

# Estimating Expenditures Without Expenditure Data

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December 1, 2011

# Why Is This Paper In This Conference?

General principle of scientific method:

- Study same question using as many different tools as possible
- There's only one reality
- $\Rightarrow$  Where tools overlap they should agree

Methodology of economists is too often:

- Use one source of data and one theory
- Ignore everything we know from any other source

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# Impossible to measure every last expenditure

When would undermeasurement NOT be a problem:

- Every HH of type  $k$  underreports  $c$  by same proportion
- We know what that proportion is for all types  $k$

Then for some  $\Omega$  we could measure 'true'  $c$  from CE-measured  $\tilde{c}$ :

$$c_t^k = \Omega \tilde{c}_t^k$$

Obviously false. But a starting point.



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# Dynamic Budget Constraint

$$\underbrace{a_{t+1} - a_t}_{\text{Haig-Simons Saving}} = a_t r_{t+1} + y_{t+1} - c_{t+1}$$

where

- $a_t$  — Total net worth at end of period  $t$
- $r_{t+1}$  — Portfolio-weighted return between  $t$  and  $t + 1$
- $y_{t+1}$  — Noncapital income (labor, transfer, etc)
- $c_{t+1}$  — Total expenditures in period  $t + 1$

implies

$$c_{t+1} = a_t r_{t+1} + y_{t+1} - (a_{t+1} - a_t)$$

## Household balance sheet in $t$

- $a_t^j$  where  $j$  are asset categories (debt is negative asset),

$$a_t = \sum_{j=0}^n a_t^j$$

- $r_t^j$  (return *including capital gains/losses*) for the  $j$  categories

$$r_{t+1} \equiv \sum_{j=1}^n \overbrace{\left( \frac{a_t^j}{a_t} \right)}^{\equiv w_t^j} r_{t+1}^j$$

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# Annual Survey of Consumer Finances

Only item missing from DBC in the SCF:

- Idiosyncratic asset returns by asset class  $r_{t+1}^j$
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## 'Household Instability' Problem

What happens if HH  $i$  does not exist in  $t + 1$ ?

- Can't find them
- Won't agree to participate
- Divorce, death of one or both members
- Marriage, etc

We will punt:

- Focus on stable categories of HH's
- Period  $t$  sample: Middle-aged married couples
- Period  $t + 1$  sample: Middle-aged couples married for at least 3 years

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# What *Can* We Measure (in U.S.)?

*Survey of Consumer Finances* (every three years):

- $a_t$
- $y_t$

*Flow of Funds* (every quarter):

- $\bar{r}_t^j$  (bar means it's an average or aggregate number)

*NIPA Accounts*

- Aggregate consumption growth  $\chi_{t+1} \equiv C_{t+1}/C_t$

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# Method

- Assume growth rate of  $\bar{c}$  matches aggregate:

$$\bar{c}_{t+1}/\bar{c}_t = \chi_{t+1}$$

- Assume noncapital income growth between  $t$  and  $t + 3$  matches surveys:

$$\bar{y}_{s+1}/\bar{y}_s = (\bar{y}_{2007}/\bar{y}_{2004})^{1/3} \quad \forall s \in \{t, t + 2\}$$

- Alternative 1: Make annual growth match NIPA DPI
- Alternative 2: Use DPI growth for year-to-year, but SCF for endpoints
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Then we have

$$\begin{aligned}\hat{a}_{t+1} &= \bar{a}_t (1 + \hat{r}_{t+1}) + \hat{y}_{t+1} - \bar{c}_{t+1} \\ \hat{a}_{t+2} &= \hat{a}_{t+1}(1 + \hat{r}_{t+2}) + \hat{y}_{t+2} - \chi \bar{c}_{t+1} \\ \hat{a}_{t+3} &= \hat{a}_{t+2}(1 + \hat{r}_{t+3}) + \hat{y}_{t+3} - \chi^2 \bar{c}_{t+1}\end{aligned}$$

but given the assumptions above, there will be a unique value of  $\bar{c}_{t+1}$  such that

$$\hat{a}_{t+3} = \bar{a}_{t+3}$$

which will be our estimate of spending,  $\hat{c}_{t+1}$ .

## Comparing to the CE

We are now in a position to compare the expenditures that (under our assumptions) satisfy the dynamic budget constraint with expenditures as measured by the CE survey over the corresponding period. Neglecting the role of interest rates, and using  $\tilde{c}$  for the measure of expenditures in the CE survey, we can calculate a ratio of 'SCF' expenditures to 'CE' expenditures directly as

$$\Omega = \left( \frac{\hat{c}_{t+1}(1 + \chi + \chi^2)}{\tilde{c}_{t+1} + \tilde{c}_{t+2} + \tilde{c}_{t+3}} \right) \quad (1)$$

which measures the scaling factor necessary to 'blow up' CE expenditures so that they are consistent with wealth accumulation as measured in the SCF.

## Almost There ...

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