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Review article

QUARTERLY NATIONAL ACCOUNTS: A SUMMARY OF CONCEPTS, SOURCES AND METHODS

The main purpose of Quarterly National Accounts (QNA) is to provide a picture of current economic developments that is more timely than that provided by the Annual National Accounts (ANA). QNA adopt the same principles, definitions, and structure as the ANA. In practice, the constraints of data availability, time, and resources mean that QNA are usually less complete than ANA. In the initial stage of implementation, only estimates of gross domestic product (GDP) with a split by industry and type of expenditure may be derived.

In Europe there has been a strong demand from users to improve the timeliness, comparability and detail of the quarterly accounts and this is likely to continue into the future. The use of QNA becomes more and more important in many areas. QNA provide an important tool for taking economic policy decisions, particularly the management of monetary and fiscal policy at national level and coordination at international level especially within the Economic and Monetary Union.

The Central Bureau of Statistics of the Republic of Croatia calculated the quarterly GDP at current and constant prices according to the production and expenditure approach. By using the international statistical standards, classifications, nomenclatures and methods international data comparability is provided.

Key words: SNA 1993, ESA 1995, quarterly GDP

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Introduction

In Europe there has been a strong demand from users to improve the timeliness, comparability, and detail of the quarterly accounts and this is likely to continue into the future. The European System of Accounts 1995 (ESA 1995) provides the methodology for national accounts in Europe. The current version, ESA 1995, is fully consistent with the worldwide guidelines on the national accounts, the System of National Accounts 1993 (SNA 1993). The ESA 1995 covers quarterly accounts only briefly in chapter 12, but it was supplemented by a detailed Eurostat handbook on quarterly accounts. Subsequently the IMF also produced a "Quarterly National Accounts Manual". The principles used for the recommendations in these handbooks derive directly from the basic principles of ESA 1995 and SNA 1993.

The quarterly gross domestic product (GDP) and its components at constant prices is an extremely important short-term economic indicator. The quarterly series are central to business-cycle analysis and subsequent policy decision. These series are also widely employed for supporting business decisions in the private sector, in particular within financial markets. GDP can be defined and calculated in three ways: 1) the output approach - as the sum of gross value added of the various institutional sectors or the various industries, plus taxes and less subsidies on products); 2) the expenditure approach – as the sum of final uses of goods and services by resident institutional units (final consumption and gross capital formation), plus exports and minus imports of goods and services; 3) the income approach – as the sum of the compensation of employees, net taxes on production and imports, and gross operating surplus/ mixed income.

The first steps of the quarterly accounts in the Republic of Croatia started with the first visit of the International Monetary Fund (IMF) mission in 1994. In June 1999 started the regular supply of quarterly national accounts results to the IMF, according to the Special Data Dissemination Standards (SDDS).

System of National Accounts 1993 and European System of Accounts 1995

The System of National Accounts 1993 (SNA 1993) consists of a coherent, consistent and integrated set of macroeconomic accounts, balance sheets and tables based on a set of internationally agreed concepts, definitions, classifications and accounting rules. Current accounts record the production of goods and services, the generation of incomes by production, the subsequent distribution and

redistribution of incomes among institutional units, and the use of incomes for purposes of consumption or saving. Accumulation accounts are flow accounts that record the acquisition and disposal of financial and non-financial assets and liabilities by institutional units through transactions or as a result of other events (capital account, financial account and other changes in assets account). The balance sheets show the values of the stocks of assets and liabilities held by institutional units or sectors at the beginning and end of an accounting period. In addition to the flow accounts and balance sheets, the central framework of the System also contains detailed supply and use tables in the form of matrices. Each account is balanced by introducing a balancing item defined residually as the difference between the total resources and uses recorded on the two sides of the account.

The European System of Accounts (ESA 1995) constitutes a version of the SNA 1993 adapted to the structures of the Member States' economies. The ESA 1995 is fully consistent with the revised SNA 1993, which provides guidelines on national accounting for all countries throughout the world. Nevertheless, there are several differences between the ESA 1995 and the SNA 1993, e.g.: 1) In the ESA there are separate chapters on transactions in products, distributive transactions and financial transactions. 2) The ESA describes a concept by providing a definition and a listing of what is included and what is excluded. The SNA describes concepts usually in more general terms. 3) The ESA also contains chapters on regional accounts and quarterly accounts. 4) The SNA also contains a chapter on satellite accounts.

The ESA 1995 states: "Quarterly economic accounts form an integral part of the system of national accounts. The quarterly economic accounts constitute a coherent set of transactions, accounts and balancing items, defined in both non-financial and financial domains, recorded on a quarterly basis. They adopt the same principles, definitions and structure as the annual accounts." The publication further states: "The importance of quarterly accounts derives essentially from the consideration that they are the only coherent set of indicators, available with a short time-lag, able to provide a short-term overall picture of both non-financial and financial economic activity."

System of National Accounts 2008

In 2003, the United Nations Statistical Commission called for an update of the SNA 1993. The update was to bring the accounts into line with the new economic environment, advances in methodological research and the needs of users.

The new features fall into five main groups: assets; the financial sector; globalization and related issues; the general government and public sectors; and the

informal sector. Expenditures on weapons systems that meet the general definition of assets have been reclassified as fixed capital formation. The most far-ranging change in the financial area relates to new guidelines for recording pension entitlements. The SNA now recognizes the liabilities of employers' pension schemes, regardless of whether funding to meet them exists or not. The treatments of stocks and flows that are characteristics of economic globalization have been clarified and elaborated. The delineation of the government and the public sectors from the other sectors of the economy has been clarified.

European Union countries and a great majority of OECD countries have indicated their intention to implement the SNA 2008 by 2014. In Eurostat, training on the new European System of Accounts will be organized for specialists of member states working with national accounts during 2011-2013. In the EU, the SNA 2008 will be implemented in the form of the revision of the ESA.

Quarterly national accounts at current prices

The main purpose of Quarterly National Accounts (QNA) is to provide a picture of current economic developments that is more timely than that provided by the Annual National Accounts (ANA) and more comprehensive than that provided by individual short-term indicators. QNA adopt the same principles, definitions and structure as the ANA. In principle, QNA cover the entire sequence of accounts and balance sheets in System of National Accounts 1993. In practice, the constraints of data availability, time and resources mean that QNA are usually less complete than ANA. In the initial stage of implementation, only estimates of gross domestic product with a split by industry and/or type of expenditure may be derived.

QNA are usually available within three months after quarter. On the other hand, ANA are produced with a considerable time lag. Thus, ANA do not provide timely information about the current economic situation, which hampers monitoring the business cycle and the timing of economic policy aimed at affecting the business cycle. Lack of timeliness is also a major disadvantage for the use of ANA for constructing forecasts. ANA are also less useful at times of high inflation, when QNA are virtually indispensable. A critique of QNA is that quarterly GDP is not a good business cycle indicator because GDP includes activities such as government and It is important for QNA to have a time-series character.[1] Having QNA data in a

[1] A time series is defined as a series of data obtained through measurement of the same concept over time that allows different periods to be compared. Thus, to form a time series, the data have to be comparable over time. Most important, this implies that the data have to be consistent over time with respect to concepts and measurement.

time-series format is essential for business cycle analysis, for identifying turning points, for trend-cycle analyses, for studying the dynamic relationships between economic variables and for forecasting. For these purposes it is also important that the time series are sufficiently long.

The quarterly accounts series quite often show very short-term variations due to weather, habits, legislation, etc., usually defined as seasonal fluctuations. Although seasonality is an integral part of quarterly data, it is often an impediment to the correct identification and analysis of the cycle-trend component. From this consideration follows the need to compile both raw and seasonally adjusted accounts. Seasonal adjustment means using analytical techniques to break down a series into its components. The purpose is to identify the different components of the time series and thus to provide a better understanding of the behaviour of the time series for modelling and forecasting purposes, and to remove the regular within-a-year seasonal pattern to highlight the underlying trends and short-run movements in the series. As for balancing items and aggregates, seasonally adjusted estimates for national accounts price indices, volume measures, and current price data can be derived either by seasonally adjusting the three series independently or by seasonally adjusting two of them and deriving the third as a residual.

The basic principle in selecting and developing QNA sources is to obtain indicators that best reflect the items being measured.[2] In some cases, source data are available in a form ready for use in the ANA or QNA with little or no adjustment. In other cases, the source data will differ from the ideal in some way, so that the source data will need to be adjusted. These adjustments may typically be established for one or a few main benchmark years for which additional sources such as the results of more comprehensive and detailed surveys or censuses may be available.

The statistical methods used for compiling quarterly accounts may differ quite considerably from those used for the annual accounts. They can be classified in two major categories: direct procedures and indirect procedures. Direct procedures are based on the availability at quarterly intervals, with appropriate simplifications, of the similar sources as used to compile the annual accounts. On the other hand, indirect procedures are based on time disaggregation of the annual accounts data in accordance with mathematical or statistical methods using reference indicators which permit the extrapolation for the current year. The choice between these approaches depends, among other things, on the information available at quarterly level.

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[2] The use of an indicator implies an assumption that it is representative of the target variable. The best strategy is to make such assumptions explicit and review them regularly. When assumptions are not made explicit, there is a greater risk that they are not being carefully evaluated. The suitability of an indicator can be assessed qualitatively by looking at the differences from the target variable in coverage, definitions and so on.

Since quarterly accounts adopt the same framework of annual accounts they have to be consistent over time with them. This implies, in the case of flow variables, that the sum of the quarterly data is equal to the annual figures for each year. In principle there are no obstacles to this condition being met for previous years. However, for the current year there is a problem of time priority between quarterly and annual data as quarterly data are normally available earlier than the annual figures.

Quarterly national accounts at constant prices

The main purpose of the constant price data is to provide measures of economic activity in which the effect of price movements is removed. Constant price estimates can be compiled in three broad ways. These are: 1) deflation of current price estimates by appropriate price information, 2) direct quantity measurement, or 3) extrapolation of "base year" figures by volume indicator series which are deemed to represent the movement in the particular variable.

The base year is the year used to determine the pattern of prices on which the constant prices figures are calculated. Different base years lead to different estimates of constant price levels. The specification of the base year may be considered as taking one of two forms. In the first figures for a given year are expressed in the prices of the previous (base) year, and the base year is changed every year. In the second data are given in terms of a particular (base) year which is then updated periodically, and regularly, over a period of more than one year (usually five).

The ESA/SNA recommends the use of Fisher indices.[3] The rationale for these indices, which are derived as the square roots of the products (the geometric means) of the Laspeyres and Paasche indices, is that they move between the other two indices, and as such are likely to provide a better estimate of reality than one or other of the alternative measures. However, the derivation of both Laspeyres and Paasche indices needed for compiling Fisher indices is a particularly time-consuming task requiring much actual and estimated data. Where relative prices are not changing much and inflation is low, the chained Laspeyres index may be regarded as an adequate approximation to the corresponding Fisher index.

The compilation of quarterly accounts at constant prices raises a number of methodological and practical issues. The most common problem encountered

[3] This is not to say that the Ideal Fisher form is the "true" index. Even if there is such an index, the Ideal form may be no nearer to it than either the Laspeyres or the Paasche index is on its own. The Fisher Ideal Index is only one possible "cross" of the Laspeyres and Paasche forms.

when compiling quarterly national accounts is that some data sources are only available on an annual basis. Compilation of quarterly accounts at constant prices increases the data requirements, and therefore adds to the difficulties found for compilation at current prices.

A general difficulty raised when compiling constant price quarterly accounts is the availability of data to undertake the "double-deflation" methods[4] that are recommended for calculation of GDP from the production side. Usually this is caused by a lack of information on intermediate consumption. The most common methods used in the quarterly area are "single indicator" methods[5] that extrapolate value added by using an output indicator.

European quarterly national accounts

The current situation of quarterly accounts has arisen as the consequence of a chain of events started in 1971 with the release of European System of Accounts (ESA) 1970 by Eurostat. As a complement to ESA 1970, Eurostat released a document commonly referred to as SEC-TRI (1973), that drew up a simplified scheme of accounts as a suggestion to the Member States for the compilation of quarterly accounts. Since it did not supply methodological rules and it provided for an extremely detailed breakdown, it was never applied, even though it has remained an important reference for Eurostat till now. After this first attempt, an agreement between Eurostat and OECD mainly left the compilation of quarterly accounts to OECD and the compilation of regional accounts to Eurostat.

Starting from the second half of the 1980s, Eurostat was again involved in quarterly accounts themes, due to the increasing interest of the EU Member States in this field. Eurostat has increased its engagement mainly in two areas: 1) methodological support for those Member States which wanted to set up or improve their system of quarterly national accounts, 2) encouraging and leading discussion of the theoretical aspects so as to achieve a satisfactory and harmonised system of European quarterly accounts. Chapter 12, ESA 1995 represents the first step in this direction and Handbook on quarterly national accounts is the next step.

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[4] The value added at constant prices is determined as the difference between output and intermediate consumption, both at constant prices, with each series obtained by deflating current values with appropriate price indices.

[5] Single indicator methods may be classified into two variants: 1) Direct deflation of current price value added by an output price index or other relevant or estimated price series. 2) Direct extrapolation of base year value added using an indicator series which aims to approximate to the movement in constant price value added.

The majority of the Member States of the European Union compile quarterly national accounts. Availability, coverage and timeliness vary according to each Member State. Totals for the euro-area and the European Union should, in principle, be obtained through the aggregation of the Member States quarterly data. As not all Member States regularly compile quarterly accounts, Eurostat has to estimate these totals using the annual and quarterly information at its disposal.

The compilation of the quarterly national accounts aggregates for the eurozone and the European Union is somewhat different from the compilation of national figures. Indeed basic information is derived from quarterly national accounts of Member States, geographical aggregation aspects are a prominent element in the process and preliminary harmonisation play a relevant role. The European estimates of quarterly national accounts aggregates in monetary terms are expressed in euro. The input to the estimation process, represented by countries' figures, is normally expressed in national currency. In order to harmonise the input of the European compilation process, national currency figures have to be converted into a common currency, the ECU/euro.[6]

Eurostat releases quarterly national accounts both unadjusted and seasonally adjusted. The approach to seasonal adjustment of quarterly accounts for the euro-area and the European Union has to integrate geographical aggregation and the benchmarking/estimation aspects. At present, seasonally adjusted aggregates are compiled according to an indirect approach: quarterly seasonally adjusted indicators are derived from Member States quarterly seasonally adjusted series and then used in the benchmarking procedure. Eurostat developed specific software, ECOTRIM, for carrying out temporal disaggregation. It offers a set of traditional mathematical and statistical techniques and the possibility of running an interactive or a batch session.

The basic idea is to use the quarterly sum of the available countries as an indicator and combine it with the annual information to derive the estimates for the European quarterly totals. From a statistical point of view, this is a traditional problem of benchmarking to be solved through temporal disaggregation techniques. Given the annual series and the quarterly indicators, the aim is to derive the quarterly target figures in the context of a statistical model. The main hypothesis is that the indicator series are good indicators for the path of the variable of interest.

The principle is exactly the same in the estimation of the quarterly data when the annual data are still not available. Eurostat's procedure for the estimation of

[6] A different treatment is applied to current and constant prices series: 1) quarterly/annual current prices data are converted according to the quarterly/annual average of daily exchange rates, 2) annual/quarterly constant prices series are converted according to the appropriate fixed base year exchange rate. Annual European aggregates and quarterly indicators are obtained as sum of national currency figures converted according to the appropriate exchange rate.

the European quarterly totals foresees: 1) the harmonisation and completion of the basic information to be used in compiling quarterly accounts, 2) the estimation of the quarterly value of the European GDP and preliminary estimation of its components according to the univariate method of Chow and Lin, 3) the estimation of the European GDP components in an accounting framework, respecting the accounting constraints, starting from the preliminary estimations, using the multivariate method of Denton.

Chow and Lin (1971) proposed an optimal method, in a statistical sense, to derive the values of a high frequency series (quarterly) by using the values of the same series available at a low frequency (annual).[7] The estimation is performed using a related indicator series able to supply information on the quarterly development of the target series. The method is based on the idea that a regression model describes the relation between the unknown basic series and some indicators. The best estimator of the unknown values of the basic series is given by a linear prediction associated to a regression model. The estimation of the parameters of the model is done on the basis of the maximum likelihood approach (procedure adopted in France), or by the least squares method (procedure adopted in Italy).

Using the Chow and Lin procedure, Eurostat obtains the quarterly estimates of the euro-area and European Union GDP and the preliminary estimates of the components. The quarterly estimates of the components, at this level, do not satisfy the accounting constraints because the quarterly sum, in general, is not equal to the corresponding value of the quarterly GDP. In order to respect the accounting constraints the difference between the sum of the components and the GDP has to be distributed among the quarterly values of the components. That is done by using the multivariate procedure of Denton. The idea is to smooth the difference gradually by ensuring the temporal consistency simultaneously.

Several differences among the quarterly national account systems still persist, in particular for release calendars, methodology, benchmarking, revision policy and seasonal adjustment procedures. Major efforts towards harmonisation have been done in the recent years, notably with respect to timeliness, seasonal adjustment, quality, coverage and integration. The final output of the compilation process is a coherent set of quarterly national accounts data covering GDP and the main components of the output, expenditure and income side. Quarterly accounts are released both in current prices and constant prices, unadjusted and seasonally

[7] The Chow-Lin method gives the dangerous impression that quarterly estimates of GDP and other national accounts variables can be derived simply by estimating the annual correlation between the national accounts variables and a limited set of some loosely related quarterly source data. In contrast, benchmarking is about combining quarterly and annual source data for the same phenomena.

adjusted. European aggregates are derived from the national data collected through the questionnaire associated to the transmission programme.[8]

Eurostat publishes three releases on quarterly national accounts: 1) a flash estimates of GDP (covers GDP at constant prices, seasonally adjusted); 2) a first regular release of quarterly national accounts covering GDP, main expenditure and output aggregates at constant and current prices, seasonally adjusted and unadjusted; 3) a second regular release of quarterly national accounts covering expenditure, output and income main aggregates and employment data.[9]

The use of quarterly national accounts becomes more and more important in many areas. Quarterly accounts provide an important tool for taking economic policy decisions, particularly the management of monetary and fiscal policy at national level and coordination at international level especially within the Economic and Monetary Union. A set of reliable quarterly figures improves macro-economic decision-making and speeds up monitoring of actions taken by economic agents.

Croatian quarterly national accounts

The quarterly national accounts data are broadly based on the methodology set out in the European System of Accounts 1995. Important support came from IMF experts who provided the basis for the compilation and verification of the estimates according to the IMF standards (SDDS). The theoretical and practical experience of the EU and OECD countries has also been used. The data are compiled using the expenditure approach and production approach at current and constant prices. By using the international statistical standards, classifications, nomenclatures and methods international data comparability is provided.

Expenditure approach

The main data sources used in compiling quarterly GDP by expenditure approach are the following: quarterly Central Bureau of Statistics (CBS) surveys

[8] Therefore the input for the compilation process has to be conformed to the temporal disaggregation techniques requirements: complete and long enough annual time series and compatible quarterly indicators.

[9] The methodology applied in the compilation process is the same in all three releases, the discriminating factor being the available basic information (countries data) and the related coverage.

and quarterly administrative records; quarterly reports on budgetary central government operations and extra-budgetary funds; Quarterly statistical report of enterprises, banks and other financial institutions, insurance, non-profit organization and budgetary users; and quarterly balance of payments estimates for the Republic of Croatia. For the GDP by expenditure category the following classification are used: Classification of Individual Consumption by Purpose (COICOP), Standard International Trade Classification (SITC) and the Central Product Classification (CPC). GDP at current market prices and at constant market prices is broken down into: household consumption, government consumption, gross fixed capital formation, changes in inventories, exports and imports.

According to the System of National Accounts 93, there are narrow and wide[10] definitions of household final consumption expenditure. The calculation of household final consumption expenditure as a part of quarterly GDP calculation of the Republic of Croatia is based on the narrow definition. Household final consumption expenditure (narrow definition) includes: expenditure incurred by resident households on consumption goods and services on the domestic territory plus expenditure incurred by resident households on consumption goods and services abroad. Expenditure incurred by non-resident households on consumption goods and services on the domestic territory is not included. Household final consumption expenditure includes, for example: imputed rent; expenditure on goods produced for own final consumption; and expenditure on goods and services received as income in kind.

The estimation of government final consumption is derived as government output (compensation of employees, intermediate consumption, consumption of fixed capital and taxes less subsidies on production) plus social transfers in kind minus receipts from market sales. For the previous periods, before the quarterly survey for the budgetary users and extra-budgetary institutions, the only data source was the Ministry of Finance.

For previous periods and first quarter 1999, the estimation of gross fixed capital formation was based on the method of commodity flow at a very aggregated level. Since the first quarter of 1999, reporting units are providing data on gross fixed capital formation through new quarterly surveys covering all legal entities. The questionnaire contains data on investments in fixed assets, identifying separately tangible and non-tangible assets.

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[10] The value of household actual final consumption is given by the sum of three components: a) The value of households' expenditures on consumption goods or services including expenditures on non-market goods or services sold at prices that are not economically significant, b) the value of the expenditures incurred by government units on individual consumption goods or services provided to households as social transfers in kind, and c) the value of the expenditures incurred by NPISHs on individual consumption goods or services provided to households as social transfers in kind.

The inventories consist of the following categories: materials and supplies, work in progress, finished goods, and goods for resale. The new quarterly business survey of enterprises is collecting the necessary information on the four mentioned categories. The data for previous periods were estimated on the basis of annual data from the legal entities surveys and data from regular CBS surveys on inventories of finished goods of industrial products and inventories in retail.

Balance of payments data for the Republic of Croatia are regularly compiled and published by the Croatian National Bank. This is the main data source for the calculation of exports and imports on quarterly basis as a part of the GDP expenditure approach at current prices. The value of exported goods is recorded FOB, the proper basis for the national accounts. However, the value of imported goods is recorded CIF, and this needs to be adjusted to FOB for the national accounts. This adjustment is made by the Croatian National Bank.

Individual components of the GDP by expenditure category at constant prices were calculated by deflating the current market price data, using indices at prices of the previous year. Household consumption data at constant prices were calculated by using adequate Consumer Price Indices (CPI) sub-indices. For government expenditures, an assumption of constant productivity was applied, so that the wage and salary indices in constant prices were calculated by dividing the data on current expenditures on wages and salaries by indices of the number of persons employed. Expenditures on other goods and services were deflated by using adequate CPI sub-indices and industrial producers' price indices. Imports and exports of goods were deflated using Fisher-type unit value indices. Exports of services were deflated by relevant price indices for goods in the domestic market. Imports of services were deflated by relevant price indices in the markets of the most significant trading partner countries. The gross fixed capital formation at constant prices was derived by using appropriate price indices and investment structure from the last annual calculation. The construction works were deflated by the implicit deflator for the construction activity from the production approach. Changes in inventories of finished goods and work in progress were deflated by price indices of industrial products. Changes in inventories of raw materials were deflated by industrial producer price indices and imports unit value index. For deflation of changes in inventories of goods purchased for resale, relevant CPIs were used.

Production approach

The calculation of the gross value added at current prices is based primarily on the results of the quarterly survey of revenues and expenditures on business

entities. The quarterly statistical report has been introduced since the first quarter of 1999 and covers five different groups of legal entities: enterprises, insurance companies, banks and other financial institutions, non-profit organisations and budgetary users. Data on taxes and subsidies on products are taken from the data of the Ministry of Finance. Gross value added at current basic prices and at constant prices, by industry is broken down into nine economic activity groups based on the NKD 2002 (compatible with NACE Rev. 1.1).[11]

The estimates for certain components that are not covered by the quarterly survey (such as unincorporated businesses and nonmarket production of agricultural products) are based on the last available quarterly data and all relevant indicators.

The gross domestic product at market prices was derived from the gross value added at basic prices by adding taxes less subsidies on products.

An alternative possibility of estimating quarterly GDP at current prices is to use the data on value added changes at constant prices and to inflate them with price indices appropriate to the particular activity. The main problem here is that price indices for all activities do not exist, while where they are available there are often differences of definition.

The calculation in constant prices is done at prices of the previous year and at constant prices of the referent year (2000=100). For the activities for which adequate volume indices are available (agriculture, industry, construction) the compilation was done at the 2-digit NKD 2002 level trough these indices. Physical indicators (transport, telecommunication) or turnover data (hotels and restaurants, trade) at the 3-digit NKD 2002 level were used for those activities. Input indicators (number of employed persons in most cases) at the 4-digit NKD 2002 level were used for most other service activities.

The methodology used for the calculation of the quarterly GDP at constant prices according to the production approach in the Republic of Croatia can be summarised as: a) estimation of the value added movement at constant prices with the extrapolation based on the movement of the output volume index or other volume indices for the relevant activities; b) using the single deflation of extrapolated output, for the activities where the deflator can be considered as reliable one; and c) for the activities where a reliable measure of output does not exist, an input indicator is used, in most cases the number of employed persons.

[11] Since January 2008 NKD 2007 has been introduced. NKD 2007 is based on the European Classification of Economic Activities NACE Rev. 2, which is obligatory for all EU Member States.

Reconciliation of the expenditure and production approaches

The expenditure and production estimates of GDP give different results. Since there is only one GDP it is necessary to reconcile the two estimates into a single measure. One technique to remove discrepancies is the allocation of discrepancies to a single category by convention. Usually the chosen category is large (such as household consumption) or poorly measured (such as changes in inventories). During the reconciliation of the production and expenditure results in the Republic of Croatia it has been assumed that the results from the production approach are more reliable, and the statistical discrepancy between results of two methods has been included in Final Consumption Expenditure – Households.

Adjustments of quarterly GDP figures

Since quarterly accounts are part of the system of national accounts they should be coherent with the annual account. For this reason it is necessary that the sum of the four quarters should be consistent with the annual data. Some solutions are introduced, ranging from adjustment "by eye" to more complex time series methods. There are two methods prevailing in practice: the proportional (D4 method) and the additive (D1 method). Both methods ensure that the sum of the adjusted quarterly figures equals the annual total as required. The proportional Denton method[12] was applied because, unlike the additive Denton method, it better preserves the growth rates shown by the original data; while with the additive Denton method the emphasis is on the absolute level of the estimates for each quarter.

Issues in Quarterly National Accounts

Ideally, the QNA should be based on the same data sources and methods as the ANA and compiled using the same system. However, in practice, this ideal is generally not achievable. To achieve both timeliness and accuracy within resource constraints, it is common to collect detailed and comprehensive source statistics

[12] The basic version of the proportional Denton benchmarking technique keeps the benchmarked series as proportional to the indicator as possible by minimizing (in a least-squares sense) the difference in relative adjustment to neighbouring quarters subject to the constraints provided by the annual benchmarks.

only annually or less frequently, and to compile a more limited set of short-term indicators on a monthly and quarterly basis using smaller sample surveys.

For many activities, the indicator of value added movement is the number of employees. In accordance with the international practice, these indicators are used for all public services. If the data on the number of employees could be augmented by information about the productivity movement, we should obtain a good measure of short-term movements in constant price value added. By convention, for public services it is assumed that there is no change in productivity.

The SNA 1993 recommends moving away from the traditional fixed-base year constant price estimates to chain-linked volume measures. Change of base period and chain-linking can be done with different frequencies; every 10 years, every 5 years, every year, or every quarter/month. The SNA 1993 recommends changing the base period, and thus conducting the chain-linking, annually.

For annual data, the approach which should be adopted for deriving constant price estimates is double deflation. For the quarterly figures, however, the absence of information on intermediate consumption requires the use of some alternative approach. One possibility is to extrapolate "base year" value added by indicator series which are deemed to represent the movement in value added.

At present there is inadequate harmonisation of quarterly national accounts, in particular at the European Union level. Chapter 12 of the ESA 1995 and the Handbook on quarterly national accounts suggest harmonisation practices to reduce or eliminate the differences between quarterly accounts compiled by different countries especially the Member States.

Conclusion

The SNA is a system of statistics that is being constantly updated, more and more widely used, and evolving in parallel with new economic developments. One interesting feature is that the measurement of GDP has systematically been modified under the different SNAs into a broader concept, thus extending progressively the production frontier. It is probable that this process will continue.

Quarterly national accounts data play a vital role in the development and monitoring of sound economic and financial programs. Seasonally adjusted data, trend data, and unadjusted data all provide useful perspectives, but the unadjusted data should be the foundation of national accounts compilation.

The potential scope of QNA is the whole of the SNA 1993 sequence of accounts. Although gross domestic product and its components are important, other parts of the national accounts system are also useful and achievable. Extending

the QNA beyond basic compilation of GDP has several advantages. It provides users with a more comprehensive picture of the various aspects of the current economic developments organised in an integrated framework for analyzing the data. Also, the extended accounting framework enables crosschecking the data.

The recent financial crises taught us that availability of timely key high-frequency data is critical for detecting sources of vulnerability and implementing corrective measures in time. More and more countries are recognizing QNA as an essential tool for the management and analysis of the economy. The sources, methods, and scope of each country's QNA system differ according to circumstances such as user preferences, availability of source data, and economic conditions.

This paper has discussed certain problems which arise with quarterly estimation for some of the variables in the accounts. Suggestions have been made as to how these problems might be dealt with. Perhaps the main point to be reiterated is that quarterly estimates should follow, as far as possible, the approach adopted for the annual figures. However, in practice, it is recognised that the information available quarterly is generally more restricted than the annual data.

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TROMJESEČNI NACIONALNI RAČUNI: REZIME POJMOVA, IZVORA I METODA

Sažetak

Glavna svrha tromjesečnih nacionalnih računa (TNR) jest osigurati sliku tekućih privrednih kretanja koja je pravodobnija od one koju daju godišnji nacionalni računi (GNR). TNR primjenjuju iste principe, definicije i strukturu kao GNR. U praksi, ograničenja raspoloživosti podataka, vremena i sredstava dovode do toga da su TNR obično nepotpuniji nego GNR. U početnoj fazi uvođenja, mogu se izvesti samo procjene bruto domaćeg proizvoda (BDP) proizvodnim i potrošnim pristupom.

U Europi su prisutni stalni zahtjevi korisnika za poboljšanjem pravovremenosti, uporedivosti i podataka tromjesečnih računa, a to će se vjerojatno nastaviti i u budućnosti. Primjena TNR postaje sve više značajna u mnogim područjima. TNR osiguravaju značajne podatke za donošenje odluka, naročito za upravljanje monetarnom i fiskalnom politikom na nacionalnoj razini i koordinaciju na međunarodnoj razini, a osobito unutar ekonomske i monetarne unije.

Državni zavod za statistiku Republike Hrvatske izračunava tromjesečni BDP u tekućim i stalnim cijenama prema proizvodnom i potrošnom pristupu. Korištenjem međunarodnih statističkih standarda, klasifikacija, nomenklatura i metoda osigurana je međunarodna usporedivost podataka.

Ključne riječi: SNA 1993, ESA 1995, tromjesečni BDP