

Prices for Digital Access Services

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and Consumer Inflation Statistics in the Digital Age
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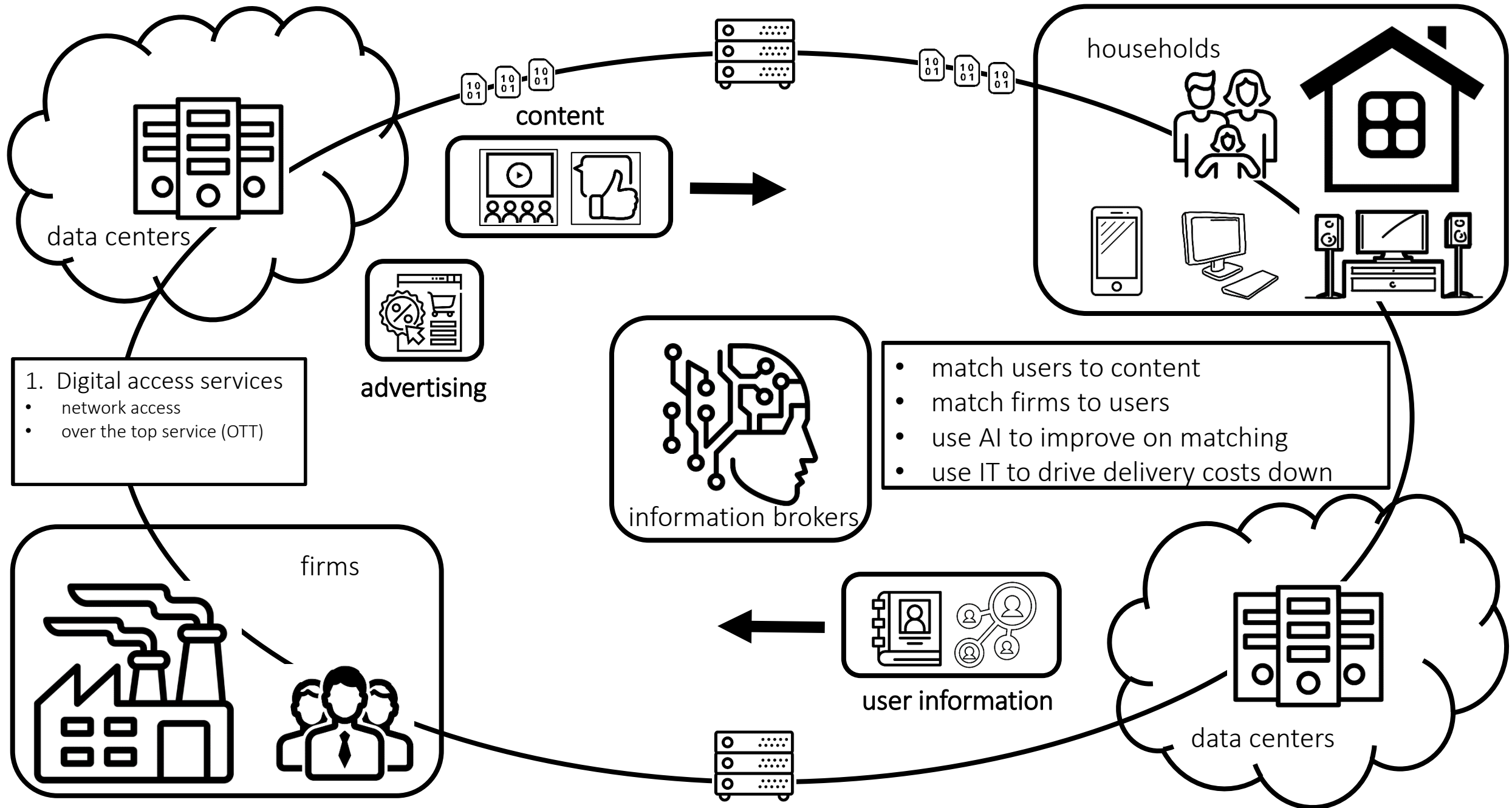
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Agenda

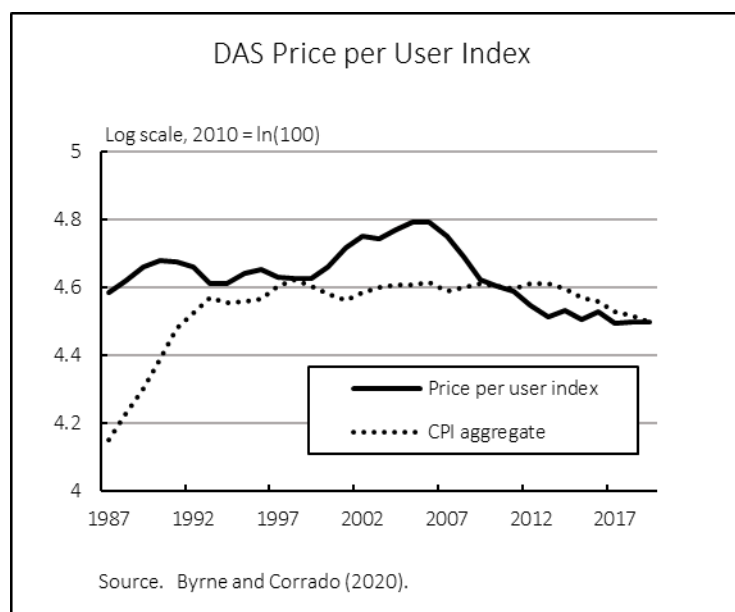
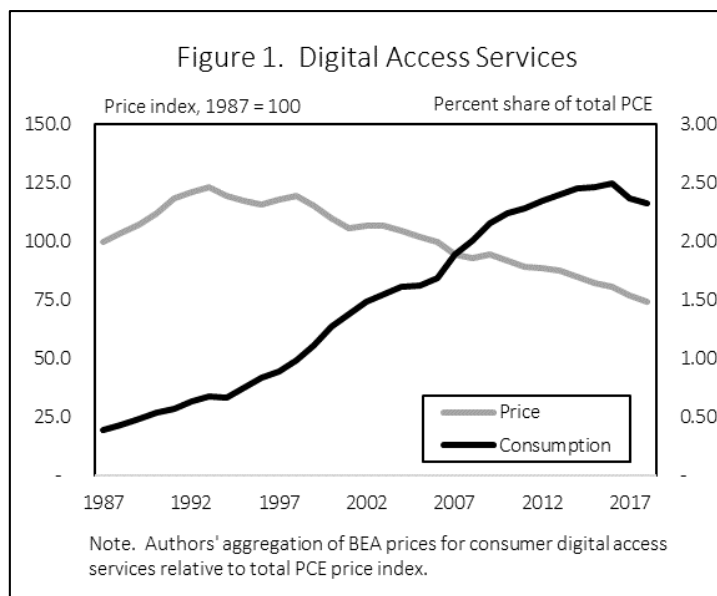
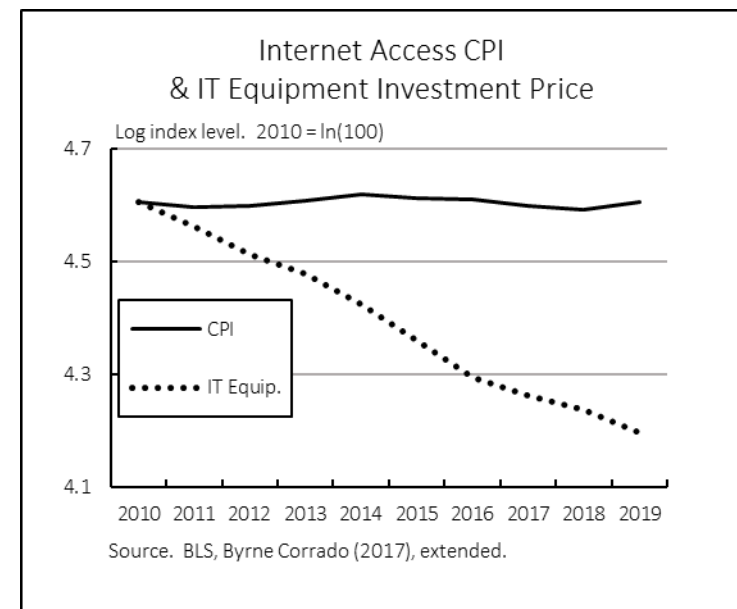
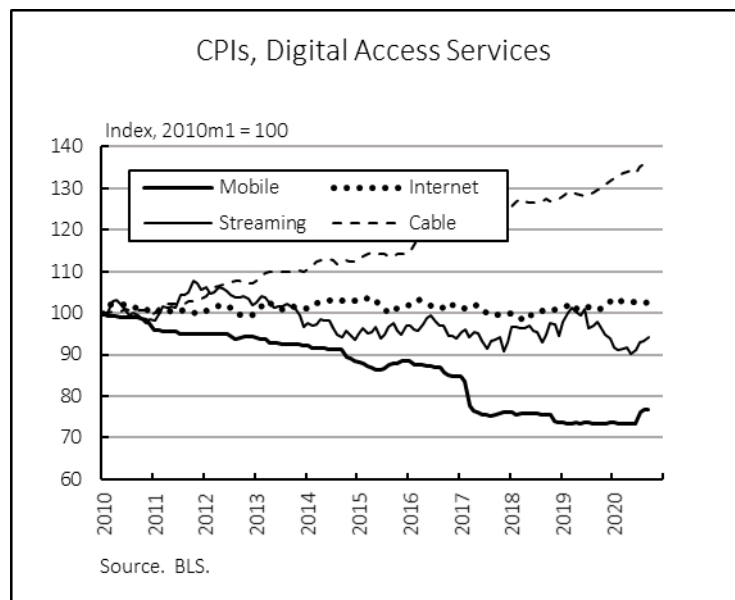
1. Digital access services (DAS)
2. CPIs for DAS & three “sniff tests”
3. DAS CPI construction
4. Alternative approach

Implications & Open questions



2. CPIs & three “sniff tests”

- Input cost trends
- Consumption shares
- Naive unit values

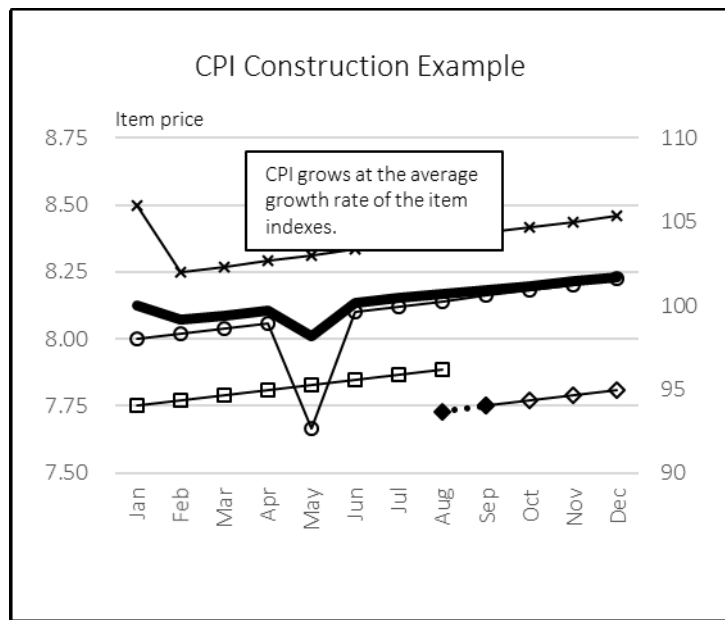


Takeaways

- Tension between slow decline in CPI and IT investment prices.
- Slow decline in CPIs inconsistent with the rapid rise in PCE share?
- Naive unit value indexes with contract prices match the CPI trend.

3. DAS CPI construction

- Standard CPI approach
- Hedonic adjustment
- The flat price puzzle



Standard CPI Approach

- Equal-weight geometric mean of price changes (Jevons)

$$I_t = 100 * \prod_{\tau=1}^t \exp\left\{\frac{1}{n_\tau} \sum_{i=1}^{n_\tau} [\ln(p_{i,\tau}) - \ln(p_{i,\tau-1})]\right\}$$

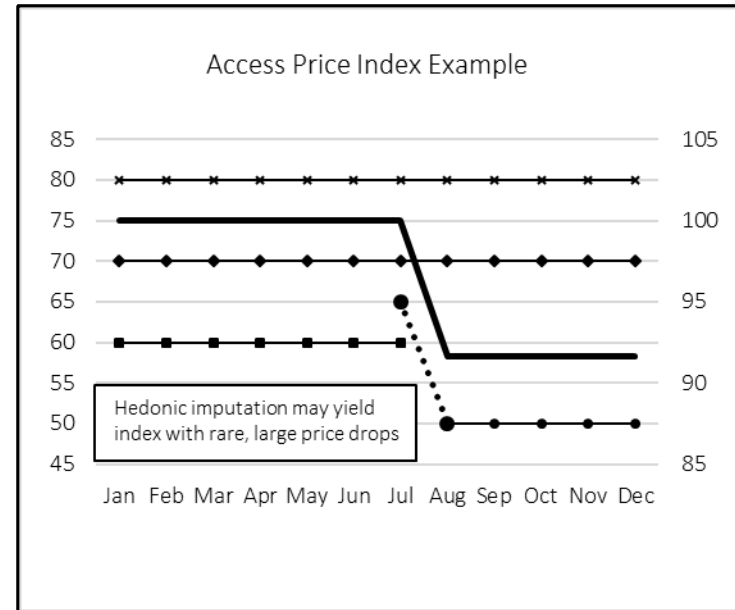
- Item price change on entry typically imputed with the class mean approach, i.e. prevailing price change

Hedonic adjustment

- Cross-sectional hedonic regressions are used to impute pre-entry prices
- For item 0 appearing in period $t+1$, use regression results from period t .

$$\ln(p_{i,t}) = \alpha_t + \beta_t X_{i,t}$$

$$\hat{p}_{0,t} = \exp\{\alpha_t + \beta_t X_{0,t}\}$$

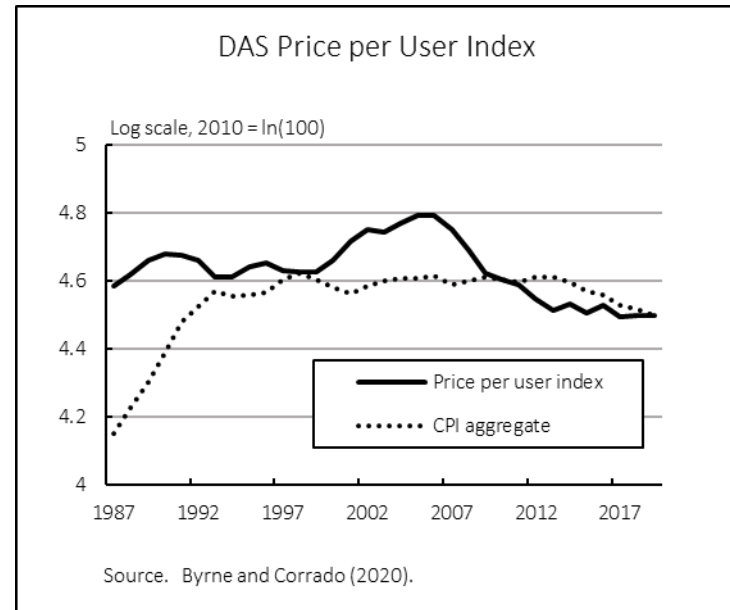


Takeaways

- Flat item prices yield flat indexes regardless of index formula.
- Quality change only captured when new items enter—pressure on analyst judgement.
- With infrequent item turnover, index will be choppy.
- Think outside the box?

4. Alternative approach

- unit value approach
- rethinking units



Are Contracts the Right Units?

- Is consumption the same whether you use your phone or not?
- Does this mirror our concept of production in the industry?
- Internet: analogy to the USPS.
- OTT quality is more nuanced.
 - Programming library
 - Quality of matching (AI)

Table X. Measures of Volume for Digital Access Services

Service	Type	Volume Indicator
Internet	Commodity	Data traffic.
Mobile	Commodity	Data traffic (smartphone); talk time (feature phone)
Cable Television	Differentiated	Programs viewed, weighted by log of channels available. (Derived from hours.)
Streaming	Differentiated	Programs viewed, weighted by log of programs available. (Derived from hours.)

Table 2. Consumer Digital Access Service Price Indexes

	Internet	Streaming	Mobile	Cable	Total
<u>Alternative</u>					
1988-2018	-35.7	NA	-20.1	0.6	-11.9
1988-1997	-43.8	NA	3.3	0.5	-1.7
1998-2007	-41.3	NA	-20.2	0.2	-13.1
2008-2019	-22.8	-19.9	-41.2	1.0	-20.0
2020H1	-55.4	-162.7	-20.6	1.0	-34.5
<u>Official</u>					
1988-2018	-2.2	NA	-3.7	4.3	1.2
1988-1997	-4.6	NA	-2.1	6.2	4.5
1998-2007	-2.7	NA	-4.7	4.3	-0.2
2008-2019	0.4	1.8	-4.4	2.6	-0.6
2020H1	2.4	-5.2	4.9	4.2	2.8

Source: Bureau of Economic Analysis and authors' estimates.

Takeaways

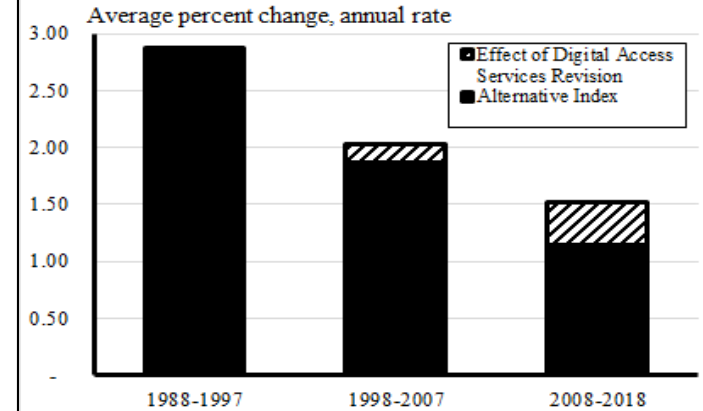
- Simple product structure and
- Unit values based on volume
- Gives a markedly different picture for digital access services.
- Prices fall far faster.

Implications & Open Questions

Implications of the Approach

- Larger step down in inflation, more difficult to achieve policy target
- Greater PCE, including a COVID effect
- Partly the impact of “free stuff”

Figure 4. PCE Inflation



Source. Bureau of Economic Analysis; authors' calculations.
Note. Alternative index is aggregate of authors' index for digital access services and official prices for other items.

Open questions

- Is the product structure granular enough?
- What about the fixed value of access (i.e. the value of a contract)?
- Is the data needed consistently available at high frequency?

- Are we counting household production because we are measuring hours of viewing programming?
- No. We're the number of programs streamed, which are an input into home production of entertainment.
- These are conceptually like exports to an external sector – the household.

- Should we measure houses, motor vehicles, lawn mowers this way?
- One could, if the durable good producing the service were capitalized.
- But, note that secular trends in use intensity for access services are supported by ongoing rapid technical change.

*“Dans ses écrits, un sage Italien
Dit que le mieux est l’ennemi du bien.”
-- Voltaire*

Reference list

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