Measurement of Productivity in the Retail Sector

by

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Outline

1. Measurement of retail trade output using sales volume
2. Measurement of retail trade output using gross margin
3. Possible use of international input-output tables/data.

Not covered: Measurement of labor or capital input need to obtain productivity

1. Measurement of retail trade using sales volume

What deflator is used for sales?

- Might it be possible to use "big data" from e.g. the Billion Prices Project?

Problem: Aside from scanner data, big data may not have quantities

Solutions:

- Using debit and credit card transactions for consumption weights

Alberto Cavallo, 2020, "Inflation with COVID Consumption Baskets", Harvard Business School & NBER

He finds that retail sales have increased for food and related items and decreased for other items, with the result that *actual* inflation exceeds CPI inflation

- Using the exp[# of stores] selling an item to infer the total quantity sold

Alexis Antoniades, Robert Feenstra, Mingzhi Xu, 2020, "Using the Retail Distribution to Impute Expenditure Shares," UC Davis

2. Measurement of retail trade using gross margin

Robert Inklaar and Marcel Timmer, 2008, "Accounting for growth in Retail Trade: An International Productivity Comparison," *Journal of Productivity Analysis,* 29(1), 23-31

Marcel Timmer, Robert Inklaar and Bart van Ark, 2005, "Accounting for growth in Retail Trade: An International Productivity Comparison," *Monthly Labor Review,* 39-45.

- These authors demonstrate the feasibility of using the gross margin with double-deflation using the retail *sales* and *purchase* prices, where the latter is constructed from other sectoral and import prices
- They argue that the results obtained for 5 countries do not differ that much from using the two approaches, *up to a factor of proportionality*
- But this result depends on having *accurate* deflators for purchases!

Big Problem:

- Imported goods used within retailing
- Depreciation (appreciation) of foreign currencies will lower (raise) import prices by some (partial) amount, with a *smaller change* in the retail sales prices. So the sales and purchase deflators will have to be accurate for each industry (and firm) so as to avoid measuring a change in the gross margin (and therefore in retail productivity) from a change in exchange rates

Examples:

Tariff liberalization in India:

Penny Goldberg, Jan De Loecker, and Amit Khandelwal and Nina Pavcnik, 2016, Prices, Markups, and Trade Reform, *Econometrica*, 445-510.

- Firms in India lower prices in response to reductions in tariffs on outputs, but they *absorb* the reductions in tariffs on inputs into higher markups.

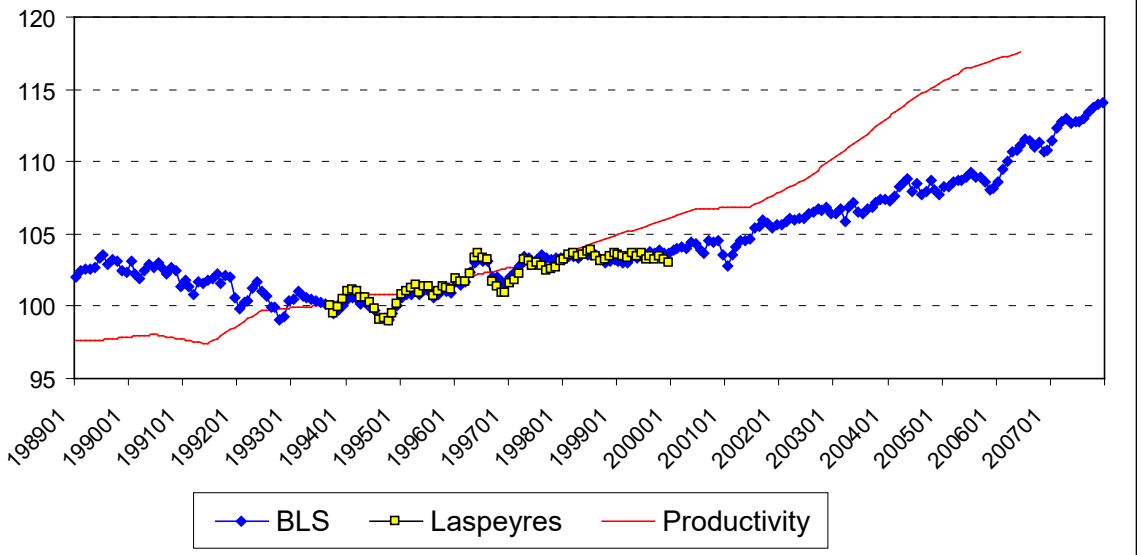
Tariff reductions in the United States (for high-tech goods):

Robert Feenstra, Benjamin Mandel, Marshall B. Reinsdorf, Matthew J. Slaughter, 2013, "Effects of Terms of Trade Gains and Tariff Changes on the Measurement of U.S. Productivity Growth," *AEJ: Economic Policy*, 59–93.

Argument:

1. Acceleration in U.S. productivity growth over 1995-2005, simultaneous with a major improvement in the U.S. terms of trade (Figure 1):

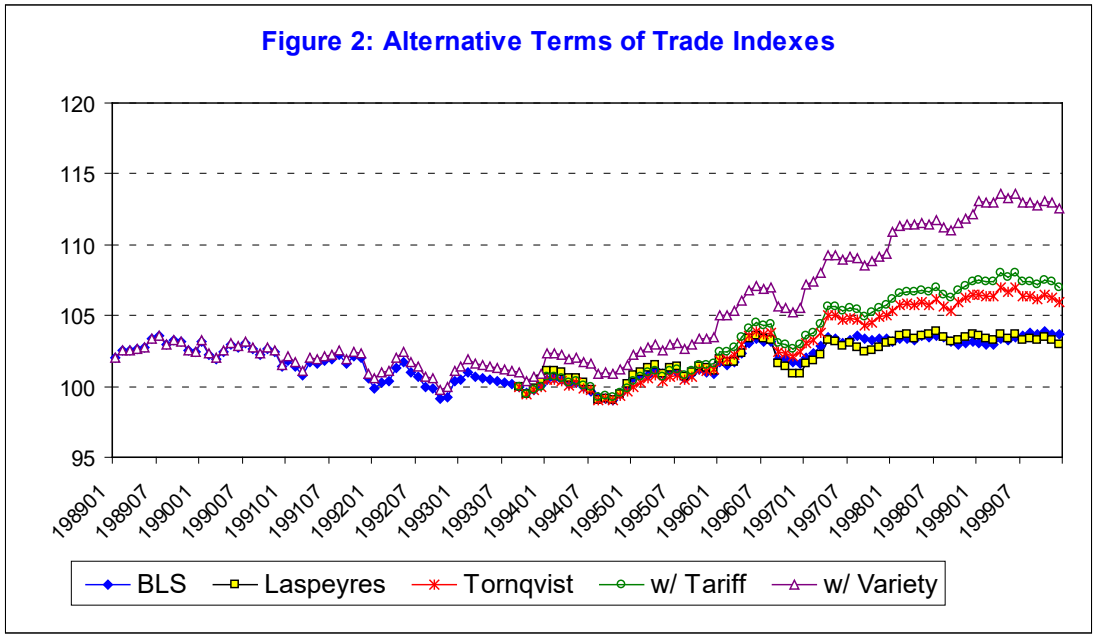
Figure 1: U.S. Terms of Trade and Productivity



2. Lower import prices for high-tech goods is due in part to the Information Technology Agreement (ITA) under the WTO, which was a multilateral elimination of tariffs for high-tech goods over 1997-1999.

3. But the terms of trade are likely mismeasured due to index number issues (that could be related to offshoring, for example).

4. The mismeasurement in the terms of trade spills over into productivity growth. If the improvement in the terms of trade is *understated*, then productivity is *overstated*. Sources of mismeasurement (Figure 2):



Conclusions:

- The growth rates of our alternative price indexes for U.S. ***imports*** are as much as 2% per year lower than the growth rate of indexes calculated using official methods.

- Because imports are subtracted from GDP, this slower growth of import prices corresponds to *faster* growth of the GDP deflator, which means *slower* growth of real GDP and lower productivity

- The U.S. terms-of-trade gain can account for close to 0.2 percentage point – or about 20% of the apparent increase – in productivity growth for the U.S. economy from 1995-2005.

- *A similar confusion between the change prices of imports as retail purchases and productivity growth in the retail sector could be obtained if the import prices are not measured accurately.*

3. Possible use of international input-output tables/data?

a) Penn World Table (PWT)

- The "next generation" avoids using nominal exchange rates to convert trade values into dollars, but instead computes PPP-exchange rates for imports and exports using *quality-adjusted* import and export unit-values.
- This procedure improves the measurement of real GDP across countries, but is too crude to accurately reflect the *changes* in import and export prices

b) World Input-Output Database (WIOD)

- World Input-Output Tables and underlying data, covering 43 countries, and ROW, for the period 2000-2014, with for 56 sectors on ISIC Rev. 4.
- *China and Hong Kong are merged into one entity* (so it is difficult to match nominal U.S. trade values to WIOD)
- *Import and export prices* are not available.