"Estimating Dwelling Services in the Candidate Countries: Theoretical

and Practical Considerations in Developing Methodologies Based on

the User Cost of Capital Measure"

by

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Introduction

1.   Within the European Union, the standard method for estimating owner-occupied dwelling services in the national accounts has been the "stratification method." Unfortunately, this method has major implementation problems for many candidate countries from Eastern Europe that were acceding to membership in the European Union because they have relatively small private rental sectors that are not representative of the overall housing market. This paper discusses an alternative method for estimating these dwelling services based on the user cost of capital measure that was developed by a Eurostat task force.

2.   The paper is organized as follows. First, the background to the task force is given. Next, the theory behind the user-cost method is described. Then, a short history of the use of the method by U.S. statistical agencies is given. The initial considerations and empirical recommendations for measuring dwelling services are then presented. These are the recommendations resulting from the first meeting of the task force. This is followed by a section on lessons learned and modifications to the initial recommendations, which discusses the outcome of the second meeting of the task force. The paper concludes with a section on observations and conclusions, which gives this author's views on the project. A mathematical appendix is also presented that derives the user-cost measure.

Background

3.   Because official measures of GDP and other aggregates are used in formulating economic policy and to determine the amounts of transfers paid to and received from the European Union, the European Commission (EC) tries to ensure that the national

accounts of Member States (MS) are estimated using comparable methodologies. To this end, the EC has given a detailed statement of how dwelling services are to be measured using the so-called "stratification method" by all of the Member States.[1] This method essentially involves dividing the stock of dwellings of a country into various strata, sampling the actual rents paid for dwelling services to estimate the average rent paid in each stratum, and valuing the dwelling services of all units in a given stratum by the product of the number of dwelling units in the stratum and its estimated average rent per unit. A similar methodology is used in the U.S. There, rents are imputed to owner-occupied dwellings by dividing the stock of dwellings into strata based on their value, determining the average rent to value ratio for comparable units (in the same value class) that are actually rented out and multiplying these ratios by the total value of the owner-occupied units in the stratum.

4.   In 1998, there were thirteen countries that were candidates to join the European Union. These Candidate Countries (CCs) consisted of: Bulgaria, Cyprus, the Czeck Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, the Slovak Republic, Slovenia, and Turkey. The "acquis communautaire" requires the CCs to comply with all EU legislation including the Commission Decision on Dwelling Services (CD). Eurostat organized two projects to assist the CCs with their estimates of dwelling services. The first was the A8 Dwelling Services Project, which took place between October 1998 and May 2000. Its initial goal was to provide technical assistance in implementing the stratification method. This goal was later abandoned because it

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[1]   See the Commission Decision of 18 July 1995 specifying the principles for estimating dwelling services for the purpose of implementing Article 1 of Council Directive 89/130/EEC, Euratom on the harmonization of the compilation of gross national product at market prices, (95/309/EC, Euratom), OJ No L 186, 5.8 1995, p. 59 (http://europa.eu.int/eur-lex/en/lif/dat/1995/en_395D0309.html).

became clear that there were a number of fundamental reasons why CCs would not be able to comply with the CD. The stratification method requires large scale and expensive rent surveys that are too costly for most CCs. More importantly, the private rental sector in each of the CCs is relatively small, very specialized, and unrepresentative of the other parts of the housing market. Having abandoned the goal of stratification, the project gave an overview of the estimation methods and data sources currently in use in the CCs, considered various methodological problems, and recommended improvements for some of the CCs.

5.   The work that A8 started was carried forward in a second project, the Dwelling Services Task Force, which took place between June 2000 and September 2000. This task force, which sought to find alternative approaches to the stratification method, was an initiative of Eurostat Units B1 and B2 and reported to the National Accounts Working Party. Eurostat Unit B3 was also interested in the issue because dwelling services have been a problem for the work on the Harmonized Index of Consumer Prices and Purchasing Power Parities for much the same reasons. Rather than set up its own separate task force, Eurostat B3 joined the national accounts task force. Consequently, the task force sought to provide a solution that would accommodate the combined needs of all of these Eurostat units.

6.   The task force set out to determine how the existing CD should be interpreted. The first task was to determine when stratification would not be an appropriate method for a given country to use. Based on statements already contained in the CD, the task force recommended that "In the case of privately rented dwellings constituting less than 10% of the total dwelling stock by number <u>and</u> where there is a large disparity between private and other paid rents (say by a factor of three), as an alternative objective assessment, the user-cost method may be applied." European Commission [2001; 68].

7.	The task force examined the two alternatives to the stratification method, self-assessment and user cost. It concurred with the CD in finding self-assessment a subjective approach and, therefore, ruled it out. Because this left user cost as the only viable measure, the task force put most of its effort into specifying a user-cost measure that is consistent with the requirements of the CD.

8.	The task force noted that the user-cost approach reverses the normal accounting procedure and builds up output from its components. Thus, gross rentals equal the sum of intermediate consumption, consumption of fixed capital (CFC), compensation of employees (which are zero for owner-occupiers), other (net) taxes on production and the net operating surplus. The task force recommended that as many of the cost elements as possible should be valued by direct measurement. Where there are imputations rather than measurements, these should be based on standardized assumptions to ensure comparability of results. To better estimate CFC, as soon as possible, the CCs should establish perpetual inventory models for estimating CFC for dwellings and these need to be partitioned into the owner-occupied and public and private paid rented sectors. The net operating surplus should not be set to zero. Instead it "should be calculated as a rate of return applied to a market valuation of the owner-occupied dwelling stock based on the adjusted current replacement cost method. The rate of return should be based on as much empirical evidence as possible and ideally should represent an average rate typically obtained from the application of similar productive assets in the most similar activities." European Commission [2001; 73].

9.	The Task Force "Estimation methods for dwelling services in the CCs" was formed to define a detailed user-cost approach and to consider practical options for its implementation by the CCs. It functioned from November 2001 through July 2002. It

was an initiative of Eurostat Units B1 and B2 and reported to the National Accounts Working Party. In contrast to the largely theoretical work of the earlier task force, the aim of this task force was to develop practical methods and have participating CCs carry out experimental calculations. The Czech Republic, Hungary, Poland, Slovak Republic and Slovenia were involved in this work.

10.   The task force was led by Roger Akers. After its final meeting, he left Eurostat to return to the U.K.'s Central Statistical Office and was replaced by Mojca Skrlec Sinkovec. Arnold Katz prepared the templates that formed the basis of the empirical work and served as the principal expert. Mr. Norbert Hartmann, Mr. Seppo Varjonen, Ms. Silke Stapel, and the experts from the participating CCs also made important contributions to taking the work forward.[2]

11.   After an initial meeting of the experts, a questionnaire was sent to the central statistical offices of the participating CCs to determine what data they had available that could be used to implement a user-cost measure. On the basis of the available data, several methodologies were developed that could be estimate user-cost measures of the rental value of owner-occupied housing. One of the major constraints on the task force's work was that it was necessary for every participating country to be able to implement at least one of the proposed methodologies. Draft templates for the proposed methodologies were developed that gave detailed step-by-step instructions for making the

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[2]   The final report of the project, Eurostat B1 [2002], was presented at the Regional Coordinator's Workshop of the International Comparison Program 2003-2005 held in Luxembourg, March 24-28 as were the template and associated notes prepared by Katz [2003b] and the paper by Katz [2003a] on the theory and application of the user cost measure. Much of this paper is based on this material.

empirical calculations. The suitability of the draft templates was discussed and agreed to by the participating countries at the first meeting of the task force. The participating countries then produced experimental estimates for the period 1997-2000 using the templates. Estimates were also made using several different assumptions about the rate of return and the rate of depreciation of dwellings so that a sensitivity analysis could be conducted. These estimates were presented at the second meeting of the task force. At that meeting, some problems were identified (particularly with the estimating of the net operating surplus) and solutions were recommended. The templates were revised to reflect these solutions and the participating countries used the revised templates to make additional experimental calculations.

The User Cost Measure in Theory

12. The "user cost of capital" measure is based on the fundamental equation of capital theory. This equation, which applies equally to both financial and non-financial assets, has been known since at least the middle of the 19th century. It states that in equilibrium, the price of an asset will equal the present discounted value of the future net income that is expected to be derived from owning it. For non-financial assets, the net income consists of the net rental income that would be obtained from renting out the durable. When durables are used by their owners rather than rented out, the value of their services represents costs that are implicitly incurred by their owner-users, i.e., this value represents the opportunity costs of forgoing the receipt of the rental income. As shown in the appendix to this paper, the fundamental equation can be easily manipulated to obtain the traditional user cost of capital measure, which expresses the implicit rental value of a durable good as the sum of depreciation, a real net operating surplus, and various operating costs.

13.   There is one theoretical point that is the source of some controversy. As shown in the appendix, the traditional version of the user cost formula is derived by assuming that all of a durable's services are received on the last day of the income period (generally a year). Elsewhere I have argued that to make the user cost measure more consistent with the principles used in national economic accounting, one should assume that equal quantities of a durable's services are received in every fraction of the year.[3] When this is done, the user cost measure is approximately equal to the traditional expression (given in equation (4) of the appendix) divided by the square root of one plus the nominal rate of return, which is the value obtained by assuming that all services are received on the mid-day of the year. Thus, it yields estimates that are smaller than those obtained using equation (4) by a percentage that is roughly equal to one half of the nominal rate of return. Although Diewert [2002b; 60] recently discussed some related questions, there does not appear to have been any further discussion on this point. Given that the expression in equation (4) has become standard in the literature, and given the need to obtain harmony and consistency between the estimates of different countries, the task force decided to avoid this controversy and did all practical work with the traditional version of the user cost measure.

14.   Another theoretical point regarding the proper measure of depreciation (or consumption of fixed capital as it is now termed in most of the literature on national economic accounting) needs to be clarified. The change in the market value of a durable from the beginning of the income period to the end of the period can be partitioned into a depreciation and a capital gains component. The depreciation component measures the

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[3]   See Katz [1982; 47] and [1983; 408].

difference in price between the given durable and an identical one that is one year older, both prices being measured at the same point in time.[4] Recently, Hill [1999] coined the term "cross-section depreciation" to denote this measure of depreciation and the term "time-series depreciation" to denote the entire change in the durable's market value over the course of the income period. Thus, the user cost measure in equation (4) can be described as being equal to the sum of the real net operating surplus (the nominal net operating surplus less the expected capital gain on the durable) plus cross-section depreciation. Equivalently, it can also be described as consisting of the nominal net operating surplus plus time-series depreciation. Now, the question of whether economic depreciation should be measured by the times series or the cross section measure was debated extensively in the 1930s and 1940s. For the past 50 years, most national accountants have appeared to accept the cross section measure, which is essentially depreciation at current replacement cost, as the appropriate measure for national accounting. However, recently some have challenged that and advocated the use of the time series measure.[5]

15.   While not really a source of controversy with respect to estimating dwelling costs, another theoretical point needs to be stressed. User costs include such operating costs as expenditures on maintenance and repair. These expenditures have been part of

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[4]   Economists have differed over whether the prices of the durables should be measured as of the beginning of the income period, the end of the period, or at some other time, see Katz [1983; 418]. Because the annual measure of depreciation that appears in the NIPAs is equal to the sum of the four quarterly estimates, it is effectively measured using prices as of the middle of the year.

[5]   Diewert (2002b; 23) cites a recent paper by Peter Hill as advocating the use of times-series depreciation for national accounting purposes.

mathematical models of user costs since at least the time of Harold Hotelling [1925] and their interaction with other factors that affect depreciation was stressed by Jack Faucett [1980]. Their inclusion in estimates of dwelling costs is obvious to most national income accountants because when dwellings are actually rented out, the residual entrepreneurial income is estimated after these expenditures are subtracted out. In short, maintenance and repair expenditures are often a substitute for purchases of new capital goods. Estimates of capital input and output should be largely independent of whether such expenditures are capitalized or not. However, it appears that these expenditures are often omitted from estimates of capital input and appear to be not treated as an input at all in various estimates of aggregate production functions.

16.   The method for estimating constant-price values with the user cost measure is now standard in the literature. In a paper written for BEA, Frank Wykoff [1980] pointed out that the Jorgensonian user cost measure of capital services can be described as the product of a quantity of capital services and a (unit) price of capital services. The latter consists of the product of the price of the capital good and an expression equal to the nominal rate of return plus the rate of depreciation less the expected rate of capital gain in the durable's price. Thus, rates of return are treated like prices and the standard way to express the measure in constant prices is to use the service price in the base year and the quantities of each given year.

Historical Application of the User Cost of Capital Measure
by U.S. Statistical Agencies

17.   In conjunction with a number of collaborators, Dale Jorgenson has shown how the user cost measure could be employed to develop a set of capital accounts for each vintage of asset. The most complete exposition of how such accounts could be integrated into a

national accounting framework is found in Christensen and Jorgenson [1973]. The Bureau of Labor Statistics (BLS) of the U.S. Department of Labor adopted a variant of the user cost measure of capital services in its work on measuring multifactor productivity, see BLS [1983]. In this work, capital services are measured only in constant prices. This finesses the problem of having to develop a theoretically appropriate current-price measure of these services that does not suffer from excessive year-to-year volatility. In the mid 1970's, the BLS attempted to develop a measure of dwelling services based on the user cost measure for use in its consumer price index. This attempt was unsuccessful. The large changes in the real own rate of return for dwellings in the 1970's undoubtedly played a major role in the inability to obtain a current-price measure that was not excessively volatile.

18.   The Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce explored the possibility of employing a user cost measure in measuring the services of consumer durables. Arnold J. Katz [1983] examined the theoretical and empirical issues involved in developing an appropriate measure. Katz [1982] examined how sensitive user cost estimates of the services of consumer durables were to alternative assumptions about expected rates of inflation and patterns of depreciation. Earlier, BEA published a de facto satellite account for the services of consumer durables in Katz and Peskin [1980] that was based on a crude version of the user cost measure that was termed an "opportunity cost measure." A similar opportunity cost measure was used at BEA by Martin, Landefeld, and Peskin [1982 and 1984] in their estimates of a de facto satellite account for the services of government capital.

Initial Considerations and Empirical Recommendations

for Measuring Dwelling Services

19.   When dwelling services are estimated with the user cost measure, exactly what costs should be counted? The answer to this basic question is straightforward. The user cost computation is actually the reverse of the usual imputation for dwelling services based on the "stratification" method. With that method the value of dwelling services is measured by the rents charged for comparable dwellings that are actually rented out. Various associated dwelling costs are then subtracted from this rent to obtain a net operating surplus. With the user cost measure, this calculation is reversed. The net operating surplus is imputed using the opportunity cost principle, i.e., on the basis of what owner-occupiers could have earned on alternative investments. Then, the dwelling costs that are subtracted in the stratification method are added to the imputed net operating surplus to obtain the rent. These costs include: consumption of fixed capital (CFC) for dwellings, expenditures on ordinary maintenance and repair of dwellings, net premiums on insurance for dwellings, and taxes paid less subsidies received on dwellings and their associated land.

Consumption of Fixed Capital

20.   CFC is one of the most important components of the user cost measure. Because it is extremely desirable for the user cost estimates to be consistent with the rest of the national accounts, the task force recommended that if a candidate country already had an estimate of CFC on owner-occupied dwellings that was developed for another part of the accounts, that estimate should also be used here. It was recommended that if estimates of CFC on dwellings are not already available, then they should be estimated using the perpetual inventory method (PIM). There are two basic reasons for using the PIM. First, variants on it can be easily constructed so that all CCs can be expected to be able to implement it. Second, the nations of Western Europe generally estimate CFC using the

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PIM and it is desirable to use similar methodologies.[6] Schedules of straight-line declines in prices (equal values of constant-price CFC in each year of an asset's life) were recommended as the preferred method because that appears to be the most prevalent method in Western European countries.

21.   In moving from CFC for a single dwelling to that for the entire stock of dwellings, it is also necessary to take account of some complicating factors. They consist of: (1) dwellings that enter the stock during the year due to new investment undergo some depreciation during this year, (2) some goods that are in the stock at the beginning of the year undergo some depreciation and are discarded from the stock before the end of the year, and (3) depreciation takes place continuously during the year rather than on one specific date. It is because of attempts to deal with these factors that CFC in U.S. national accounting is calculated by assuming that new investment depreciates by only half the amount that it would if it had taken place entirely on the first day of the year and

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[6]   For those unfamiliar with the PIM, it can be summarized as follows. Constant-price CFC is estimated by taking the product of the beginning-of-year net stock at constant prices and the depreciation rate and summing it with one-half of the product of constant-price investment in dwellings (of a constant quality) and the depreciation rate. The end-of-year net stock at constant prices is estimated by taking its beginning-of-year value, adding constant-price investment in dwellings, and subtracting constant-price CFC on dwellings. Thus, both CFC and the net stock are essentially weighted averages of past investment. Current-price CFC is estimated by multiplying the constant-price value of CFC by the average value of the appropriate price index for the year in question. Current-price net stocks are similarly estimated by multiplying the constant-price value of the net stocks by the end-of-year price index for the year in question.

CFC is calculated using year-average prices (i.e., average prices during the year).[7] It was recommended that this half-year convention be integrated into the CCs' estimates.

22.   The straight-line method is not the easiest method to implement because depreciation rates are different for assets of different ages and all assets are eventually fully depreciated and, consequently, discarded. Because the straight-line method requires keeping track of accumulated depreciation for each vintage of assets, there is little reason for requiring its use given that a simpler alternative exists that can produce results that closely approximate those obtained using it. Specifically, simulations were conducted that showed that total estimates of user costs produced using straight-line depreciation and an approximately normal distribution of service lives around the mean life could be closely approximated by geometric depreciation with a declining-balance rate of 1.6. With this method, the rate of depreciation is held constant over the asset's life; in the first year of an asset's life, it is 1.6 times what it would have been with the straight-line method. Thus, depreciation rates are independent of an asset's age so that depreciation does not have to be estimated separately for each vintage of assets.

23.   Because the data requirements for a PIM using geometric depreciation are so meager and the equations so simple, it was anticipated that all of the CCs would be able to implement the method. All that is required is an initial value of the (net) capital stock in constant prices and series of fixed capital formation for subsequent years in both current and constant prices. Because these series are required to estimate GDP, the only problem comes in obtaining the estimate of the initial value of the capital stock.

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[7]   See OECD [2002, p.96]

24.   Because of the general lack of available price data in the CCs, it was necessary to provide specific guidance regarding the proper price indexes for the CFC calculations. In the final instructions, Katz [2003b] pointed out that the appropriate price index is the deflator for gross fixed capital formation (GFCF) for owner-occupied dwellings, i.e., the one used to convert current-price estimates of GFCF to constant-price ones. If this index does not exist, a similar one is to be substituted. The instructions recommended that in order of their usefulness, possible prices are the deflator for GFCF for all dwellings, the deflator for GFCF for all structures, and an index of relevant construction costs. (For all of these deflators, the appropriate value is the average annual value.) Note that in the U.S., all of the deflators for investment in structures are derived from at most half a dozen unique indexes of construction costs.

25.   It was left up to the individual countries to determine the appropriate average service life for dwellings, which when divided into the assumed rate of declining-balance (1.6) yields the depreciation rate. It was pointed out that some countries in Western Europe have used a life of 50 years, which would yield a depreciation rate of 3.2 percent. In contrast, because the United States now uses 0.91-declining balance rates for residential structures, it uses a geometric depreciation rate of 1.14 percent for 1-4-unit (new) dwellings and a rate of 1.4 percent for 5-or-more-unit dwellings; it uses rates that are more than double these for major replacements and for additions and alterations to dwellings. It was suggested that analyses of past censuses should give some indication of what services life assumptions may be reasonable. For example, based on the U.S. experience, if one examined census data, one would ordinarily not expect to see significant rates of discard from the cohort of dwellings constructed in a given year until those dwellings were about 70 to 80 percent of the appropriate average service life.

Net Stock of Dwellings and Associated Land

26.   To estimate the user cost of capital measure, it is necessary to have an estimate of the value of the net stock of owner-occupied dwellings at constant prices for the beginning of the period in which the user cost estimates are to be made. Because it appeared that many of the CCs did not already have such estimates and because some of the these countries would not have the data required to implement the most useful methods, several alternative methods were recommended. First, if a long time-series on fixed capital formation for dwellings in constant prices is available, the stock estimate can be obtained using a PIM and geometric depreciation. This method incorporates the effects of improvements to existing dwellings because these are included in fixed capital formation. It also has the advantage of being consistent with the PIM that is used to estimate CFC, which would ordinarily make this the preferred method. The method has several disadvantages. In order to be useful in estimating the net stock, the time series on CFC must be very long, i.e., it must cover at least forty years. (Note that the shorter the time series, the more important are errors caused by inaccurate estimates of the initial or seed value of the capital stock.) When there is significant war damage and sales or transfers of dwellings between sectors, the series on CFC must be adjusted for these factors. Such adjustments may not be easy to make.

27.   The initial value of the stock of dwellings can also be estimated using the physical inventory method. This method requires physical data on dwellings that is usually obtained in a census. Most CCs appear to have such data. Basically, the method involves placing a value on all dwellings reported in a recent census. The number of existing dwelling units is converted into the number of equivalent new units by adjusting existing units for their age (depreciation) and for differences in quality. All units would

be valued at current prices using a price index for fixed capital formation in dwellings, or if this is unavailable, an index of relevant construction costs.

28.	The chief difficulty in implementing the physical inventory method is in making proper adjustments for the effects of depreciation. To make such adjustments, two variants of the basic method were recommended. The first requires data from only the single recent census. However, it also requires that the data on dwelling units be stratified by their year of construction (or age). The requirement would be met if, for example, separate data are available on all dwelling units in the stock that are 0-10 years old, 11-20 years old, etc. The second variant does not require such stratified data. However, it does require data from a second census conducted at least several decades before the recent one. By assuming constant growth rates for some of the major determinants of the stock, such as the quality and number of units, it is possible to convert the number of units in the recent census from actual (physical) numbers of units into equivalent numbers of new units. Because this method essentially substitutes assumptions for the actual data of the first variant, it is less preferred than that method. Both of these variants of the physical inventory method do not have the same problems of dealing with war damage as the PIM estimates do. However, as noted earlier, the stock estimates derived from the PIM reflect the effects of improvements to dwellings while such effects would have to be made by explicit quality adjustments to the physical inventory data.

29.	In both variants of the physical inventory method, it was recommended that adjustments for the effects of age on the value of the stock be made using the same 1.6-declining-balance-rate depreciation that is recommended when the PIM is used. By using the same depreciation rate to value the stock and CFC, the two estimates are made more

consistent and estimates of total user costs are less sensitive to alternative assumptions about the service life of dwellings.

30.   It was recommended that wherever possible, the estimates of fixed capital formation that are used in the PIM or the estimates of equivalent numbers of new units that are estimated with the physical inventory method should be adjusted for quality change. This could be done either by fitting a hedonic regression equation to micro data on the costs of constructing individual units or by using expert opinion to make equivalent estimates of the marginal costs of various quality factors.

31.   In addition to valuing the stock of dwellings, it is also necessary to value their associated land, i.e., the land that the dwellings sit on and which would be included in their selling price, if they were being sold. (Land can be thought of as a fixed capital good that differs from other fixed capital goods in that it does not suffer any depreciation.) Valuing land, however, is extremely problematical. Even in Western Europe, prices per unit of land in a central city can easily exceed those in rural areas by more than a thousand fold. Where land is taxed, it may be possible to infer the assessed value of the land. Otherwise rough rules of thumb may have to be used such as by assuming that land is a fixed percentage of the value of the dwelling that is located on it.

Other Operating Expenses

32.   All expenses incurred on dwellings must be reflected in the user cost measure of dwelling services. Expenses that are capitalized and included in gross fixed capital formation, such as expenditures on improvements, will be reflected in the estimates of value of the stock of dwellings and, therefore, in the estimates of the net operating surplus. They will also be reflected in the estimates of CFC. All expenses that are not

capitalized need to be treated as other operating expenses and explicitly added to the other components of the user cost measure. These expenses include expenditures on intermediate goods, such as those for ordinary maintenance and repair, net insurance premiums, and taxes less subsidies. Note, if the expenditures on maintenance and repair are of the kind that a tenant would make, they are not included in the housing imputation but are measured elsewhere in the accounts together with other expenditures that are not for dwellings. The task force anticipated that there would be little trouble in obtaining data on other operating expenses because they are generally required to estimate the various accounts according to SNA93 and its European version, ESA95.

33.   Net insurance premiums on dwellings are an important operating expense. This expense does not include insurance on the contents of the dwelling; such insurance is of a kind that a tenant would have and is measured elsewhere in the accounts. Insurance premiums are measured net of any payments received for incurred losses. Strictly speaking, the losses should be measured when they are incurred rather than when they are paid and premiums are measured when they are earned; the losses reflect the relevant insurance company's views about the liability it has incurred as a result of the loss (not the insured's views about the magnitude of the loss). According to SNA93, the measure should also include premium supplements, which are the expected investment income on technical reserves other than on own assets (of the insurance company); this income should exclude capital gains.[8] Initial indications were that the data required to refine the estimates of insurance may be lacking in the CCs and cruder estimates may have to suffice.

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[8]   This measure of insurance services was introduced in the System of National Accounts 1993 [1993; 575].

34.   The final component of other operating expenses is taxes less subsidies paid. In theory this would include taxes levied on the services of dwellings; however, very few countries levy such taxes. Many countries do levy taxes on the value of dwellings and the land they are situated on. These are often referred to as property taxes. Because such taxes are costs that would not be borne by an investor in a financial asset, they represent opportunity costs that need to be included in the user cost measure. Some countries levy taxes on housing services. These taxes would also be added here. Conversely, any subsidies that owner-occupiers receive need to be subtracted from the measure.

Net Operating Surplus

35.   The most important and problematic component of the user cost of capital measure is the imputed real net operating surplus.[9] This surplus is estimated as the difference between the nominal net surplus received from an investment in an alternative asset and the expected capital gains on the durable itself. It is clear from the derivation of the user cost measure itself that the latter gains are those arising from changes in the price of the durable (when new) and not those from general inflation.

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[9]   For those who are unfamiliar with the concept of an operating surplus, an explanation is in order. In the U.S., it has been customary to measure the rental income of persons as a profit-type residual income after the subtraction from space (gross) rent of all associated dwelling costs including the payment of mortgage interest. In the SNA, the operating surplus is the residual income accruing to capital before payments are made to debt (such as dividends and interest). The operating surplus, therefore, includes the return to both the debt and equity portions of capital.

36.   Computationally, the nominal net operating surplus is estimated as the product of

an assumed nominal rate of return and the value of the net stock of dwellings and their

associated land. It was recommended that the stock's value be measured as the average

of the beginning- and end-of-year values of the net stock. This incorporates the effects

on the stock's value of gross investment during the year, depreciation, and changes in the

price level for (new) dwellings.

37.   The determination of the appropriate real rate of return is contentious. In theory,

on the basis of the opportunity cost principle, the nominal rate of return is measured as

the rate on the best alternative investment. In practice, many different rates have been

used in empirical work. The rates are almost always those obtained from investment in

financial assets, including rates paid on loans as well as those earned on bonds and other

assets. The most important practical problem in empirically implementing the user cost

measure is the year-to-year volatility of the real own rate of return. This is only a

problem for current-price measures. Constant-price measures utilize prices, rates of

inflation, and rates of return of the base (reference) year. Therefore, the real own rate of

return for a given type of asset is a constant and there is no volatility.

38.   The different rates of return used in practice reflect differences in the analysts'

thoughts with respect to some basic questions. These questions include: whether a

before- or after-tax rate should be used, whether the same rate should be applied to the

debt and equity portions of the stock, whether a borrowing or lending rate should be used,

and whether the rate should reflect differences in risk.[10] In the present context, a

definitive answer can be given to the first question. The objective is to approximate the

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10   For a discussion of these issues, see Katz [1983].

rental value for dwellings obtained with the stratification method and this value is measured before taxes. Therefore, we can definitely state that a before-tax rate should be used in the imputation. The last question reflects the concern that the risk on the alternative financial asset should be comparable to that of the durable in question. In the present context, this means that because investments in dwellings and land are generally done on a long-term basis and are less risky than investments in other types of goods, there is a strong case for using returns on long-term assets that are less risky, such as those on long-term government bonds.

39.   The solutions to the remaining questions center around three possible methods: (1) applying a lending rate to both the debt and equity portions of the stock, (2) applying a borrowing rate to both the debt and equity portions of the stock, and (3) applying a lending rate to the equity portion of the stock and a borrowing rate to the debt portion. In general, the rates at which money is borrowed (on loans) are higher than those at which it is lent (by consumers to financial institutions in the form of saving accounts, bonds, or similar financial instruments). The opportunity cost principle of using the highest rate points to using a borrowing rate. Also, it can be argued that when owner-occupants have taken out loans on dwellings, the expected benefits must be greater than the expected costs including any interest paid. In many instances, borrowers have the option to pay off some or all of their loans early and thereby "earn" the interest rates charged on the loans. The forgoing arguments point to using the rate actually paid on mortgage loans on at least the debt portion of the stock. Consequently, if data is available on the amount of the stock financed by debt, the return on the debt portion of the stock should be estimated by the amount of interest actually paid on the debt.

40.   This leaves the question of what rate of return should be applied to the equity portion of the stock if data to support the calculation of method 3 is available or what rate

should be applied to the entire stock if this data is not available. The principle of using the highest rate suggests the use of a borrowing rate. However, it can be argued that the relatively high rates "earned" by borrowers do not represent true alternatives to owner-occupiers who do not have any debt. Thus, the theoretical arguments are inconclusive and either borrowing or lending rates are permissible.

41.   Another theoretical point is whether the real rates of return in effect when a durable is purchased should be used to estimate the durable's services throughout its lifetime, or whether the rate to be used to value services in any given year should be the real rate in effect for comparable purchases of a new durable in the given year. Some economists have favored the former "vintage" approach to measuring rates of return.[11] However, most economists have favored using the latter approach of using a single rate for all durables. In particular, some have argued that the vintage approach seems to deny that old durables can be perfect substitutes for newer durables that are identical, except for their ages. Such a denial would appear to erode the theoretical foundations on which the entire user cost of capital derivation is based. One of the implications of this approach is that if a borrowing rate is used to make the estimates, the rate should be on newly issued loans rather than the average rate on all loans outstanding.

42.   Having decided on the general parameters of how, in theory, the real rate of return should be measured, we turn to the thorny question of how it should be estimated in practice. Initially, the task force decided against assuming what the rate of return was and attempted to see if reasonable estimates of it could be made from data available in the CCs. While it was recognized that estimated rates could be very volatile, there were

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[11]   For example, see Mike Mohr [1984].

some strong reasons for seeking to estimate them. Specifically, it was felt that real rates of return to housing could vary significantly over time in any single county (they varied tremendously in the U.S. between 1979 and 1984), real rates of return might vary significantly between countries, and rates of inflation in housing and land prices might differ significantly from each other.

43.   These considerations led to a recommendation that real rates of return be initially estimated by taking an appropriate nominal interest rate on long-term loans and subtracting from it an estimate of the rate of inflation. Different rates of inflation would be used for the rates applicable to land and those to the dwellings themselves. Specifically, the rate of inflation in dwelling prices should be based on the same price index that is used to estimate consumption of fixed capital, i.e., the deflator for fixed capital formation in owner-occupied dwellings, or when that is unavailable an index of relevant construction costs. Theoretically, the rate for land prices should be based on actually selling prices for land. Such price indexes are not available in many countries. When that is the case, a measure of general price inflation should be used instead. The rates of change of the consumer price index and the implicit deflator for GDP are two measures of price inflation that were recommended as appropriate examples.

44.   Regardless of how the real rate of return was estimated for a given year, it was recommended that the rate be smoothed by taking a moving average of past rates. There are several reasons for such smoothing. In the past, the volatility of interest rate series has been the biggest obstacle to employing the user cost measure. Smoothing should mitigate this problem. Moreover, the theoretically relevant rate is an expected rate and many have argued that the best method of estimating an expected rate is by making it a function of past actual rates.

Lessons Learned and Modifications to the Initial Recommendations

45.   Sample calculations made by representatives of statistical offices of some of the CCs exhibited many of the problems that have turned up in past attempts to implement user cost measures. As expected, most of these centered on attempts to estimate appropriate real rates of return on dwellings. In the estimates made by some countries, there was extreme year-to-year volatility in the estimated real rates of return. Attempts to smooth these by taking weighted averages of past rates did little to mitigate the problem. The variation in estimated rates between countries was unreasonably large. Some countries had rates of return that were unacceptably high. They produced imputed values for housing services that were a much higher percentage of GDP than in other European countries. Other countries had estimates of real rates of return that were unreasonably low. Some even had negative rates for several years in a row. The task force felt that such results could not be theoretically justified and had little worth for practical work.

46.   The failure to obtain reasonable estimates of real rates of return appears to be largely due to the lack of fully developed markets for financial funds. Many of the CCs appeared to lack the kind of large scale markets for mortgage loans that are common in the West. In some countries, the only statistics on long-term debt were for government bonds. These were often closely administered by government authorities and set at rates that were lower than the rate of increase in the consumer price index, which resulted in estimated negative real rates of return.

47.   Many of the past practical studies employing user cost measures have resolved problems in estimating real rates of return by assuming that it is a constant over time. This was essentially the approach taken by the task force. The members of the task force agreed that the best way to resolve the practical problems was to determine a real rate of

return for dwellings and associated land that would be used by all countries. This rate would be used in all estimates made during the next five years. The rate would then be reviewed to determine if it should be modified.

48.   The remaining question was what value of the real rate of return is appropriate? One gauge of an appropriate rate is found in a recent paper by Erwin Diewert, where he stated, "The Australian Bureau of Statistics assumes that producers face a real interest rate of 4 %. This is consistent with long run observed economy wide real rates of return for most OECD countries which fall in the 3 to 5 percent range," Diewert [2002b; 20]. Evidence was presented to the task force that suggested that, at least in Western European countries, the appropriate real rate of return for owner-occupied dwellings was lower than that for other durables, perhaps in the 2.5 to 3.0 percent range. Norbert Hartmann presented evidence based on data found in the German National Accounts that if land associated with dwellings were included in the net stock of dwellings, a real rate of return of 2.5 percent would be realistic based on rents obtained from the German stratification model. It was the consensus of the task force that given the actual situation in the CCs, real rates of return on both dwellings and land should be assumed to be 2.5 percent. In the subsequent sample calculations performed by the participating CCs, this rate resulted in estimates of dwelling services that ranged between 7 and 9 percent of each country's GDP. This was judged as being reasonable because dwelling services generally averaged about 8 percent of GDP in the countries of Western Europe.

49.   Obtaining estimates of land values turned out to be extremely problematical. It was pointed out that in the CCs land in the central cities could be worth more than a thousand times the value of equivalently sized plots in the countryside. However, such large relative differences also occur in the U.S. and Western Europe. There appeared to be very little data, if any, on what values of land were implied in any tax assessments.

This left us with only the hope that there might be some agreement as to what might be a reasonable rule of thumb. It was pointed out that in the U.S., when there is new construction, the value of land generally accounts for about a quarter of the total sales price. Some of the experts on the task force noted that the value of land was relatively higher in Western Europe; it was generally more than one third and sometimes more than one half of the total sales price. However, some experts from the CCs insisted that the value of land in their countries was worth less than five percent of the value of the dwellings that were built on it. This appeared to be contradicted by the fact that in some CCs even newly constructed high value dwellings outside of central cities are built on relatively small plots. If land were so cheap, one would expect the plots for such dwellings to be larger. The task force concluded that the valuation of land is largely based on variables that are specific to a given locality and that rules of thumb that work in one country cannot be assumed to apply to other countries. Consequently, there seemed to be no alternative to allowing countries to estimate the value of their land independently of each other without imposing any specific guidelines.

50.   It appeared that a number of the CCs would not have the data required to estimate the premium supplements that are part of net insurance premiums. To promote comparability in the estimates, the task force recommended that all CCs forgo estimating such supplements. Similarly, few countries had separate data on insurance losses to dwellings and their contents. It was recommended that such losses be split in proportion to the relative values of the stock of dwellings and their estimated contents.

51.   Table 1 presents estimates from the final report of the project, see Eurostat B1 (2002). They show how the various components of the output of owner-occupied dwellings differed between the participating candidate countries and some member states when estimates for the former were derived by the user cost method with an assumed real

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rate of return of 2.5 percent. U.S. data have been added to this table; they are based on

estimates that were recently published in the U.S. national income and product accounts.

The estimates for the candidate countries and the member states are very similar. There

are, however, major differences between the estimates for both sets of countries and those

for the U.S. Consumption of fixed capital and expenditures on maintenance and repair

account for much smaller shares of the output of dwellings in the U.S. while taxes on

production account for a much larger share.

Table 1 - Components of Output of Owner-occupied Dwellings in Participating Candidate Countries, Some Member States, and the U.S., in percent, 1998.									
	Czech Rep.	Hungary	Poland	Slovak Rep.	Slovenia	Germany	Nether-lands	Finland	U.S.
Output of owner-occupied dwellings	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Intermediate consumption	25.1	16.2	17.9	11.5	19.5	12.1	20.0	22.9	17.3
Current maintenance and repairs	25.2	15.2	17.6	11.4	19.2	-	-	17.1	3.9
Insurance services	-0.1	1.0	0.2	0.1	0.3	-	-	5.8	1.4
Other Intermediate consumption	0.0	0.0	0.0	0.0	0.0	-	-	0.0	12.0
Value added	74.9	83.8	82.1	88.5	80.5	87.9	80.0	77.1	82.8
Consumption of fixed capital	29.1	34.7	27.3	48.7	34.0	32.5	41.0	41.4	16.0
Other taxes on production	0.8	0.0	1.1	0.5	1.1	3.3	3.0	-0.8	14.5
Net operating surplus	44.9	49.1	53.7	39.2	45.4	52.0	36.0	36.4	52.3

52.   Some of these differences may be due to differences between the statistical

methodologies used in the U.S. and Europe. Major replacements to dwellings, such as

the replacement of roofs and water heaters, are treated as capital formation in the U.S. but

as current maintenance and repair in the SNA and presumably in Europe. Conversely,

costs of acquisition are included in capital formation in Europe but a large part of it is

treated as current intermediate expenditures in the U.S. The rate of depreciation for dwellings used in the U.S. is much lower than comparable rates used in Europe. How much this impacts the relative estimates of consumption of fixed capital is not clear. Nevertheless, the difference in taxes is a real one and it does not seem likely that statistical differences account for most of the other differences.

53.   The percentage of the output of owner-occupied dwellings accounted for by the net operating surplus is relatively large in the U.S. Assuming that the value of residential land is equal to one third of the value of the net stock of dwellings, the real rate of return on dwellings and land in the U.S. was about 3.7 percent in 1998, which is much higher than it is in Europe. To put this another way, the value of residential land would have to be about equal to the value of dwellings in order for the real rate of return on dwellings and associated land to be 2.5 percent. Moreover, the composition of the operating surplus is clearly different in the U.S. and Europe. In the U.S. it is largely a return on debt (i.e., it is largely used to pay mortgage interest) while in much of Europe it is largely a return on equity.

Observations and Conclusions

54.   During the course of the project it became evident that there are major institutional differences between housing markets in the U.S. and those in both Eastern and Western Europe. These differences affect international comparisons of income and product. In the U.S., housing markets are extremely well developed and highly

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competitive. Individuals can easily buy or sell existing homes, rent out homes they live in, or purchase new homes. Loans to finance the purchase homes are readily obtainable. Mortgages are now offered in a bewildering array of products, some of which require virtually no down payment. There are so many products that the purchaser can effectively customize his loan, having the interest rate fixed for whatever term he desires. The population is very mobile. The average family moves every seven years. If one does not like the size of one's home, one can readily obtain a different one that is larger or smaller. Moves are readily made to distant cities because obtaining housing is generally not a problem. As a result, all of the opportunities discussed in the user cost model represent true opportunities to owner occupiers and the user cost model can give an accurate measure of the value of housing services.

55.   The converse holds true in Eastern Europe. Because homes are rarely sold, many of the sales are at distressed prices, mortgage loans are difficult to obtain, new homes are difficult to acquire, etc., many of the theoretical opportunities of buying and selling (or renting) homes do not represent true opportunities. Thus, in a theoretical sense, the user cost model is less applicable. Nevertheless, estimates of the value of housing services need to be made and appropriate market prices do not exist. The results of the project demonstrate that the user cost measure does give reasonable estimates of the value of these services. Some critical assumptions that are almost heroic in nature, i.e., that the real rate of return is 2.5 percent, have to be made. But, given the objectives of making comparisons between different countries, the drawbacks of making such assumptions are less important. In other words, by assuming the same real rate of return across countries,

the relative magnitude of housing services is made more strictly a function of the relative

sizes of the net stock of housing. This may not be such a bad thing to do.

56.   The valuation of land is a major difficulty. The difference between the average

value of land being five percent of the value of dwellings and fifty percent of their value

could alter the measure of GDP by as much as two percent of its total value. The task

force left the CCs to value land as they see fit. This decision may have to be reexamined

in the future.

57.   The project demonstrated that the CCs have a wealth of data on the physical

characteristics of dwellings from censuses that can be used to make estimates of the net

stock of dwellings. Given the enormous damage to the stock during World War II,

estimates made using variants of the physical inventory method may actually give more

accurate estimates than those based on the perpetual inventory method. Furthermore, in

devising the examples for the templates using U.S. data, it proved difficult to reconcile

stock estimates obtained with the perpetual and physical inventory methods. Studies of

why the two approaches tend to give different results may be a promising area for future

research.

58.   The data from the project suggest that there may be significant institutional

differences between the markets for owner-occupied dwellings in the U.S. and those of

the CCs and Western Europe. In the U.S., a large part of the services of these dwellings

goes toward the payment of property taxes and mortgage interest. In Europe, the share of

output spent on these costs is much lower but expenditures on maintenance and repair

and as well as depreciation are relatively higher. The true extent of these differences is

difficult to determine because of the lack of underlying detail and differences in the

statistical methodologies used to construct the estimates.

Appendix

The user cost of capital measure provides an estimate of the market rental price

based on costs of owners. It is directly derived from the principle that, in equilibrium, the

purchase price of a durable good will equal the discounted present value of its expected

net income (or benefits), i.e., the discounted present value of its expected future services

less the discounted present value of its expected future operating costs. To see this, let

$P_{s,t}$ denote the purchase price of an s year old durable at the beginning of year t; $P^e_{s+1,t+1}$

denote its expected purchase price at the beginning of year $t+1$ when the durable is one

year older; $C^e_{s,t}$ denote the expected value of the services of this s year old durable in

year t; $O^e_{s,t}$ denote the expected operating expenses for this s year old durable in year t;

and r^e_t denote the expected nominal discount rate (i.e., the rate of return on the best

alternative investment) in year t. Expected variables are measured as of the beginning of

year t. Assume that the entire value of the durable's services in any year will be received

at the end of the year, and that the durable is expected to have a service life of m years.

From the definition of discounted present value,

$$(1) \quad P_{s,t} = \frac{C^e_{s,t}}{1+r^e_t} + \frac{C^e_{s+1,t+1}}{(1+r^e_t)(1+r^e_{t+1})} + \ldots + \frac{C^e_{m-1,\,t+m-s-1}}{\prod_{i=t}^{t+m-s-1}(1+r^e_i)} - \frac{O^e_{s,t}}{1+r^e_t} - \frac{O^e_{s+1,t+1}}{(1+r^e_t)(1+r^e_{t+1})} - \ldots - \frac{O^e_{m-1,\,t+m-s-1}}{\prod_{i=t}^{t+m-s-1}(1+r^e_i)}$$

When the durable is one year older, the services it renders in year t will have been

received and the operating expenses of year t already incurred. Consequently, the

expected price of the durable at the beginning of year $t+1$ is given by

$$(2) \quad P^e_{s+1,t+1} = \frac{C^e_{s+1,t+1}}{1+r^e_{t+1}} + \frac{C^e_{s+2,t+2}}{(1+r^e_{t+1})(1+r^e_{t+2})} + \ldots + \frac{C^e_{m-1,\,t+m-s-1}}{\prod_{i=t+1}^{t+m-s-1}(1+r^e_i)} - \frac{O^e_{s+1,t+1}}{1+r^e_{t+1}} - \frac{O^e_{s+2,t+2}}{(1+r^e_{t+1})(1+r^e_{t+2})} - \ldots - \frac{O^e_{m-1,\,t+m-s-1}}{\prod_{i=t+1}^{t+m-s-1}(1+r^e_i)}$$

Dividing both sides of equation (2) by $(1+r^e_t)$ and subtracting the result from equation (1) yields

$$(3) \quad P_{s,t} \;-\; \frac{P^e_{s+1,t+1}}{1+r^e_{t+1}} \;=\; \frac{C^e_{s,t}}{1+r^e_t} \;-\; \frac{O^e_{s,t}}{1+r^e_t}$$

Multiplying both sides of equation (3) by $(1+r^e_t)$ and combining terms, one obtains the standard user cost measure

$$(4) \quad C^e_{s,t} \;=\; r^e_t P_{s,t} \;+\; (P_{s,t} \;-\; P^e_{s+1,t+1}) \;+\; O^e_{s,t}$$

Equation (4) expresses the expected value of the durable's services as the sum of three components: the expected nominal net operating surplus, the expected decline in the price of the durable during the year, and the expected value of operating expenses. The expected decline in the price of the durable is usually partitioned into two components: consumption of fixed capital (i.e., depreciation) and the expected capital loss on the durable. The expected capital loss component can be summed with the nominal net operating surplus to yield an expected real net operating surplus. When this is done, the expected value of the durable's services is, consequently, expressed as the sum of the expected real net operating surplus, depreciation, and the expected value of operating expenses.

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