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?
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...has simply not had much impact. Foreigners don’t have much influence...”
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.
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.
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
Coefficients from Standard Model
Dependent Variable: 10-year Treasury Yield
Sample: Monthly, January 1984 – May 2005

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Expected GDP</td>
<td></td>
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<tr>
<td>Long-term expected inflation</td>
<td>0.57</td>
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<tr>
<td>Short-term (rel. to long-term)</td>
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<tr>
<td>expected inflation</td>
<td></td>
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<td>Risk Premium</td>
<td>5.37</td>
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<td>Fed Funds</td>
<td>0.44</td>
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<tr>
<td>Structural Budget Deficit</td>
<td>0.24</td>
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</table>

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.
Foreigners own one-half of the Treasury bond market.
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.
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.
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.
TIC data on flows into US Treasury Bonds are accurate…

Treasury Bonds:
TIC- and Survey-based Holdings Estimates

$ billions, Dec 1994-June 2004
...but TIC data overstates flows into US Agency Bonds.

Agency Bonds:
TIC- and Survey-based Holdings Estimates

0 200 400 600 800
$ 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

\[ h_t = h_{t-1}(1 + r_t) + gp_t - gs_t + adj_t \]

\[ adj_t = gap_T \times adffactor \times \frac{gp_t + gs_t}{\sum_{k=1}^{T} gp_k + gs_k} \]

Adjusted flows then given by

\[ np_t = gp_t - gs_t + adj_t \]
Cumulated Flows: TIC v. Restated

Restated Capital Flows Data:
12-month foreign flows (scaled by lagged nominal GDP)

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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
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<tbody>
<tr>
<td>Expected GDP</td>
<td>0.26</td>
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<td>Long-term expected inflation</td>
<td>0.64</td>
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<td>Short-term (rel. to long-term) expected inflation</td>
<td>0.65</td>
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<td>Risk Premium</td>
<td>4.82</td>
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<td>Fed Funds</td>
<td>0.36</td>
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<td>Structural Budget Deficit</td>
<td>0.21</td>
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<tr>
<td>Total Bond Inflows</td>
<td>-0.25</td>
</tr>
</tbody>
</table>

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.

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)
Conclusion

- Yes, foreign flows substantially impact US interest rates.