

Fiscal audits

Information from fiscal audits (personal and corporate income tax systems and VAT systems) can also be used to make adjustments for underreporting. Tax authorities usually investigate the tax returns of a sample of taxpayers. The information on tax evasion can be used to adjust the national accounts data compiled on the basis of tax system data. Such information may also be used to adjust the national accounts estimates compiled using business surveys. However, a comparison of tax returns and survey inquiries should be made to verify that both sources have similar underreporting problems. It is very likely that enterprises submit the same and consistent information to both the statistical office and tax authorities.

The adjustments based on fiscal audits can be affected by changes in detection methods, tax structure, and tax legislation. Furthermore, fiscal audits may be targeted towards units considered to be involved in underreporting. In such cases, the fiscal audits information may not be representative of all units. Systematically conducted tax evasion studies might be more useful for national accounts adjustments.

Expert judgments

The experiences of auditing, bookkeeping, and tax consulting firms providing services to enterprises may throw some light on the methods that businesses use to conceal incomes. Expert judgments on a specific case (revenues reported by a small entrepreneur involved in a certain activity) may be used to adjust for underreporting. Obviously, the business service providers would be careful to protect business secrets. However, they can be a useful source to determine an approximate magnitude of the most significant and frequent accounting interventions and the possible limits for concealment.

Comparison of data relating to similar aspects of economic activities but from different sources

Data relating to similar aspects but from different sources should be compared and analyzed to identify errors or remaining gaps. Supply of a certain input can be compared with the use of that input by an industry for which the input is the main raw material. Wages from business statistics can be compared with data from the social security administration. Various categories of final uses can be compared with the sources of their supplies. Income data can be compared with expenditure data (at an individual level or some aggregate level). The possibilities of data comparison can be significant, depending on the availability of existing data sources.

G. Issues Related to Illegal Activities

Statistical measurement of illegal activities is evidently a difficult case because direct observation is often out of question. Nevertheless, these activities can be of significant importance not only for a reliable picture of the production process, but also because of the effects on income distribution, consumption, saving, and finance.

Despite the obvious difficulties with the measurement of illegal activities, some information may be available. Information may be obtained from administrative and enforcement records, estimates of key inputs or major uses, and special research. A major constraint is that comparable time series data are mostly lacking.

It should be noted that part of illegal production might be included implicitly in the reported data. Enterprises may over-report legal activities in attempts to legitimize incomes from illegal activities. Uses of legally produced goods and services as inputs in illegal production may have been included implicitly, but wrongly classified. Enterprises engaging in illegal activities sometime register as a legal activity for tax purposes, and this affects grossing-up factors for surveys in the legal activities. Additional research on the contents of the source data is needed to avoid double counting and misclassifications.

V. Developing Data Sources

A. General Remarks

The main focus of this section will be on the development of data sources to cover the unincorporated segment of the economy, which is usually covered only partially and presents special challenges for national accounts compilers.

An important element in the data development strategy that also applies to unincorporated enterprises is to improve efficiency in the implementation of existing statistical collections. The aim is to cover/represent all statistical units within the scope of existing collections comprehensively and accurately.

Direct data can also be generated on hidden activity. Examples are surveys of hidden labor, consumer surveys of purchases from producers in the hidden economy, surveys of labor participation in the black market, etc. Nonetheless, the motives for underreporting in the hidden economy make it difficult to conduct direct data collection. Improvements in regulations, better education about data, and a dialogue with data suppliers are some ways to improve the situation.

B. Collecting Data on Household Unincorporated Activities

In many countries, household unincorporated activity accounts for a substantial portion of employment and income generated in the economy. The motives, incentives, mode of operations, and growth patterns for such activities are heterogeneous and quite different from those in the rest of the economy. Consequently, the data collections for household unincorporated activity face specific challenges.

Specific issues in collecting data on household unincorporated activities

Many countries have made attempts to conduct surveys targeted at specific segments of household unincorporated activities. Examples are specific informal activity surveys, city market or rural market place surveys, small scale or cottage manufacturing surveys, own-account residential construction surveys, private business and personal services surveys, private transportation surveys, repair surveys, etc. Statisticians have now accumulated substantial experience in organizing surveys of household production activities. This experience shows that the collection of data on household unincorporated activities poses two types of problems, namely, (i) problems in capturing production units, and (ii) problems in measuring transactions. The design and operation of data collection should take into account these issues.

Problems in capturing production units

The problems in capturing production units of household unincorporated activities are associated with difficulties in identifying production units, developing sample frames, and managing data collection. The difficulties arise because of the following specific characteristics of these production units:

- Production is often on a small scale.

- Production units are quite large in numbers.

- Some activities may be widespread and some may be concentrated in certain areas.

- Home-based activities may not easily be detected.

- Most of the production units may be not registered.

- Enterprises may open and close quickly and frequently.

- Many activities are done on a part-time or seasonal basis.

- Some activities are mobile, without fixed working premises.

A successful survey design and implementation should take these factors into account.

Measurement problems

The surveys of household unincorporated activities involve specific measurement issues. These issues arise due to the inability of the respondents to provide information required to compile national accounts. They concern valuation, distinction between different flows, timing of recording, and memory recall.

The following are the main causes of the measurement problems.

- Often there is no formal bookkeeping.

- Appropriate market prices to value production for own use might not be available.

- The use of own material, labor, and capital makes it difficult to calculate cost of production.

- Expenditure for production may often be indistinguishable from that for household consumption.

- Capital goods may be used indistinguishably for business and household consumption purposes.

- Activities may have a seasonal character.

Survey methods

It is usually not feasible, and probably cost-wise not advisable, to include a multitude of small-scale operators in a business register. To cover the economic activities of these units two types of surveys can be used: (i) list-based establishment surveys, and (ii) area sampling-based surveys.

List-based surveys require an economic census to identify household production units (establishments). The establishment survey should be conducted shortly after the list is prepared, and before the list becomes outdated. In most cases, such surveys may not be able to capture all household activities, particularly businesses without a fixed location and home-based production units. The disadvantage of this method is that censuses are costly, and the information they provide may become obsolete soon after completion.

Area sampling-based surveys are more effective in capturing household unincorporated economic activities. Generally, such surveys are conducted in two stages. During the first stage, sample areas are selected using information on concentration of household economic activities, and household listings are prepared in the selected areas to obtain a list of household enterprises. The respondents in this stage are households. During the second stage, all or a sample of household enterprises are selected to collect the data. Establishments are used as the primary sampling unit to provide the data on production activities.

In addition to surveys specifically designed to collect data on household unincorporated activities, existing household based surveys (such as labor force surveys and income and expenditure surveys) can also be used to gather data on household unincorporated activities. For this purpose, a special module could be attached to an existing survey. This arrangement is very cost effective. However, the results are affected by the survey's sample design, which is directed at the survey's main purposes and could be less than optimal for the collection of data on the economic activity in household unincorporated enterprises.

Some other issues in survey design and implementation

Due to the specific characteristics of the production units as described above, special attention should be given to questionnaire design, reference period, non-response, quality checks, field operations, training of enumerators, and persuading respondents to participate fully. There are many pitfalls causing non-sampling errors, and survey statisticians should be aware of these non-sampling problems and devise procedures to handle them.

The questionnaire design should consider all factors affecting measurement of activities and various flows. Respondents may have a low level of education, which complicates the interview process. Because responses are often based on memory recall, the reference period may not be more than one month and sometimes even shorter reference periods may have to be used. Appropriate procedures should be devised to account for seasonal variations when a shorter (less than a year) reference period is used. Furthermore, the mixing of business and consumption activities makes it difficult even to distinguish the flows respondents may still remember. As a result, item non-responses are likely to occur. Respondents might also be afraid of subsequent taxation or other interference from government authorities, which contributes to non-response. Improving field operations by way of training of enumerators, supervision of fieldwork, and educating the respondents about the importance and purposes of the data collection is important to enhance the quality of the data collection. It is also important that every aspect of data collection is pre-tested.

VI. CONCLUDING REMARKS

We have argued in this paper that lack of exhaustiveness of the national accounts severely affects the usefulness of the estimates. Therefore, national accounts compilation has to adopt procedures, appropriate in their circumstances, to deal with unrecorded economic activities. The availability and quality of basic source statistics that can be used to make adjustments

for unrecorded activities differ from country to country, activity to activity, and over time. For each situation, an appropriate approach should be selected by investigating various possible alternatives. Care should be taken to evaluate, on a regular basis, the plausibility of the methods and the results.

Several macro model techniques have been used by analysts and policy makers to gauge the comprehensiveness of macroeconomic aggregates, such as GDP, relying heavily on debatable assumptions. However, for compiling national accounts estimates, this paper advocates an approach based on improvements in source statistics, and—where this is not directly feasible—application of indirect methods that use all available information on a detailed compilation level.

- In general, direct measurements should be preferred to indirect estimates, although situations may exist where indirect methods are preferable. As well, it is unrealistic to assume that full coverage of all economic activities with statistics can be achieved in any country, big or small, developed or less developed. Nevertheless, to the extent sensible and feasible, exhaustiveness should be pursued through the improvement and expansion of source statistics. However, improvement and extension of source statistics (particularly new collections) take time, while the lack of exhaustiveness of the national accounts is an immediate problem. This situation may necessitate a strong reliance on indirect measurements in the short run.

The extent to which the economy of a country is covered through source statistics differs between countries. This also applies to the potential to improve sources statistics or to extend their coverage. Thus, countries have to make a strategic choice between relying on indirect methods or enhancing source statistics, as optimal in their situation. This calls for active involvement at the highest level of a statistical system (not just at the level of national accounts compilation) to address the issue of unrecorded economic activities

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