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**ECE REPORT ON MEASUREMENT OF CAPITAL STOCK
IN TRANSITION ECONOMIES**

Note by the ECE Secretariat

INTRODUCTION

1. The issue of capital stock measurement was specified as one of fifteen so-called critical problems in economic statistics by the 18th meeting of the UN Statistical Commission's Working Group on International Statistical Programmes and Co-ordination which met in April 1996. Furthermore, both - researchers and statisticians, acknowledge that the estimation of capital stock is a complicated issue. The practical estimation problems are known to be greater than in any other field of economic statistics. It is also considered to be one of the most difficult jobs that economists have set to statisticians.

2. Both developed market economies and transition economies are concerned with the measurement of capital stock. However, the problems are somewhat different for these two groups of countries. Most developed economies are concerned with the clarification of the conceptual issues associated with capital stock measurement within the 1993 SNA framework and concepts. Another area of concern is to ensure consistency between the various measures of capital, i.e. that measures used in national accounts are consistent with those used in productivity analysis for which there is a growing interest in these countries. The gross capital stock is often used as a measure of capital input in productivity measures and multi-factor productivity studies.

3. At the same time, the majority of transition economies, which are in a process of implementing the 1993 SNA, are more concerned with developing capital stock statistics that conform to current international standards. The method used by them in the past to estimate the stock of fixed capital, that

is the Balance of Fixed Assets (BFA) was more appropriate for a centrally planned economy within the context of the Material Product System (MPS). In addition, the high rates of inflation which most of these countries experienced in the beginning of the 1990s created great difficulties for making meaningful estimates of the value of stock of fixed capital and the consumption of fixed capital.

THE ECE PROJECT

4. In 1997, the ECE secretariat carried out a small survey to establish to what extent countries in Central and Eastern Europe and the former Soviet Union already compile capital stock statistics and, if so, what methods are used. The purpose of the survey was not to collect actual data but to ascertain how much information, if any, is available on capital stocks and capital consumption and what methods of data collection and estimation are being used. The survey revealed that until the beginning of the 1990s when the reforms began, all countries were using the BFA method. This method is based on direct observation of fixed assets at the enterprise level which differs from the methods applied in most developed market economies.

5. Preliminary results about the methods used by transition economies were reported by the ECE secretariat already in June 1997. The results showed that the majority of the countries were making some effort to compile estimates using SNA concepts, even though some estimates might be incomplete or not up-to-date. Moreover, during the survey, countries expressed a strong interest in this subject matter and attached high priority to improving their estimates of capital stock.

6. The work continued with a small project designed to study in greater detail the procedures that were used and see how they can be improved to produce economically meaningful capital stock estimates consistent with the 1993 SNA which is now being implemented by all transition economies. The Russian Federation and Bulgaria were chosen as case studies. Their respective statistical agencies, Goskomstat and the National Statistical Institute, co-operated with the ECE secretariat by providing additional information on the methods used, including some estimates of fixed capital stock. The Statistical Committee of the CIS countries assisted the ECE secretariat in the preparatory work on the project.

PARTICIPATION OF ECE IN THE CANBERRA GROUP

7. Meanwhile the ECE secretariat has become a member of the Canberra Group on Capital Stock Measurement created on the recommendation of the UN Statistical Commission. The objective of the Group was to produce a Manual on Capital Stock Statistics. Reports on the ECE project were presented at the Second and Third Meeting of the Canberra Group held in Paris (1998) and Washington (1999). Information from these reports was used as an input to the Manual to be published by OECD in 2001. Currently the Manual on the Measurement of Capital Stocks, Consumption of Fixed Capital and Capital Services can be viewed on the OECD home page at: <http://>

www.oecd.org/std/nahome.htm. The OECD Manual deals with conceptual and measurement aspects of capital stock statistics and provides some practical guidelines for estimation. It is aimed at compilers in all countries, both developed and developing. Therefore, the ECE Report on measurement of capital stock in transition economies does not go into conceptual discussion, but rather makes reference to the Manual whenever appropriate. In view of this it was thought appropriate to finalise the ECE Report once the Manual is ready.

8. It should be noted that though the work on the ECE survey was initiated and carried out independently, it coincided with the work of the Canberra Group. Therefore, the ECE Report benefited from discussions within the Canberra Group and from close communication with experts preparing the Manual on Capital Stock Statistics. Moreover, the ECE Report should be best read together with the Manual, which gives a broad presentation of the conceptual and measurement issues concerning stocks and flows of fixed capital.

CONTENTS OF THE ECE REPORT

9. The ECE Report consists of two parts. The first part focuses on some practical issues concerning the estimation of stocks and flows of fixed assets in transition economies which are members of the UN Economic Commission for Europe (UN/ECE). The experience of these countries in measuring the stock of fixed capital using the method of Balance of Fixed Assets is explained in some detail. This method, which is based on annual direct observation of fixed assets at the enterprise level, was used by all former centrally planned economies. Because of the high rates of inflation in the beginning of the 1990s, most of the countries developed procedures for revaluing the assets at current market prices. Finally, taking account of past experience, but also of new economic realities in the transition economies, some recommendations on how to measure capital stock in future are given.

10. Chapter 1 of the ECE Report explains the background for the work on the ECE project. It also describes the country coverage of the survey and the availability of capital stock estimates. The chapter briefly introduces some basic concepts and definitions used in capital stock measurement. Reference is made to respective chapters in the OECD manual.

11. Chapter 2 reviews the main results of the ECE survey carried out in 1997. Following the survey additional information was collected as a result of direct communication with the countries or in the course of discussions at various meetings where representatives of transition economies were present. Details on the experience of the Russian Federation and Bulgaria were collected in consultations with capital stock and national accounts experts in these countries.

12. Chapter 3 describes in detail the method of Balance of Fixed Assets (BFA) used by all centrally planned economies to produce estimates of capital stock. The specific procedure applied by the Russian Federation is explained in some detail. It was common for all countries of the former Soviet Union. The chapter reviews the valuation concepts used in the BFA and the basic data sources, as well as the questionnaires, that are used in the CIS countries. The questionnaire *Form -11* which is the major tool for collecting capital stock statistics in the CIS countries is described in some detail.

13. Chapter 4 describes the revaluation of fixed assets at current (replacement) prices as carried out by transition economies because of the high rates of inflation in the beginning of the 1990s. It reviews in more detail the revaluation procedures of the Russian Federation and some other CIS countries. There is also a description of the revaluation of capital stock accompanied with a full inventory of the assets carried out in Bulgaria in December 1997. A number of concerns and problems related to the revaluation of capital stock, such as the use of revaluation coefficients, price indices and terminology applied, are noted.

14. Chapter 5 reviews the experience of transition countries in estimating service lives of assets. Asset service lives are crucial element when the Perpetual Inventory Method (PIM) is used to derive estimates of capital stock. The accuracy of these estimates depends to a great extent on the reliability of the information on service lives of assets. As many transition economies are planning to use the PIM in future, the issue is discussed in the ECE report. The chapter also describes the experience of the Russian Federation in using specific surveys of age structure of assets to derive estimates of their service lives.

15. Chapter 6 describes the methods used at present by six CEE countries to measure capital stock, namely Bulgaria, Hungary, Poland, Czech Republic, Slovak Republic and Slovenia. With the changes that began in the 1990s, these countries stopped the compilation of the 'old' BFA and made experimental estimates of capital stock using PIM. Alternative methods have been sought to estimate the stock of fixed capital under the conditions of significant structural changes in the economy, changing legislation, but also serious budget restrictions. The experience of the six countries could be used as an example for other transition economies, which envisage to replace the BFA method with other techniques.

16. Chapter 7 discusses how the use of capital stock statistics has changed over the years in transition economies. It also touches on the issue about the cost of conducting annual comprehensive survey of stocks and flows of fixed assets and the burden it represents for the accountants to provide the data. The conclusion is drawn that, in general, the interest in the compilation of the balance of fixed assets is diminishing. In fact, in two countries - Bulgaria and Slovenia, the reason for discontinuing the compilation of the BFA was lack of interest.

17. Chapter 8 considers what methods of measuring the capital stock should be recommended to transition economies for the future. In doing this, the experience, past and present, of the three groups of countries, i.e. CIS countries, Baltic States and Central and Eastern Europe is taken into account.

18. The second part of the report (the Annex) consists of a paper written by Peter Hill¹ who worked as a Statistical Adviser to the ECE Statistical Division in 1998 at the time the ECE project on capital stock measurement was underway. His paper on Economic Depreciation and the SNA is written as the result of his work on capital stock measurement during the last few years. The paper is concerned with the economic theory underlying the traditional concept of depreciation used in national

¹ The paper was presented at the IARIW Conference held in Cracow, Poland, 27-31 August 2000.

accounts. It shows that this concept, although only briefly described in general terms in national accounts manuals, has a solid foundation in economic theory.. Depreciation on fixed assets is described as 'consumption of fixed capital' in the 1993 SNA.

SUMMARY RESULTS OF THE SURVEY OF METHODS USED

19. As noted earlier, the purpose of the survey was not to collect actual data on capital stock but to find out what methods of data collection and estimation are being used. It was confined to fixed assets as defined in the 1993 SNA and was mainly directed towards tangible rather than intangible fixed assets. The survey revealed that most transition economies are collecting information on stocks of fixed assets, although the nature and the quantity of data collected varies considerably between countries.

CIS countries and the Balance of Fixed Assets

20. The countries of the Commonwealth of the Independent States (CIS), but also the Baltic States, The former Republic of Macedonia and Romania continue to follow the methodology of Balance of Fixed Assets. Annual surveys are undertaken of the fixed assets recorded in the balance sheets of the enterprises. The assets are valued at historic prices but are also usually revalued at current prices using the most appropriate price indices available.

21. The BFA surveys continue to be comprehensive and collect detailed information disaggregated by type of asset. The BFA method has some similarity with the Perpetual Inventory Method in that the opening and closing stocks have to be consistent with the gross fixed capital formation in the intervening period, but it has the advantage of utilising stock data directly as recorded in balance sheets. Nevertheless, it remains difficult to make proper allowance for factors such as declining efficiency, obsolescence and high inflation when valuing the assets.

Central and Eastern Europe

22. The majority of countries of Central and Eastern Europe (CEE) no longer follow the BFA approach in a systematic way and the amount and type of information now available varies from country to country. Nevertheless, annual surveys of fixed assets continue to be undertaken in some of the countries, the assets usually being valued at historic prices.

23. Some countries, such as the Czech Republic and Slovenia have been trying to build on earlier survey data using PIM. Poland has also conducted some experimental work on applying PIM, but no results have been published. Hungary has tried to apply a simplified version of PIM and there are plans to extend the work further. Other CEE countries are considering the possibility of applying PIM in the future. In the case of Hungary, capital stock estimates were produced for the period 1968-1991 according to a national methodology introduced in 1970. It accommodated both Material Product System and SNA concepts within an integrated set of accounts and balances. Since 1991, however, no official estimates of capital stock and consumption of fixed capital have been made in Hungary.

Valuation

24. Although assets may be initially valued at historic cost, their revaluation to current prices has been often obligatory in most CIS countries, but also in Bulgaria. In the Russian Federation regular revaluations have been carried out in each year during 1992 to 1997, though they did not cover the assets in all economic sectors. After 1997, however, the revaluation is not carried out every year. Assets are also revalued in some other CIS countries. Revaluation of the fixed assets together with a full inventory of all fixed assets (census of fixed assets) was carried out in Bulgaria in December 1997.

Disaggregation

25. When estimates of stocks of fixed assets are compiled, they are always available by industry. However, in some countries the coverage of the data may be far from complete in industries in which there are many small enterprises, such as agriculture, trade and transport. It should be also noted that the majority of the transition economies have already implemented the internationally recommended industrial classifications, such as ISIC Rev.3 or NACE Rev.1.

26. As the 1993 SNA is now being implemented in all transition economies, the institutional sectors are defined as recommended by the System. Five institutional sectors are identified: non-financial corporations, financial corporations, general government, households and non-profit institutions serving households. In some countries all institutional sectors are covered, in others data are not always available for households and non-profit institutions serving households.

Intangible fixed assets

27. The 1993 SNA specifies that intangible fixed assets should also be included in the value of stocks of fixed assets.

28. New business accounting methods introduced in most transition economies require intangible assets, such as software, mineral exploration, entertainment, literary or artistic originals, as well as tangible assets to be recorded. In practice, some information on intangible assets has indeed been obtained recently in those CIS and CEE countries, which currently collect data on fixed assets, although problems with valuation are typically reported. Recent regulations in the Russian Federation clearly define the scope of intangible assets and the rules for their depreciation. Intangible assets are included in the classification of fixed assets and should be reported by enterprises. However, in practice enterprises very often have problems with the estimation of their value.

Consumption of fixed capital

29. In the business accounts of the enterprises in transition economies (as in most of the rest of the world) depreciation has traditionally been calculated at historic cost. Nevertheless, as already indicated,

assets are often systematically revalued at current prices so that some attempts are made to estimate consumption of fixed capital as defined in the 1993 SNA. As in the rest of the world, there may be considerable practical problems in determining what are the most appropriate rates at which to write down the efficiency (and hence the value) of the assets in order to calculate capital consumption.

Gross Fixed Capital Formation (GFCF)

30. The survey also sought to obtain information about the lengths of the time series of gross fixed capital formation available at both current and constant prices in order to explore the feasibility of compiling estimates of stocks of fixed assets using PIM. For most transition economies gross fixed capital formation as defined in the 1993 SNA is available from about 1990 onwards, although the series tend to be somewhat shorter for CEE than CIS countries. Series for earlier years are generally compiled using Material Product System rather than SNA. Many of the countries compile their constant price estimates at the prices of the previous year.

Conclusion

31. The survey has shown that there is a considerable amount of information available about stocks of fixed assets in most transition economies. In contrast to the western countries, transition economies have relied much more on annual surveys of stocks of assets than on the cumulative investment data used in the PIM method. PIM is the method used by most developed market economies to derive capital stock estimates. The method involves adding capital formation to an initial estimate of the capital stock and subtracting capital assets that are withdrawn. The application of the Perpetual Inventory Method is described in great detail in the OECD Manual. The ECE Report discusses the PIM as an alternative method for use by transition economies in the future.

32. The survey also demonstrated the great importance attached to capital stock data in many transition countries and a strong interest in developing the data further.

CONCLUSIONS AND RECOMMENDATIONS OF THE ECE REPORT

33. The ECE Report concludes that all transition economies have similar experience in measuring capital stock from the time when the economy was centrally planned. However, at present, they are at different stages in their transition to new statistical and accounting systems that are in line with those in developed market economies. While the Russian Federation, other CIS countries and the Baltic States are still using direct annual surveys of fixed assets, countries from Central and Eastern Europe are more inclined to continue with the PIM method or a combination of direct observation of the assets with PIM.

34. The estimation of the stock of fixed capital and consumption of fixed capital is a fairly demanding exercise, even when done in a simple way, as evident from the Hungarian experience. Three basic approaches can be envisaged: (i) a 'pure' PIM method; (ii) direct observation of capital stock

(similar to the BFA); or (iii) direct observation of capital stock (a benchmark estimate) combined with PIM.

35. In the Report, it is argued that any recommendation for improving capital stock statistics in transition economies should take as a starting point the data collection procedures already in place. The constraints on resources available as well as any other special circumstances in which transition countries may find themselves should be taken into account, as well as the need to obtain some improved estimates as quickly as possible.

36. A general recommendation is made that transition economies should start their transition to new standards in capital stock measurement by analysing the capital stock statistics currently available. They should document the sources and methods used to compile the capital stock statistics and evaluate the quality and reliability of the data. Improved methods for estimating stocks of fixed assets should be developed which are tailored to their particular circumstances.

37. Having in mind the arguments mentioned above, it seems that the most appropriate approach for transition economies to apply in future would be the combination of benchmark estimates of capital stock combined with PIM. Both groups of countries, i.e. those who have discontinued the annual surveys (mainly Central and Eastern Europe) and those who are still compiling some of the information required by the balance of fixed assets (CIS countries plus the Baltic States) could consider it.

PROPOSALS FOR FUTURE WORK

38. The ECE Report will be finalised and published as a UN working paper in the second half of 2001. It will be translated into Russian and distributed to all transition economies, both in English and Russian.

39. In view of the great interest in capital stock measurement expressed by transition economies, it is suggested that the ECE project on capital stock measurement continue with the analysis of actual capital stock data which countries may provide to the ECE Secretariat. It is suggested that the ECE Secretariat, together with the countries concerned and the CIS-STAT, analyse and publish some of the data. As mentioned above, in paragraph 36, the evaluation of the availability, quality and reliability of the capital stock data may lead to developing improved methods for estimation of stocks of fixed assets.
