The Yen and Japan's Economy, 1985-2007

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The Yen, Policy, and Fluctuations (1)

- The yen's sharp appreciation after the 1985 Plaza Accord was associated with a growth slowdown in Japan.
- A desire to avoid renewed appreciation helped motivate a monetary stance in the latter 1980s that critics claim was too loose for too long, helping to generate bubbles (e.g., Ito and Mishkin 2006).

The Yen, Policy, and Fluctuations (2)

- After the bubble collapse, the yen appreciated sharply through mid-1995, coinciding with a sharp slowdown in economic growth.
- Since then, the yen has largely been on a depreciating trend (except perhaps recently), while real output growth has been low on average (relative to pre-1990) and extremely volatile.

Goals of this Paper

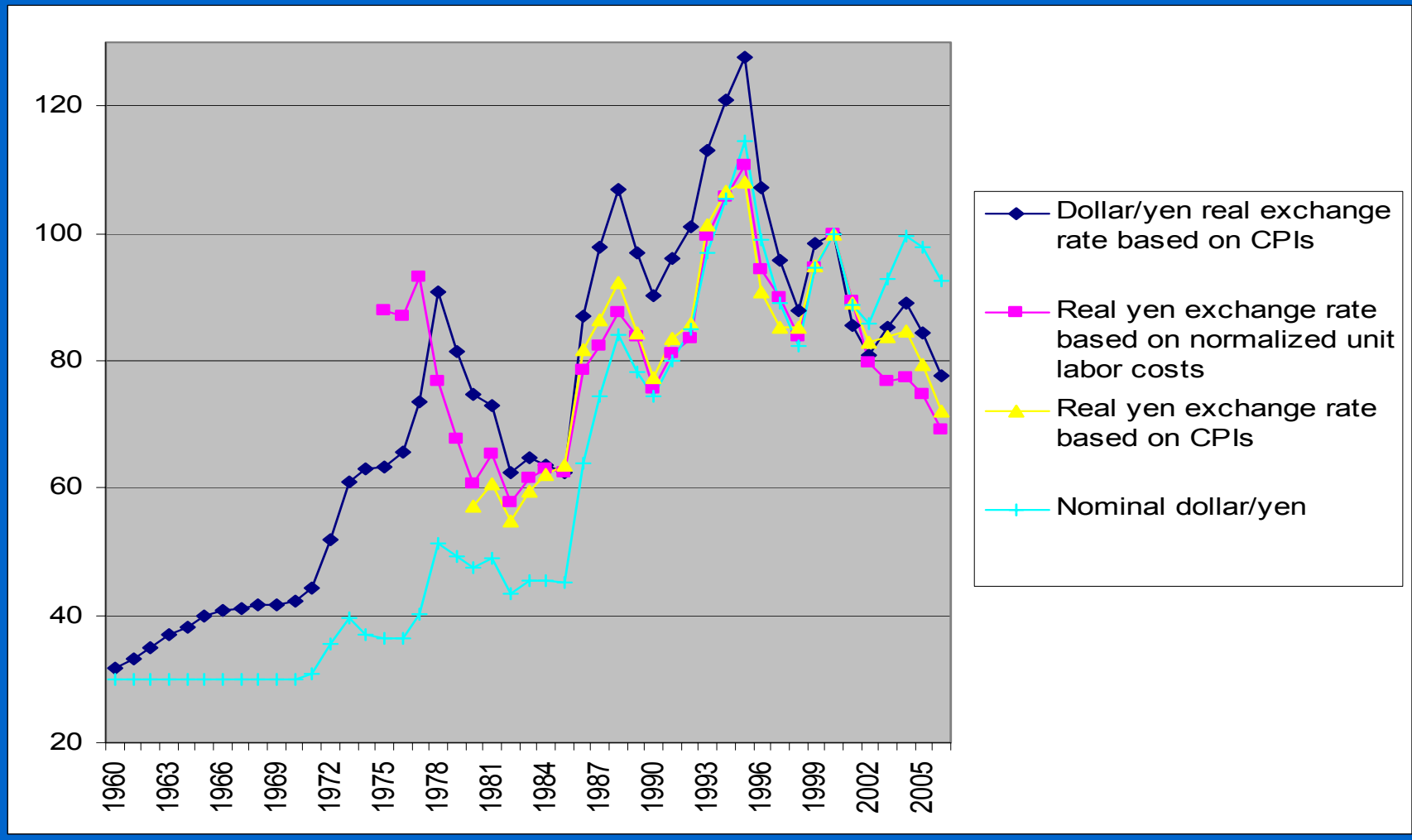
- To understand better the economic factors moving the yen's real exchange rate over the long-term in a general-equilibrium setting.
- Possibly to shed light on shorter-term moves.
- Puzzle: an apparent sharp contradiction of the Balassa-Samuelson theory, both in long-term and short-term data.
- What models explain these developments?

A Sampler of Tentative Hypotheses

- The yen's behavior is exogenous to the economy, driven by conflicts over trade (McKinnon and Ohno 1997).
- The yen reflects expected future growth.
- China's growth and trade success are key.
- Under a zero-interest rate policy the yen's nominal value is decoupled from current monetary conditions – only the (expected) future matters. Effect on short-term volatility?
- What role for current account fluctuations?

Yen Exchange Rates (1)

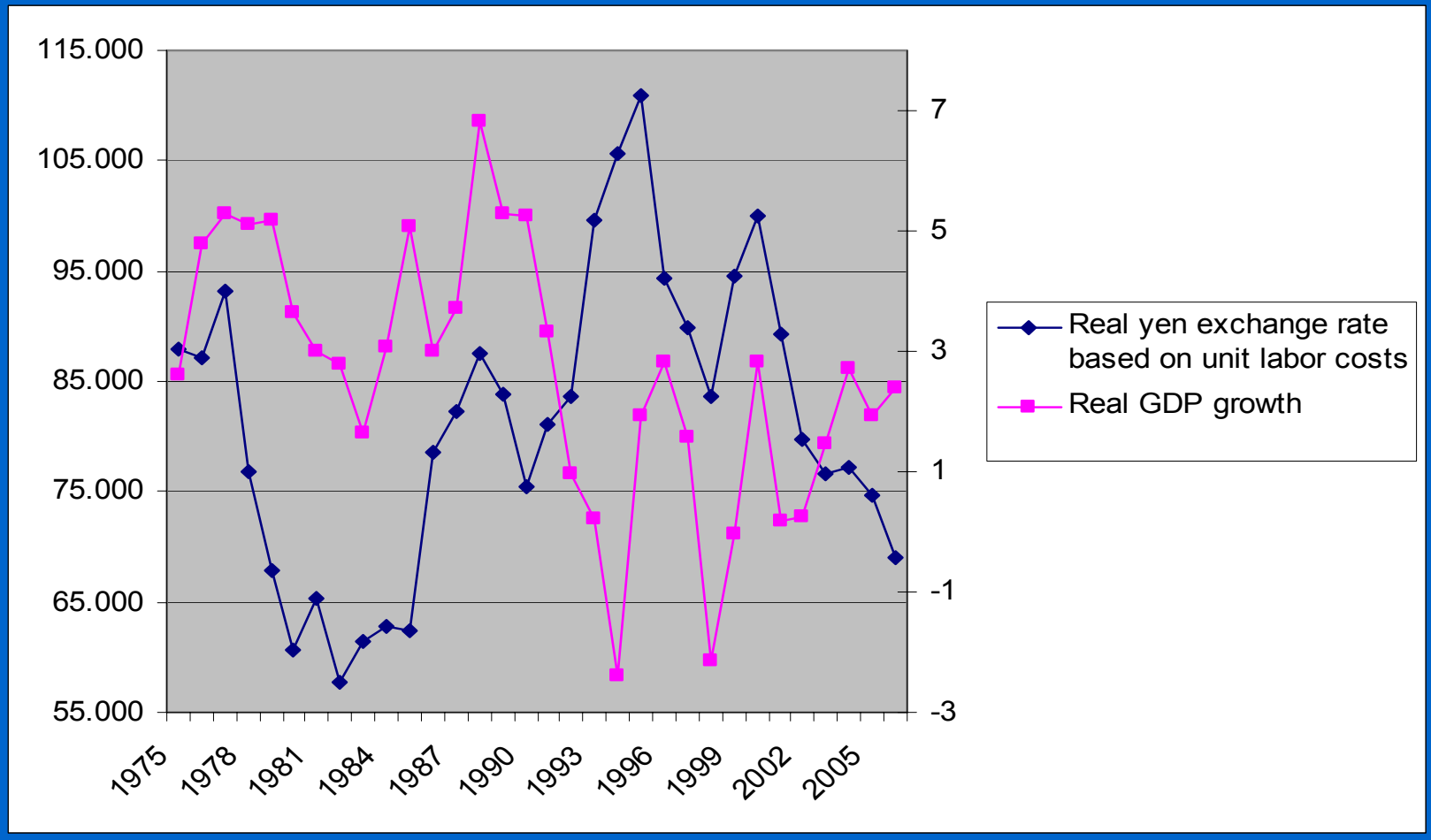
(2000 = 100)



Yen Exchange Rates (2)

- By 1985 (pre-Plaza) the real yen had returned to its 1960-72 trend line.
- The yen appreciated sharply through 1988 but then began to fall.
- Inflation accelerated, and monetary tightening commenced in 1989.
- But from 1990-95 the yen appreciated to unprecedented heights, notwithstanding the real economy's sharp slowdown. *A puzzle*.

Yen Exchange Rates (3)



Correlation = –0.32. Lower average growth after 1990 ….

Yen Exchange Rates (4)

- Since 1995 the historical real appreciation trend of the yen has dramatically reversed.
- The *nominal* $/¥ rate has shown relatively more stability, and less of a trend.
- But Japan, U.S. price levels have diverged.
- In early 2000s, nominal $/¥ rose (yen appreciated) even though real multilateral yen rate based on unit labor costs fell.

The Balassa-Samuelson Hypothesis

- Above I sketched a number of hypotheses about real exchange rate determination.
- Perhaps the leading theory of long-run movements is the Balassa-Samuelson view.
- If true it provides an anchor for expectations; if not, its failure may provide useful clues about exchange rate determination.
- So I start by focusing in Balassa-Samuelson, possibly broadening the investigation later.

Relative Productivities and Real Exchange Rates

- Balassa-Samuelson: difference-in-differences approach.
- Assume tradables prices equalized.
- CPI (GDP deflator) depends on tradables, nontradables prices.
- P_N/P_T higher when relative tradables productivity higher.
- Real exchange rate between countries depends on relative relative inter-sectoral productivity ratios.

Early Balassa-Samuelson Studies (1)

- Let q be the CPI real exchange rate. David Hsieh (1982) estimated for 1954-76 time series data (and log labor productivities)

$$q = \alpha\left(a_T - a_N\right) - \beta\left(a_T^* - a_N^*\right) + \left(w - s - w^* + a_T^* - a_T\right)$$

- This covered only a few years of floating rates. Were we to estimate over the floating rate era, only the third regressor would be significant.

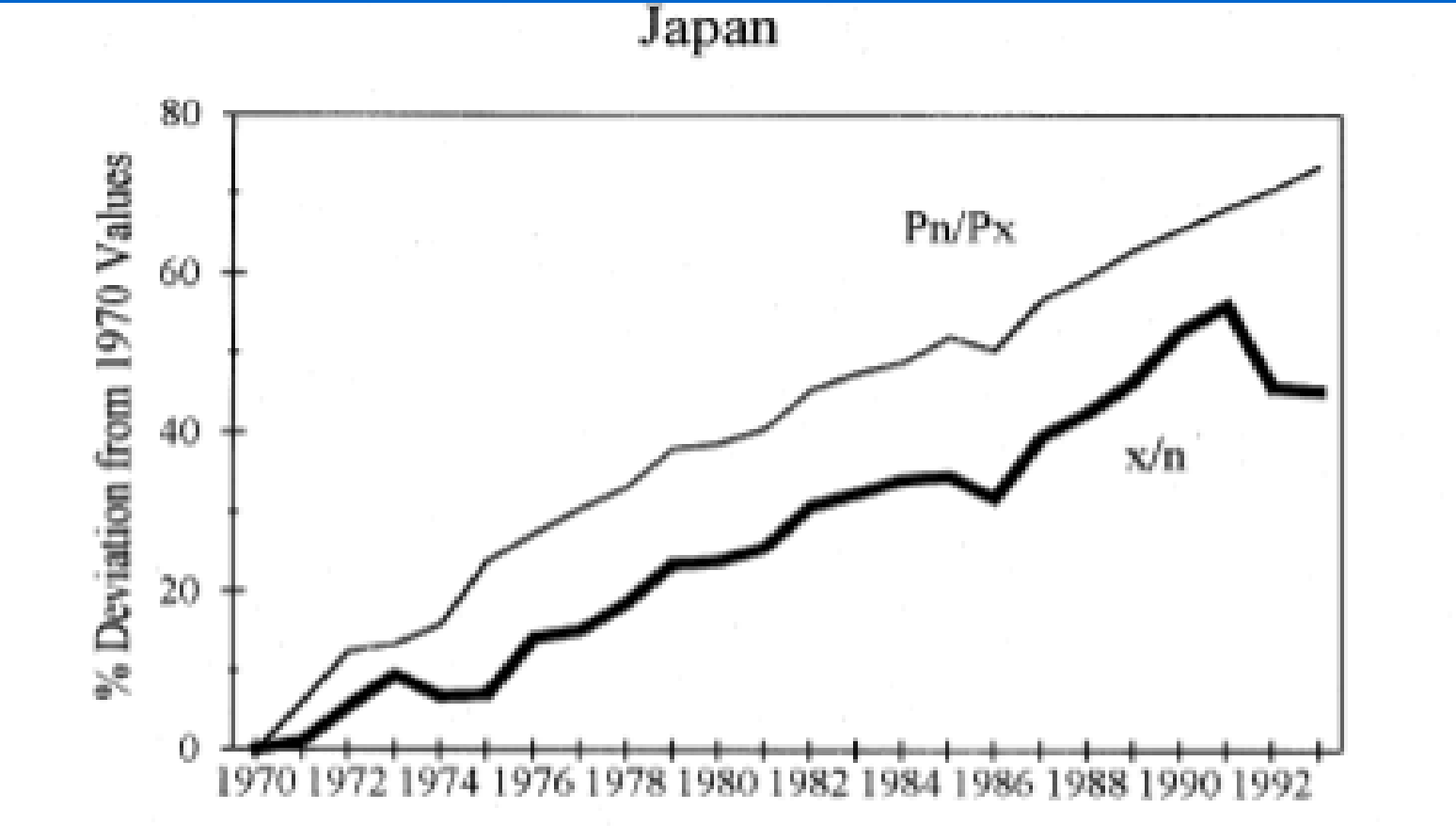
Early Balassa-Samuelson Studies (2)

- Marston (1987) conducted a detailed study of productivity growth in Japanese and U.S. tradables and nontradables, 1973-83.
- In the U.S., tradables productivity exceeded that in nontradables by 13.2 percent.
- In Japan the same cumulative differential was 73.2 percent.
- Japanese relative nontradables prices rose by 56.9 percent as opposed to only 12.3 percent in the U.S.
- The yen appreciated against the US$ in real terms.

Panel Study by Canzoneri et al. (1999)

- For OECD panel, relative labor productivities track relative prices.
- Exchange rates track relative tradables prices against DM, not dollar.
- Even in the individual case of Japan these results seems to hold (1970-1993).
- They displayed without comment an anomaly not present in their 1996 NBER version. (P_X = traded output price below.)

Early Evidence of an Anomaly?



Source: Canzoneri, Cumby, and Diba (1999).

Other Studies

- Asea and Mendoza (1994) find that while Balassa-Samuelson has some predictive power for the relative price of nontradables (using TFP as the productivity measure), it fails for the real exchange rate.
- Rogoff (1992) emphasizes the impact of sector-specificity of productive factors for the productivity/real exchange rate link.

Balassa-Samuelson in Asia

- Further multi-country studies indicate reasons for skepticism as far as the group of Asian countries is concerned:
  - Ito, Isard, and Symansky (1999)
  - Drine and Rault (2003)
  - Thomas and King (2004)

Labor Productivity or TFP Growth?

- Assume the sectoral production function:

$$Y = AK^{\alpha} L^{1-\alpha}$$

- Labor productivity growth is

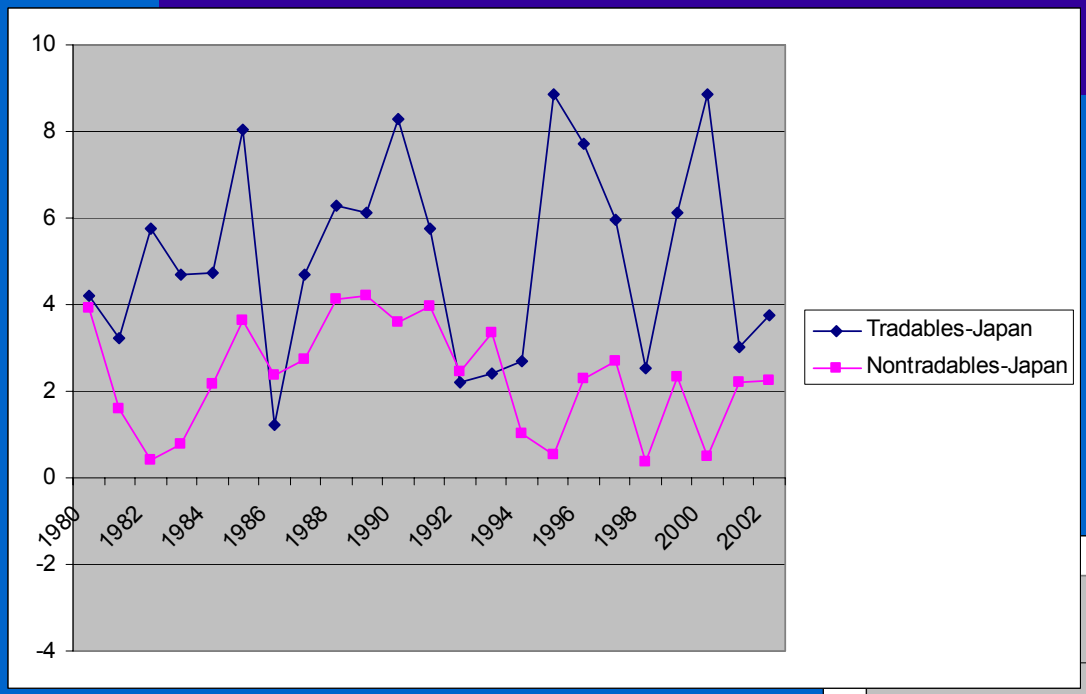
$$\hat{Y} - \hat{L} = \hat{A} + \alpha\left(\hat{K} - \hat{L}\right)$$

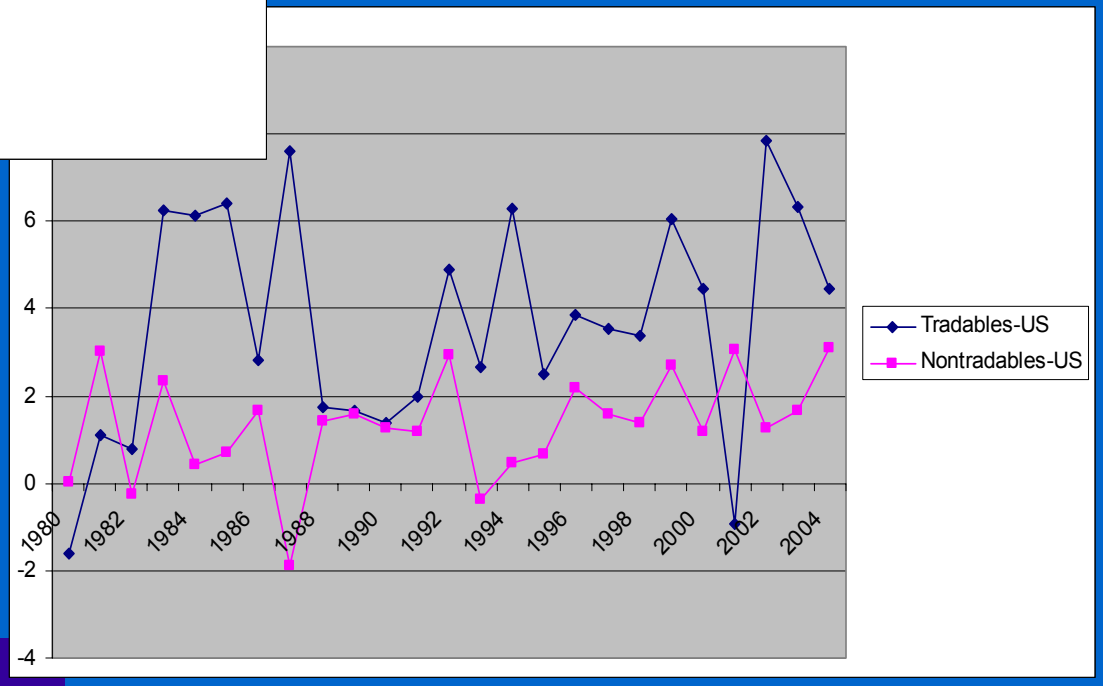
- It is TFP growth plus a capital-deepening term.

Labor Productivity Growth Numbers (1)

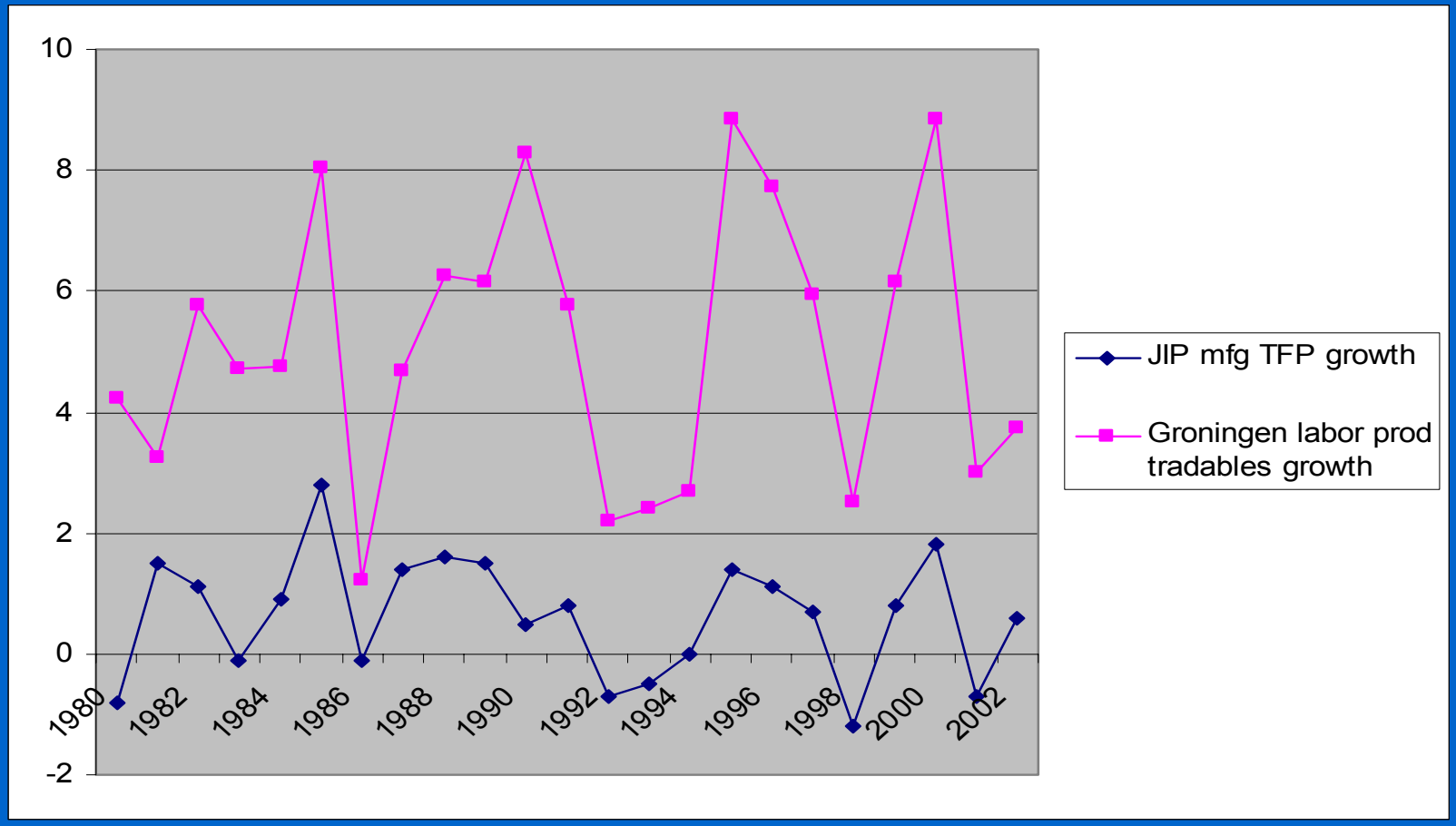
- A source of Japan and U.S. sectoral *labor* productivity is Groningen Growth and Development Centre, Industry Database, September 2006, http://www.ggdc.net/ (1979-2004).
- I took sectors 1-32 as traded and 33-57 as nontraded, aggregating by value added weights to get *T* and *NT* productivity growth, respectively. (Labor input is *hours worked*.)

Labor Productivity Growth Numbers (2)



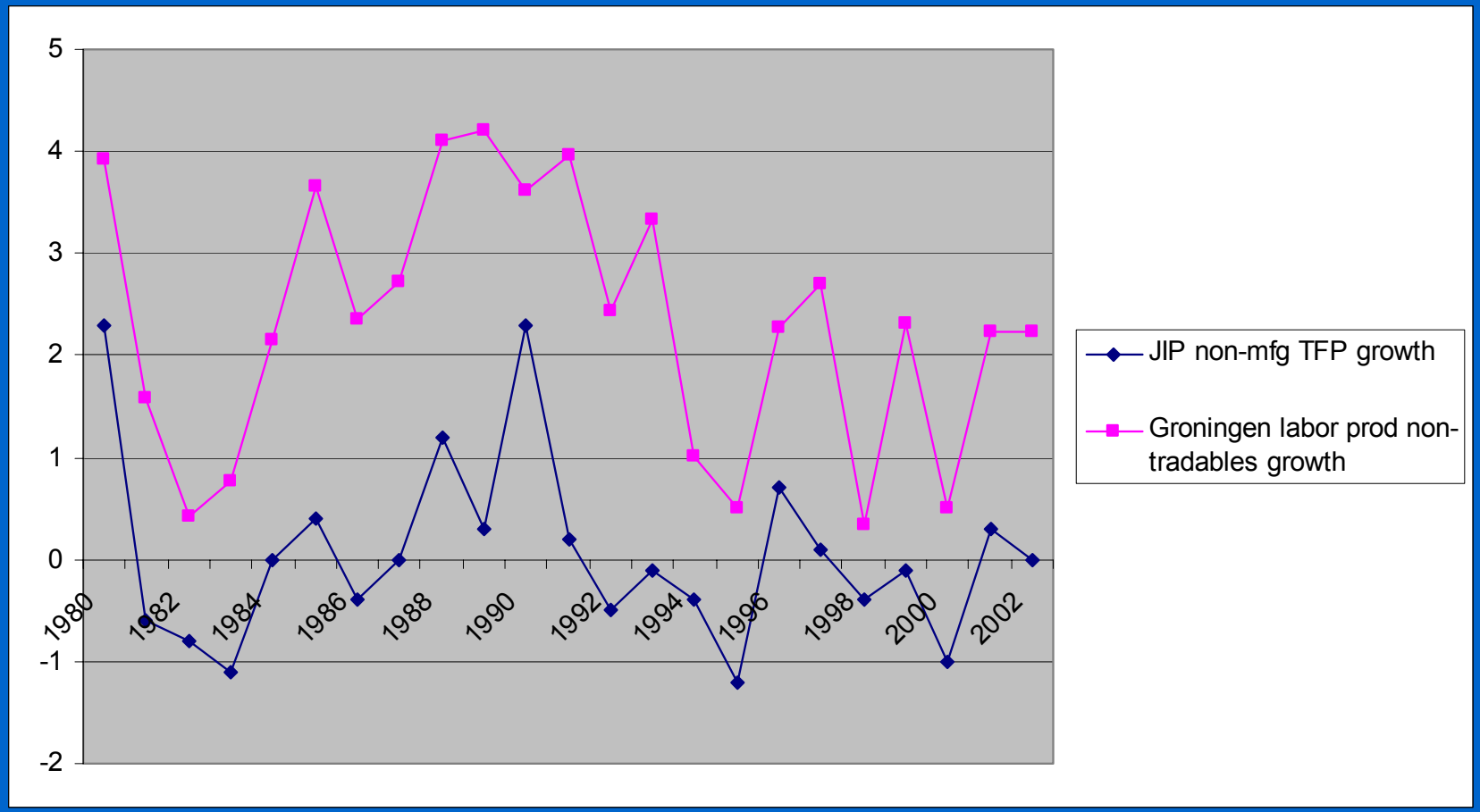


Labor Productivity vs. TFP Growth: Japan, *T*



Correlation = +0.71. TFP from JIP database, 1980-2002.

Labor Productivity vs. TFP Growth: Japan, *NT*



Correlation = +0.75. TFP from JIP database.

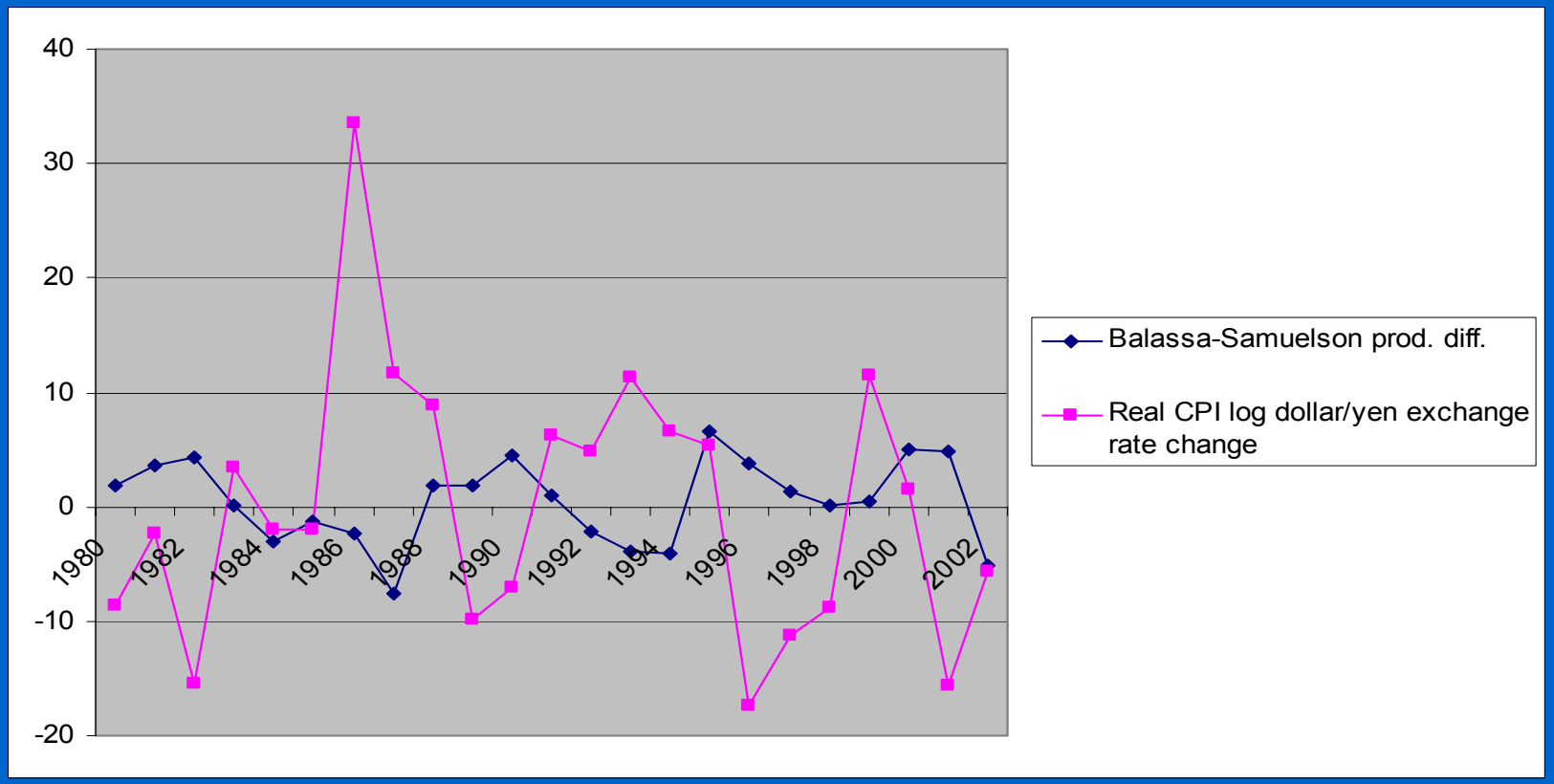
Labor Productivity vs. TFP Growth

- The difference between trend TFP and labor productivity growth for Japan is explicable by plausible capital deepening.
- For the U.S., 1988-2004, we can make a comparison with BLS multifactor productivity growth in (tradable) manufacturing.
- Correlation of annual growth rates = +0.62.

Implication of Balassa-Samuelson

- Construct the variable Japanese *T* productivity growth less Japanese *NT* productivity growth less U.S. *T* productivity growth plus U.S. *NT* productivity growth.
- If a yen real exchange rate *increase* is an *appreciation*, a rise in the preceding factor should be positively correlated with the change in the log real exchange rate.

Implication is Reversed in Short Run



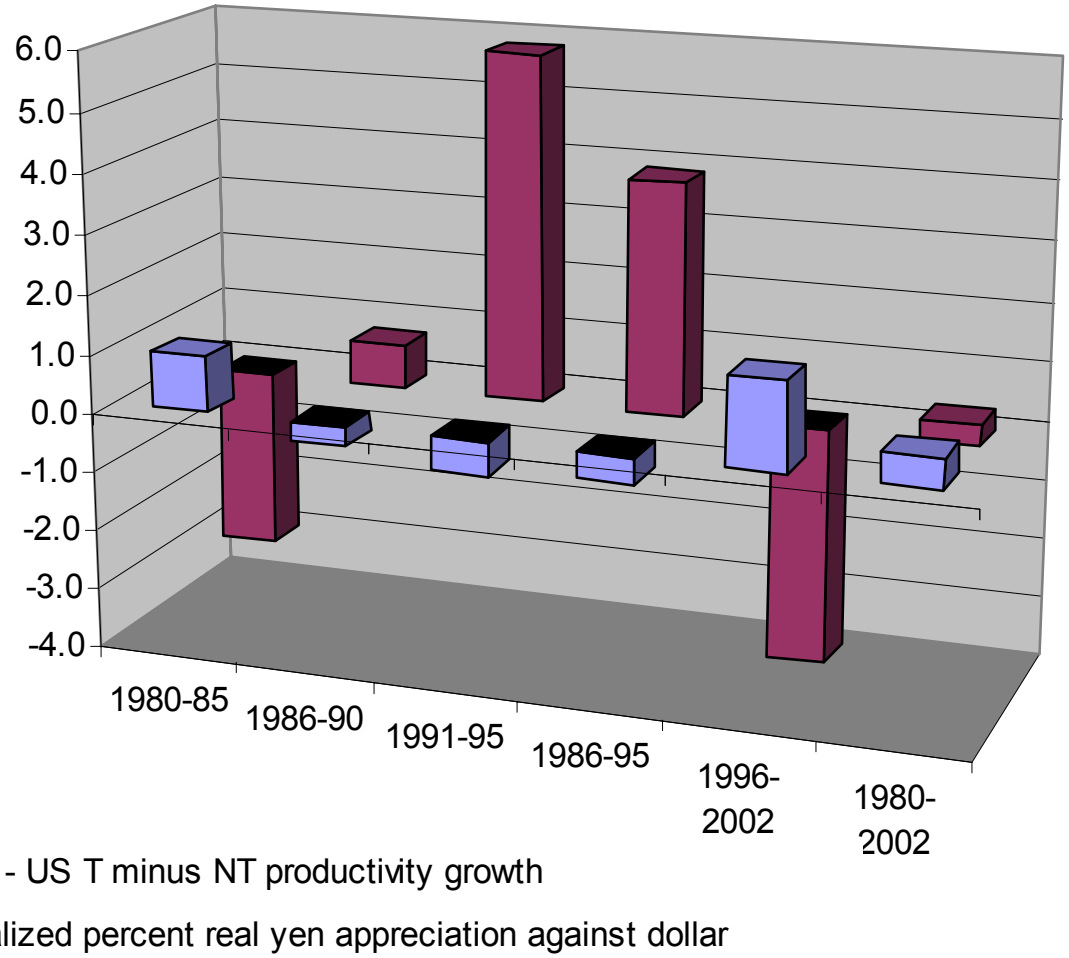
Year to year, the true correlation coefficient is –0.46 (using the CPI real dollar/yen exchange rate).

Balassa-Samuelson over Longer Horizons (1)

- Over 1980-2002, Japan has higher relative annualized productivity growth in tradables.
- Especially true over 1980-85 and 1996-2002, when yen ***depreciated***.
- From 1986-1995 yen ***appreciated*** yet U.S. has relatively higher tradables productivity growth.

	1980-85	1986-90	1991-95	1986-95	1996-2002	1980-2002
Japan: *T* less *NT* prod. growth	3.0	1.9	2.1	2.0	3.6	2.8
U.S.: *T* less *NT* prod. growth	2.1	2.2	2.7	2.4	2.1	2.2

Balassa-Samuelson over Longer Horizons (2)



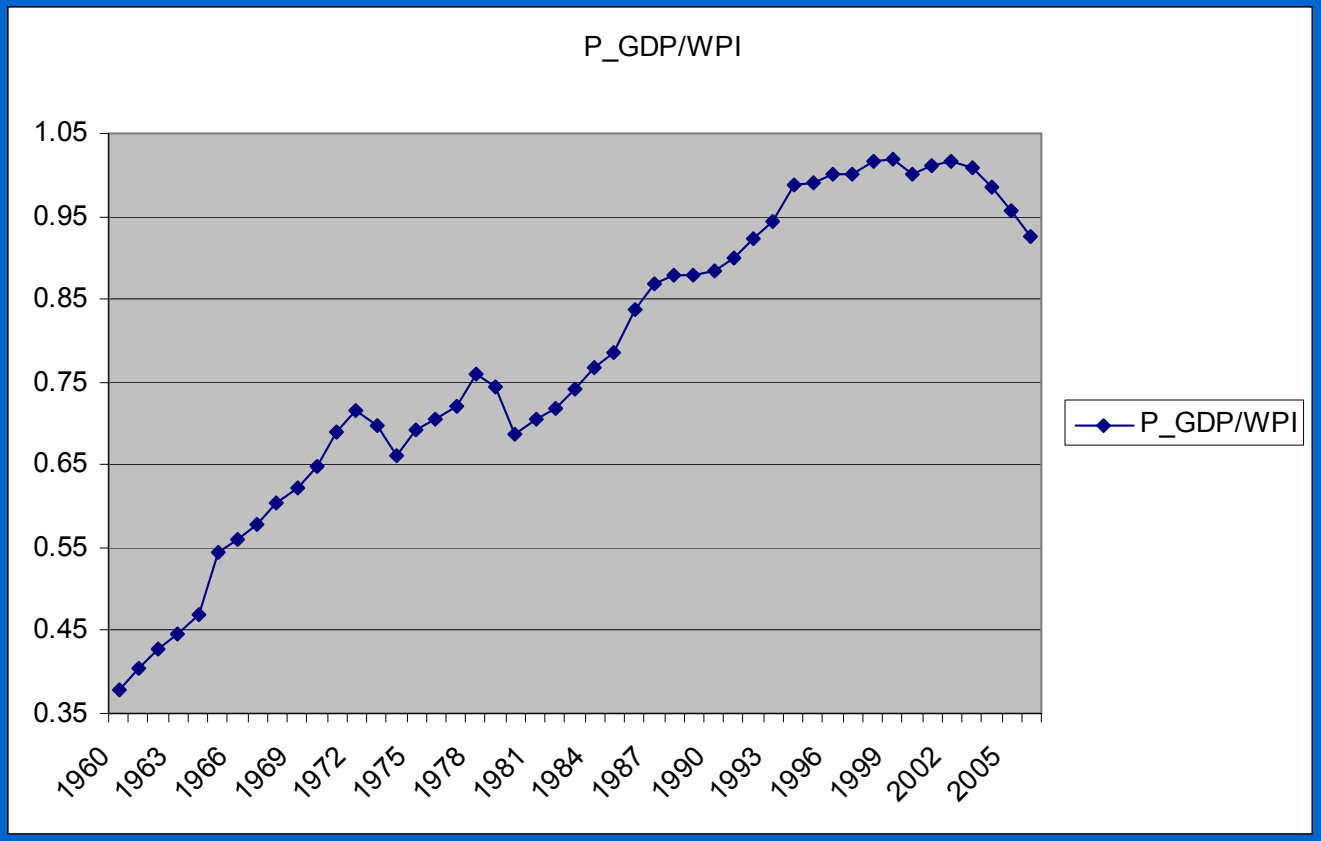
Balassa-Samuelson over Longer Horizons (3)

- Only over the entire 1980-2002 period is the cumulative yen appreciation (of 0.35 percent per year annualized) matched by commensurate excess tradables productivity growth in Japan relative to the U.S.
- Over every subsample period shown, the appreciation rate is negatively correlated with its Balassa-Samuelson fundamental.

The Relative Price of Nontradables (1)

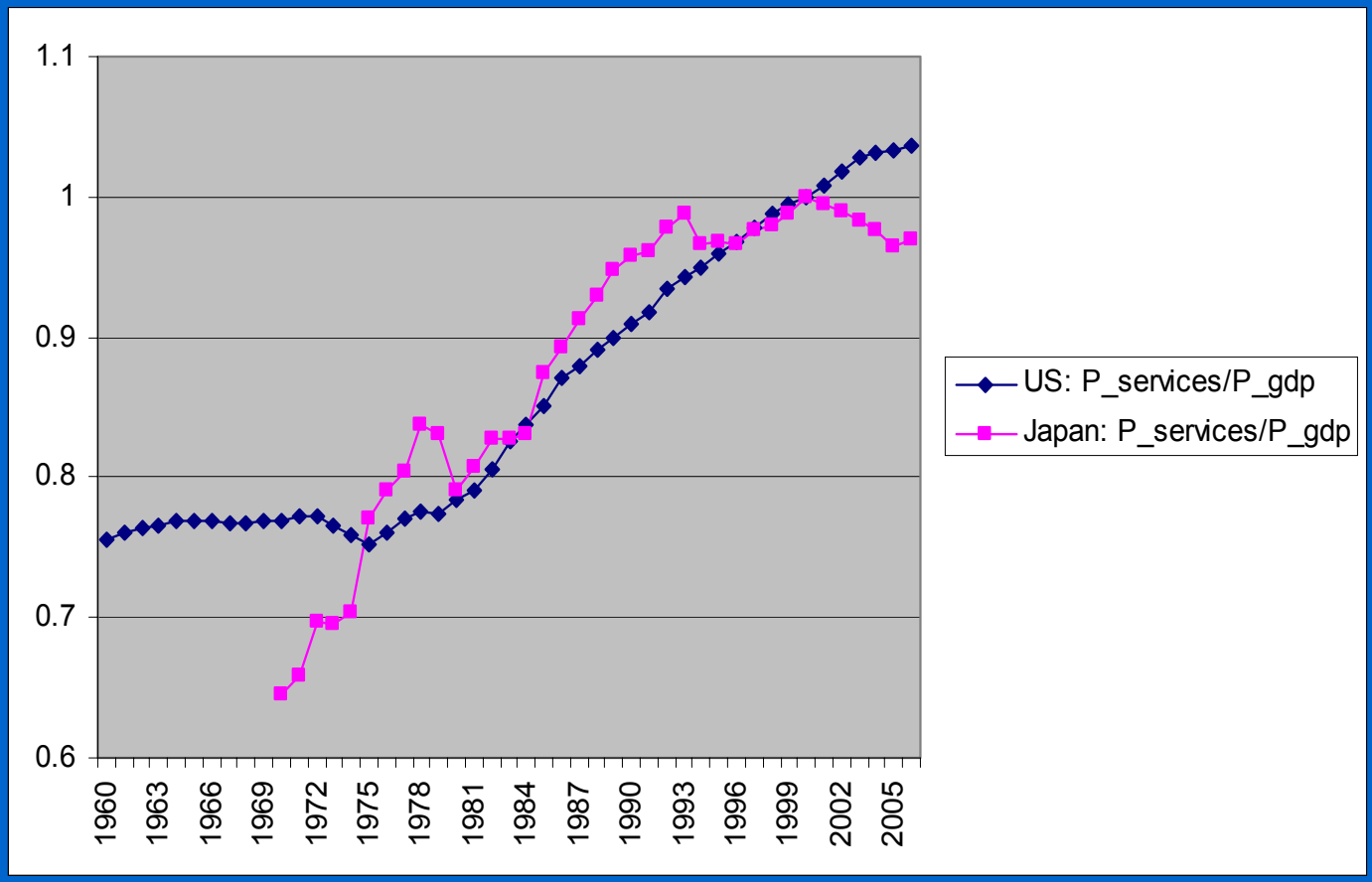
The GDP deflator/WPI may track the relative price

After leveling in late 1990s, it has started to fall.



The Relative Price of Nontradables (2)

Same pattern for service prices vs. total GDP deflator.



Hypotheses (1)

- Real yen depreciation, by raising foreign demand and capacity utilization, raises measured productivity in tradables relative to tradables.
- Higher tradables supply – an exogenous productivity increase – lowers relative price (terms of trade channel).
- In line with literature on procyclical U.S. productivity (e.g., Basu 1996).

Hypotheses (2)

- The data show productivity in tradables relative to nontradables rises when real yen depreciates.
- Nontradables productivity growth is less volatile than in tradables.
- Perhaps since 1990, a rise in the relative price of nontradables causes higher productivity growth in that sector – the traditional supply effect of relatively low *NT* growth seems to be trumped.
- Measured nontradables productivity growth in Japan has generally been lower after the early 1990s than before. Related to post-1995 depreciation of yen (which may now be ending)?

Tasks

- What general-equilibrium model of Japan in the world economy can explain these comovements of sectoral productivity, relative prices, and exchange rates?
- Demand and overall productivity growth?
- Role of current account?
- Role of intersectoral factor mobility?
- If Balassa-Samuelson factors do not drive the exchange rate, even in the longer run, then what does?

References (1)

Asea, Patrick K., and Enrique G. Mendoza. 1994. "The Balassa-Samuelson model: A general equilibrium appraisal." *Review of International Economics* 2: 244-67.

Basu, Susanto. 1996. "Procyclical productivity: Increasing returns or cyclical utilization?" *Quarterly Journal of Economics* 111: 719-51.

Canzoneri, Matthew B., Robert E. Cumby, and Behzad Diba. 1999. "Relative labor productivity and the real exchange rate in the long run: Evidence for a panel of OECD countries." *Journal of International Economics* 47: 245-66.

Drine, Imed, and Christophe Rault. 2003. "Does the Balassa-Samuelson hypothesis hold for Asian countries? An empirical analysis using panel cointegration tests." Mimeo, Sorbonne and Evry Universities.

References (2)

Hsieh, David A. 1982. "The determination of the real exchange rate: The productivity approach." *Journal of International Economics* 12: 355-62.

Ito, Takatoshi, and Frederic S. Mishkin. 2006. "Two decades of Japanese monetary policy and the deflation problem." In T. Ito and A. K. Rose, eds., *Monetary Policy with Very Low Inflation in the Pacific Rim*. Chicago: University of Chicago Press.

Ito, Takatoshi, Peter Isard, and Steven Symansky. 1999. "Economic growth and real exchange rate: An overview of the Balassa-Samuelson hypothesis in Asia." In T. Ito and A. O. Krueger, eds., *Changes in Exchange Rates in Rapidly Developing Countries.* Chicago: University of Chicago Press.

McKinnon, Ronald I., and Kenichi Ohno. 1997. *Dollar and Yen*. Cambridge: MIT Press.

References (3)

Marston, Richard C. 1987. “Real exchange rates and productivity growth in the United States and Japan.” In S. W. Arndt and J. D. Richardson, eds., *Real-Financial Linkages among Open Economies*. Cambridge: MIT Press.

Rogoff, Kenneth. 1992. “Traded goods consumption smoothing and the random walk behavior of the real exchange rate.” *Monetary and Economic Studies* 10: 1-29.

Thomas, Alastair, and Alan King. 2004. “The Balassa-Samuelson effect in Asia: Now you see it, now you don’t.” Mimeo, University of Otago.