"Price Trends over the Product Life Cycle and the Optimal Inflation Target," by Klaus Adam and Henning Weber

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[1]The views expressed here do not represent the views of the Federal Reserve Bank of Richmond or the Federal Reserve System.

Overview

1. One-slide summary of paper
2. Features of model than can make zero inflation suboptimal
3. Miscellaneous comments

- Micro price data from U.K.
  - prices of individual products tend to fall over product lifetime
  - differential price trends across items (terminology: many products per item)

- Calvo model with Z items (Cobb-Douglas agg.), Dixit-Stiglitz products for each item
  - random lifetime of a product (poisson)
  - productivity growth varies across items
  - productivity grows with product age
  - *quality* (demand-side) is constant with age, is higher for each entering cohort of products

- Optimal inflation:
  - want concentrate nominal price adjustment in new items; new items can choose price unconstrained, Calvo thereafter
  - calibration implies π^* between 2.6% and 3.2%

Deep Background

- In simplest sticky price models, zero inflation eliminates distortions associated with price stickiness
  - With zero inflation, no need for any prices to adjust, so price stickiness irrelevant
- Reasoning breaks down if there are multiple “objects” (goods, labor) whose relative price needs to change over time and whose nominal prices are sticky. For example:
  - Erceg, Henderson and Levin (2000): labor and single consumption aggregate
  - Benigno (2004): 2 regions with distinct consumption goods in a currency union
  - Huang and Liu (2005): final goods and intermediate goods
  - Wolman (2011): multiple consumption goods, trends in relative productivity

Immediate Background

- Adam and Weber (2019 *AER*), one-good Calvo model with 3 components to productivity:
  - aggregate (A)
  - factor that increases with age of product (Z)
  - factor that increases with cohort of product (Q)
- Optimal inflation concentrates price adj. in new cohorts, where it's "free," keeps product price constant with age
  - If productivity increases with age, but not cohort (Z grows, Q constant), inflation is optimal, because want relative price to decline with age
  - If productivity increases with cohort, but not age (Q grows, Z constant), deflation is optimal, want relative price to increase with age.
- Although optimal inflation not zero, with only one sticky-price "good" optimal inflation does eliminate distortions associated with price stickiness (like Aoki)

This paper

- Loosely, Wolman (2011) + Adam and Weber (2019)
  - Multiple items with trending relative productivity $\Longrightarrow$ relative price trends across items
  - Random product entry and exit within sectors
    - productivity increases with age
    - quality increases with cohort (slight change from prev. paper)
- Three reasons for nonzero inflation
  - item-level relative prices might need to change because of productivity differences
  - product-level relative prices might need to fall with age because of rising productivity with age
  - product-level relative prices might need to rise with age because of quality rising with cohort
- Optimal inflation balances these three considerations

Inflation or deflation?

- Productivity growth differs across items
  - If items with stickier prices have relative high (low) productivity growth, this favors inflation (deflation): let the other prices increase (decrease)
- Productivity increases with age
  - as in AW (2019), this favors inflation: let the new items' prices rise
- Quality increases with cohort
  - this favors deflation: let the new items' prices fall
- Optimal inflation balances these three considerations (elegant but complicated nonlinear equation on p. 26)

Optimal inflation

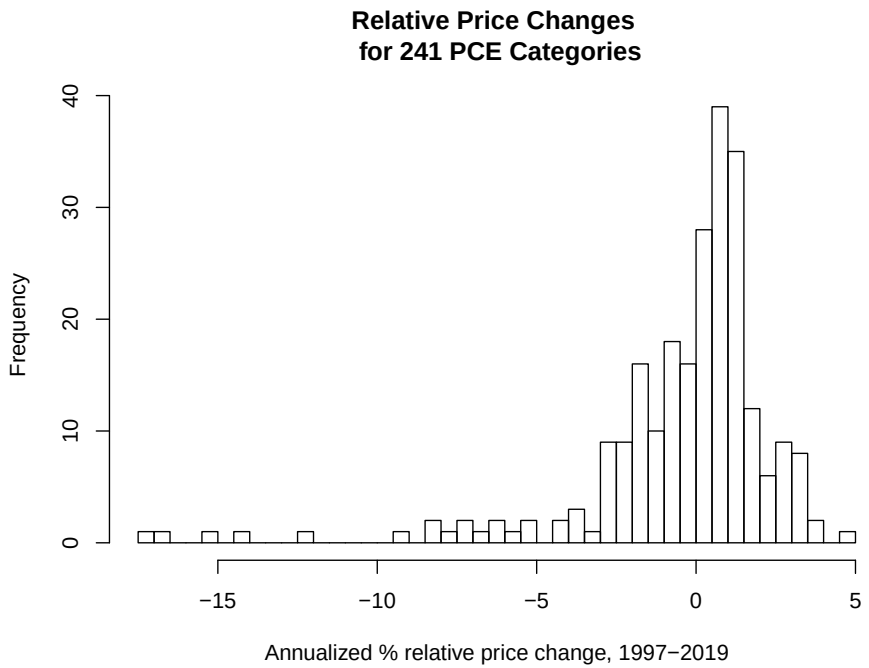
- Approximation:

$$\Pi^* = \sum_{z=1}^{Z} \overbrace{\psi_z}^{\text{CD weights}} \times \underbrace{\frac{\gamma_z^e}{\gamma^e}}_{\text{inv.rel. price trend (time)}} \times \overbrace{\frac{g_z}{q_z}}^{\text{inv.rel. price trend (age)}} + O(2)$$

  - notable that heterogeneity in price stickiness does not appear, whereas central in Wolman (2011)
  - however, note that the approximation is taken around a point without trends in item level relative prices...

Trends in item-level relative prices

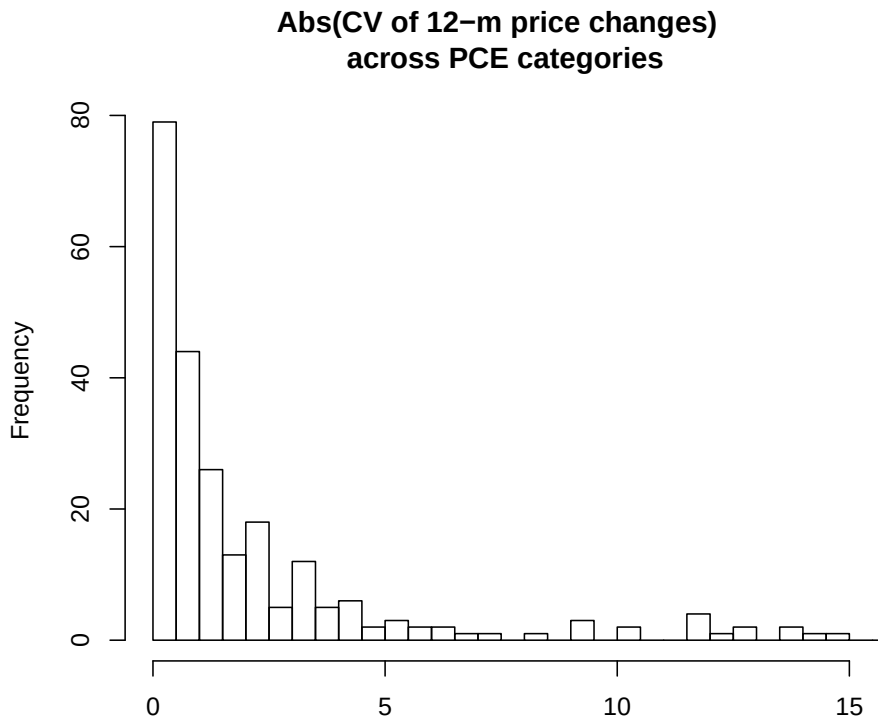
- Suggestive picture from U.S. PCE



- Variation in trends resurrects variation in price stickiness as relevant consideration for optimal inflation

Fluctuations around trends in item-level relative prices

- There are trends in category-level relative prices (previous picture), but also significant price-change variation around those trends. Histogram for absolute value of coefficient of variation of price changes:



Why care about the noise in relative price changes?

- The two pictures showed that there are trends in relative prices and volatility around those trends. For the optimal rate of inflation, only the trends matter (I think).
- HOWEVER, the presence of idiosyncratic fluctuations (in the paper, the ϵ variables) has implications for the welfare cost of suboptimal inflation:
  - ϵ represent reasons for desired price changes independent of trends.
  - to the extent that these factors dominate the trends in driving price adjustment behavior (figure 2 suggest so, at least in some sectors), then varying inflation rate may have small welfare implications
  - this is speculation, but authors can calculate welfare cost of deviating from Π^*

Concluding thoughts

- As a policy advisor, I will not YET be actively promoting this paper's findings and mechanisms to my superiors.
- As a researcher, I will definitely be promoting the paper.
  - It was a pleasure to read and it is an impressive accomplishment
  - The mechanisms it introduces (along with the authors' AER 2019) deserve further study.
  - The paper represents an excellent use of micro price data, as the mechanisms require micro data for 'identification.'