What Really Happened to Consumption Inequality in the United States?

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Inequality in the U.S. since 1980

- There exists a large literature studying the dynamics of inequality in the U.S. during the 80s and 90s
- Most research focuses on wage or income inequality
- There is broad agreement among economists that income and wage inequality rose sharply in the early 80s, then continued to rise modestly through the 80s and 90s
- The dynamics of consumption inequality are much less studied and much less agreed upon
Evolution of Income Inequality

Figure 13: From disposable income to consumption (CEX)
Focus on Consumption Inequality

Why are the dynamics of consumption inequality important?

- Consumption is a better indicator of welfare than income
- Measures of consumption reflect income insurance
- Dynamics of consumption inequality yield information on history of agent welfare
Research Question

Has consumption inequality mirrored the rise in income inequality in the U.S. since the 1980s?

- Economists are divided over the answer
- For example, Slesnick (2001) and Kruger and Perri (2006) say consumption inequality was essentially flat
- Among others, Cutler and Katz (1991) and Aguiar and Bils (2009) say consumption inequality rose significantly
Source of Dispute

The main reason for disparate estimates is differing use of the Consumer Expenditure Survey (CEX) data.

- The CEX is collected mainly to compute weights of the CPI, not to study consumption inequality
- There are two completely separate surveys to accomplish this: the Interview Survey (IS) and the Diary Survey (DS)
- The BLS believes some items are better measured in retrospective interviews and others by daily diary entries
- Different surveys provide very different consumption inequality dynamics
Paper Contribution

The authors provide a *unified* picture of the dynamics of consumption inequality in the U.S. between 1986 and 2001.

- The key is to use the information that some items are better measured in the IS and some in the DS
- Using assumptions on the nature of measurement error in the two surveys, they combine data from the IS and DS
- They find consumption inequality increased more than indicated by the IS, but less than that indicated by the DS
The DS and IS consist of two separate and independent samples of households representative of the same population.

- The IS is a rotating panel of $\approx 5,000$ consumer units (CUs) each quarter
- In the IS, each CU is asked to report data for the previous quarter for 4 consecutive quarters
- The DS is a repeated cross section of $\approx 4,500$ CUs collecting data over 2 weeks
- Both surveys are exhaustive of all consumer expenditures
Consumption Inequality Dynamics: Separate Surveys

The levels and trends of consumption inequality are very different between the IS and DS (flat in IS, rising in DS).

![Graph showing consumption inequality dynamics](image)
Consumption Mean Dynamics: Separate Surveys

The disparity in inequality dynamics is even more puzzling because the means evolve similarly across surveys.

![Graph showing the mean of log monthly expenditure on nondurable goods (2001 dollars) for interview data and diary data.](image)
BLS Good Notation

When computing aggregate statistics, the BLS uses info from the IS for more durable and less frequently purchased goods and uses the DS for more frequently purchased goods.

- Let $D$ denote goods better measured in the DS
- Let $C_D$ denote expenditures on D goods
- Let $R$ denote goods better measured in the IS
- Let $C_R$ denote expenditures on R goods
Variance in $D$ goods

The squared coefficient of variation increases in both surveys.
Variance in $R$ goods

The squared coefficient of variation increases slightly in the DS and is flat in the IS after 1990.
Combining DS and IS

Standard Data Prep

- Convert household consumption to individual levels using an adult equivalency scale
- Deflate data by CPI
- Seasonally correct data
- Trim outliers
- Use population weights
Consumption Accounting: Variable Definitions

CUs are either in DS or IS, but buy both D and R goods.

- Let $C^*$ be true total ND expenditures
- Let $C^d$ be total ND expenditures reported in DS
- Let $C^r$ be total ND expenditures reported in IS

\[
C^* = C^*_D + C^*_R \\
C^d = C^d_D + C^d_R \\
C^r = C^r_D + C^r_R
\]
Variable of Interest

Estimation focuses on the coefficient of variation squared.

\[ CV(C^*)^2 = \frac{\text{var}(C^*)}{E[C^*]^2} = \frac{\text{var}(C^*_D) + \text{var}(C^*_R) + \text{cov}(C^*_D, C^*_R)}{[E(C^*_D) + E(C^*_R)]^2} \]

- If \( C^* \sim LN \), then
  \[ \text{var}(\ln C^*) = \ln \left( \frac{\text{var}(C^*)}{E[C^*]^2} + 1 \right) \]
- Otherwise, \( CV(C^*)^2 \) is a good approximation to \( \text{var}(\ln C^*) \)
From $C^*$ to $C^d, C^r$: Measurement Error

Motivated by BLS methodology, assume the extreme:

$$C^d_D = C^*_D$$
$$C^r_R = C^*_R$$

then

$$v^d_R : = C^d - C^*$$
$$v^r_D : = C^r - C^*$$

i.e., there is no measurement error in “well measured” goods

- Identifies $E[C^*], \text{var}(C^*_D),$ and $\text{var}(C^*_R)$
- Need to identify $\text{cov}(C^*_D, C^*_R)$
Combining DS and IS

Identification

Combined with ME assumption, simple algebra reveals the following sufficient identification condition:

\[ \Delta \text{cov}(C^d_D, C^d_R) = \Delta \text{cov}(C^r_D, C^r_R) = 0 \]

i.e.,

\[ \Delta \text{cov}(C^*_R, v^r_D) = \Delta \text{cov}(C^*_D, v^d_R) = 0 \]

Note: Only the changes are identified, not the level.
Estimates of $CV(C^*)^2$: DS vs. IS

Need info on $cov(C_D, C_R)$. Can use IS or DS.

- DS yields larger increase than IS.

![Graph showing inequality growth using observed covariances](image)
Combining DS and IS Estimates

Let $\hat{\theta}_R$ and $\hat{\theta}_D$ be estimates of $CV(C^*)^2$ using IS and DS, respectively.

$$\hat{\theta} = \alpha \hat{\theta}_R + (1 - \alpha) \hat{\theta}_D$$

where,

$$\alpha_t = \arg \min var(\hat{\theta}_t)$$

Minimization yields:

$$\alpha = \frac{cov(\hat{\theta}_D, \hat{\theta}_D - \hat{\theta}_R)}{var(\hat{\theta}_D - \hat{\theta}_R)}$$
United Estimates: $\hat{\theta}$

For 1990 to 2000: $\Delta \hat{\theta} = 5.4\%, \Delta DS = 8\%, \Delta IS = 0\%$,
This paper helps us understand the sources of division in the field and suggests a way to bridge the gap.

- Show the differences in IS vs. DS and R vs. D goods
- Propose a methodology for combining IS and DS data
- Provide a first pass at a unified measure of the increase in consumption inequality
**Table 17.2 Commodity Split**

<table>
<thead>
<tr>
<th>Commodities better measured in the Diary Survey: $D$ goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and nonalcoholic beverages at home</td>
</tr>
<tr>
<td>Food and nonalcoholic beverages away from home</td>
</tr>
<tr>
<td>Alcoholic beverages (at home and away from home)</td>
</tr>
<tr>
<td>Nondurable goods and services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commodities better measured in the Interview Survey: $R$ goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing and public services</td>
</tr>
<tr>
<td>Tobacco and smoking accessories</td>
</tr>
<tr>
<td>Clothing, footwear, and services</td>
</tr>
<tr>
<td>Heating fuel, light, and power</td>
</tr>
<tr>
<td>Transportation (including gasoline)</td>
</tr>
</tbody>
</table>
Potential Sources of Differences

- Changes in survey methodology
- Increase in zeros in the DS
- Time varying response accuracy
- Survey nonresponse
- Changes in sample compositions
CEX Aggregation Caveat

There are large discrepancies between CEX aggregations and NIPA data, in levels and in trends.

Fig. 17.2  Nondurable expenditures in 2000 dollars—Consumer Expenditure Survey (CEX) and Personal Consumption Expenditures (PCE)