17th Meeting of the Ottawa Group on Price Indices

Measuring the Services of Durables and Owner Occupied Housing

June 09, 2022

Istat and Banca d'Italia, Rome
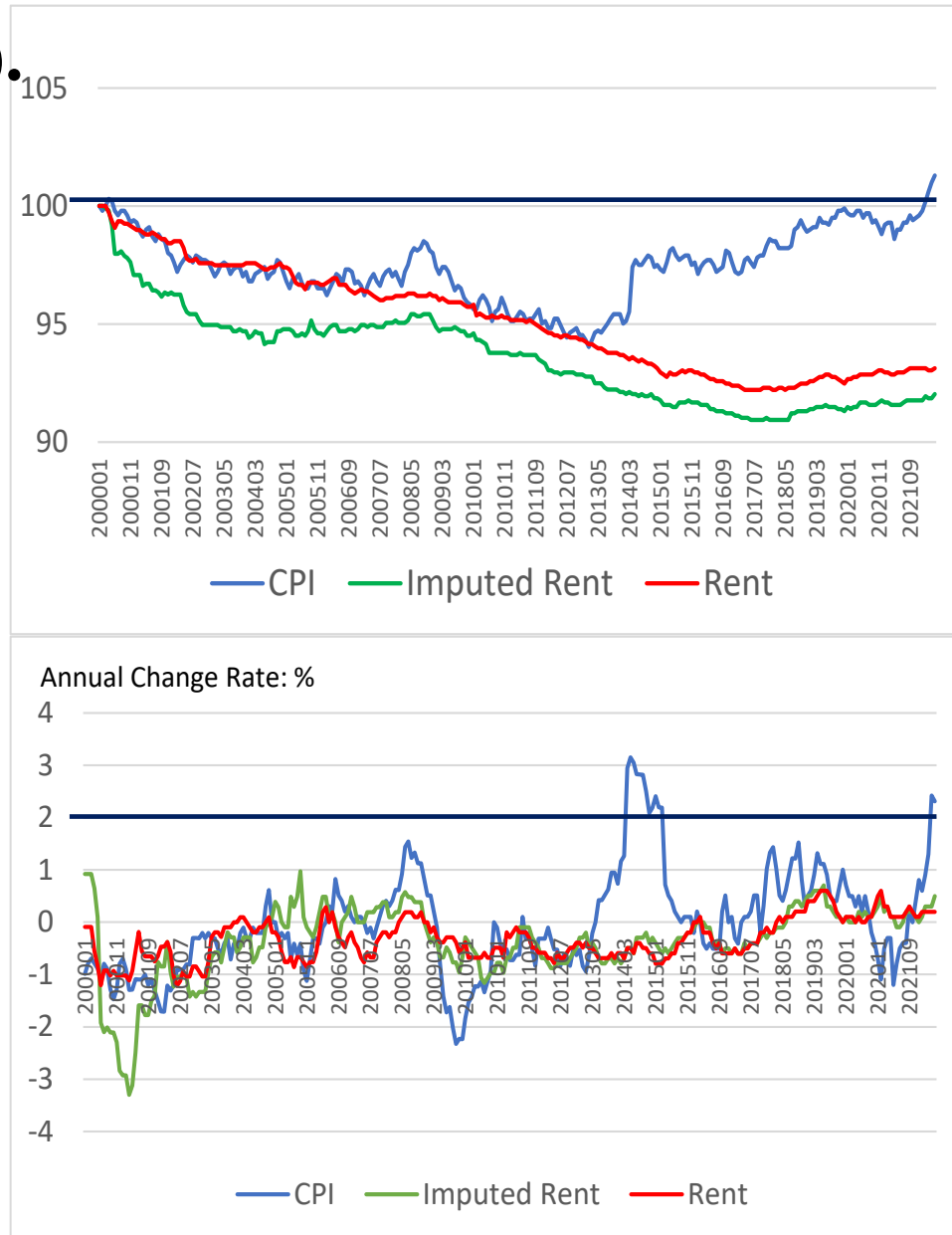
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Case of Japan(1).

Case of Japan(2).

- Whether Japan's long period of deflation is due to problems with monetary policy, the measurement of the CPI, or both.

- The measurement of owner-occupied imputed rents, which have a weight of roughly 20% to 25% in the CPI and a large rate of decline.

  – The imputed rent of owner-occupied dwellings is measured using the "**Equivalent Rent approach**" in Japan. As a measurement issue, particular attention has been paid to the problem of not taking *depreciation* into account.

  – Rents in Japan has strongly stickiness.

  – The quality of Japanese housing for rent is lower than that of owner-occupied housing.

  – Rural area suffers from a high vacancy rate due to a declining population.

- Alternative methods: Acquisition Approach , User Cost Approach and Payment Approach.

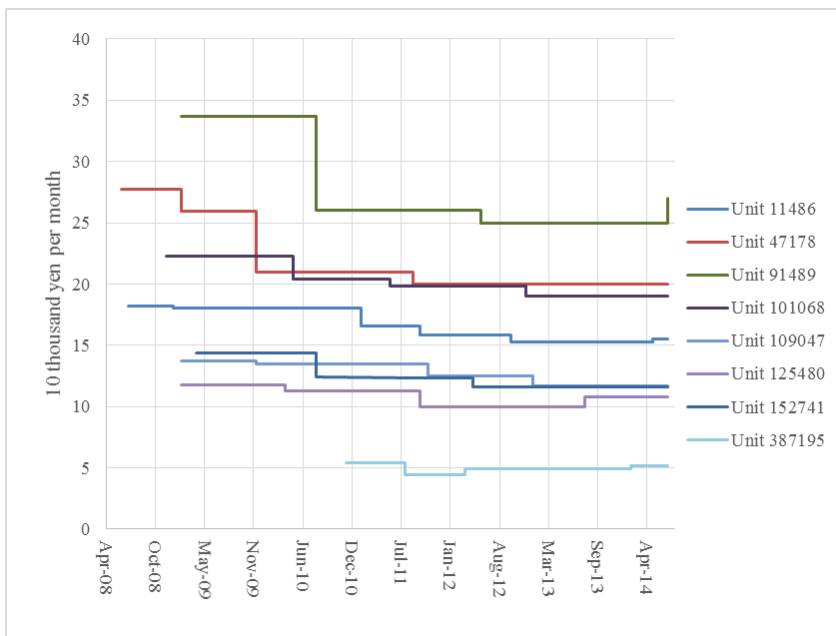# Problems in Rental equivalence approach. (1).

Price Change

$$\Delta R_{it} \equiv R_{it} - R_{it-1}$$

Probability of event on *New Contract* (I^N) and *Renewed Contract* (I^R)

$$\Pr(\Delta R_{it} = 0) = \left[1 - \Pr(I_{it}^N = 1) - \Pr(I_{it}^R = 1) \right]$$

$$+ \Pr(\Delta R_{it} = 0 \mid I_{it}^N = 1) \Pr(I_{it}^N = 1)$$

$$+ \Pr(\Delta R_{it} = 0 \mid I_{it}^R = 1) \Pr(I_{it}^R = 1)$$

Problems in Rental equivalence approach. (2).

	Extensive margin		Intensive margin: Probability		
	Observations	Fraction	Negative	Zero	Positive
Overall	11,554,154	1.000	**0.017**	0.980	**0.003**
At contract renewal	293,511	**0.025**	**0.057**	0.934	**0.009**
At new contract	256,218	**0.022**	**0.556**	0.359	**0.085**
Within contract	10,455,015	0.905	0.003	0.996	0.001
During vacancy	549,410	0.048	0.000	1.000	0.000

0.020   **0.025**   **0.066**

Pr[Adjust] = **Pr[Contract renewal]** × **Pr[Adjust | Contract renewal]**

\+ **Pr[New contract]** × **Pr[Adjust | New contract]**

0.022   **0.641**

Overall flexibility   **Extensive margin**   **Intensive margin**

→ **Monthly rigidity: 98.0% (Yearly rigidity: 78.9%)**

Suzuki, M., Y. Asami, C. Shimizu (2021) "Housing rent rigidity under downward pressure: Unit-level longitudinal evidence from Tokyo", *Journal of Housing Economics*, 52, 101762. hiip://dx.doi.org/10.1016/j.jhe.2021.101762.

Problems in Rental equivalence approach. (3).

- There are differences between **"contract rent (paying rent)" and "market rent (new contract rent)".**

- "Contract rent" refers to the rent paid by a renter who has a long term rental contract with the owner of the dwelling unit and "*market rent*" is the rent paid by the renter in the first period after a rental contract has been negotiated.

  – **Stickiness Problem in *Equivalent Rent Approach*.**

Problems in Rental equivalence approach. (4).

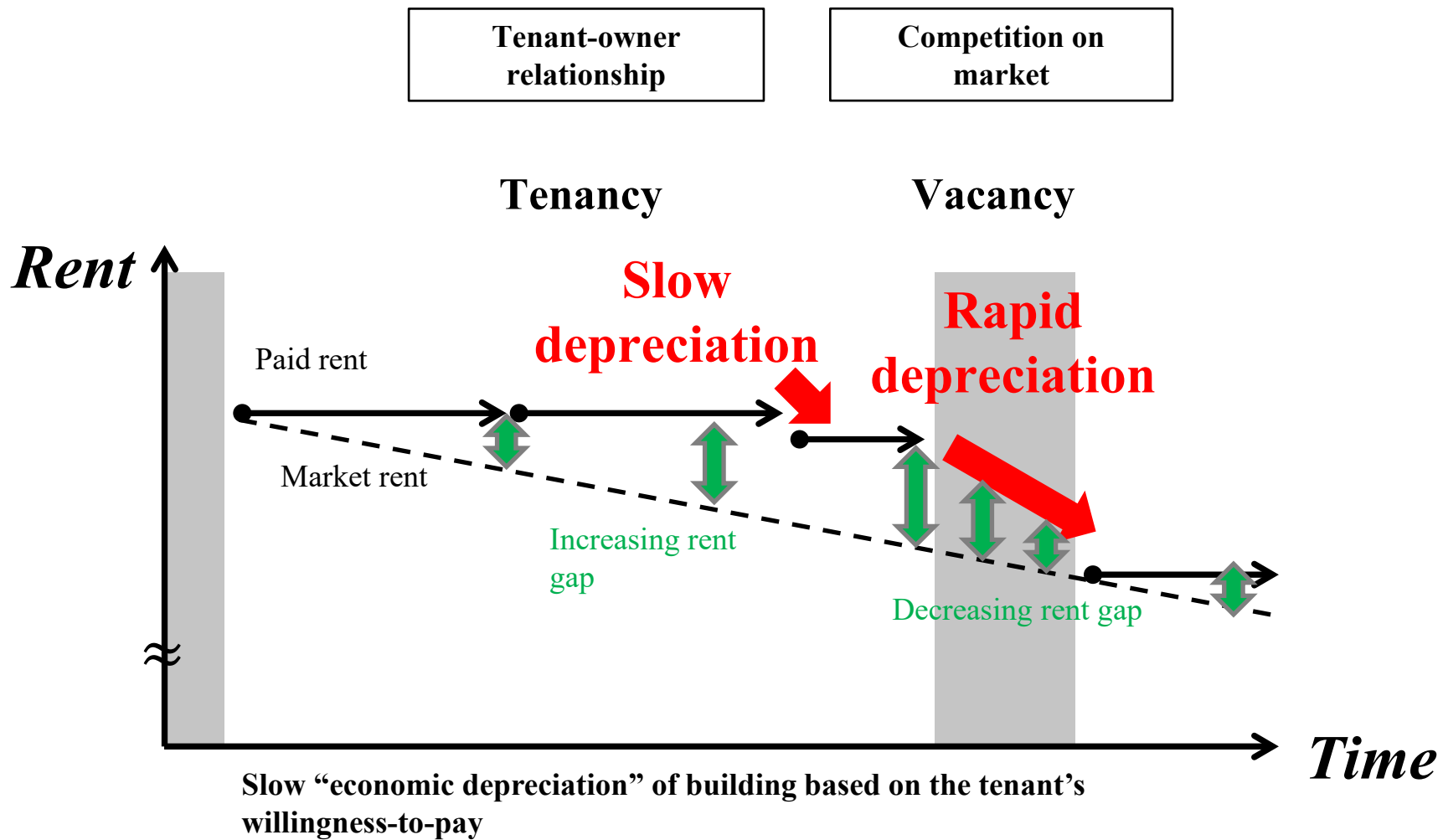| Yearly rigidity	Country	Year (Frequency)	Literature
29%	US	1974–1981 (1 year)	Genesove (2003)
32%	Turkey	2008–2011 (1 year)	Aysoy et al. (2014)
49%	US	1998–2008 (half year)	Verbrugge & Gallin (2017)
78%	Germany	1998–2003 (1 year)	Hoffmann & Kurz-Kim (2006)
89%	Tokyo, Japan	**March 2008 (1 month)** 1986–2006 (bet. new contract)	Shimizu et al. (2010)

$$\underset{\text{Overall flexibility}}{\underset{0.020}{\text{Pr[Adjust]}}} = \underset{\substack{\text{Extensive margin} \\ 0.022}}{\underset{0.025}{\text{Pr[Contract renewal]}}} \times \underset{\text{Intensive margin}}{\underset{0.066}{\text{Pr[Adjust | Contract renewal]}}}$$

$$+ \text{Pr[New contract]} \times \underset{0.641}{\text{Pr[Adjust | New contract]}}$$

→ Yearly rigidity: 78.9%

Suzuki, M., Y. Asami, C. Shimizu (2021) "Housing rent rigidity under downward pressure: Unit-level longitudinal evidence from Tokyo", *Journal of Housing Economics*, 52, 101762. hiip://dx.doi.org/10.1016/j.jhe.2021.101762.

Stickiness in Housing Rent and High *Vacancy Rate* in Housing Stock

| Tenant-owner relationship | Competition on market |

Tenancy　　　　　**Vacancy**

Rent

Slow depreciation

Rapid depreciation

Paid rent

Market rent

Increasing rent gap

Decreasing rent gap

Time

Slow "economic depreciation" of building based on the tenant's willingness-to-pay

Suzuki, M., Y. Asami, C. Shimizu (2021) "Housing rent rigidity under downward pressure: Unit-level longitudinal evidence from Tokyo", *Journal of Housing Economics*, 52, 101762. hiip://dx.doi.org/10.1016/j.jhe.2021.101762.

Contents of paper and presentation.

1. Introduction.

- This paper provides an update to the chapter on the treatment of durables in the Consumer Price Index Manual (2004). The most important durable is housing, which typically accounts for approximately 20% of total consumption services. A large fraction of total housing services consists of the services of Owner Occupied Housing (OOH).

- The main approaches to measuring the services of OOH are (i) the acquisitions approach; (ii) the rental equivalence approach and (iii) the user cost approach. Two other approaches are sometimes used: (iv) the opportunity cost approach and (v) the payments approach.

- A main purpose of this paper is to present the main approaches to the treatment of OOH and to discuss the benefits and costs of the alternative approaches.

The fundamental problem of accounting.

- *"Durability means that a capital good is productive for two or more time periods, and this, in turn, implies that a distinction must be made between the value of using or renting capital in any year and the value of owning the capital asset. This distinction would not necessarily lead to a measurement problem if the capital services used in any given year were paid for in that year; that is, if all capital were rented. In this case, transactions in the rental market would fix the price and quantity of capital in each time period, much as data on the price and quantity of labor services are derived from labor market transactions. But, unfortunately, much capital is utilized by its owner and the transfer of capital services between owner and user results in an implicit rent typically not observed by the statistician. Market data are thus inadequate for the task of directly estimating the price and quantity of capital services, and this has led to the development of indirect procedures for inferring the quantity of capital, like the perpetual inventory method, or to the acceptance of flawed measures, like book value."* Charles R. Hulten (1990; 120-121).

Introduction (cont)

- When a durable good (other than housing) is purchased by a consumer, national Consumer Price Indexes typically attribute all of that expenditure to the period of purchase, even though the use of the good extends beyond the period of purchase.

- →**Acquisitions approach**

- However, if one takes a cost of living approach to the Consumer Price Index, then it may be more appropriate to take the cost of using the services of the durable good during the period under consideration as the pricing concept.

- →**Rental equivalence approach.**

- →**User cost approach.**

2. The Acquisitions Approach.

- **Thus the weights for the *net acquisitions approach* are the *net purchases of the household sector of houses* from other institutional sectors in the base period.**

- *"The first is the net acquisition approach, which is the change in the price of newly purchased owner occupied dwellings, weighted by the net purchases of the reference population. This is an asset based measure, and therefore comes close to my preferred measure of inflation as a change in the value of money, though the change in the price of the stock of existing houses rather than just of net purchases would in some respects be even better. It is, moreover, consistent with the treatment of other durables. A few countries, e.g., Australia and New Zealand, have used it, and it is, I understand, the main contender for use in the Euro-area Harmonized Index of Consumer Prices (HICP), which currently excludes any measure of the purchase price of (new) housing, though it does include minor repairs and maintenance by home owners, as well as all expenditures by tenants." Charles Goodhart (2001; F350).*

Problems in acquisition approach.

- If the base year corresponds to a boom year (or a slump year) for the durable, then the base period expenditure weights may be too large or too small. Put another way, the aggregate expenditures that correspond to the acquisitions approach are likely to be more volatile than the expenditures for the aggregate that are implied by the rental equivalence or user cost approaches.

- In making comparisons of consumption across countries where the proportion of owning versus renting or leasing the durable varies greatly, the use of the acquisitions approach may lead to misleading cross country comparisons. The reason for this is that opportunity costs of capital are excluded in the net acquisitions approach whereas they are explicitly or implicitly included in the other two approaches.

Fundamental View.

- More fundamentally, whether the acquisitions approach is the right one or not depends on the overall purpose of the index number.

- If the purpose is to measure the price of current period ***consumption services***, then the acquisitions approach can only be regarded as an approximation to a more appropriate approach (which would be either the rental equivalence or user cost approach).

- If the purpose of the index is to measure ***monetary (or nonimputed) expenditures by households during the period***, then the acquisitions approach might be preferable (provided the land component of property value is in scope), since the rental equivalence and user cost approaches necessarily involve imputations.

The major *advantages* and *disadvantages* of the acquisitions approach.

- *Advantages*:
    - It is conceptually simple and entirely similar to the treatment of nondurables and services and
    - No complex imputations are required.

- *Disadvantages*:
    - The acquisitions approach is not likely to reflect accurately the consumption services of consumer durables in any period. Thus suppose that real interest rates in a country are very high due to a macroeconomic crisis. **Under these conditions, purchases of automobiles and houses and other long lived consumer durables may drop dramatically, perhaps to zero.** However, the actual consumption of automobile and housing services of the country's population will not fall to zero under these circumstances: households will still be consuming the services of their existing stocks of motor vehicles and houses.

3. The Rental Equivalence Approach.

- The *rental equivalence approach* simply values the services yielded by the use of a consumer durable good for a period by the corresponding market rental value for the same durable for the same period of time (if such a rental value exists). This is the approach taken in the *System of National Accounts: 1993* and Eurostat: 2001 for owner occupied housing:

  - *"As well-organized markets for rented housing exist in most countries, the output of own-account housing services can be valued using the prices of the same kinds of services sold on the market with the general valuation rules adopted for goods and services produced on own account. In other words, the output of housing services produced by owner-occupiers is valued at the estimated rental that a tenant would pay for the same accommodation, taking into account factors such as location, neighbourhood amenities, etc. as well as the size and quality of the dwelling itself."* Eurostat, IMF, OECD, UN and World Bank (1993; 134).

  - *"The output of dwelling services of owner occupiers at current prices is in many countries estimated by linking the actual rents paid by those renting similar properties in the rented sector to those of owner occupiers. This allows the imputation of a notional rent for the service owner occupiers receive from their property."* Eurostat (2001; 99).

The statistical agency find the relevant rental data to price the services of OOH

- Ask home owners what they think the market rent for their dwelling unit is;

- Undertake a survey of owners of rental properties or managers of rental properties and ask what rents they charge for their rental properties by type of property or

- Use one of the above two methods to get a rent to value ratio for various types of property for a benchmark period and then link these ratios to indexes of purchase prices for the various types of property.

Disadvantages in Rental Equivalence Approach.

- Homeowners may not be able to provide very accurate estimates for the rental value of their dwelling unit.

- On the other hand, if the statistical agency tries to match the characteristics of an owned dwelling unit with a comparable unit that is rented in order to obtain the imputed rent for the owned unit, there may be difficulties in finding such comparable units. Furthermore, even if a comparable unit is found, the rent for the comparable unit may not be an appropriate opportunity cost for valuing the services of the owned unit.

- The statistical agency should make an adjustment to these estimated rents over time in order to take into account the effects of *depreciation*, which causes the quality of the unit to slowly decline over time (unless this effect is completely offset by renovation and repair expenditures).

- Care must be taken to determine exactly what extra services are included in the homeowner's estimated rent; i.e., does the rent include insurance, electricity and fuel or the use of various consumer durables in addition to the structure? If so, these extra services should be stripped out of the rent, if they are covered elsewhere in the consumer price index.

Case of Japan.

- In order to overcome the first difficulty listed above, statistical agencies, including the Japanese government, are currently collecting housing rent data from property management companies or owners who rent out their dwelling units; i.e.,

- Japan uses the second method to value the services of OOH. However, the characteristics of the owner occupied population of dwelling units are generally quite different from the characteristics of the rental population.

- Thus typically, it is difficult to find rental units that are comparable to owned dwelling units. The use of hedonic regression techniques can mitigate this lack of matching problem. Moreover the use of hedonic regressions can deal with the **depreciation or quality decline problem** mentioned above.

Newly signed rental contracts and rollover contracts.

- The rents used to estimate the cost of rented dwellings in the Japanese CPI is the aggregate of rents paid for rental accommodation. These rents include a combination of newly signed rental contracts and rollover contracts for existing tenants.

- It is appropriate to use both types of contract to measure the actual cost of rental housing (but of course, these rents should be quality adjusted for depreciation and other changes in quality).

- But it is not appropriate to use both types of contract to impute rents for owner occupied housing: only market rents should be used. It is known that price adjustments are basically not made for rollover contracts (i.e. renewed leases). As a result, it is to be expected that new contract rents determined freely by the market will diverge considerably from rollover contract rents.

- Genesove (2003), Shimizu, Nishimura and Watanabe (2010).

4. The User Cost Approach for Pricing the Services of a Non-Housing Durable Good.

- The user cost approach to the treatment of durable goods is in some ways very simple: it calculates the cost of purchasing the durable at the beginning of the period, using the services of the durable during the period and then netting off from these costs the benefit that could be obtained by selling the durable good at the end of the period.

- However, there are several details of this procedure that are somewhat controversial. These details involve the use of opportunity costs, which are usually imputed costs, the treatment of interest and the treatment of capital gains or holding gains.

- Typically, when constructing a consumer price index, we think of all quantity purchases as taking place at a single point in time, say the middle of the period under consideration, at the (unit value) average prices for the period. In constructing user costs, prices at the beginning and end of an accounting period play an important role.

Formula of User Cost.

- To determine the net cost of using a durable good during say period 0, it is assumed that one unit of the durable good is purchased at the beginning of period 0 at the price P^0. The "used" or "second-hand" durable good can be sold at the end of period 0 at the price PS^1. It might seem that a reasonable net cost for the use of one unit of the consumer durable during period 0 is its initial purchase price P^0 less its end of period 0 "scrap value", PS^1.

- However, money received at the end of the period is not as valuable as money that is received at the beginning of the period. Thus in order to convert the end of period value into its beginning of the period equivalent value, it is necessary to discount the term PS^1 by the term $1+r^0$ where r^0 is the beginning of period 0 nominal interest rate that the consumer faces.

- Hence the period 0 user cost u^0 for the consumer durable is defined as:

- **(1) $u^0 = P^0 + PS^1/(1+r^0)$.**

Formula of User Cost.(cont)

- There is another way to view the user cost formula (1): the consumer purchases the durable at the beginning of period 0 at the price P^0 and charges himself or herself the rental price u^0. The remainder of the purchase price, I^0, defined as:

- **(2) $I^0 \equiv P^0 - u^0$**

- can be regarded as an *investment*, which is to yield the appropriate opportunity cost of capital r^0 that the consumer faces. At the end of period 0, this rate of return could be realized provided that I^0, r^0 and the selling price of the durable at the end of the period $P_S^{\ 1}$ satisfy the following equation:

- **(3) $I^0(1+r^0) = P_S^{\ 1}$.**

- Given $P_S^{\ 1}$ and r^0, (3) determines I^0, which in turn, given P^0, determines the user cost u^0 via (2).

Formula of User Cost.(cont)

- The user cost formula (1) can be put into a more familiar form if the period 0 *economic depreciation rate* δ and the period 0 *ex post asset inflation rate* i^0 are defined. Define δ by:

- **(4) $(1 - \delta) \equiv P_S^1/P^1$**

- where P_S^1 is the price of a one period old used asset at the end of period 0 and P^1 is the price of a new asset at the end of period 0. Typically, if a new asset and a one period older asset are sold at the same time, then the new asset will be worth more than the used asset and hence δ will be a positive number between 0 and 1. The *period 0 inflation rate* for the new asset, i^0, is defined by:

- **(5) $1+i^0 \equiv P^1/P^0$.**

- Eliminating P^1 from equations (4) and (5) leads to the following formula for the *end of period 0 used asset price*:

- **(6) $P_S^1 = (1 - \delta)(1 + i^0)P^0$.**

Formula of User Cost.(cont)

- Substitution of (6) into (1) yields the following expression for the *period 0 user cost* u^0:

- **(7) $u^0 = [(1 + r^0) - (1 - \delta)(1 + i^0)]P^0/(1 + r^0)$.**

- Note that $r^0 - i^0$ can be interpreted as a period 0 *real interest rate* and $\delta(1+i^0)$ can be interpreted as an *inflation adjusted depreciation rate*.

- The user cost u^0 is expressed in terms of prices that are discounted to the *beginning* of period 0. However, it is also possible to express the user cost in terms of prices that are "anti-discounted" or *appreciated* to the *end* of period 0. Thus define the *end of period 0 user cost* p^0 as:

- **(8) $p^0 \equiv (1 + r^0)u^0 = [(1 + r^0) - (1 - \delta)(1 + i^0)]P^0$**

- where the last equation follows using (7). If the real interest rate r^{0*} is defined as the nominal interest rate r^0 less the asset inflation rate i^0 and the small term δi^0 is neglected, then the end of the period user cost defined by (8) reduces to:

- **(9) $p^0 = (r^{0*} + \delta)P^0$.**

Calculation of User Cost.

- Abstracting from transactions costs and inflation, it can be seen that the end of the period user cost defined by (9) is an *approximate rental cost*; i.e., the rental cost for the use of a consumer (or producer) durable good should equal the (real) opportunity cost of the capital tied up, $r^{0*}P^{0}$, plus the decline in value of the asset over the period, δP^{0}.

- Formulae (8) and (9) thus cast some light on what are the economic determinants of rental or leasing prices for consumer durables.

Calculation of User Cost.(cont)

- If the simplified user cost formula defined by (9) above is used, then at first glance, forming a price index for the user cost of a durable good is not very much more difficult than forming a price index for the purchase price of the durable good, P^0. The price statistician needs only to:
  - Make a reasonable assumption as to what an **appropriate monthly or quarterly real interest rate r^{0*}** should be;
  - Make an assumption as to what a reasonable **monthly or quarterly depreciation rate δ** should be;
  - **Collect purchase prices P^0** for the durable and use formula (9) to calculate the simplified user cost.

Disadvantages in User Cost Approach.

- If it is thought necessary to implement the more complicated user cost formula (8) in place of the simpler formula (9), then the situation is more complicated. As it stands, the end of the period user cost formula (8) is an *ex post* (or after the fact) *user cost*: the asset inflation rate i^0 cannot be calculated until the end of period 0 has been reached. Formula (8) can be converted into an *ex ante* (or before the fact) *user cost* formula if i^0 is interpreted as an **anticipated asset inflation rate**. The resulting formula should approximate a market rental rate for the durable good.

- Note that in the user cost approach to the treatment of consumer durables, the **entire user cost formula** (8) or (9) is the period 0 price. Thus in the time series context, it is *not* necessary to deflate each component of the formula *separately*; the period 0 price $p^0 \equiv [r^0 - i^0 + \delta(1+i^0)]P^0$ is compared to the corresponding period 1 price, $p^1 \equiv [r^1 - i^1 + \delta(1+i^1)]P^1$ and so on.

- In principle, depreciation rates can be estimated using information on the selling prices of used units of the durable good. **However, for housing, the situation is more complex**.

5. The Opportunity Cost Approach.

- The opportunity cost approach to the valuation of the services of a consumer durable during a time period is very easy to describe: the opportunity cost valuation is simply the *maximum* of the foregone rental or leasing price for the services of the durable during a period of time and the corresponding user cost for the durable.

- It is easy to see that when a household has a consumer durable in its possession, the household forgoes the money that one could earn by renting out the services of the durable good for the period of time under consideration. (Such rental markets may not exist, in which case, this opportunity cost is 0).

- However, there is another opportunity cost that is applicable to using the services of the durable good during the period under consideration.

Opportunity Cost Approach.

- The term opportunity cost refers to the cost of the best alternative that must ***be forgone in taking the option chosen.***

- **Option0**:Homeowner continue to live the home.

- →***Opportunity Cost*** associated with **Option0.**

- **Option1**: Selling at the beginning of period t and buy back at the $t+1$.→ **User Cost.**

- **Option2**: Renting out from t to $t+1$. →**Equivalent Rent.**

- $t+0$,   **Option1 (User Cost) > Option2 (E. Rent) = Option1**
- $t+1$,   **Option1 (User Cost) < Option2 (E. Rent) = Option2**
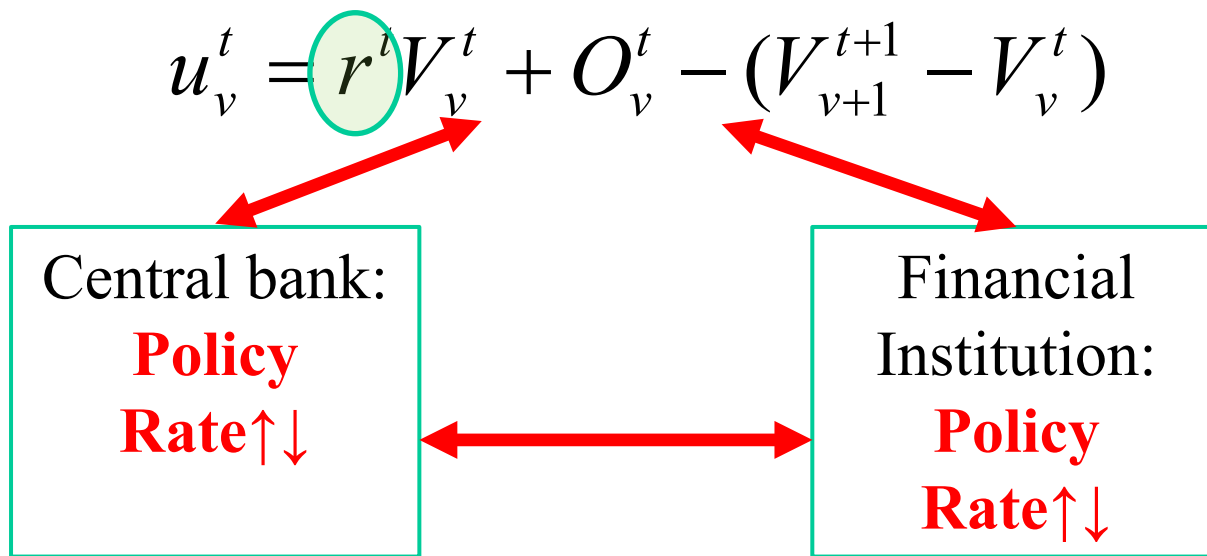
6. The Payments Approach.

- The fifth possible approach to the treatment of owner occupied housing in a CPI, the *payments approach*, is described by Goodhart as follows:

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- "The second main approach is the payments approach, measuring actual cash outflows, on down payments, mortgage repayments and mortgage interest, or some subset of the above. ... Despite its problems, such a cash payment approach was used in the United Kingdom until 1994 and still is in Ireland." Charles Goodhart (2001; F350-F351).

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- Thus the *payments approach* to owner occupied housing is a kind of a *cash flow approach* to the costs of operating an owner occupied dwelling. It consists mainly of mortgage interest and principle payments along with property taxes. Imputations for capital gains, for the cost of capital tied up in house equity and depreciation are ignored in this approach.

The Payments Approach.(cont)

- This leads to the following objections to this approach; i.e., it ignores the opportunity costs of holding the equity in the owner occupied dwelling, it ignores depreciation and it uses nominal interest rates without any offset for inflation in the price of land and the structure.

- In general, the payments approach will tend to lead to much smaller monthly expenditures on owner occupied housing than the other 4 main approaches, except during periods of high inflation, when the nominal mortgage rate term may become very large without any offsetting item for inflation.

- One reason for implementing this approach is that it may be useful for indexing the pensions of homeowners; i.e., as the cash costs of home ownership increase, it may be popular to increase pensions to offset these costs. This line of argument has some validity but in recent years, perhaps it is less compelling in many countries due to the ability of homeowners to draw on their equity with reverse mortgages and to postpone paying property taxes until the property is sold.

Disadvantages in Payments Approach.

Vicious circle in Financial Policy.

$$u_v^t = r^t V_v^t + O_v^t - (V_{v+1}^{t+1} - V_v^t)$$

Central bank: **Policy Rate↑↓**		Financial Institution: **Policy Rate↑↓**

7. Conclusions.

- The fundamental problem of accounting arises when constructing a price index for the services of a durable good: imputations will have to be made in order to decompose the initial purchase cost into period by period components over the life time of the durable good. The method of imputation will involve assumptions which may not be accepted by all interested parties. In spite of this difficulty, it will be useful for statistical agencies to construct analytical series for the services of long lived consumer durables that can be made available to the public. This will meet the needs of different users.

- The valuation of the services of housing is very difficult due to the fact that housing services are unique: the location of each dwelling unit is unique and the location affects the land price component of the property and thus affects rents and user costs. Moreover, the structure component of housing does not remain constant over time due to depreciation of the structure and to renovation expenditures.

Specific recommendations.

- There are three main approaches for the treatment of consumer durables in a CPI: the acquisitions approach, the rental equivalence approach and the user cost approach.

- The acquisitions approach is suitable (for most purposes) for durable goods with a relatively *short expected useful life*.

- The acquisitions approach is particularly useful for central bankers who want consumer inflation indexes that are largely free from imputations.

- The acquisitions approach provides an index for purchases of a durable good and this index is a required input into the construction of a user cost index.

Specific recommendations. (cont)

- The remaining two approaches are useful for measuring the flow of services yielded by consumer durables over their useful lives.

- At present, only the flow of services for OOH is estimated by national statistical agencies (using the rental equivalence or user cost approaches) because this information is required for the international System of National Accounts.

- The acquisitions approach will substantially understate the value of the service flow from consumer durables that have relatively long lives. Hence at least one of the rental equivalence or user cost approaches should be implemented by statistical agencies for durables with long lives.

- Examples of long lived durables are automobiles and household furnishings.

Specific recommendations. (cont)

- The rental equivalence approach to the valuation of the services provided by consumer durables is the preferred method of valuation when rental or leasing markets for the class of durables exist, because, in principle, no imputations are required to implement this method.

- However, when rental markets for the durable good under consideration are thin or do not exist, then the user cost approach should be used to value the services of the durable good.

- The user cost approach requires the construction of a price index for new acquisitions of the durable. It also requires a model of depreciation and assumptions about the opportunity cost of capital and about expected asset inflation rates. Thus the user cost approach necessarily involves imputations.

Specific recommendations. (cont)

- In order to avoid unnecessary volatility in the user costs, long run expected asset inflation rates should be used in the user cost formula.

- Rental markets for high end dwelling units are generally nonexistent or very thin and hence, it may not be possible to use the rental equivalence approach for high end OOH. Even if some rental information on high end housing units is available, usually these rents are far below the corresponding user costs.

- However, for housing, the "comparable" rental property may not be exactly the same as the owned unit. Moreover, the observed rents may include insurance services and the services of some utilities and possibly furniture. It will be difficult to extract these costs from the observed rent.

Specific recommendations. (cont)

- The "true" opportunity cost for using the services of a consumer durable is the maximum of its rental price (if it exists) and its user cost. Thus the use of the rental equivalence approach to value the services of a high end housing unit will understate the "true" service flow by a substantial amount.

- In order to construct national balance sheets and to measure national multifactor productivity, it is necessary to decompose the selling prices of dwelling units into structure and land components. This can be done for both detached housing and condominium units using hedonic regression techniques, *Builder's Model*. This decomposition is also required in order to construct accurate user costs for housing units since depreciation applies to the structure but not to the land component of the property.

- When constructing price indexes for rental housing, statistical agencies need to make an adjustment to observed rents for the same unit for depreciation of the structure and possible improvements to the structure.

Specific recommendations. (cont)

- Long run user costs and rents will tend to be approximately equal to each other for lower end housing units since this type of housing unit will be built by property developers who provide rental housing and they need to set rents that are approximately equal to their long run user costs. However, short run dynamics can cause user costs and rents to diverge even for lower end housing units.

- When using observed rents to measure the service flow for comparable owned properties, statistical agencies should use new contract rents to evaluate the service flow for the owned units since rents for continuing tenants may be sticky and not reflect current opportunity costs.

Specific recommendations. (cont)

- When constructing user costs for OOH, statistical agencies need to avoid double counting of some housing related costs that may appear elsewhere in the CPI such as insurance costs. Similar double counting problems may arise with housing rents, which may include the services of some utilities or furniture and of course, the housing rent will include insurance costs. In principle, these associated costs should be deducted from the observed rent and placed in the appropriate classification of the CPI. In practice, this is a difficult imputation problem.

- A variant of the acquisitions approach is sometimes applied to OOH. This variant excludes the land component of the purchase of a new house. Thus this variant reduces to a construction cost index for housing with some allowance made for builders' profit margins. This variant generates valuations for OOH that are far below the comparable rental equivalent and user cost valuations. It is difficult to justify the use of this variant in a CPI.

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