Negative Real Interest Rate Causes the Housing Bubble

Dr. Edward C.Y. Yiu
ecyY - REDBRIC
Housing Bubble - Unsustainably High Housing Price

• 'high price'? - relative!
• Housing price to household income ratio = 12.6, twice than the international upper cap of 6.

It requires 1/2 of the median household income for 25-year to pay for the housing unit!
What Causes High Housing Price?

The most common 2 explanations:
1. Insufficient land and housing supply
2. Ultra low interest rate

But, they are Theoretically Implausible and No Empirical Evidence!
Due Insufficient Supply - A Tautology

• When housing price is high / low, then it is because of insufficient / too much supply; it is a tautology.
• demand cannot be observed, how can one determine what is sufficient supply?
Due Insufficient Supply - Empirically Contradictory

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing Completion</td>
<td>34,000</td>
<td>18,202</td>
<td>31,052</td>
<td>7,160</td>
<td>11,890</td>
</tr>
<tr>
<td>yoy change</td>
<td>21%</td>
<td>-8%</td>
<td>18%</td>
<td>-18%</td>
<td>26%</td>
</tr>
<tr>
<td>Ave. Housing Price Index</td>
<td>114.9</td>
<td>163.1</td>
<td>69.9</td>
<td>121.3</td>
<td>200.2</td>
</tr>
<tr>
<td>yoy change</td>
<td>24%</td>
<td>40%</td>
<td>-11%</td>
<td>1%</td>
<td>10%</td>
</tr>
</tbody>
</table>

http://blog.yahoo.com/ecyyiuu/articles/160936
How Many is Sufficient?

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2011</th>
<th>Ave ann growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nos. of Housing Units</td>
<td>2,477,300</td>
<td>2,601,800</td>
<td>24,900</td>
</tr>
<tr>
<td>Total Household Nos.</td>
<td>2,226,546</td>
<td>2,368,769</td>
<td>28,445</td>
</tr>
<tr>
<td>Vacant or Others</td>
<td>250,754 (10%)</td>
<td>233,031 (9%)</td>
<td>&gt;&gt; natural vacancy 4%</td>
</tr>
<tr>
<td>Population</td>
<td>6,864,300</td>
<td>7,071,600</td>
<td>41,460</td>
</tr>
</tbody>
</table>

Nos. of Housing Units > Nos. of Households
Related Empirical Evidence


- restrictive land supply (50ha/yr) caused high housing price;
- i.e. administratively RESTRICT supply, results in a market failure to adjust, which exacerbates the bubble.

Due Ultra Low Interest Rate - Theoretically Wrong!

- **Scenario A**
  - If now mortgage interest rate = 0;
  - but it is expected to have deflation 15%;
  - would you buy a flat because of the zero mortgage rate?

- **Scenario B**
  - If now mortgage interest rate = 10%;
  - but it is expected to have inflation 15%;
  - would you NOT buy a flat because of the high mortgage rate?

*It is NOT the cost that matters, it is the expected return that matters!*
Due Ultra Low Interest Rate - Empirically Wrong!

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HIBOR %</td>
<td>4.00</td>
<td>3.63</td>
<td>5.50</td>
<td>5.75</td>
</tr>
<tr>
<td>HPI (yr end)</td>
<td>74.3</td>
<td>100.8</td>
<td>134.5</td>
<td>73.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2003</th>
<th>2006</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIBOR %</td>
<td>1.88</td>
<td>0.07</td>
<td>3.84</td>
<td>0.33</td>
</tr>
<tr>
<td>HPI (yr end)</td>
<td>73.8</td>
<td>65.4</td>
<td>93.8</td>
<td>181.1</td>
</tr>
</tbody>
</table>
A New Explanation - Negative Real Interest Rate Model

• Real Interest Rate is the expected value of money in future;
• Real Interest Rate = Nominal Interest Rate - Expected Inflation + Risk Premium;
• It is theoretically positive;
• If it becomes NEGATIVE, all the economic and econometric models of future value would be collapsed!
• \( P = \frac{R}{k-g} \), if \( k<g \), then price < 0!!
Due Negative Real Interest Rate

- Both theoretically sound; and
- The only one empirically confirmed in the following 3 dimensions!

- It is empirically valid in the past data;
- It is empirically valid in other countries;
- It is empirically valid in prediction (future).
Due Negative Real Interest Rate - Theoretical Logic

- RIR = -4.17% in Feb. 2013
  - mortgage payment < rent;
  - hibor (0.23%) < inflation rate (4.4%)
  - mortgage rate (2.25%) < yield rate (3.3%)
  - rental growth in 2012 (13%)
  - price growth in 2012 (28%)
- RIR tempts people to borrow and invest in the housing markets to reap "no-risk" returns and to hedge inflation!
- RIR enlarges the wealth disparity!!

Due Negative Real Interest Rate

• Casual observations confirmed the negative relationship hypothesis:
  • ignore the risk premium first.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HIBOR %</td>
<td>5.48</td>
<td>3.44</td>
<td>4.21</td>
<td>0.27</td>
</tr>
<tr>
<td>CPIA yoy %</td>
<td>6.31</td>
<td>-1.60</td>
<td>2.03</td>
<td>5.51</td>
</tr>
<tr>
<td>RIR</td>
<td>-0.83</td>
<td>5.04</td>
<td>2.18</td>
<td>-5.24</td>
</tr>
<tr>
<td>HPI (yr end)</td>
<td>134.5</td>
<td>73.8</td>
<td>93.8</td>
<td>181.1</td>
</tr>
</tbody>
</table>

Why RIR is Negative in HK?

• Currency Board Arrangement
• Currency exchange rate is fixed!
  – Linked Exchange Rate (peg) US$1 = HK$7.8;
• Interest rate is fixed!
  – If the rate does not follow the US's, arbitrage can make no-risk profit!! (carry-trade)
• Inflation does not follow
  – Economic conditions very different from the US;
  – When the economic conditions are opposite, then
  – Either a LOW INTEREST RATE + HIGH INFLATION;
  – Or a HIGH INTEREST RATE + HIGH DEFLATION.
Intertwined Extraneous Factor - US Currency

• US Currency strength
  – when US$ is weak (as in the 2000s);
  – foreigners find HK's factors of production cheaper;
  – attracts foreign funds inflow from strong currency countries into HK to speculate on the negative RIR.

  – Normally, US currency goes in the same direction of nominal interest rate;
  – It aggravates the negative RIR effects.

∴ BSD, HK Land for HK People policy
US currency index drops from 120 to 70

US interest rate drops from 6.25% to 0.25%
Prediction of a Housing Bubble in Oct. 28, 2009


When did the Negative Real Interest Rate start?

The prediction was made when the real interest rate just started to drop to negative zone (Nov. 2008);

It is now − 4.17% (in Feb. 2013)
Empirical Evidence in Other Countries

What Can We Learn from the Past: A Common Pre-existing Symptom of Three Recent Real Estate Pricing Bubbles

Chung Yim Yiu,* Sherry Y.S. Xu,** and Counce Y.J. Cao***

Abstract: This study puts forth a holistic framework incorporating the supply and demand for property and credit with hypotheses and associated economic growth in contemporaneity and

2010 JREPE 13(1), 1-22
Theoretical Framework for the Causes of Asset Price Bubbles
The Lost Decade(s) since 1991 - Japan

- Rise from 60 in 1980 to 126 in 1991;
- 110% up in 11-year;
- Drop from 125 in 1991 to 72 in 2008;
- 43% down in 17-year or longer?

The Plaza Accord 1985

The Plaza Accord signed in Sep 1985;

Yen rate drops from 254/$ to 127/$ in 1990, and further to 80/$ in 1995.

Nominal Interests Rate of Japan, a Spike in 1991

- short-term interest rate lowers 5 times in 1980-1989;
- drops from 9% to 2.5%;
- Suddenly, it is reverted back to 6% in 1989;
- but too late!
Real Interest Rate of Japan - Close to 0 in 1989

- Real rate drops to 0;
- Housing bubble burst when the real rate goes up 3% in 1991.

Interest rate from the basic loan rate in Japan at: http://www.stat-search.boj.or.jp/ssi/mtshtml/m_en.html. Inflation rate = 12-month % change of consumer price index (composite) at data-stream. Data after 1996 are excluded due to the volatile risk premium and expectation of income growth after the bubble burst. Source: Statistical Survey Department, Statistics Bureau, Ministry of Internal Affairs and Communications, Japan.
Japan Annual Housing Return v. RIR

- Correlation is not perfect;

- because of exchange rate distortion and risk premium changes.

Exhibit 13
Scatterplot of Annual Housing Return versus Real Interest Rate in Japan (1980–1992)

Annual housing return = 1-year % change of Japan Land Price Index. Real interest rate = (nominal interest rate – inflation rate) * 100%. Data after 1992 are excluded due to the volatile risk premium and expectation of income growth after the bubble burst.
Asian Financial Crisis 1997 - HK

- Rise from 85 in 1993 to 170 in 1997;
- 100% up in 4-year;
- Drop from 170 in 1997 to 60 in 2003;
- 65% down in 6-year.
- It is now 200+, 300%+ up in 10-yr!

Nominal Interest Rate of HK - a Spike in 1997

- HIBOR is jerked up to 10% in 1997,
- when speculators bet the delink of the peg,
- risk premium increases tremendously,
- bubble burst!
Real Interest Rate of HK - Negative before 1996

- RIR is negative before 1996;
- but cross the boundary in 1997;
- it becomes highly positive afterwards due deflation;
- it is now negative again!

Exhibit 9
Real Interest Rate in Hong Kong (1993–2008)

HK Annual Housing Return v. RIR

- Correlation strong;
- especially in the negative RIR zone;
- gradient = -1.9%.
Subprime Crisis 2007 - US

- Rise from 75 in 1991 to 226 in 2007;
- 201% up in 16-year;
- Drop from 226 in 2007 to 158 in 2012;
- 30% down in 5-year or longer.
Real Interest Rate of US - Negative 2003 - 2005

- Negative 2% in 2003 - 2006;
- Subprime crisis in 2007;
- Now, RIR is positive because of deflation.

Exhibit 10
Real Interest Rate in the U.S. (1991-2008)

Source: the U.S. Federal Reserve System.
Long Term Interest Rate of US - Negative in 2006

• Long-term rate is also negative in 2006;
• which is more market driven; and
• normally reflect future expectation.
US Housing Price Change v. RIR

Exhibit 12

US Annual Housing Return v. RIR

- Correlation very strong;
- especially in negative RIR zone;
- gradient = -1.5
A More Robust Empirical Test

Negative real interest rate and housing bubble implosion – an empirical study in Hong Kong

Chung Yim Yiu
Department of Real Estate and Construction,
The University of Hong Kong, Pokfulam, Hong Kong

Abstract

Purpose – The purpose of this paper to identify the asymmetric effect of real interest rate on housing return.

2010 JFMPC 14(3), 257-270
HK - dlog(HPI) v. d(RIR)

Notes: It shows that the bubble burst in 1998 was coincided with the several sharp rises (+4 per cent) in real interest rate after a long period of negative real interest rate; similarly, the second bubble burst in 2008 was also coincided with a strong rise (+2 per cent) in real interest rate when it had been negative.
HK - dlog(HPI) v. d(±RIR(-1))

For +RIR, correlation = -0.22

For -RIR, correlation = -0.30

negative RIR corr stronger
Econometric Models

RIR effect

\[
\begin{aligned}
\{ d\log(HPI_t) &= \alpha_1 + \alpha_2 d\log(GDP_t) + \alpha_3 d(UNE_t) + \alpha_4 d\log(EXR_t) + \beta_1 d(RIR_{t-1}) + \epsilon_t \\
\epsilon_t &= \rho \epsilon_{t-1} + \mu_t 
\end{aligned}
\]

where:

\[
\begin{aligned}
d \log(HPI_t) &= \alpha'_1 + \alpha'_2 d\log(GDP_t) + \alpha'_3 d(UNE_t) + \alpha'_4 d\log(EXR_t) \\
&\quad + \beta'_1 d(RIR_{t-1}^+) + \beta'_2 d(RIR_{t-1}^-) + \epsilon'_t \\
\epsilon'_t &= \rho \epsilon'_{t-1} + \mu'_t
\end{aligned}
\]

separate positive and negative RIR effect
### Econometric Models' Results

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model 1</th>
<th>Model 2a</th>
<th>Model 2b (excl. outliers of d(RIR)_{t-1} ≥ 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t-statistics</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Constant</td>
<td>1.86</td>
<td>1.75***</td>
<td>1.99</td>
</tr>
<tr>
<td>d log(GDPₜ)</td>
<td>0.09</td>
<td>0.61</td>
<td>0.08</td>
</tr>
<tr>
<td>d(UНЕₜ)</td>
<td>-5.30</td>
<td>3.96*</td>
<td>-5.37</td>
</tr>
<tr>
<td>d log(EXCₜ)</td>
<td>-0.38</td>
<td>2.26**</td>
<td>-0.36</td>
</tr>
<tr>
<td>d(RIR)_{t-1}</td>
<td>-0.83</td>
<td>2.47**</td>
<td>-</td>
</tr>
<tr>
<td>d(RIR)_{t-1}^+</td>
<td>-0.56</td>
<td>1.42</td>
<td>-0.56</td>
</tr>
<tr>
<td>d(RIR)_{t-1}^-</td>
<td>-1.67</td>
<td>2.43*</td>
<td>-2.61</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.64</td>
<td>7.13*</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Dependent variable: d log(HPIₜ)

<table>
<thead>
<tr>
<th>Adjusted R²</th>
<th>Durbin-Watson statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.58</td>
<td>2.03</td>
</tr>
<tr>
<td>0.60</td>
<td>1.96</td>
</tr>
<tr>
<td>-2.61%</td>
<td>0.61</td>
</tr>
<tr>
<td>1.77</td>
<td></td>
</tr>
</tbody>
</table>

White Heteroskedasticity-Consistent Standard Errors & Covariance

Observations: 101 (1984Q1-2009Q2)

**Strongly significant NEGATIVE effects of both positive and negative RIR, but the impact of negative RIR on housing return is almost 5 TIMES stronger!**
Applications

• Make a fortune!?  
  – Risky

• Preventive measures:  
  – Had the government taken my advice, the land and housing supply would have been increased to counteract the price escalation;  
  – the measures to stop foreign funds inflow would have been implemented much earlier.

• Policy review:  
  – the pros and cons of the peg;  
  – how to improve the monetary policy in the future.
Another Journal Paper is Coming Soon!

• to be published when the coming Housing Bubble Bursts in Hong Kong in 201x;
• Empirical evidence:
  – risk premium increases; or
  – money flows back to the US;
  – US currency strengthens;
  – US interest rate increases;
  – China economic growth decelerates;
  – HK inflation drops;
  – RIR becomes POSITIVE!
  – Housing price plummets!!
  – Deflation comes again!!!
End

• Contacts:
  - email: ecyyiu@yahoo.com.hk
  - blog: http://blog.yahoo.com/ecyyiuu

• Download:
  - homepage: http://ecyy.weebly.com