

## Adopted methodologies to estimates NOE

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Amman 4 -8 may 2014



## Summary

1. Methods used
2. The position of international organizations
3. The Italian approach

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## Methods

- Direct methods
- Indirect methods
- NSIs methods
- Istat method

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## Methods - Direct methods (1)

- Household surveys
- Time use survey
- Fiscal audit

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## Methods - Direct methods (2)

These are surveys that are not part of the basic data collection programme in national accounts.

They can take a variety of forms, being special surveys of expenditure, income, labour, time use, and opinion surveys.

They can be designed to target any or all of the NOE problem areas – underground, illegal, informal sector and household production for own use.

They can be conducted by the national statistical office or by other agencies including, for example, sample audits by the tax authorities.

However, the results must be interpreted very carefully, especially for those surveys focussed on sensitive subjects. For example, in surveys relating to tax evasion, it is very likely that the non-response is selective because people who are involved in tax evasion are more likely to refuse to co-operate than people who are not. Such non-response is difficult to reduce or to adjust for.

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## Methods - Indirect methods

- Methods *not based on models*
  - ✓ Data Confrontation and Discrepancy Analysis
  - ✓ Sensitivity analysis on the underground activities
  - ✓ Supply-based approach (including the labour input approach)
  - ✓ demand-based approach
  - ✓ income-based approach
  - ✓ commodity flow approach
- Model based methods
  - ✓ Latent variables method
  - ✓ Relationship exists between demand for money and its determinants: real income, inflation rate and nominal exchange rate.
  - ✓ Currency demand approaches

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## Methods - Indirect methods not based on model (1)

### Data Confrontation and Discrepancy Analysis (1)

Confrontation of data from different sources is an integral part of the national accounts compilation. It can also be used to identify the remaining errors and gaps in and between these data. Ideally, data confrontation should take place prior to national accounts compilation, with the aim of checking the statistics and increasing their quality. **Examples of possible data confrontation are:**

- Enterprise survey data versus taxation data; wages paid versus taxes raised; sales of goods and services due to VAT versus VAT raised; and production versus production related taxes;
- Enterprise survey data about the production of commodities versus enterprise survey data about purchases of commodities;

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## Methods - Indirect methods not based on model (2)

### Data Confrontation and Discrepancy Analysis (2)

- Actual value added tax versus theoretical value added tax

This analysis is useful if a significant amount of value added tax (VAT) is collected. The actual amount of VAT collected by the government is compared with the theoretical amount of VAT that should have been raised, calculated from the supply and use tables. In principle, the latter equals the VAT revenues that a government should raise if no VAT was evaded. In practice, there are some statistical and legal reasons for differences, such as bankruptcies, discharges and individual arrangements.

Therefore, the theoretical VAT should always exceed the actual VAT by perhaps as much as 5%, depending on the particular situation in the country. If the difference is less, or even worse, **if the theoretical VAT is less than the actual VAT, it may safely be assumed that there are NOE activities not included in the national accounts.**

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## Methods - Indirect methods not based on model (3)

### Data Confrontation and Discrepancy Analysis (3)

Use of labour versus supply of labour

Wages and employment measured from the use (employer) side and from the supply (employee) side can be compared. With appropriate allowances for conceptual differences, the measures should be the same. Examination of the discrepancies can provide an indication of the size and distribution of activities that are missing from the enterprise data. In fact this approach is so effective that analysis of labour inputs is one of the mechanisms specified by the European Commission (1994) for assessing the exhaustiveness of GDP estimates. European Union Member States are required to make a systematic comparison of the estimates of employment which underlie their estimates of GDP with the alternative estimates of employment obtained from household based sources, as described by Hayes and Lozano (1998).

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## Methods - Indirect methods not based on model (5)

- supply-based approach (including the labour input approach): it relies on data on the supply of inputs (number of primary raw materials, just one major raw material, labour, land, fixed capital stock, etc.) that are used for producing goods and services. Input/output and input/value added ratios are needed to calculate output and value added estimates from the input data.
- demand-based approach: it aims to assess production by using indicator data on specific uses of goods and services that sufficiently describe their production: household final consumption expenditures of a certain commodity as health and personal services, uses of raw materials such as the processing of agricultural products, major export commodities, administrative data indicating demand for a product, such as motor vehicle registrations and building permits, etc.
- income-based approach: it is based on available data from administrative sources in some categories of income, that can be used to obtain an indication of production covered by the administrative system (income taxes, social security contributions paid by self-employed persons or private entrepreneurs, etc.).
- commodity flow approach: it involves balancing total supplies and uses of individual products, using accounting equations. One specific application of a commodity flow method is by calculating the output of the retail trade from supply of commodities.

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## Methods - Indirect methods based on model

### Currency Demand Approach

The Currency Demand Approach (CDA) is the most popular method to estimate the shadow economy among the so-called indirect macroeconomic approaches. Originally suggested by Cagan (1958), the CDA was subsequently refined and applied by Tanzi (1980, 1983).

This estimation technique is based on the assumption that the exchanges in the underground sector are settled in cash, in order to avoid traceability.

The CDA measures is based on the econometric estimation of an aggregate money demand equation, with a specific component related to cash transactions in the underground sector.

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## Position of international organisations

OECD, IMF and Eurostat agree that the model-based approaches are based on assumptions too simple

- I. Production activities measured are not definable in a clear way; that cannot permit of distinguishing if the measurement of the phenomenon is comprehensive of underground activities or underground and illegal too

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## Position of international organisations (2)

- ii. The results obtained change sensible if, using the same model, the basis assumptions change
- iii. Model-based approaches are able to obtain results for the whole economy, while GDP data have to be provided at least by industry and, for being in compliance with international regulations, by type of adjustments
- iv. The results cannot be integrated with those regularly obtained using statistical approaches commonly applied in the national accounts framework

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Country	National Statistical Institutes' approaches
<b>UK</b>	<b>Discrepancies</b> between independent estimates from the production and income distribution
<b>France</b>	<b>1) Fiscal audit:</b> imputation to all similar enterprises of a share of evasion equal to that one observed during fiscal inspections on not random samples of enterprises; <b>2) Sensitivity analysis</b> for integrating the production of industry affected by unregistered work
<b>Netherlands</b>	<b>1) Sensitivity analysis</b> on national accounts aggregates; <b>2) Sample survey</b> on the demand and supply of unregistered work; <b>3) Discrepancies analysis</b> between NA estimates and fiscal data
<b>United States</b>	<b>Direct survey</b> for adjusting fiscal data with direct results of confidential statistical survey on tax payers
<b>Austria</b>	<b>Adjustment for turnover underreporting:</b> coherence between the entrepreneurs and employees remunerations (Franz method – MF)
<b>Italy – Albania – Moldova – Brasil - ...</b>	<b>Labour input method or so-called Italian approach:</b> per capita productivity values, as obtained on economic data of enterprises, are expanded to the universe of production units using FTE's estimates

## Focus on Italian method (1)

It is defined **Labour input method** (LIM – called Italian approach) because per capita productivity values, as obtained by surveys on economic data of enterprises, are expanded to the universe of production units using FTE's estimates

FTE's are obtained transforming in full-time units part-time jobs, unique, main and/or multiple jobs

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## Focus on Italian method (2)

The definition of LIM is limited because Istat, in order to overcome difficulties due to the incorrect fiscal behaviours of enterprises, uses the following instruments:

1. **Estimate unregistered labour input** in order to overcome the total lack of information on productive activities by enterprises;
2. **Correcting under-reporting value-added** for adjusting the distortion of the information available on productive activity by enterprises;
3. **Reconciling the supply and the demand aggregates**, estimated in an independent way, in a framework of supply and use tables for adjusting others possible incorrect fiscal behaviours.

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## Focus on Italian method (3)

The approach can give good results in an economic system characterized by **many small enterprises**, high volume of unregistered employment, considerable under-reporting of production by enterprises.

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## Focus on Italian method (4)

Methodology adopted for the preliminary output estimation ( $Y$ )

$$Y = \sum_{b=1}^m \sum_{c=1}^z X'_{bc} \cdot U_{bc} + \sum_{b=m+1}^n YM_b + \sum_{b=1}^n YP_b + \sum_{b=1}^n YN_b$$

$U$  = FTE unit  
 $X'$  = per-capita  $X$  derived for survey or administrative data and adjusted for underreporting  
 $b$  = branch index ( $b = 1, \dots, m, \dots, n$ )  
 $c$  = size class index ( $c = 1, \dots, z$ )

$\sum_{b=m+1}^n YM_b$  = component of  $Y$  related to the activity of market activity of NPIs, of societies and households producers estimating not using FTE

$\sum_{b=1}^n YP_b$  = component of  $Y$  related to market activities of PA

$\sum_{b=1}^n YN_b$  = component of  $Y$  related to non market activity of PA e NPIs

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## Focus on Italian method (5)

### Approaches to calculating output

SECTORS OF ECONOMIC ACTIVITIES	Output figures reported by enterprises	Quantity x price	Expenditure	Remuneration of the factors of production
Agriculture		x	x	
Energy		x		
Industrial processing	x			
Construction	p	p	p	p
Letting of buildings			x	
Other services	x			
Non market activities				x
Private households with employed persons				x

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