# International Capital Flows and U.S. Interest Rates

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# Motivation

- We know that international capital flows impact emerging markets
  - reduction in systematic risk (Chari and Henry, 2004)
  - increase in physical investment (Henry 2000, 2003)
  - increase in economic growth (Bekaert, Harvey, and Lundblad, 2005)
  - spreading crises (Boyer, Kumagai, and Yuan, 2005)
- But are flows' impact on developed economies detectable?

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# Are capital flows' impact on developed economies detectable?

- We focus on the impact on U.S. interest rates.
- "U.S. bond yields…have fluctuated over a wide range in response to many factors…but foreign buying…ha(s) simply not had much impact. Foreigners don't have much influence…"

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# Three Contributions

- Provide a straightforward empirical presentation of the interest rate implications of the standard IS/LM model.
- Bring foreign flows into the model and show that they have had a statistically and economically significant impact on U.S. long-term rates.
- Provide a short primer on capital flows.
  - Highlight some less-than-desirable features of reported capital flows data.
  - Present alternative measures designed to address the deficiencies.

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# Our Findings

- Yes, the surge in foreign demand has put downward pressure on US interest rates, especially long rates.
- Others haven't found this result because US capital flows data are confusing.
  - Capital flows data are notoriously difficult to understand.
  - Researchers have concentrated on readily available data on foreign official accounts at FRBNY.
    - But many governments avoid the FRBNY.
  - Can utilize broader TIC data.
    - But quasi-public purchases are counted as 'private'.
  - Moreover, should not omit near substitutes for Treasuries, such as US agency bonds.
    - But these are flawed in the TIC data and must be adjusted.

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# Standard IS/LM Model: Variables

- One Requirement: Each variable must be observable at time *t* and should be forward looking.

- Short-term (one-year-ahead) expectations of future output and inflation.
- Long-term (ten-year) inflation expectations
- Current monetary policy measured by the target federal funds rate
- interest rate risk premium
- *structural* budget deficit (as a % of GDP)

- impact of foreign economies
- expected future productivity
- output beyond full employment

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# Coefficients from Standard Model

Dependent Variable: 10-year Treasury Yield
Sample: Monthly, January 1984 – May 2005

| | |
|---|---|
| Expected GDP | |
| Long-term expected inflation | 0.57 |
| Short-term (rel. to long-term) expected inflation | |
| Risk Premium | 5.37 |
| Fed Funds | 0.44 |
| Structural Budget Deficit | 0.24 |
| | |

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All coefficients are significant at the 1% level.

# Bringing in Capital Flows

- Two necessary conditions to measure the impact of capital flows:
  - Foreigners must in some sense be an important part of the market.
  - Must be able to adequately identify exogenous foreign demand.

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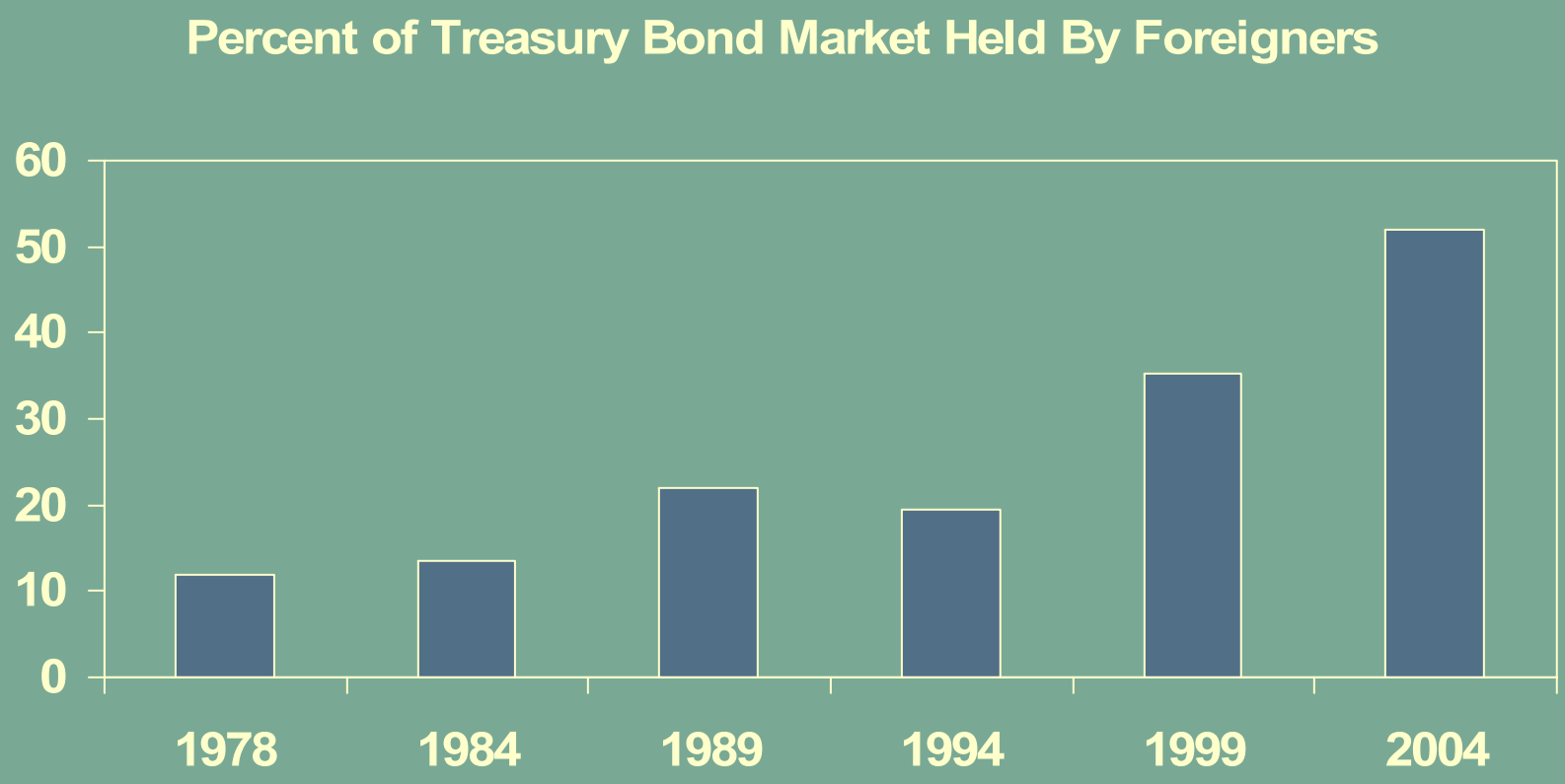
# Foreigners own one-half of the Treasury bond market.

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# Identification Strategy

- Option 1: Event Study
  - Bernanke, Reinhart, & Sack (2004 BPEA) find that for each $1B of Japanese intervention, the 10-year Treasury yield declines 0.7 bps.
  - If Japanese accumulation is $100B - $200B per year, and if we can extrapolate, this implies a 70-140 bps impact.
- Option 2: Longer-term Analysis
  - Write down a traditional model (for example, an empirical representation of IS/LM) and include exogenous foreign flows.
  - Which foreign flows are plausibly thought of as exogenous? Those from foreign governments.
    - Think Japanese and Chinese accumulation, recycling of petrodollars, etc.

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# Capital Flows Data: Problems and Solutions

- Problem 1: TIC data underestimates foreign official flows.
  - Any purchase through a 3rd country will not be reported as a foreign official flow.
  - TIC-reported OPEC positions in US government bonds were only $29B as of 2004 and further inflows totaled an implausibly low $6B in 2005.
- Solution: Recognize that reported foreign official flows into US government bonds represent only a lower bound.

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# Capital Flows Data: Problems and Solutions

- Problem 2: TIC data overestimates flows into agency bonds.
  - $158 billion overestimation in a 12-month period.
- Solution: Use higher quality data from infrequent benchmark surveys to restate flows into agency bonds.

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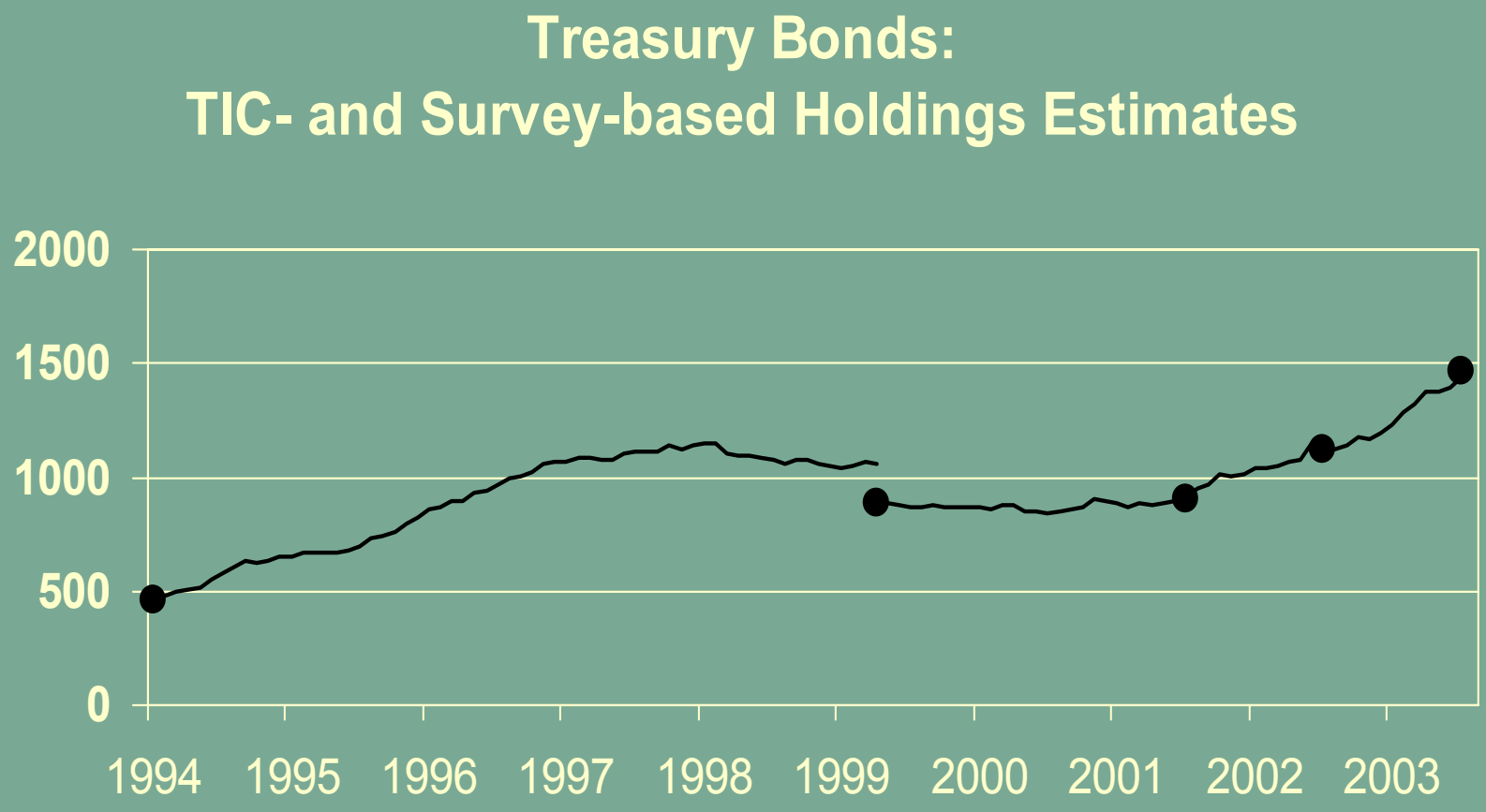
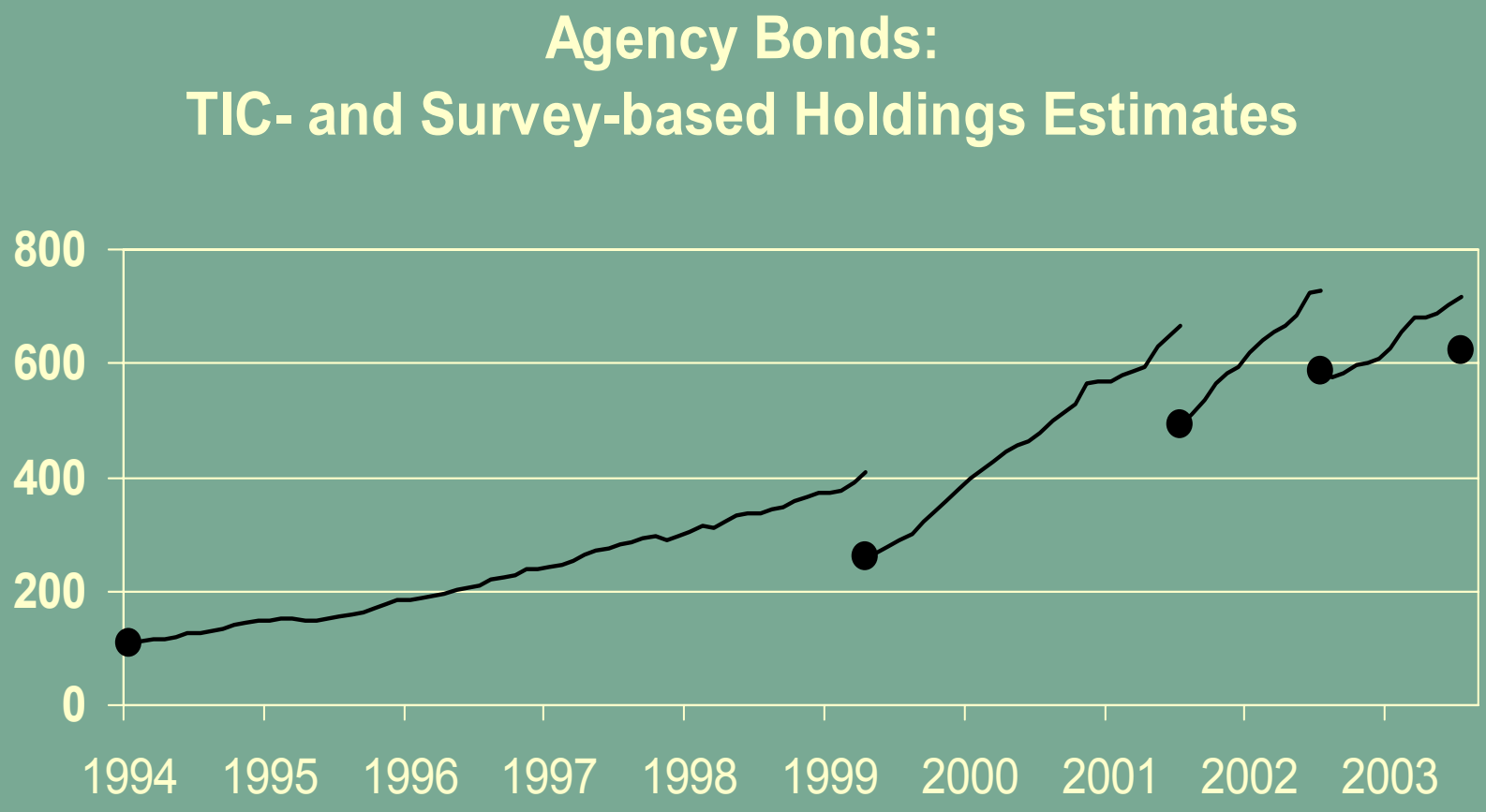
# TIC data on flows into US Treasury Bonds are accurate…




$ billions, Dec 1994-June 2004

# …but TIC data overstates flows into US Agency Bonds.




$ billions, Dec 1994-June 2004

# Adjusting TIC Flows Data

Form Naïve Holdings Estimates

$$nh_t = nh_{t-1}(1+r_t) + gp_t - gs_t$$

Doing so will result in a 'gap' at time T of a benchmark

$$gap_T = bh_T - nh_T$$

Solve for an adjustment factor such that at T estimated holdings=benchmark holdings

$$h_t = h_{t-1}(1+r_t) + gp_t - gs_t + adj_t$$

$$adj_t = gap_T * adjfactor * \frac{gp_t + gs_t}{\sum_{k=1}^{T} gp_k + gs_k}$$

Adjusted flows then given by

$$np_t = gp_t - gs_t + adj_t$$

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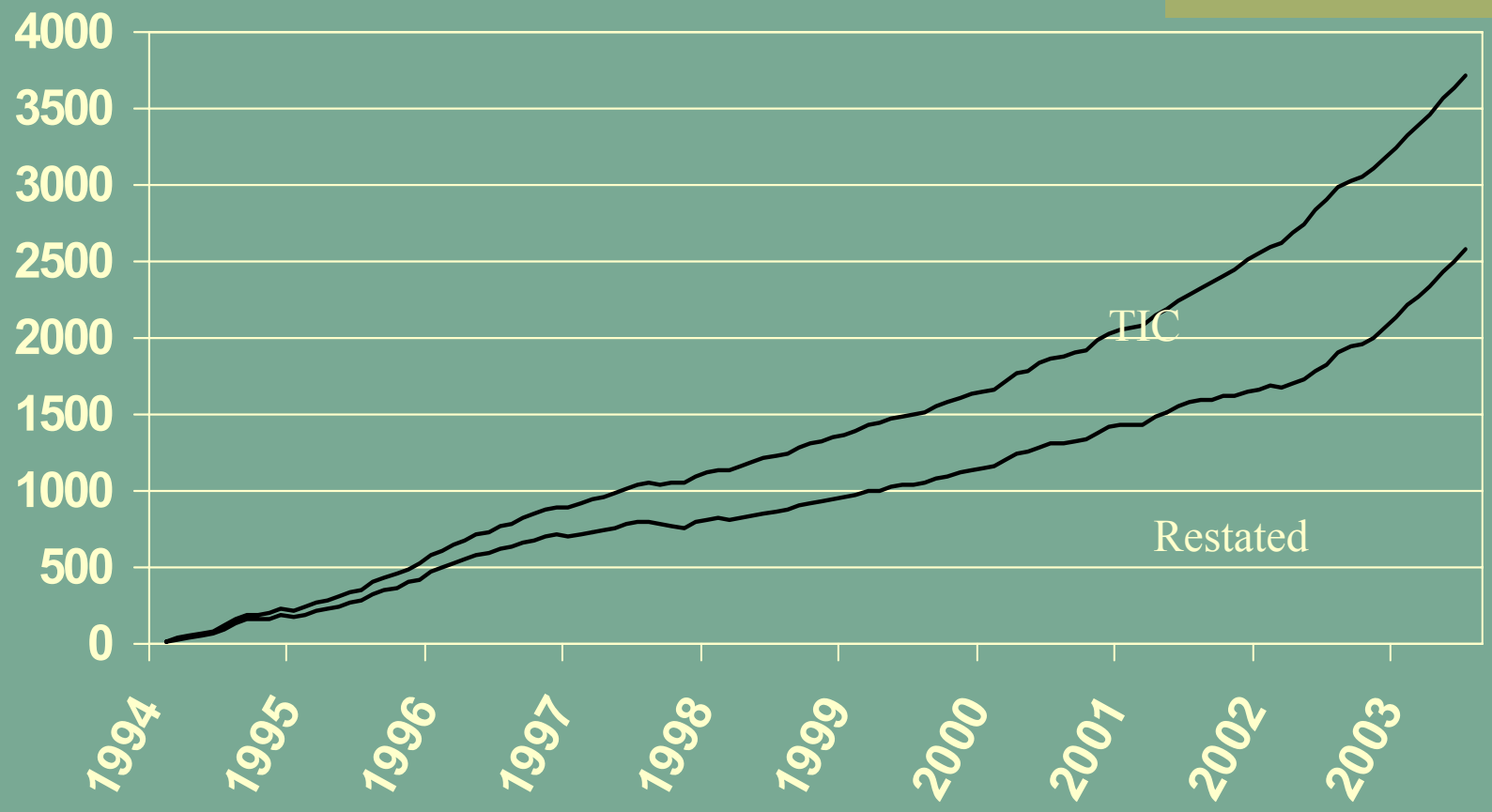
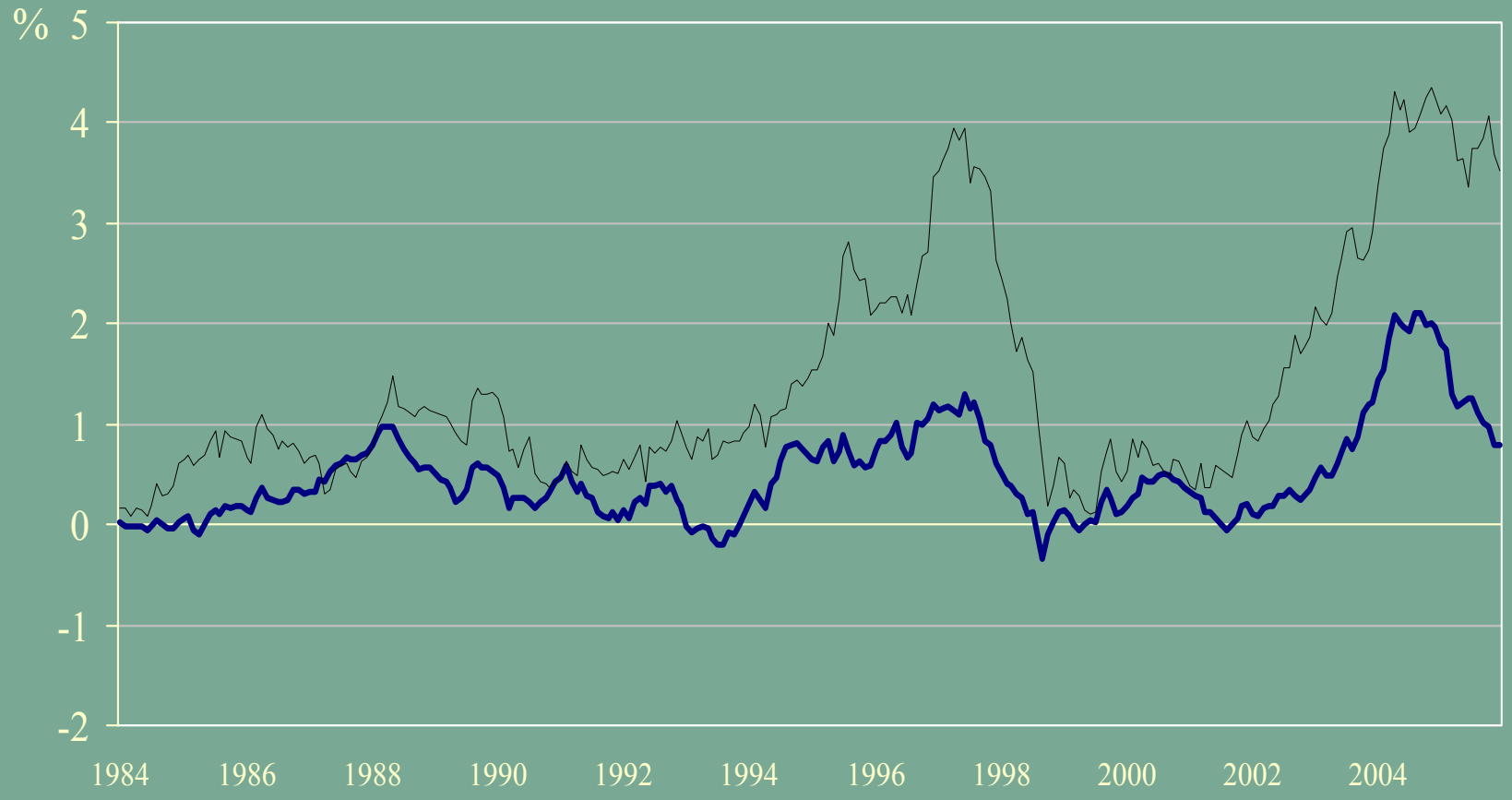
# Cumulated Flows: TIC v. Restated




$ billions, Jan 1995-June 2004. Includes corporate bonds.

# Restated Capital Flows Data:

## 12-month foreign flows (scaled by lagged nominal GDP)

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In this and all following graphs, last data point is Dec 2005.

# The impact of foreign flows on US rates is statistically significant.

Dependent Variable: 10-year Treasury Yield
Sample: Monthly, January 1984 – May 2005

| | |
|---|---|
| Expected GDP | 0.26 |
| Long-term expected inflation | 0.64 |
| Short-term (rel. to long-term) expected inflation | 0.65 |
| Risk Premium | 4.82 |
| Fed Funds | 0.36 |
| Structural Budget Deficit | 0.21 |
| Total Bond Inflows | -0.25 |

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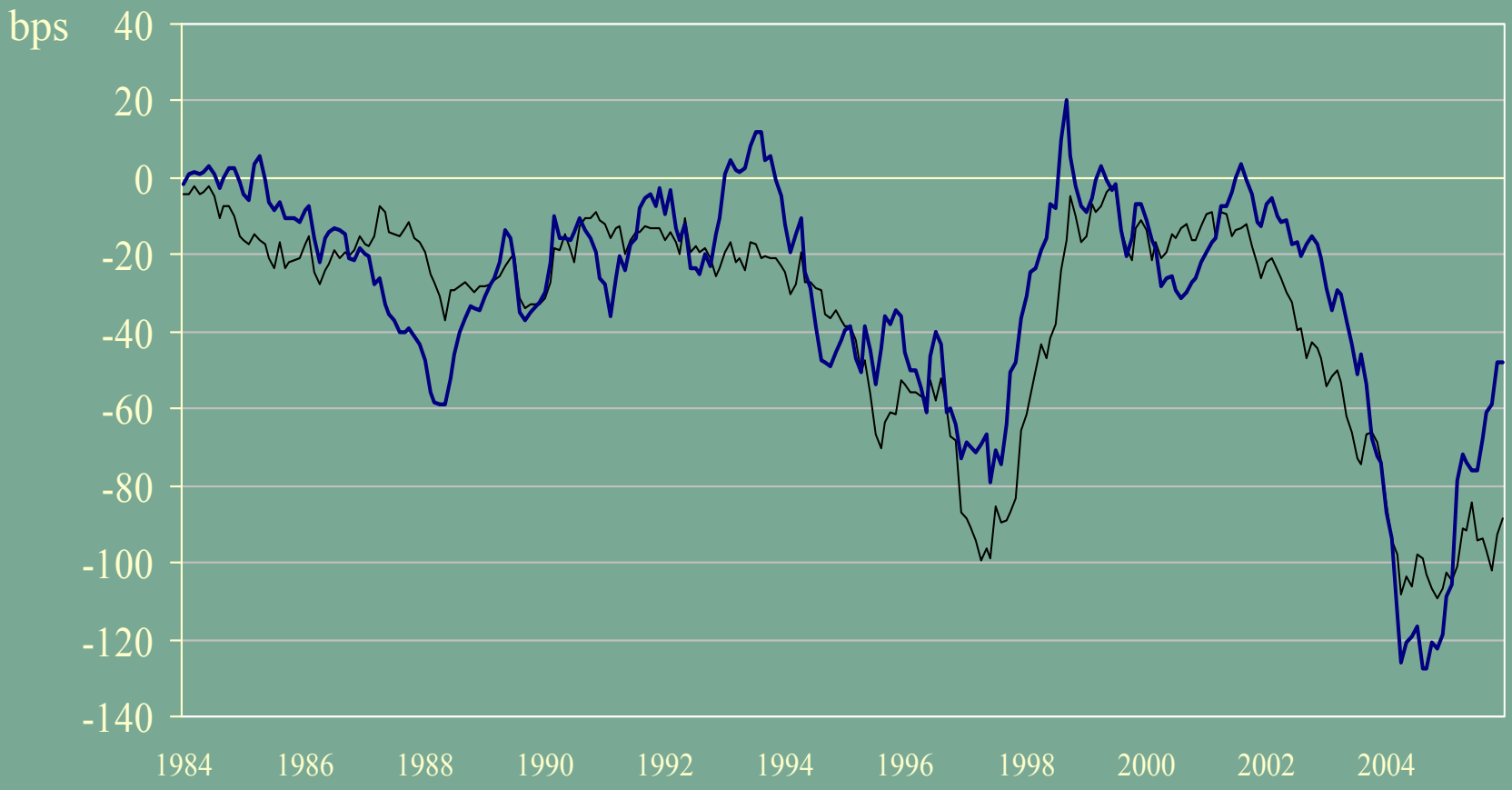
All coefficients are significant at the 1% level.

# The impact of foreign inflows on the 10-year Treasury yield peaked in the summer of 2004.

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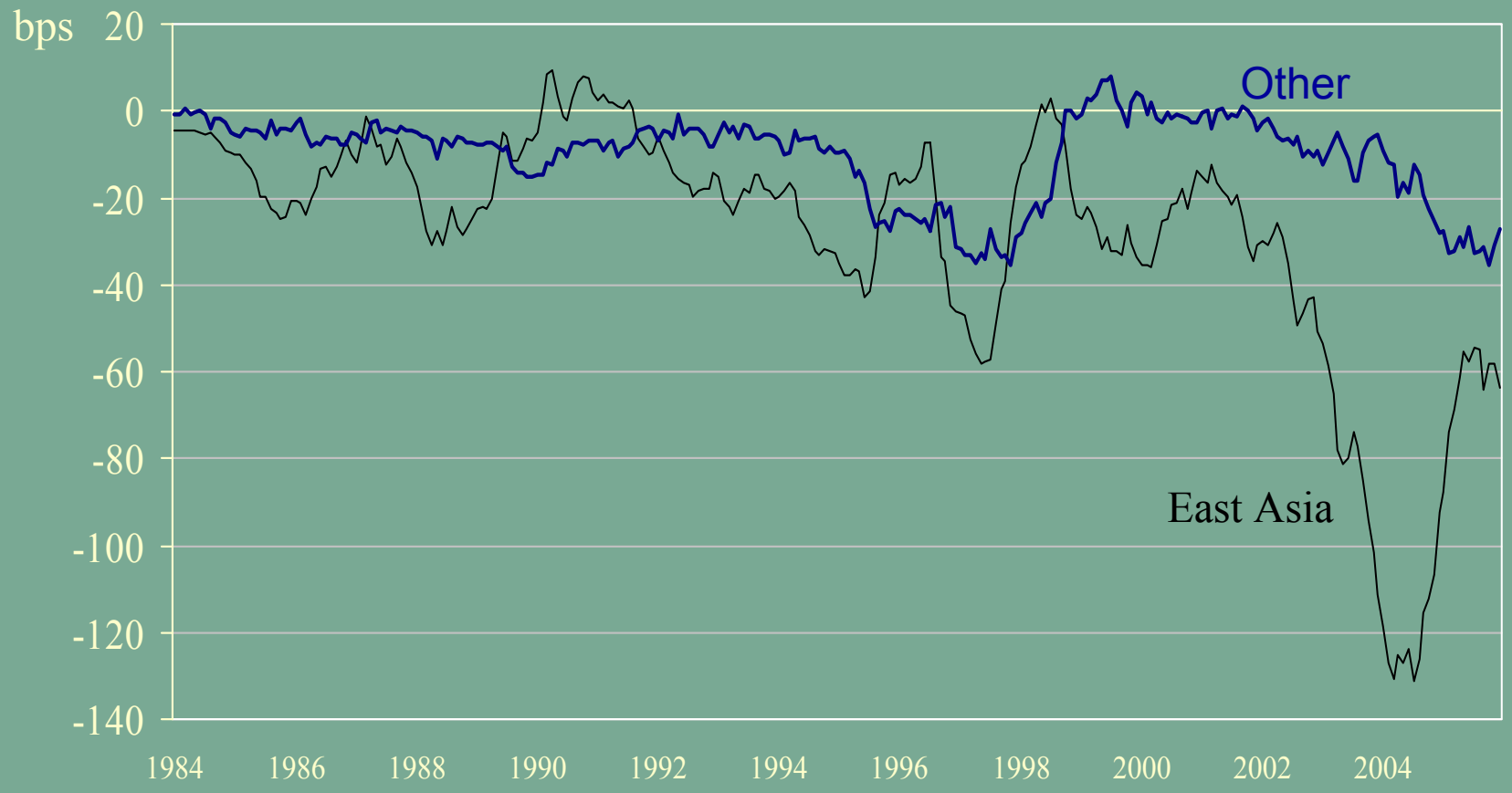
Impact is defined relative to the case of zero inflows for a 12-month period.

# Much of the impact owes to East Asian flows.




For the purpose of this exhibit, East Asia is Greater China, Japan, and Korea.

# Robustness Checks

- DepVar: Real 10-year yield
- Include financing gap
- DepVar: Real 5-5 forward rate
- Start sample after Greenspan takes over or after Fed begins announcing FF target
- Include r-r* or real exchange rate
- Model other rates (Aaa, Baa, 30-year fixed mortgage, 1-year ARM, 2-year Treasury)

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# Conclusion

- Yes, foreign flows substantially impact US interest rates.

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