The Broad Yen Carry Trade

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*The views expressed in this presentation are those of the authors and do not necessarily represent those of the Bank of Japan.
Yen Carry Trade

- Yen carry trade: borrow yen to fund purchase of higher yielding currencies
- Its importance extends beyond merely the FX market
- Tied with fluctuations of global balance sheets
  - implications for financial cycles
  - implications for global spillovers in monetary policy
Balance Sheet Trail

Following the trail of leveraged bets

Wall St Bank NY Head Office  Interoffice accounts  Wall St Bank Japan Office  JPY interbank market  Japanese Banks

Hedge Fund
Interoffice Accounts of Japan Office

Assets | Liabilities
---|---
interoffice assets | interoffice liabilities
Japanese securities | call money
call loans |

Assets | Liabilities
---|---
interoffice assets | interoffice liabilities
Japanese securities | call money
call loans |
Interbank Assets of Foreign Banks in Japan

Interbank Assets (Call Loan) of Foreign Banks in Japan
Interbank Liabilities of Foreign Banks in Japan

Interbank Liabilities (Call Money) of Foreign Banks in Japan
Net Interbank Assets of Foreign Banks in Japan

Net Interbank Assets of Foreign Banks in Japan
Net Interoffice Accounts of Foreign Banks in Japan
Channeling of Yen Liquidity out of Japan

Scatter chart of change in net interoffice accounts against change in net call loans (units: 100 billion yen)
Basic Balance Sheet Arithmetic: Passive Investor

- Household balance sheet

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>House, 100</td>
<td>Equity, 10</td>
</tr>
<tr>
<td>Mortgage, 90</td>
<td></td>
</tr>
</tbody>
</table>

\[
\text{Leverage} = \frac{\text{Assets}}{\text{Equity}} = 10
\]

- Assume that the market value of debt is constant at 90.

\[
L = \frac{A}{A - 90}
\]
- Leverage is inversely related to total assets:
Balance Sheet Size and Leverage: Households

From Adrian and Shin (2007)

U.S. Flow of Funds (1963 - 2006)
Financial Institutions

Financial institutions actively manage balance sheets so as

- to meet value at risk or economic capital targets
- to meet performance measures such as return on equity (ROE).
- to hit desired credit ratings
- meet regulatory requirements

What are the consequences?
Security Dealers and Brokers

U.S. Flow of Funds (1963 - 2006)
Targeting Constant Leverage

Initial balance sheet

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securities, 100</td>
<td>Equity, 10</td>
</tr>
<tr>
<td></td>
<td>Debt, 90</td>
</tr>
</tbody>
</table>

Assume price of debt approximately constant. Suppose the security price increases by 1% to 101.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securities, 101</td>
<td>Equity, 11</td>
</tr>
<tr>
<td></td>
<td>Debt, 90</td>
</tr>
</tbody>
</table>
Leverage falls to

\[
\frac{101}{11} = 9.18
\]

If bank targets **constant leverage**, it must take on additional debt of \( D \) to purchase \( D \) worth of securities on the asset side so that

\[
\frac{\text{assets}}{\text{equity}} = \frac{101 + D}{11} = 10
\]

The solution is \( D = 9 \). In other words, the bank takes on additional debt worth 9, and with this money purchases securities worth 9.

**The demand curve is upward-sloping.**
The new balance sheet looks like this.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securities, 110</td>
<td>Equity, 11</td>
</tr>
<tr>
<td></td>
<td>Debt, 99</td>
</tr>
</tbody>
</table>

The leverage is now back up to 10.

The mechanism works in reverse, too. Suppose there is shock to the security price so that

<table>
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</thead>
<tbody>
<tr>
<td>Securities, 109</td>
<td>Equity, 10</td>
</tr>
<tr>
<td></td>
<td>Debt, 99</td>
</tr>
</tbody>
</table>

Leverage is too high \( \frac{109}{10} = 10.9 \).
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Sell securities worth 9, pay down debt of 9.

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<td>Securities, 100</td>
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Back to leverage of 10.

Supply curve is downward-sloping.

What is the aggregate impact of perverse demand and supply curves?
Aggregate Impact

- Target leverage
  - Stronger balance sheets
  - Increase B/S size
  - Asset price boom

- Target leverage
  - Weaker balance sheets
  - Reduce B/S size
  - Asset price decline
Carry Trades and VIX Index

Risk appetite as measured by the VIX index.
Impact on Exchange Rates of Carry Currencies (NZD/JPY)
Interest Rate Differential

Net interoffice accounts (in red, right hand scale) and difference between overnight rates in Japan and simple average of USD, EUR and AUD overnight rates (in green, left hand scale).
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**Interest Rate Differential**

Scatter chart of the net interoffice accounts and interest rate differential

\[ t \text{ statistic } = -7.8 \]
Monthly Changes

Monthly changes in interest differential explain fluctuations in carry trade
Global Spillover of Monetary Policy

Two-way flow:

- Role of yen liquidity in fueling global balance sheets
- Impact of credit crisis and contracting balance sheets on yen appreciation and Japanese deflation