

Taxes on residuals ~~x~~ will help employment by
reducing material inputs, $\Delta g \therefore$ labor share in output.

E.g. newspapers will have smaller circ., better writing.

Spurious ex. of scale are due to free residual disposal
(to say nothing of below-cost xptn., etc.)

Re Fry paper.

1. Call Sus, Elsie

2. Copies of Erick-Wilson plagiarism to Biernat,

McNally. No covering letter needed.

Dear Supervisor Biernat:

Congrats on yr. alertness in spotting the Fry scandal and yr. public spirit in publicizing it. It is time the immorality of the Meier adm. was exposed, and ~~its ties with UWM~~ the complaisance of UWM.

There is a worse case — ^{copies} documents enclosed.

~~My~~ Circumstances prohibit my identifying myself, but you may easily check the originals. ~~UWM~~ co

Fry's UWM Paper to Be Investigated

By Joel McNally
of The Journal Staff

A paper submitted for a master's degree by Kenneth E. Fry, deputy commissioner of city development, is under university investigation as a result of a complaint that it contained material identical to that in a master's thesis by a former city employee who worked for Fry.

Karl E. Krill, dean of the University of Wisconsin—Milwaukee graduate school, said Saturday it would be up to the professors involved to decide whether action would be taken. Krill said he considered improper the similarity between portions of the two papers.

Fry, recently named by Mayor Maier to succeed Richard W. E. Perrin as commissioner of city development, conceded that he used material which his employee, Leo C. Talsky, helped to develop.

However, Fry said he saw nothing wrong with using the material without giving credit to Talsky and added that he thought the investigation was started to torpedo his appointment.

"My first reaction is tsk, tsk, tsk," Fry said. "My second reaction is I wondered where the fun and games would begin on my appointment, and I'm not at all surprised that the county and our so-called urban university are involved."

The reference to the county being involved was directed at

Turn to Fry, page 15, col. 1

Sunday, January 17, 1971

THE MILWAUKEE JOURNAL

Paper Submitted for Master's Degree Investigated

From page 1

Sup. Francis F. Biernat, who started the inquiry when he wrote a letter to Krill after discovering the similarities in the two papers.

"Both Leo and I used common figures developed jointly by us and even by others more for the purpose of city problem solving than the chicken manure requirements for a degree," Fry said.

Talsky, who since 1969 has been a financial analyst for the County Board's Finance Committee, denied Saturday that he had worked with Fry on any of the material that appeared in Talsky's thesis.

"What went into my master's thesis was only for the master's thesis and for nothing else," Talsky said. "No part of it ever turned out to be a division report, period."

In 1967, when the two papers were turned in, Talsky was a researcher in the city's Division of Economic Development, which Fry has headed since 1962.

Can Document Work

"However he did it or didn't do it, I'm sure he can explain," Talsky said of the similarities between the two papers. "Certainly I can document my work. I am sure that he can document his."

The similarities between the two papers occur in one background chapter that is contained in both manuscripts. The two papers deal with different subjects.

Talsky's, submitted in June, 1967, for a master's degree in

economics, is entitled "Real Estate, Race and Revenue." It deals with blighted areas on the near North and near South Sides. It is 108 pages long, not counting appendices.

Fry's paper, submitted in July, 1967, in partial fulfillment of requirements for a master's degree in business administration, is called, "Downtown Milwaukee, Progress and Promise." It is concerned with the future of the downtown business district. It is 133 pages, not counting appendices.

Different Titles

The chapter in question is entitled "City Real Estate Value Trends" in Talsky's paper and "Postwar City Real Estate Value Trends" in Fry's paper. The chapter is about nine pages in Talsky's paper and a little more than ten pages in Fry's.

The chapters in both papers are broken down into the sub-headings, "Population," "Rental Market," "Volume of Real Estate Construction," and "Value of Real Estate."

Much of the two chapters are in reference to statistical charts contained in appendices.

Some examples of the similarities:

Talsky: "Appendix B-1 depicts the Milwaukee population level. The gain in population has been at a steady rate except for the period of 1953 through 1958. The total number of motor vehicles registered in the city after the postwar demand was satiated in the early 1950s and depicted

the expected though remarkable parallel to the level of population."

Fry: "Appendix B-1 depicts the Milwaukee population and vehicle registration trends. Except for the period of 1953-1958, the population rate has increased steadily. The trend in city motor vehicle registration, after the postwar demand was satiated in the early 1950s, has a close relationship to the population trend."

Talsky: "Appendix B-2 depicting the level of county population also displays the significant increase as did the city, though beginning a year earlier in 1952 and culminating two years early in 1956. Apparently the increase in city population, though starting late, lasted longer."

Fry: "Appendix B-2 shows the county population trend increasing at a sharper rate beginning in 1952 and culminating two years earlier than the city, in 1956. Apparently the increase in city population, though starting late, lasted longer."

In his letter to Krill, Biernat said he came across the two papers when he was doing research last week at the UWM Library on property values.

"In my perusal of these manuscripts, there appeared to be a great deal of similarity," Biernat said. "Upon closer observation, similarity gave way to facsimile. Coincidence would seem to be ruled out as a possibility."

"... It would appear that the overwhelming conclusion here is that at best there is plagiarism and at worst, a serious challenge to the intellectual integrity of the academic community."

Biernat said that, in addition to notifying Krill, he was sending copies of the two texts to the university's Board of Regents in Madison and to Atty. Gen. Robert W. Warren.

Fry Saturday dismissed as unimportant not only the investigation but also the degree itself.

"As far as I'm concerned, my own was a mediocre effort rushed to meet a deadline for a degree whose utility I now wonder about," he said.

Fry got a master's degree in business administration in 1967 and another in political science in 1969.

"I don't know. I'm a city employee, not an academic. I used my talented staff in many respects."

Krill said he considered Fry's actions wrong, but he did not know if they were serious enough to cause his degree to be lifted.

Krill said any action taken might depend on the recommendations of the two professors involved — Norbert J. Stefaniak, who was Fry's professor, and Manuel Gottlieb, who was Talsky's.

Maier's appointment of Fry will formally go before the Common Council Tuesday. Under normal procedure, it would be referred to committee for public hearings.

I. Urban pop., density, areas

A. Cities are not "converging."

1. As the old giants ~~lose rank~~, new giants replace them.

2. NYC remains #1 - bigger than ~~all~~ top 4 Calif. cities combined

3. FL is growing w/ much urban core - a retirement haven, dangerously sprawled, dangerously dependent on prop. inc. + soc. sec.

B. "Ec. cities" > political cities

1. The SMSA more of ec. cities

2. Ratio of SMSA/city ~~is rising~~ has risen greatly

3. " " " differs among cities, so

SMSA rankings differ from city rankings

4. ~~City~~ City rankings o'state growth + rank of cities outside old NE rectangle, bcs. they are ~~included~~ in. So are Miami, Tampa, + SF.

C. ~~Urban areas~~ City ^{+ SMSA} Areas

1. Land requirements are very small; but locations are critical.

2. City areas are not closely related to city pop. ~~Vac~~ Vac area usually means low density.

3. Cities amass vacant acreage for various reasons unrelated to real need.

a. Political pride, imperialism (Cot's next gt.)

b. ~~To~~ To inflate wth. claims, esp. in

17 western states

hookups

c. Political payoffs - e.g. Edgemont, sewer

d. Grab retail trade, tax revs.

4. Riv. is a vast, low density city, 73 s.m.

5. Urban price influence >> unbuilt land.

Concept of urban perennials

" " winner's curse

" " strong hands

D. Density

1. Falling density of central cities.

2. Pop. density ^{only a partial} ~~is~~ ^{measure} of ex. density

- based on where you live, not where you work or shop

3. Extreme range - a) among cities

a. Manh. 66,000

Ok. City 734 = 1.1% of Manh.

b. W/in cities

Upper e. side of Manh. - 200,000 ps/m

Most of Manh - walkups

1/2 Midw. 50% of pop. occupy 5% of

resid. land; 5% occupy 50%.

Statue Isl. is where NY dumps its garbage.

4. At hi density, auto xptn. gives way to public mass transit. D.C. has .39 vehicles p.c.; NY State has .59 ^{over}

Few cities have good transit, but they contain hi fraction of U.S. pop - e.g. greater NY has 10%.

5. At hi densities, pop. of U.S. wd. occupy negligible % of our land area.

U.S. has .83; MT has 1.21
(TX only has .79 - has lots of cities)

6. Density does not equilibrate itself away - no tendency for pop. to spread out evenly.
Hi rents do not drive people away.

7. Density not assoc. w. poverty or crime.

E. Dynamics

1. Shifting rank of cities (by pop.) + SMSAs
a.) 1900 - now

Top 10 then all fell

Top 10 then were all in n.e. rect.

(except S.E.)

b) Huge pop. changes occurred before their plausible "causes" — autos, interstate, cheap oil, jets, trucking, air condit., etc.)

c) Cities compete

d) " go thru pds. of explosive growth

e) 1984 - 98, older SMSAs shrank down, new ring cities exploded.

f) Know how to calc. growth rates

2. Shifting rank of states

a. Some states are marked by several small cities: WI, NH, NC, FL. They have bn. off our radar screen when we focus only on largest cities.

b. Moves have bn. from:

e - to w.

n to s

Inland to coasts

away from farm towns

into previously neglected nat. opps, away from old n.e. rectangle

4
c. Nth is bucking all those trends

II. Land uses

A. Bldgs cover only a small fraction, even of the priv. land, offshoots.

Other uses,

Curtilage (lawns, gardens)

open storage

Parking & turning space

Unbowed machinery (refrigerators)

B. Streets et al. xptn.

C.

III. Land values

A. Data from S.C.

↳ Variation from lowest to highest

~~A. Floor rentals low small diff. become large~~
Low values in desert

Peak values rise toward magnets of attraction, & come to sharp peaks at some points or lines:

Shorelines

Business centers

Residences of the wealthy, famous & powerful

Nodes of xptn

① ~~LSRE~~ LSR EV

Rises toward midpoints of attraction
2 simple tests

① ~~Value~~ Value pst of floor space

Bldg. costs do not vary much. Prices

pst of floor space vary greatly

Ex. of scale → Bldg. costs pst full as bldgs + count get larger. Law of the square, for simple e.g.

$$A = B^2$$

$$P = 4B$$

$$\frac{A}{P} = \frac{B^2}{4B} = \left(\frac{B}{4} \right)$$

E.g., if $B = 20' + 30'$

B	P	A	A/P
20'	80'	400 sf	$\frac{400}{80} = \frac{20}{4} = 5$
30'	120'	900 sf	$\frac{900}{120} = \frac{30}{4} = 7.5$
40'	160'	1600 sf	$\frac{1600}{160} = \frac{40}{4} = 10$

Double the Base from 20' to 40', Quadruple A from 400 to 1600; and double A/P from 5' to 10'.

Cost pst is recip. of sf/cost, so you cut cost pst in half.

The above is o'simplified and o'stated, to ~~make~~ ~~focus~~ focus on an essential point w. min. digression & distraction, - to separate the essential from the incidental.

C. Why ~~a~~ a small ^{do} diff. in ^{floor} rents p.s.f. makes for
a big ^R diff. in land prices.

1. Leverage. Subtract a const. from a variable.

f = floor rent, annual

c = costs, annual

g = ground rent, annual

$$g = f - c$$

$$g' = f' - c$$

$$\frac{g'}{g} = \frac{f'}{f - c}$$

$$\frac{f'}{f - c} > \frac{f'}{f}$$

E.g.

Considering only cost of scale, ~~houses of the~~
~~rich~~ ~~and~~ ~~cost~~ large houses ~~shd.~~ cost less p.s.f.
 than small ones. For houses of given quality, they
 do. OTOH, those who can afford bigger bldgs. can
 also afford higher quality. ~~So~~ These factors
 are offsetting. So call it a toss-up, & assume
 bldg. cost p.s.f. is constant.

Mkt. prices p.s.f. of floor space vary over a consider-
 able range. Min. is about \$60; they range up
 from that.

Mead Valley: \$22,000 for 1200 sf = \$60 p.s.f.

Rolling Hills Estates: \$600 for 6000 sf = \$1,000 p.s.f.

Why the diff? Location

Mar, 3-1-99

(2) ~~1~~ 2nd simple test: Freq. of renewal

Bev. Hills, Hollywood Hills, Bel Air - tear-down
 city. Every week, L.A. Times reports on a new one.

Retail land: constant remodeling,
 frequent rebuilding.

1 + 2
~~1 + 2~~ combined. Bldgs of apparent high
 quality are often approaching zero value bcs. of
 locational obsolescence.

Bldg. value is residual. For many, this
 is counterintuitive. If it is so for you, change
 your thinking.

Mon, Jun 11, '99

1

1. Pass out short syllabus.

2. Popu. (p. 1, alphabet. for ref. only)

(a.) by pop. '84

1. No "convergence"

$$N_4 / \text{mi}^2 = \frac{7.2 \text{ m}}{.18 \text{ m}} = 40$$

2. Md. of top 34 is ca. 621,000 (Miles.)

$$N_4 / \text{mi}^2 = 11.5$$

3. 4 of top cities are in Calif. ~~San Fran.~~ ~~San Jose.~~

# 2	La.	3.1 m
# 8	San Diego	.96 m
# 12	SF	.71 m
# 14	San Jose	.64 m
		<hr/> 5.46 m

Sum is less than N_4 .

4. 5 of top cities are in TX.

# 4	Houston	1.7 m
# 7	Dallas	.98 m
# 10	San Ant.	.84 m
# 25	El Paso	.47 m
# 31	Ft. Worth	.42 m
		<hr/> 4.58

5. FL only has one - Jacksonville. But all of FL is growing fast.
(Very scattered.)

- (b.) adjusting rankings by including SMSA. (p. 10)
 Miami, Minn. & Tampa look a lot bigger
 San Antonio a lot smaller
 SF jumps ahead of S.D.

Morales:

1. Ec. city $\neq$ pol. city
2. Old n.e. cities are hemmed in - politically (except Minn.). [It was L.A. that started game of enclosing empty land (see Chinatown). Now ^{most} ~~all~~ outside old n.e. quad. do it
3. Miami & Tampa are also hemmed in.
4. Review of raw data - needs interpreting.
5. Urban price influence dominates vast agric. areas. This is different from actually urbanizing them. "Floating Values."
6. Cities w. tight limits have dropped in rank as pop. spread, while their SMSAs have not dropped. Thus. is easy to overstate decline of ^{rank of} older cities.

3. Area

~~See~~ Cities ranked by land area p3

- a. Little relation to pop.
- b. Inflated boundaries are common in S & W (often to inflate ~~the~~ claims on water.)
- c. Milwaukee, 73 sq. mi., is vaster than Brooklyn, Wash., St. Louis, Pittsburgh, Minneapolis, Boston, SF.
 Mayor wanted to double area! W.D. have made us vaster than Detroit, Phila., & Atlanta!
- d. ~~See~~ Morales: look at density

4. Density (p. 4)

a. Great ranges:

Manhattan 65,590 (used to be higher)

Okla. City 734 = $\frac{1}{90}$ or 1.1% of Manhattan

At 10,000 psm, pop. of U.S. requires 25,000 sm. (over)

b. Foto of upper east side over ~~Manhattan~~ Met. Mus. of Art.

Probably > 200,000 psm (much of Manh. is low-rise)

Cords, or streets killed (vertical subdivision)

One slab costs > \$/m

Manh > cost of constr. - locationL.v. psm ^{of floor} is higher here than elsewhere - counter

c. Riv. @ 2500 psm.

Too low for mass transit.

intuitive

d. Only a few are dense enough for mass transit.

D.C. @ 9,933/su is about as low as works (subway is subsidized).

L.A. @ 6,647/su is having big problem w. subway (but Metro & surface, or light rail, work better).

Pitt. has good bus system.

e. But those few have hi frac. of U.S. pop.

Gtr. NY, ca. 10% to

BART covers much of Bay Area

Chi. CTA serves hubs.

Boston MTA " "

So mass transit is of interest to large frac. of U.S. pop. including all those too young, too old, too handicapped, or too poor to drive.

What is radius of circle w. $25,000 \text{ cm}^2$.

$$25k = \pi r^2$$

$$r^2 = \frac{25k}{\pi} = 7,958$$

$$r = 89 \text{ mi}$$

At $200,000 \text{ psu}$, (upper e-sides), need 1245 cm

$$r = \sqrt{\frac{1245}{\pi}} = \sqrt{396} = 19.9$$

Some people have edificaphobia, visualize Manhattanization of whole U.S. (Lana Lake). Can't happen.

a few little forests like Manh. are enormously productive, in a small space. Most famous case is Hong Kong.

f. Do crowds drive people away?

Only selectively.

Do hi rents & l.v. drive people away?

No, they cause sub. R for land, hi-rise, accommodating more people.

h. Missing from list: small cities of hi density.

Miami, Fla.

Ft. Lee, N.J.

Roslyn, Va.

i. Crowding ^{land is} not assoc. w. poverty, or crime.
(Hi rates of violent death in rural mt. states.)

Low density of S. Central L.A.

16,000 vacant lots in Phila. & vacant

bdgs.

5. Shifting rank of cities. ~~p. 8, 9~~

p. 7 Rank by 1900 popn.

Top 10 all fell. - Buffalo & Chic. the most.

1900, all but one (SF.) were in N.E. quadrant & example
- nothing south of St. Louis.

All Major League ball clubs were there, until ca. 1950. But they lagged huge pop. changes.
From 1950, huge ^{changes} ~~pop. changes~~ ^{but migration mostly came first.}

(Autos, interstate, ^{cheap oil}, jet planes, trucking, computerization, air conditioning, oil business, higher incomes & taxes per ~~cap~~, new emphasis on amenities, 2-inc. families, longer retirement years,

Movables:

(a) Cities compete (will see how, under external circ.)

(b) Cities ^{may} go thru phs. of explosive growth, like early Chicago.

(c) Coming from nowhere ^{L.A.} next Houston, Detroit, Dallas, S. Diego, Phoenix, S. Antonio, Jacksonville. - 1900-50.

1950-84, Most of above slowed down, except Phoenix. New leader is San Jose

(c) Many cities lost pop - i.e. density dropped.

(d) Pop. isn't everything - inc. p.c. also matters. So does ec. base - land in indus. ^(Mk) commerce ^(SF) & ^(Ch) xptn (Ch), edu. (Boston), instrs (NY), military (S.D., Hon), govt (Wash)

1984-96, growth rates slowed down.

So did U.S., but not as much. Difference is new outer rings: Moreno V., Temecula, Murietta, Valencia, Laguna Hills, Fremont, Mission Viejo

Eden Park, Pleasanton, Livermore, Sta. Clara, Rancho Bernardo,
Poway, Canyon Lake, Moorpark

6

(p. 10) 6.

Shifting rank of states -

Some states are dominated by one city, like Phoenix
Others are off our screen b/c. have several small
cities. (WI, NH, NC, FL.)

(a) One sleeper is NH, 4th highest pop. growth, 1980-90
Biggest cities are Manchester & Nashua (80,000)

100,000

But all close together

Fast growth - p.c. inc.

Reversing several trends

Decline of traditional industries.

" " farms

Rise of air xpt - has no airports

Fall of NE - all surrounding states grow slow

Fall of Canadian immigrant.

Fall of older states (except Ga.)

Slow renewal of cheap land.

Fall of snowbelt

" " rust belt

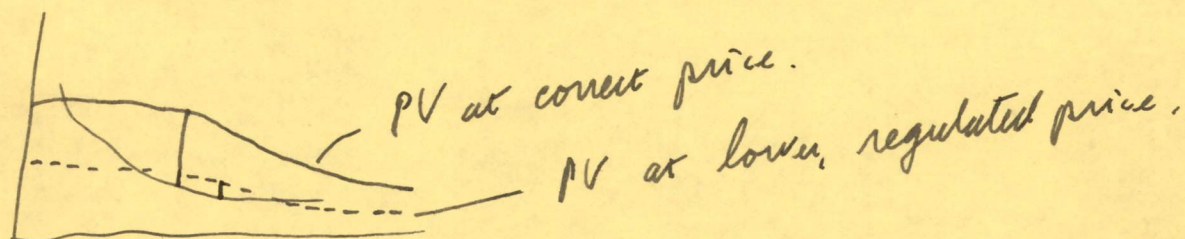
Move from e. to w.

" " n. to s.

7. Mke City.

Bias to future in natural gas.

Regn. holds price too uniform, by area. Gas of superior location should bring higher price, bcs. of lower exptn. cost. But if this be denied, it slows rate of extraction



Simult. unqual. fields are explored & developed prematurely.

The Atwood thesis is summarized in an available article, Atwood, Rollin S., 1928. "Localization of the Cotton Industry in Lancashire, England." Economic Geography IV (2), April:187-95.

Atwood brings out several location factors that made Manchester, and Lancashire County, the center of the Industrial Revolution in cotton processing. These are:

- the need for lime-free water, and the limit on locations possessing it;

- Manchester's central location, surrounded on three sides by water power, and on the fourth by easy access to ocean shipping;

- the scarcity value of water drops, and the Ricardian rent gradient as mills resorted to poorer resources and remote sites;

- the dense network of rail and other transportation that facilitated movement of goods and people around Manchester;

- local availability of coal, as steam replaced water power, let industry remain near Manchester, with slight migration northward toward coalfields;

- the high social cost (communicable diseases)¹ of maintaining humidity in the work rooms;

- interdependence of spinning, weaving, and chemical treatment of yarn and cloth (bleaching, especially); need for ore imports (limestone and salt by canal, pyrites by ocean); growth of allied chemical industry at head of Mersey; need of cotton industry for proximity to chemical industry;

- differentiation of products, and specialization of mills and subcenters in different kinds of cloth;

- economies from clustering of textile industry and its appanages in one region.

The geographer, free from the limitations of math modeling, is able to bring in more of the fullness and variety of real life. Math models have their place, but they may also be exclusionary and rigid. Atwood is a good supplement.

¹Atwood says nothing about "brown lung," but that is of course another high social cost. These social costs have gradually become internalized, with the development of workmens' comp, unions, lawsuits, etc.

Changes in Land Policy - How fundamental.

1. Very fundamental - + bad for Am. labor
Compete to repel labor.
2. Evolution of "speculator" as pejorative.
3. Whole states & provinces have gone anti-growth.
4. Regressive effect. E.g., of Va. Top 1% own 62% of the land - by value.
5. Reasons for turning vs. growth.
 - a. Environment.
Due to affluence? Not of wage earners
Growing tech. efficiency of polluters
Decline of labor-intensive solutions, e.g. social controls. Instead, spatial segregation
 - b. Fiscal
Demand for public services
End of overt discriminations. A compensatory device is to keep immigrants out
Hi fed. paid taxes. ~~Many~~ Perversion of Fed. inc. tax
"Overseas" taxes, from Wash. leaves less for local govt.
Fed. profits go to govt. - not to people.
Feds exempt muni. bonds
Contrast G.I. Bill

2
b. Fed subsidies to urban sprawl
- Housing.
- Highways

c. ~~the~~ NIMBY

e.g. El Toro

e.g. Eagle Mt.

d. X subsidy

Punishes hi density.

Summary, p. 79

Reasons rejected:

Pop. control

Survivors family farms.

Gini Ratios, p. 80

Cynthia

From Baker

1. Interest in CPI

a. Mortgage int. eliminated in 1983?

b. Credit cards?

c. Before 1983, mortgage int. was part of housing cost.

Did they figure real or nominal int.? If real,
wd. get free housing in some years.

#

Pollin + Stone

F:
CPI

[Back](#) 6 page(s) will be printed.

Record: 1

Title: The Illusion of an Improved CPI.

Authors: Pollin, Robert¹
Stone, Michael²

Source: Challenge; Jan/Feb91, Vol. 34 Issue 1, p53-57, 5p, 1 chart

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*CONSUMER confidence
*CONSUMER price indexes
*COST & standard of living
*ECONOMIC indicators
COST-of-living adjustments

Abstract: This article discusses improvements in Consumer Price Index (CPI). Avoiding the pitfalls of inflation illusion has been one of the great themes throughout the history of economics. More specifically, it has been recognized for several years that the most basic measures of economic well-being, family incomes, wages and housing costs, vary significantly according to the method one employs for measuring inflation. To a large degree, controversy has centered around the relative merits of alternative price indexes. The most widely recognized measure of inflation is the CPI. The two indexes did diverge over the high inflation years. During the 1970s, the gap between them averaged nearly one percentage point, though neither was consistently higher or lower on a year-to-year basis. The old CPI was a Paache index, which means that it measures price change over time for a fixed basket of goods and services. The PCE deflator is a Laspyres index, meaning that it measures change for a variable basket, one that changes in response to consumer spending patterns.

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ANALYSIS**THE ILLUSION OF AN IMPROVED CPI**

Avoiding the pitfalls of inflation illusion has been one of the great themes throughout the history of economics. It remains a fundamental issue today in a number of areas: for example, determining the size of the federal deficit; evaluating proposals to achieve a zero inflation rate; and measuring the number of people currently living in poverty. Indeed, how one assesses U.S. economic performance over the past twenty years

depends substantially on how one accounts for inflation.

More specifically, it has been recognized for several years that the most basic measures of economic well-being--family incomes, wages, housing costs--vary significantly according to the method one employs for measuring inflation. As a result, the validity of even such widespread contentions as the worsening of poverty and the squeeze on the middle class since the early 1970s depends on the technique one uses to purge nominal data of inflation illusion.

To a large degree, controversy has centered around the relative merits of alternative price indexes. The most widely recognized measure of inflation is the Consumer Price Index. This has been the measure used by proponents of the increasing poverty/middle-class squeeze argument. Critics of this argument have also been critics of the CPI. They contend that the measure of price change derived from the Personal Consumption Expenditures (PCE) deflator conveys a more accurate picture of economic conditions during the high inflation years of the 1970s and early 1980s.

so this is why Hanson changed

The two indexes did diverge over the high inflation years. During the 1970s, the gap between them averaged nearly one percentage point, though neither was consistently higher or lower on a year-to-year basis. However, in 1979 and 1980, the gap between them grew to an unprecedented degree, with the CPI exceeding the PCE deflator by 2.5 percent in 1979 and 4.5 percent in 1980.

Such differences carry far-reaching implications. Bureau of Labor Statistics (BLS) Commissioner Janet Norwood, for example, recently reported that every one percent change in the CPI has an estimated fiscal impact of about \$4.6 billion. Given this, it is not surprising that the much more rapid rise of the CPI in 1979-80 sparked an intense debate as to its merits relative to the PCE deflator. This debate culminated in 1983 in a major revision of the methodology for calculating the CPI to one which more closely approximates that of the PCE deflator. We may now compare the "old" CPI, which is calculated through 1982, with the revised version, as well as with the PCE deflator.

What was the difference between the pre-revision CPI and the PCE deflator? To begin with, they were derived from separate index number techniques. The old CPI was a Paache index (and remains so in its revised form), which means that it measures price change over time for a fixed basket of goods and services. The PCE deflator is a Laspyres index, meaning that it measures change for a variable basket, one that changes in response to consumer spending patterns. To illustrate the difference, consider a well-known example in which the price of hamburger meat rises and, as a result, households substitute macaroni for hamburger in their consumption basket. Following the CPI, the rise in hamburger will be fully reflected in calculating the aggregate inflation rate. With the PCE deflator, the rise in hamburger is incorporated into the aggregate inflation rate only insofar as hamburger is still a part of the consumption basket. If macaroni had fully substituted for hamburger, the PCE deflator would actually register a price decline, no matter how high the price of hamburger had risen.

Reasonable arguments can be made in behalf of both of these techniques (e.g., a fixed-basket approach is a better gauge of the consumer's ability to purchase a stable living standard, while a variable-basket index should more accurately reflect the prices of commodities actually purchased over a given time period). However, for explaining the gap between the CPI and the PCE deflator during the 1970s, and especially over 1979-80, this particular distinction between the two methodologies turned out to have relatively little influence. The major factor causing the divergence between the CPI and the PCE deflator was instead that the two series treated the costs of homeownership in different ways. This difference became magnified when, over the 1970s, both home prices and mortgage interest rates rose dramatically--the median nominal home price increasing from \$23,000 to \$65,000 between 1970 and 1980, while mortgage interest rates rose from 8.4 percent to 14.1 percent.

The homeownership cost controversy

The basic analytic technique underlying the CPI (old and new) was to measure price change according to current purchase prices for all commodities in the fixed consumption basket, including durable goods as well as non-durables and services. Following this approach, the old CPI measured the current price of purchasing a home on the basis of five components of homeownership--the price of the house, mortgage

interest rates, property taxes, homeowners' insurance, maintenance and repairs. The weight of each component for the aggregate CPI was derived from the proportionate level of expenditure on that item in the current Consumer Expenditure Survey. By contrast, the PCE deflator calculated the costs of homeownership on the basis of "rental equivalence"--what the costs would be of renting a home equivalent to that which one occupied. Rental equivalence values were simply derived from the CPI's series on rented houses.

The principal argument made against the CPI's purchase price approach was that it confused the consumption and investment components of homeownership. A consumer price index, it was argued, should incorporate only the price of purchasing the consumption aspects of owning a home. The investment aspects of homeownership, according to this view, does not belong in the CPI basket any more than do other investment goods such as stocks and bonds, none of which are included in the CPI basket.

The most reasonable way to separate the consumption and investment components, according to critics, was to impute values from the rental market for homes. Renters, by definition, have no investment stake in the home. Thus, according to this view, the rental equivalence approach embodied in the PCE deflator was an analytically superior method of deriving the consumption costs of homeownership.

As a result of this debate, in 1979 the Bureau of Labor Statistics began experimenting with alternative measures of the CPI, which incorporated the rental equivalence approach as well as other techniques for estimating the flow of consumption services from homeownership. In 1982, after much contention and hesitation, but with the gap between the two indexes in 1979-80 having endowed the question with a sense of urgency, the BLS decided to adopt rental equivalence and abandon the purchase price approach. Thus from 1983 onward, homeownership costs in the official CPI are based on rental equivalence. Robert Gillingham, the senior BLS technician working on the issue, expressed the official motivation for the change in a 1982 article co-authored with Walter Lane:

The essence of the decision is to change the homeownership component of the CPI from its current form, which includes both investment and consumption aspects, to a flow of services approach, which focuses only on the consumption of shelter services, on the principle that the index should focus only on current consumption.

Disparate views of economic reality

The new CPI still follows both the fixed basket and, for the most part, the current purchase price methodologies. Nevertheless, similar to the PCE deflator, it generates a substantially different image of the U.S. economy than that derived from the old CPI. We can see this most clearly when we compare statistical patterns over 1967-82, the years for which the new CPI has been retroactively calculated (see Table 1). Of course, most pronounced are differences in estimates of the costs of homeownership, with the old CPI estimating an 8.6 percent average annual increase between 1967-82 and the new index estimating a 5.5 percent increase. Resulting from this, the price level over these years rises at an average annual rate of 7.1 percent according to the old CPI, but by only 6.5 percent using the new index.

This difference in the price level, in turn, generates divergent estimates of general well-being. For example, according to the old CPI, average real wages fell by 9.4 percent between 1967-82, while they essentially remained stable--falling by only 0.4 percent--according to the new index. Similarly, median household incomes fell by 2.3 percent according to the old CPI, but rose by 7 percent according to the new measure.

Such differences, moreover, are not merely due to possible distortions from using 1967, a mid-expansion year, and 1982, a recession trough, as data points. If we shift the end point to 1986, another mid-expansion year--- even though this also entails incorporating four years (1983-6) in which we use new CPI data exclusively since there are no figures for the old CPI--we still obtain sharply divergent patterns. Real wages fell by 9.2 percent according to the old CPI, but by only 0.9 percent according to the new measure. Family incomes show a 6.1 percent increase according to the old CPI, but a 14.4 percent rise according to the new.

In short, if the lens through which one visualizes the economy since the mid 1960s is the old CPI, one observes that average households have experienced, at best, stagnation, if not decline, in their living standard. Alternatively, working from the new CPI, just as with the PCE déflator, one observes definite, if

moderate, gains in average well-being.

The federal government itself is fully aware that living conditions look better under the new CPI, and indeed has considered utilizing this fact to raise 3.5 million people above the official poverty line. Such action becomes possible because the official poverty line has always been indexed to the CPI, in both its earlier and present versions. Thus the Census Bureau published an "alternative poverty line" in its 1989 annual report, which it derived by retroactively applying the new CPI back to 1967. When this is done, the 1988 official poverty threshold for a family of four falls from \$12,092 to \$10,997. Comparable downward adjustments would apply to families of different sizes. Because the official poverty line affects eligibility for an array of government programs--including food stamps, free school lunches, Medicaid, and Head Start--several million poor people would become ineligible for support if the "alternative" line became the official poverty measure.

Is rental equivalence better?

It is remarkable, in short, how much hinges on a technical argument as to the relative merits of rental equivalence rather than current purchase prices for deriving the costs of homeownership. This is especially so since, under careful examination, the reputed superiority of the rental equivalence approach is difficult to discern. Consider the following points.

To begin with, as has been widely recognized, the market for owneroccupied homes is distinct from that of single-family detached rentals. Most apparently, the owner-occupied house market is simply much larger. As of 1987, 85 percent of all single-family detached homes were owner-occupied. Moreover, owneroccupied homes are of generally higher quality than rental houses. Rentals, for example, contain only about 70 percent of the square footage per person of owner-occupied homes.

BLS officials acknowledged this distinction from the beginning, though they initially took no measures to control for it. The original calculations of rental-equivalence in the CPI simply took figures from the CPI's rental component to proxy for the price of owner-occupied housing. This technique still underlies the 1967-82 retroactive estimates of the new CPI. More recently, the BLS has attempted to control for the difference in the two markets by developing rental equivalence figures from a sample of rented homes that more closely reflect the market for owner-occupied rather than rental homes. However, even such a controlled survey approach to generating rental equivalence values misses the key point: With the market for owner-occupied houses being much larger and of higher quality, one often has no choice but to purchase the "investment" component of homeownership in order to acquire the consumption features one seeks. In other words, investment in a home becomes the price of entry into the only broadly available market for the consumer services flowing from housing.

Related to this, homeownership itself provides consumption services that cannot be reproduced through renting. "Freedom from the landlord" would be a catch-all term to categorize these services. This would include greater security and privacy as well as the ability to control and alter one's living environment. One purchases these consumer services only through investing in homeownership. Thus, to the extent one desires these services, consumption and investment in homeownership become inseparable.

The risks associated with investment in a home--e.g., fluctuations in property values, taxes, insurance, and, with the growth of variable rate mortgages, in mortgage payments as well--are thus part of the cost one bears to obtain the consumption features that are unique to homeownership. The rental equivalence measure therefore suppresses both the consumption goods and services that uniquely flow from homeownership and the costs and risks associated with purchasing these consumption items.

In addition, the BLS is unclear as to what it regards as the investment features of homeownership, and therefore what it seeks to exclude in calculating an "investment-free" CPI. Moreover, regardless of what definition of investment it follows, its approach to indexing homeownership as an investment good remains inconsistent.

At times, the BLS defines investment goods as being simply durable commodities. This view is expressed in the following passage from the CPI Detailed Report for January 1983, as part of a lengthy discussion of the

revision: "Ownership of a source of consumption service--a durable good--is an 'investment', designed to provide consumption services over a future time span." But if durability is the defining characteristic of a household commodity with investment features, then owner-occupied homes are certainly not unique among commodities in the CPI consumption basket as an investment as well as consumption good. Other such investment/consumption goods would include cars, furniture, refrigerators, lawnmowers, clothes, and stereo systems. But prices for all of these items continue to be indexed according to the purchase price approach, and no controversy has resulted from this practice.

The alternative meaning of owneroccupied housing as an investment good is that, like stocks and bonds, it can generate a capital gain when sold. In this sense, owning a home is distinct among household items (though not unique, as sales of certain kinds of furniture, jewelry, and works of art also carry the possibility of capital gains). However, it is not true that the rental equivalence method succeeds in separating investment in this sense from the consumption aspects of homeownership. This is because rental payments include income for landlords and the repayment of mortgage interest, in addition to the amount which purchases the occupants' housing services. To be more specific, the payment of rent can be decomposed into four components. One is the expenses of operations, including maintenance and repairs, management, insurance, and utilities. Another is net operating income, which represents the total current cash return to be shared by the landlord and her creditors. The other two are depreciation and property taxes. But only the portions of rent going to operations, depreciation, and property taxes purchase consumer services. Net operating income is a payment to those whose relationship to the property is exclusively to its investment component.

Reopen the debate

To be sure, many of the subsidiary problems associated with the old purchase price approach, identified by the BLS and other critics, were serious. One was that the BLS relied on an increasingly unrepresentative sample of FHA-financed homes to generate current purchase prices. Another was the difficulty of incorporating variable rate mortgages into the current purchase price methodology. A third was that the deductibility of mortgage interest payments was not incorporated into the calculation of purchase prices. A fourth was that home purchases were overweighted in the aggregate consumption basket, since the BLS included both the purchase price of the home and one-half of all mortgage interest payments as separate items in calculating the relative weight of home purchases. In fact, the purchase price alone would have provided appropriate weighting, since, with a first mortgage, the money from the loan goes precisely to pay off the cost of the home.

However, none of these problems was insurmountable. They could have been corrected while maintaining, indeed improving, the purchase price methodology. Of greater concern with the purchase price approach, as some critics have recognized, is the unavoidable problem that it measures changes in the cost of living less accurately than changes in the price level. This is especially serious, since the CPI is universally employed as a cost of living index.

The problem is that all user-owned durables--not just owner-occupied homes--are purchased infrequently, so that most consumers' living costs are not directly affected by fluctuations in the current prices of the durables they own. The purchase price methodology handles this difficulty reasonably well through weighting, since relative weights do measure, among other things, the frequency at which an item is purchased. But perhaps some version of a "flow of services" measurement technique--and rental equivalence is only one of several methods of calculating flows of services--could more accurately measure the costs of living as applied to durables. However, before such an approach should be regarded as a credible alternative to the purchase price technique, its analytic superiority as well as practicality should be apparent.

Was the 1983 change in the CPI motivated by a convincing demonstration of the analytic superiority of the rental equivalence approach? It is difficult to accept either that its superiority was apparent, or that the perception of such impelled the change to the new CPI. Rather, the determining factor seems to have been the political pressures that emerged after the 1979-80 experience, when sharply rising housing costs drove the CPI to extraordinary levels, substantially above the PCE deflator. At present, home prices have stopped rising. In fact, the CPI would be lower now were purchase prices rather than rental equivalence being used to measure homeownership costs. Perhaps these are agreeable circumstances in which to reopen

consideration as to how best to measure the costs of homeownership. In the meantime, inflation illusion will continue to afflict our understanding of past and present economic circumstances.

Table I Alternate Measures of Inflation (percentage increases)

Year	Homeowner- ship Costs		All Items	
	Old CPI	New CPI	Old CPI	New CPI
1968	5.7	2.6	4.2	3.9
1969	9.7	3.2	5.5	4.5
1970	10.8	4.0	5.7	4.8
1971	4.0	4.7	4.4	4.4
1972	4.8	3.5	3.2	3.0
1973	4.7	4.2	7.7	4.9
1974	11.2	5.1	11.0	10.0
1975	11.3	5.1	9.1	8.3
1976	5.5	5.3	5.8	5.7
1977	6.9	6.1	6.5	6.4
1978	10.9	6.9	7.6	6.8
1979	15.5	7.2	11.3	9.6
1980	19.7	8.9	13.5	11.2
1981	12.3	8.7	10.3	9.5
1982	6.8	7.6	6.2	6.1

Source: Bureau of Labor Statistics.

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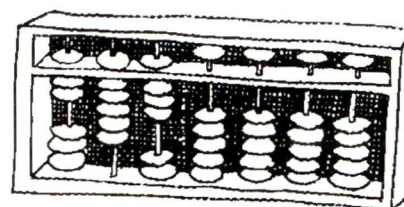
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# Technical Notes



## Adjusting the CPI shelter index to compensate for effect of depreciation

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Beginning with the Consumer Price Index (CPI) for January 1988, the Bureau of Labor Statistics (BLS) introduced an adjustment into the CPI shelter indexes for the phenomenon known as "age bias." The need to correct the shelter indexes (the rent index and the owners' equivalent rent index) arises from the need to keep the quality of consumer items in the CPI market basket constant over the period for which price change is observed.

The CPI measures price changes for urban consumers in the United States.<sup>1</sup> It does this by following the prices of a sample of consumer goods and services called the CPI market basket. Using longitudinal surveys, the CPI tracks the prices of consumer goods and services in the market basket, comparing their current prices to those previously observed. The percent change in the CPI is an average of these price changes. For this to be an accurate measure of price change, it is critically important that the quality of the goods and services be identical in both periods for which prices are observed.

The CPI measures price change for both renter-occupied and owner-occupied housing with a longitudinal survey of housing units. The residential rent index, which is the measure of the change in the cost of renter-occupied shelter, is based on the movement of rents in the survey. Since 1983, the Bureau has also used the changes in the rents of rental units in the survey to estimate the change in the owners' equivalent rent index, which measures the change in the cost of owner-occupied shelter.<sup>2</sup> Currently, the Bureau does this by imputing an implicit rent for each owner-occupied unit in the survey from an initial estimate obtained at the first interview with the unit's owner, and then periodically adjusting this estimate with the average rent change of similar renter-occupied housing units

nearby. BLS agents ask for rent information from the rental units in the survey every 6 months. At each interview they obtain the rent and services provided for the rent. BLS computes the rent change for each sample unit and then averages the rent change. Following the same units—which provide services that rarely change—and computing the average rent change from the individual units' rent changes avoids most apparent problems with quality changes between periods of rent comparison.

Consequently, a large proportion of the sample appears to be of "constant quality." In other words, the services offered in exchange for rent are the same at successive interviews. However, the Bureau has procedures to estimate the value of and adjust for common changes in the services offered. For example, if an apartment's owner stops providing electricity as part of the rental services, the BLS estimates its value and adds it to the rent for the current month. The estimated value depends on the electrical appliances and size of the unit, and the climate and price of electricity in that area. Currently, BLS does not estimate the value of changes such as the addition of a room or a bathroom. When a rental unit in the sample experiences such a change, the Bureau leaves it out of the CPI calculation for one period.

Because quality changes of the types mentioned above occur quite rarely in the housing survey, there are relatively few problems with them. However, following the same units over time introduces the possibility of a subtle but potentially significant quality change. Even though BLS surveys the same set of housing units in successive periods, the quality of the units is not exactly the same because in the later period they are older and their quality is slightly lower. Of course, some housing units receive maintenance that slows and can even prevent them from wearing out. However, because most housing eventually wears out and is torn down or is closed down for complete rehabilitation, the housing stock as a whole—and therefore the average housing unit—clearly depreciates. Empirical estimates of the physical depreciation show that it is small but significant.

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## Measuring the age bias

The question of how much housing depreciates during each period must be answered empirically. To do this, BLS researchers<sup>3</sup> used a hedonic regression model in which the logarithm of the rent of a housing unit is a function of (1) its structural characteristics—such as number of rooms, (2) its location, (3) services, such as utilities, included in the rent, (4) neighborhood characteristics, such as percent of the population with some college education, and (5) a set of six “depreciation” variables. The depreciation variables are the only variables in the model that depend directly on the age of the dwelling. The first two depreciation variables are (1) the age, (2) the age squared divided by 2. The others are variables interacting with age, namely: (3) age times a dummy for detached housing, (4) age times a rent control dummy, (5) age times the number of rooms, and (6) age times a dummy variable for very old units (built before 1900). (Table 1 lists all the variables, except the location variables, which are very numerous.)

BLS economists used data from the CPI housing survey and the 1980 Census of Housing to estimate the model. The data for the structural characteristics, location, services included in the rent, age, and other data needed for the depreciation variables came from the CPI survey. Neighborhood characteristics data came from the smallest published geographic levels of the 1980 census (usually the census block) containing the housing unit. The Census Bureau defined these areas to be relatively homogeneous with respect to population characteristics, economic status, and living conditions.<sup>4</sup> BLS accounted for location by letting all regression parameters vary over the four census

regions and letting many of them vary across CPI pricing areas within regions.

The model was estimated both with maximum likelihood and with ordinary least squares regression methods. The maximum likelihood estimates are slightly more efficient; however, the ordinary least squares estimates are much easier to obtain and they are unbiased. For this reason, the least squares method was chosen for computing the aging adjustments for the shelter indexes.

To provide lower variance depreciation estimates for individual CPI areas, the Bureau uses a composite estimation procedure<sup>5</sup> that combines the regional depreciation estimate with that of the local area. Similar procedures are used elsewhere in the CPI—most notably in the calculation of base-period expenditure weights—to reduce variance.

The hedonic regression model can be summarized with the following expression:

$$(1) \text{ Log (rent) } = f(13 \text{ structural characteristics variables,} \\ \text{various location and survey variables,} \\ 13 \text{ neighborhood characteristics variables,} \\ 7 \text{ dummy variables for services provided} \\ \text{with rent,} \\ 6 \text{ depreciation variables, and a random} \\ \text{error term})$$

The function is linear in most of these variables. After BLS estimated the coefficients using the data and the hedonic regression techniques, this function became a formula that can project the log of rent for any unit for which the values of the explanatory variables are known. In addition, a coefficient estimated for a variable in such a semilog function (the log is taken of the dependent variable only) can be interpreted as an approximation of the expected percentage change in the dependent variable (here, the rent) that will result from a unit change in the explanatory variable. For example, the national average of the coefficients for the structural characteristic variable “more than one bathroom” is about 0.099, which implies that a housing unit with an additional bathroom would have a rent about 10 percent higher than another housing unit in which all else was the same. Table 1 provides estimates in percentage terms of the effect of the regression variables on rent.

Depreciation is the effect of aging on the quality of a housing unit. The partial derivative of the full equation with respect to age provides a formula for depreciation, which can be interpreted as the approximate percent change in rent (net of inflation) as the rental unit ages 1 year. Note that the only variables in the formula that contain age are the depreciation variables. When the partial derivative is taken, the other terms drop out, leaving only the depreciation terms. Keep in mind that the inclusion of other variables influences the estimates of the depreciation variables’ coefficients.

**Table 1. National averages of parameter estimates in age bias adjustment model for selected variables (multiplied by 100)**

| Item                              | Average | Item                                             | Average |
|-----------------------------------|---------|--------------------------------------------------|---------|
| <b>Depreciation</b>               |         | <b>Continued—Services included in rent</b>       |         |
| Age                               | -0.48   | Fuel oil                                         | 2.3     |
| Age*Rent control                  | -0.026  | Parking                                          | 3.5     |
| Age*Old                           | .06     | Furnishings                                      | -2.6    |
| Age*Detached                      | -0.37   | Swimming pool                                    | 4.3     |
| Age*Rooms                         | .05     | Other recreation                                 | 1.7     |
| <b>Structural characteristics</b> |         | <b>Neighborhood characteristics (by percent)</b> |         |
| Detached                          | 16.0    | Plumbers                                         | -0.05   |
| Bedrooms                          | 14.6    | White                                            | .11     |
| Other rooms                       | 3.1     | Large buildings                                  | .09     |
| Complete kitchen                  | 7.3     | Two or more autos                                | -0.03   |
| Dishwasher                        | 11.0    | Without complete plumbing                        | -0.63   |
| Washer/dryer                      | 6.6     | Air conditioned                                  | -0.65   |
| Oil heat                          | -21     | Children age 6 to 18                             | -0.13   |
| Electric heat                     | .57     | College students                                 | -0.04   |
| Central air conditioning          | 10.9    | Families below poverty level                     | -0.15   |
| Window air conditioning           | 4.2     | Elderly over 65                                  | .12     |
| Extra bathroom                    | 9.9     | Mobile homes                                     | -0.17   |
| Rent control                      | -7.5    | Unemployment                                     | -0.32   |
| <b>Services included in rent</b>  |         | With college education                           | .46     |
| Gas                               | 4.2     |                                                  |         |
| Electric                          | 7.3     |                                                  |         |



We can obtain depreciation as:

(2)

$$\text{depreciation} = \frac{\partial \log(\text{rent})}{\partial \text{age}} = g(\text{depreciation variables})$$

Depreciation, or the amount of quality change lost because the sample does not keep the age constant, can be found from this simpler formula.

To derive the depreciation formula explicitly, we can rewrite equation (1), the hedonic regression for the logarithm of rent, as:

(3)

$$\begin{aligned} \log(\text{rent}) = & aX + b_1 \text{age} + b_2 (\text{age}^2) + b_3 \text{age (number} \\ & \text{of rooms)} \\ & + b_4 \text{age (very old unit)} + b_5 \text{age (de-} \\ & \text{tached housing)} \\ & + b_6 \text{age (rent control),} \end{aligned}$$

where  $X$  is a vector of the variables that do not measure depreciation and  $a$  is the vector of regression coefficients for the variables in vector  $X$ . The depreciation variables, which are all functions of the age of the housing unit, are listed individually. The derivative provides an explicit version of equation (2):

(4)

$$\begin{aligned} \frac{\partial \log(\text{rent})}{\partial \text{age}} = & b_1 + 2b_2 (\text{age}) + b_3 (\text{rooms}) \\ & + b_4 (\text{very old unit}) \\ & + b_5 (\text{detached}) + b_6 (\text{rent control}) \end{aligned}$$

Because none of the variables in vector  $X$  depends directly on the age of the unit, those variables do not appear in the derivative.

### Vintage effects

The results from this approach to measuring the age bias are subject to possible error caused by vintage (or year built) effects. The regression coefficient estimates for the age variables (the depreciation variables) may reflect something other than the effect of aging. If the housing units built in a certain year are consistently better or worse than those built in years before or since, the regression would not be able to separate the effect of depreciation from the effect of vintage on the rent of a housing unit. For example, older homes that still survive may have been more soundly constructed, have more mature landscaping, or be in better locations than newer homes. On the other hand, newer homes may have better floor plans, insulation, appliances, equipment, wiring, and plumbing. To the degree that the market values newer houses more highly or less highly than older ones, the regression equation estimating the effect of age on the rent may be distorted. However, BLS research<sup>6</sup> on the subject indicates that the regression, by including structural and neighborhood variables, accounts for most vintage effects or that vintage effects that favor older housing are offset by other vintage effects favoring newer housing. The

model used to adjust the shelter indexes for depreciation ultimately rests on the assumption that, when the regression contains such variables, vintage effects are negligible. In light of empirical evidence, such an assumption is preferable to assuming—as the CPI implicitly did before aging adjustments began—that housing does not depreciate and that depreciation effects can be ignored.

### Results

Equation (4) provides a way to estimate the depreciation of housing units for the CPI housing index and also provides adjustments for the CPI rent and owners' equivalent rent indexes. To minimize the variance that this new procedure introduces, BLS uses the same adjustment for all housing units in a CPI area. To obtain the adjustment for each area, BLS estimates the area's average value for the depreciation variables with equation (4). The Bureau then uses the composite estimation procedure that combines the adjustments estimated at the regional level with those from the local level to obtain the final local values. Table 2 gives the estimates of the corrections for the largest CPI areas. These are the annualized values, in percentage terms, of the corrections introduced in January 1988. They will be recomputed yearly using the same (or improved) methods with newer data. BLS makes the adjustments by adding the estimated percent change from depreciation to the percent change in rent for each shelter index in each of the 85 CPI pricing areas. For example, if an area has an annual adjustment of, say, 0.3 percent, one-twelfth that amount (0.025) would be added to the percent increase for the rent and owners' equivalent rent indexes in each month of the year. In the future, BLS may apply the corrections at smaller geographic levels, possibly as low as the sample unit level.

The adjustments in table 2 show relatively little variation in housing depreciation by region. This is a result of the composite estimation process described on the preceding

**Table 2. Age bias adjustments for selected metropolitan areas**  
(In percent)

| Pricing area       | Annual adjustment | Pricing area          | Annual adjustment |
|--------------------|-------------------|-----------------------|-------------------|
| <b>Northeast</b>   |                   | <b>South</b>          |                   |
| New York .....     | 0.36              | Washington, D.C. .... | 0.17              |
| Philadelphia ..... | .36               | Dallas .....          | .14               |
| Boston .....       | .36               | Baltimore .....       | .17               |
| Pittsburgh .....   | .36               | Houston .....         | .11               |
| Buffalo .....      | .35               | Atlanta .....         | .17               |
|                    |                   | Miami .....           | .16               |
| <b>Midwest</b>     |                   | <b>West</b>           |                   |
| Chicago .....      | .22               | Los Angeles .....     | .22               |
| Detroit .....      | .24               | San Francisco .....   | .23               |
| St. Louis .....    | .21               | Seattle .....         | .25               |
| Cleveland .....    | .24               | San Diego .....       | .21               |
| Minneapolis .....  | .21               | Portland, OR .....    | .24               |
| Milwaukee .....    | .22               | Honolulu .....        | .22               |
| Cincinnati .....   | .24               | Anchorage .....       | .19               |
| Kansas City .....  | .23               | Denver .....          | .24               |



page. Among the regions, the Northeast has the highest depreciation rates and therefore requires the largest adjustment. This may reflect the effects of the severe climate, but it also results from the prevalence of rent control and multi-unit housing in that region. The lower rates in the South result from the milder climate, more detached housing, and less rent control. □

-----FOOTNOTES-----

<sup>1</sup>For a complete description of the Consumer Price Index, see chapter 19 of the *BLS Handbook of Methods*, Bulletin 2285 (Bureau of Labor Statistics, April 1988).

<sup>2</sup>Rental equivalence is described in the *BLS Handbook of Methods*, and in more detail in "Changing the Homeownership Component of the CPI to Rental Equivalence," *CPI Detailed Report*, January 1983, pp. 7-11.

<sup>3</sup>The full development of the aging adjustment is described in William C. Randolph, "Housing Depreciation and Aging Bias in the Consumer Price Index," *Journal of Business and Economic Statistics*, July 1988, pp. 359-71.

<sup>4</sup>See *Census of Population and Housing Technical Documentation* (Bureau of the Census, 1982), p. 221.

<sup>5</sup>For a complete development of the composite estimation procedure, see William C. Randolph and Kimberly D. Zieschang, "Aggregation Consistent Restriction Based Improvement of Local Area Estimators," *Proceedings of the Business and Economics Section* (American Statistical Association, January 1988).

<sup>6</sup>For a full development of the vintage effect question, see William C. Randolph, "Estimation of Housing Depreciation: Short-Term Quality Change and Long Term Vintage Effects," *Journal of Urban Economics*, March 1988, pp. 162-78.

## Establishment survey incorporates March 1987 employment benchmarks

JOHN B. FARRELL

With the release of data for May 1988, the Bureau of Labor Statistics introduced its annual revision of national estimates of employment, hours, and earnings from the monthly survey of establishments. The revision uses employment counts for March 1987 as a benchmark. As part of the annual benchmarking process, the Bureau also revised seasonally adjusted series for the past 5 years, and computed new seasonal adjustment factors.

### Adjustment procedure

Monthly estimates from the Current Employment Statistics (CES) survey are based on information collected from a sample of approximately 300,000 establishments. To help improve their accuracy, the Bureau adjusts CES estimates each year to new benchmarks. Benchmarks are

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comprehensive counts of employment based primarily on mandatory unemployment insurance reports filed by employers with the State employment security agencies.

The current revisions are based on March 1987 benchmarks and affect all unadjusted series from April 1986 forward. As is the usual practice with the introduction of new benchmarks, the Bureau has also revised the seasonally adjusted series from January 1983 forward and has published new seasonal adjustment factors to be used for the coming year.

**Current revisions.** The March 1987 benchmark level for total nonagricultural employment—100.4 million—was only 35,000, or 0.04 percent, below the corresponding sample-based estimate, resulting in one of the survey's smallest benchmark revisions. The pattern of revisions was mixed across industry divisions, with downward revisions in the goods-producing industries (-0.7 percent) being about offset by upward revisions in the service-producing industries (0.2 percent). Table 1 provides the revisions for March 1987 by industry division.

New estimates were computed for April 1987 forward, based on the new March 1987 benchmark levels and recomputed seasonal adjustment and bias factors. In addition, the sample was redistributed into estimating cells that reflect their March 1987 employment size, and sample reports were added that had been received since the original estimates were made. The combined effect of the new benchmark level, recomputed seasonal and bias factors, the resized sample, and added late reporters resulted in the new estimates generally showing larger over-the-month employment gains than previously reported. The cumulative effect on the survey estimate from April 1987 through February 1988 was the addition of

**Table 1. Differences between nonagricultural employment benchmarks and estimates, by industry division, March 1987**

(Numbers in thousands)

| Industry                                  | Benchmark | Estimate | Difference |                  |
|-------------------------------------------|-----------|----------|------------|------------------|
|                                           |           |          | Number     | Percent          |
| Total nonagricultural ..                  | 100,427   | 100,462  | -35        | ( <sup>1</sup> ) |
| Total private .....                       | 83,173    | 83,152   | 21         | ( <sup>1</sup> ) |
| Mining .....                              | 696       | 718      | -22        | -3.2             |
| Construction .....                        | 4,531     | 4,599    | -68        | -1.5             |
| Manufacturing .....                       | 18,810    | 18,897   | -87        | - .5             |
| Transportation and public utilities ..... | 5,274     | 5,275    | -1         | ( <sup>1</sup> ) |
| Wholesale trade .....                     | 5,763     | 5,725    | 38         | .7               |
| Retail trade .....                        | 17,902    | 17,737   | 165        | .9               |
| Finance, insurance, and real estate ..... | 6,443     | 6,478    | -35        | - .5             |
| Services .....                            | 23,754    | 23,723   | 31         | .1               |
| Government .....                          | 17,254    | 17,310   | -56        | - .3             |
| Federal .....                             | 2,916     | 2,916    | 0          | 0                |
| State .....                               | 4,050     | 4,036    | 14         | .3               |
| Local .....                               | 10,288    | 10,358   | -70        | -.7              |

<sup>1</sup>Less than 0.05 percent.



# Changing the treatment of shelter costs for homeowners in the CPI

*In 1983, the treatment of housing in the official Consumer Price Index for All Urban Consumers will change to reflect only the cost of shelter services of owner-occupied housing*

ROBERT GILLINGHAM AND WALTER LANE

In late 1981, Commissioner of Labor Statistics Janet L. Norwood announced plans to change the procedures used to compile the homeownership component of the Consumer Price Index (CPI). Although the particular procedures used in compiling the CPI might seem dry and technical and of little general interest, such is not the case with respect to the homeownership component. The treatment of owner-occupied housing in the CPI has been one of the most widely discussed issues in economic statistics in recent years. The interest in this component stems from its substantial weight in the CPI and the sensitivity of the overall index—our most widely publicized measure of inflation—to the particular procedures used.

Currently, the homeownership component is based on house prices, mortgage interest rates, property taxes and insurance, and maintenance costs. This treatment captures elements of both the service flow and asset investment aspects of housing expenditures. The Bureau first raised questions about this component 10 years ago and, since then, has encouraged public review of alternative approaches. For some time, the Bureau staff has supported a change in favor of a treatment which would

focus solely on the cost of the shelter services of owner-occupied housing, thus abstracting from investment aspects. The Commissioner believes that the increased general understanding of the issues surrounding this component, along with the growing problems inherent in continuing the current procedure, make a change imperative. This paper summarizes the proposed modifications and the reasons why an immediate decision to make them was necessary,<sup>1</sup> describes the current treatment of homeownership to provide an understanding of the flaws in the current approach,<sup>2</sup> explains why the proposed rental equivalence approach is the best alternative for improving the index, and outlines the technical procedures which the Bureau is currently implementing to ensure an adequate rental equivalence index.

## Why the CPI must be changed

As noted, the current approach to homeownership is based on, *inter alia*, house prices and mortgage interest rates. In announcing the changes for the CPI homeownership component, the Commissioner cited several serious difficulties in obtaining reliable data on these components to continue the current approach. First, important changes have occurred in financial markets which are not reflected in the CPI. Funds available for long-term mortgage commitments have declined sharply. New types of mortgage instruments involving variable rates, shorter financing terms, and other special arrangements have developed so that the standard,

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long-term, fixed rate mortgage used in the CPI is becoming increasingly unrepresentative of the mortgage market. In fact, some of the new instruments have characteristics, such as variable rates and principal amounts, which make it impossible to use them in computing the CPI which assumes a long-term mortgage at fixed interest rates. Furthermore, because of high interest rates and difficulties faced by home buyers in securing bank mortgages, many owners who wish to sell their homes are facilitating sales by providing financing to buyers at below bank rates. These financing arrangements are not reflected in the CPI. The house prices used in the CPI are obtained from the Federal Housing Administration (FHA) and pertain to sales financed with FHA-insured mortgages. This data base represents a small and specialized segment of the housing market and presents BLS with increasingly serious estimation problems.

In addition to problems of data adequacy, impetus to change the homeownership component stems from an important new use of the index. The Economic Recovery Tax Act of 1981 (Public Law 97-34) requires use of the CPI for All Urban Consumers (CPI-U) for escalation of income tax brackets and the personal exemption amount. The law requires announcement of the new tax brackets in December 1984 based on CPI-U data for the prior 2 years. This is a major new use of the index which will have a broad effect on total Federal Government revenues, and this new use underscores the importance of action to ensure that the CPI reflects the consumption cost experience of consumers to the fullest extent possible.

Another reason to immediately initiate the proposed change is the increasing public awareness of the issues surrounding the measurement of homeownership costs in the CPI. A growing number of concerned parties feel that this component is seriously flawed and that changes must be made in order to maintain public confidence in the index. The specific changes to be made are detailed in exhibit 1. The essence of the decision is to change the homeownership component of the CPI from its current form, which includes both investment and consumption aspects, to a flow of services approach, which focuses only on the consumption of shelter services, on the principle that the index should focus only on current consumption.

### Current treatment

In its current form in the index, homeownership has five parts, or elements. Each has its own weight and procedure to estimate monthly price change. The appropriateness of these methods can only be judged in terms of underlying conceptual framework for CPI homeowner costs. Unfortunately, the current treatment of homeownership has no clear conceptual rationale, so the par-

**Exhibit 1. Dates of change in the Consumer Price Index**

| Date          | Action                                                                                                                                                                                                            |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| January 1982  | Publication of CPI for December 1981 <ul style="list-style-type: none"> <li>• increased prominence for experimental rental equivalence measure (CPI-U-X1) in the text of CPI press release</li> </ul>             |
| 1982          | Work on enhancement of CPI-U-X1                                                                                                                                                                                   |
| February 1983 | Publication of CPI for January 1983 <ul style="list-style-type: none"> <li>• first publication of CPI-U with rental equivalence homeownership</li> <li>• last publication of CPI experimental measures</li> </ul> |
| July 1983     | Publication of CPI for June 1983 <ul style="list-style-type: none"> <li>• last publication of overlap CPI-U with current homeownership methods</li> </ul>                                                         |
| 1984          | Publication of rental equivalence homeownership with expanded rent sample and improved computation methods                                                                                                        |
| February 1985 | Publication of CPI for January 1985 <ul style="list-style-type: none"> <li>• first publication of CPI for Urban Wage Earners and Clerical Workers (CPI-W) with rental equivalence homeownership</li> </ul>        |
| July 1985     | Publication of CPI for June 1985 <ul style="list-style-type: none"> <li>• last publication of overlap CPI-W with current homeownership method</li> </ul>                                                          |

ticular procedures used are largely definitional and cannot be justified by resorting to any broader conceptual framework. It is not surprising, then, that much of the debate over homeownership has focused on them.

**Weights.** The weights reflect consumption patterns reported in the 1972-73 Consumer Expenditure Survey, which forms the basis for the overall weighting scheme of the CPI. (The relative importance of the items as of December 1980 is given in table 1.) The weight for home purchase is the purchase price for homes bought in the survey year, less the sales price for homes sold, plus transactions costs for these purchases and sales. Thus, consideration is limited to those consumers who purchased or sold homes during the survey period. To reduce the sampling error, data from a longer period (1968-73), annualized and adjusted for the price increase which took place over the period, were used to compute this weight. Use of these procedures resulted in a home purchase weight which is quite large.

Like home purchase, the mortgage interest concept is limited to mortgages obtained in the survey period. The mortgages must be for the purchase of homes, and only mortgages initiated at the time of house purchase are included in the weight. The weight for "contracted



mortgage interest cost" is the amount of interest that survey period borrowers promise to pay during the first half of the term of their mortgage loans. It is called contracted mortgage interest cost because it includes future payments. With long mortgages, homeowners will not, in general, hold their mortgages for the full term. The choice of half the term for the specification of this weight was based on procedures established during the 1964 CPI revision.

The weight derivations for the other homeownership elements follow more conventional CPI methods. They depend only on expenditures actually made in the survey year, and refer to expenses incurred by all survey year homeowners—not just home buyers.

*Measuring house price changes.* The estimate of the monthly change in house prices is one of the most difficult tasks entailed in the CPI. This estimate moves the weight for home purchase and, with a mortgage interest rate index, is also used in estimating the mortgage interest cost index. It is not feasible to follow, over time, the prices of a fixed sample of houses—a practice which would be analogous to that used to track price change on most consumer goods and services—because individual houses change hands only infrequently. So, a new selection of recently sold homes must be used each month. To obtain an estimate for the change in house prices from last month to this month, the average price of this month's set of homes must be compared—after adjustment for quality difference—to the average price for last month's set.

The primary difficulty in pursuing this approach is finding a source of data on recent house sales, with both price and quality information, that are (1) available promptly and (2) inclusive of the various types of houses and housing areas. In the current CPI, the data are for house sales on which financing is insured by the Federal Housing Administration. These data fall far short of the ideal. Processing delays often mean that several months elapse between the time a house sale occurs and the time it is used in the CPI. For some geographic areas, especially those in the Northeast, the number of FHA transactions is very small. In addition, the FHA mortgage ceiling virtually eliminates higher priced homes from consideration. The impact of the ceiling—and especially changes in the ceiling—may be quite substantial, possibly resulting in a downward bias in the house price indexes used in the CPI.<sup>3</sup>

The other important difficulty in estimating house price change is the development of good quality adjustment procedures, required before a valid comparison between two different samples can be made. Quality adjustment is currently accomplished by sorting the observations on FHA sales into 600 mutually exclusive cells. The cells were generated from the cross classification of

the 40 CPI geographic areas, 5 age ranges, and 3 size groups. The estimate of change in house prices is computed from the cells. First, the average of the prices per square foot is obtained for each cell. Second, the change is computed for each cell from the average price per square foot of the previous month. Finally, the average of the change is taken over the cells with weights that reflect the base period importance of each cell.<sup>4</sup>

*Mortgage interest and other cost changes.* Changes in mortgage interest costs are determined from the combination of (1) an estimate of changes in mortgage interest rates and (2) the estimate of the changes in house prices. Thus, the mortgage interest cost element of the CPI shows the effect of changing interest rates, with other loan features held constant, and changing house values, with house quality held constant. Put another way, this element shows the change in the amount required to finance a given house in the face of changes in both the interest rate and the price of the house.

The rate change is estimated using quality control cells similar to those used for house prices. For conventional loans, the cells result from the cross classification of the 40 CPI geographic areas, 3 downpayment classes, and 2 classes to distinguish between mortgages on new and existing houses. The source data for conventional loans are provided by the Federal Home Loan Bank Board. They consist of all mortgages closed during the first 5 business days each month by a sample of savings and loans and other lenders. There is currently a 1-month lag before the data are used in the CPI. In addition, there are cells for FHA and VA ceiling rates; these have 13.5 percent of the mortgage weight.

Price changes for the other homeownership elements are estimated with the standard CPI technique of following the prices of a fixed set of selected items over time. The property taxes on a sample of homes are tracked from year to year, after removing the effect of capital changes and exemption changes which are not the result of new tax rules. Price change for property insurance is

**Table 1. Relative importance of index components of the official (CPI-U) and experimental (CPI-U-X1) measures, December 1980**

| Component                           | Relative importance |          |
|-------------------------------------|---------------------|----------|
|                                     | CPI-U               | CPI-U-X1 |
| All items                           | 100.000             | 100.00   |
| Food and beverages                  | 18.309              | 21.264   |
| Housing                             | 45.519              | 36.720   |
| Shelter                             | 31.650              | 20.613   |
| Rent, residential                   | 5.120               | 5.946    |
| Other rental costs                  | .714                | .830     |
| Homeownership                       | 25.816              | 13.837   |
| Fuel and other utilities            | 6.550               | 7.604    |
| Household furnishings and operation | 7.319               | 8.503    |
| Apparel and upkeep                  | 4.854               | 5.639    |
| Transportation                      | 18.955              | 22.020   |
| Medical care                        | 4.717               | 5.476    |
| Entertainment                       | 3.647               | 4.237    |
| Other goods and services            | 3.999               | 4.643    |



estimated by following the price of a specified amount of homeowners or fire and extended coverage insurance, with annual inflation adjustments to any dollar values used in the specifications. For maintenance and repair expenses, a specified set of commodities and services are priced in retail outlets by CPI field representatives.

### The rental equivalence approach

The current treatment of homeownership in the CPI has some very ad hoc aspects: there is no recognition of the distinction between investment and consumption, nor is there any clearly identified underlying conceptual structure. This is not the case for the rental equivalence approach. The following summarizes the conceptual arguments for this approach and outlines the operational steps which will be taken to ensure that the approach is effectively implemented.<sup>5</sup>

*Conceptual framework.* The overall conceptual framework for the Consumer Price Index was presented by Robert Gillingham in 1974. To summarize, we assume that the consumer's welfare is determined by the flow of consumption services received, where the services can be (1) directly provided, (2) obtained coincidentally with the consumption of a nondurable good (in which case the distinction between a good and a service is unnecessary), or (3) obtained from the use of a durable good owned by the consumer. In each case, satisfaction is derived from the act of consumption; ownership of a source of consumption services—a durable good—produces no additional satisfaction. In other words, the purchase of a durable good is an "investment," designed to provide consumption services over a future time span.

Within this framework, we want the CPI to measure the cost over time of the market basket of services consumed in the base period. For the services provided by directly-purchased services and nondurable goods, this implies observing market prices and transaction levels in the base period, as well as the subsequent time path of market prices. However, for the services provided by durable goods owned by consumers, the implicit price of the services must be estimated, because market transactions do not take place each time the service is consumed.

Within this framework, the problem is basically one of estimation. This problem is not serious for many durable goods because aggregate service flows and aggregate purchase flows are closely related, and asset price movements are closely related to service price movements. Thus, standard techniques can be used. For housing, however, this pattern does not typically hold, and alternative procedures must be developed. To analyze this problem for housing, we will start by defining the user cost of housing in the simplest case—in a

world of certainty without taxes, and with perfectly competitive markets—and proceed to outline the complications which arise when these assumptions are dropped.

In a world with perfect rental and resale markets and no uncertainty, the user cost of a house in a given period can be shown to be the following:

$$(1) \quad C_t = r_t P_t - A_t + Z_t$$

where  $r$  is the (single) rate of interest in period  $t$ ,  $P$  is the average price of the house in period  $t$ ,  $A$  is equal to the change in the average price over the period, and  $Z$  represents all other cost components. In other words, the user cost is defined as the opportunity cost of holding the house,  $r \cdot P + Z$ , less the increase in the house's value. In equilibrium, the rental price of the house,  $R$ , will be equal to the user cost and, because we have assumed frictions away, the rent received by a landlord will equal the rent paid by a tenant. Thus, in a perfect world the following obtains

$$(2) \quad R_t^L = C_t = R_t^T$$

where the superscripts  $L$  and  $T$  denote landlord and tenant.

Under the conditions we have assumed, measurement of the value of the flow of shelter services from a house becomes a trivial matter. It can be measured with information from either rental or resale and money markets and it does not matter whether the information refers to buyers' or sellers' prices. Problems arise, however, when we attempt to measure the cost of shelter for homeowners in a more complicated setting, in which the exact form of the user cost function is more difficult to define and the equalities above need not hold.

To lay out this problem more clearly, we will drop the assumption of perfect certainty, thereby allowing for a structure of differing asset yields. We will also relax the assumption of perfect markets to allow for the possibility that the rent received by a homeowner may be less than the rent paid by a tenant, the difference representing, for instance, the value of a management function. Although we no longer assume perfect rental markets, we do assume that there is some price at which each homeowner can rent shelter services equivalent to those provided by his own home, and some strictly positive price at which another consumer would be willing to rent his house. Under these conditions, the user cost measure can be redefined as

$$(3) \quad C_t = r_{et} E_t + r_{mt} M_t - A_t + Z_t$$

where  $M$  and  $E$  are mortgage and equity amounts which sum to the average price of housing ( $P$ ),  $r_m$  is the



mortgage interest rate, and  $r_e$  is the opportunity cost of equity capital.<sup>6</sup>

The relationship between user cost, defined in this manner, and the alternative rent measures defined above is now ambiguous, and depends critically on the manner in which the opportunity cost of equity capital is defined. Certainly, the rent paid by a tenant must be greater than or equal to that received by a landlord, but depending on the manner in which one chooses to define and estimate the opportunity cost of equity capital, the relationship between each of the rent measures and user cost is uncertain.

The variables included in the redefined user cost function are all conceptually and operationally straightforward with one crucial exception—the opportunity cost of equity capital. Unfortunately, estimates of user cost are also sensitive to alternative definitions of this variable. In 1980, Gillingham presented several somewhat “natural” alternatives for defining the opportunity cost of equity capital.<sup>7</sup> In 1972, he had suggested that  $r_e$  be estimated as an internal rate of return defined by the identity

$$(4) \quad R_t^L + A_t \equiv r_{et}E_t + r_{mt}M_t + Z_t$$

where  $R_t^L$  is an estimate of the market rental which an owner could receive for his house.<sup>8</sup> Alternatively, one might argue that the appropriate internal rate of return be defined by substituting  $R^T$  in equation (4). In either case, the resulting estimate of user cost, which we will call  $C_p$ , reduces to an implicit rent, and the following relationship holds:

$$(5) \quad R_t^L \leq C_p \leq R_t^T$$

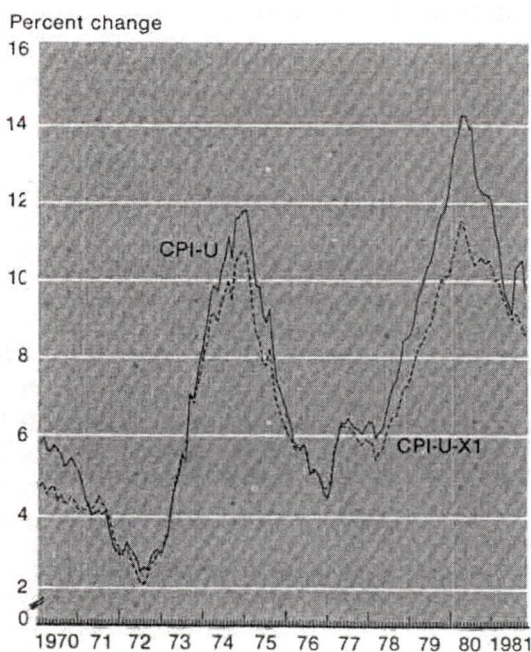
The suggestion to use an internal rate of return on housing to estimate user cost is based on the assumption that this rate best describes the alternative rate of return an owner/investor could receive on another investment with similar liquidity and risk characteristics.

That is, the household's user cost of owner-occupied housing or cost of *consuming* the flow of services from its housing unit must be at least as great as the income which the household could receive by renting the unit to someone else. This cost is independent of the capital gains achievable from holding housing assets, except insofar as such gains are reflected in rent levels. Each household determines its housing stock based on decisions regarding the expected rates of return on housing equity and other assets with varying characteristics. This determination is separate, however, from the decision as to the rate of consumption of housing services. Such factors as the rate of change in house prices determine the rate of return on equity, but *ex post* capital gains do not affect the user cost. In the same way, de-

fining  $r_e$  other than as the internal rate of return has the effect of incorrectly including in  $C$  some element of the investment return on housing investments. This result implies that rental equivalence measures are a necessary input into the development of acceptable user cost measures.

*Empirical implementation.* The foregoing discussion emphasizes the importance of explicit or implicit rental market information in developing conceptually sound user cost measures. It has been demonstrated that estimated user cost functions are subject to extreme volatility and that direct use of rental market information is a far more promising approach.<sup>9</sup> The basic question then becomes the appropriate design of a rental equivalence estimation procedure.<sup>10</sup> Over the past several years, the Bureau has produced an experimental rental equivalence index (CPI-U-X1) which simply uses the rent index to move a rental equivalence weight derived from the 1972–73 Consumer Expenditure Survey. Relative importances for this index are shown in table 1 and the rela-

**Chart 1. Changes in the Consumer Price Index for All Urban Consumers, official (CPI-U) and experimental rental equivalence (CPI-U-X1) measures, 1970-81**



NOTE: Percent changes are calculated using 12 months of unadjusted data.



tive movements of this index and the official index are displayed in chart 1. Although CPI-U-X1 gives a rough idea of how a rental equivalence index would move, the Bureau believes several procedural improvements are required before an official rental equivalence index is introduced. Following are the steps currently underway to improve the method of calculating the rental equivalence measure now used in the CPI-U-X1. This work will be completed in the latter part of 1982 and will be ready for introduction into the CPI-U with data for January 1983. (See exhibit 1.)

Specifically, three limitations of the current rental equivalence measure will be addressed. First, the sample of rental units now used will be reweighted so that it will represent owner-occupied housing units instead of renter-occupied units. The current sample of rental units was selected, with a probability-based technique, from the renter-occupied units in selected neighborhoods in each CPI pricing area. The rent survey neighborhoods were selected using, among other stratification variables, the percent of the neighborhood that was owner-occupied. By taking advantage of this element of the design of the rent survey, new weights can be assigned to the housing units in the sample so that they will represent the owner-occupied housing units in their neighborhoods, CPI areas, and, ultimately, all urban places in the United States. The reweighted rent sample can then be viewed as representing—under the rental equivalence concept—homeowner costs for all urban consumers in the United States.

Second, the expenditure weight for rental equivalence, which for the experimental index was calculated by means of a short-cut method, will be recalculated using the complex statistical estimating procedure used for weights in the official CPI. This enhancement will improve the quality of the national CPI's rental equivalence

weight, and will provide weights for computation of local area CPI using the rental equivalence approach.

Finally, the data processing system which produces the CPI each month will be expanded to accommodate the calculation of a CPI-U, with complete item and geographic detail, which employs the rental equivalence approach.

Subject to resource availability, longer range plans for improving the rental equivalence measure include an augmentation of the sample of rental units. This new sampling will be concentrated in areas where the housing is predominantly owner-occupied in order to increase the proportion of rental units that have characteristics similar to owner-occupied units. In addition, improvements in the statistical estimating techniques for rental equivalence will also be developed.

THE DECISION TO CHANGE to a flow-of-services approach in measuring shelter costs for homeowners implies a major conceptual change for this component of the CPI. We believe the current approach is severely lacking in conceptual rationale, and that the proposed changes will be a great improvement. Much of the controversy over the change, however, has centered around the empirical question of which index will increase more rapidly over the next several years. As shown in chart 1, the rental equivalence index increased less rapidly over the past decade. However, this period has been marked by substantial activity in housing markets and widely fluctuating mortgage interest rates. It would be extremely difficult to predict relative future movements and, thus, the decision to change the index should be based on conceptual and operational adequacy, a subject on which we do have information, rather than on predictions of future movements in the indexes, a subject on which our information is extremely uncertain. □

#### —FOOTNOTES—

<sup>1</sup> This section paraphrases Commissioner Norwood's statement of Oct. 27, 1981, announcing that the CPI would be changed.

<sup>2</sup> This section is based on Walter Lane's, "The Costs of Homeownership," *Seller/Service*, September-October 1979.

<sup>3</sup> For a detailed discussion of these effects, see John Greenlees, "Sample Truncation in FHA Data: Implications for Home Purchase Indexes," Working Paper No. 113 and "Alternative Indexes of Home Purchase Prices, 1973-1978," Working Paper No. 114 (Bureau of Labor Statistics, 1981).

<sup>4</sup> Additional procedures exist for dealing with cells with inadequate sample sizes.

<sup>5</sup> For a detailed discussion, see Robert Gillingham, "Estimating the user cost of owner-occupied housing," *Monthly Labor Review*, February 1980, pp. 31-35.

<sup>6</sup> Robert Gillingham, "A Conceptual Framework for the Revised Consumer Price Index," *Proceedings*, Business and Economics Statistics Section, American Statistical Association, 1974, pp. 246-52.

<sup>7</sup> Gillingham, "Estimating the user cost."

<sup>8</sup> Robert Gillingham, "Measurement in the Consumer Price Index of the Cost of Shelter for Homeowners," Bureau of Labor Statistics, June 1972.

<sup>9</sup> Robert Gillingham, "Measuring the Cost of Shelter for Homeowners: Theoretical and Empirical Considerations," Working Paper No. 122 (Bureau of Labor Statistics, 1981).

<sup>10</sup> *Ibid.* Gillingham produces experimental rental equivalence indexes using a very different set of procedures unsuited for use in the CPI. The results, however, give no evidence that a reasonable rental equivalence measure would be excessively difficult to produce.



February 16, 2006

## Economic Scene

# A Way to Cut Fuel Consumption That Everyone Likes, Except the Politicians

By ROBERT H. FRANK

SUPPOSE a politician promised to reveal the details of a simple proposal that would, if adopted, produce hundreds of billions of dollars in savings for American consumers, significant reductions in traffic congestion, major improvements in urban air quality, large reductions in greenhouse gas emissions, and substantially reduced dependence on Middle East oil. The politician also promised that the plan would require no net cash outlays from American families, no additional regulations and no expansion of the bureaucracy.

As economists often remind their students, if something sounds too good to be true, it probably is. So this politician's announcement would almost surely be greeted skeptically. Yet a policy that would deliver precisely the outcomes described could be enacted by Congress tomorrow — namely, a \$2-a-gallon tax on gasoline whose proceeds were refunded to American families in reduced payroll taxes.

Proposals of this sort have been advanced frequently in recent years by both liberal and conservative economists. Invariably, however, pundits are quick to dismiss these proposals as "politically unthinkable."

But if higher gasoline taxes would make everyone better off, why are they unthinkable? Part of the answer is suggested by the fate of the first serious proposal to employ gasoline taxes to reduce America's dependence on Middle East oil. The year was 1979 and the country was still reeling from the second of two oil embargoes. To encourage conservation, President Jimmy Carter proposed a steep tax on gasoline, with the proceeds to be refunded in the form of lower payroll taxes.

Mr. Carter's opponents mounted a rhetorically brilliant attack on his proposal, arguing that because consumers would get back every cent they paid in gasoline taxes, they could, and would, buy just as much gasoline as before. Many found this argument compelling, and in the end, President Carter's proposal won just 35 votes in the House of Representatives.

or was it  
oil money?

The experience appears to have left an indelible imprint on political decision makers. To



this day, many seem persuaded that tax-cum-rebate proposals do not make economic sense. But it is the argument advanced by Mr. Carter's critics that makes no sense. It betrays a fundamental misunderstanding of how such a program would alter people's opportunities and incentives.

Some examples help to illustrate how the program would work. On average, a family of four currently consumes almost 2,000 gallons of gasoline annually. If all families continued to consume gasoline at the same rate after the imposition of a \$2-a-gallon gasoline tax, the average family would pay \$4,000 in additional gasoline taxes annually. A representative family with two earners would then receive an annual payroll tax refund of \$4,000. So, if all other families continued to buy as much gasoline as before, then, this family's tax rebate would enable it to do so as well, just as Mr. Carter's critics claimed.

But that is not how things would play out. Suppose, for example, that the family was about to replace its aging Ford Explorer, which gets 15 miles per gallon. It could buy another Explorer. Or it could buy Ford's new Focus wagon, which has almost as much cargo capacity and gets more than 30 miles per gallon. The latter choice would save a whopping \$2,000 annually at the pump. Not all families would switch, of course, but many would.

From the experience of the 1970's, we know that consumers respond to higher gasoline prices not just by buying more efficient cars, but also by taking fewer trips, forming carpools and moving closer to work. If families overall bought half as much gasoline as before, the rebate would be not \$2,000 per earner, but only \$1,000. In that case, our representative two-earner family could not buy just as much gasoline as before unless it spent \$2,000 less on everything else. So, contrary to Mr. Carter's critics, the tax-cum-rebate program would profoundly alter not only our incentives but also our opportunities.

A second barrier to the adoption of higher gasoline taxes has been the endless insistence by proponents of smaller government that all taxes are bad. Vice President Dick Cheney, for example, has opposed higher gasoline taxes as inconsistent with the administration's belief that prices should be set by market forces. But as even the most enthusiastic free-market economists concede, current gasoline prices are far too low, because they fail to reflect the environmental and foreign policy costs associated with gasoline consumption. Government would actually be smaller, and we would all be more prosperous, if not for the problems caused by what President Bush has called our addiction to oil.

At today's price of about \$2.50 a gallon, a \$2-a-gallon tax would raise prices by about 80 percent (leaving them still more than \$1 a gallon below price levels in Europe). Evidence suggests that an increase of that magnitude would reduce consumption by more than 15 percent in the short run and almost 60 percent in the long run. These savings would be just the beginning, because higher prices would also intensify the race to bring new fuel-efficient technologies to market.

The gasoline tax-cum-rebate proposal enjoys extremely broad support. Liberals favor it. Environmentalists favor it. The conservative Nobel laureate Gary S. Becker has endorsed



it, as has the antitax crusader Grover Norquist. President Bush's former chief economist, N. Gregory Mankiw, has advanced it repeatedly.

In the warmer weather they will have inherited from us a century from now, perspiring historians will struggle to explain why this proposal was once considered politically unthinkable.

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