Housing as a Commodity

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Expected Outcomes

• What is Inflation?
  – Equation of Exchange

• Why land and housing are good hedge of inflation?
What is Inflation?

• The value of a dollar does not stay constant when there is inflation.
• The value of a dollar is observed in terms of purchasing power, which is the real, tangible goods that money can buy.
Causes of Inflation?

• Demand-Pull Inflation:
  – Too much money chasing too few goods; and

• Cost-Push Inflation:
  – Insufficient supply of a common factor of production.
Monetarism’s Definition of Inflation

- Inflation is defined as “a continuing rise in the general price level usually attributed to an increase in the volume of money and credit relative to available goods and services.” (Webster)
Equation of Exchange

• **MV = PQ**
  – M is the total nominal amount of money in circulation
  – V is the velocity of money
  – P is the price level (P hike implies inflation)
  – Q is an index of real expenditures

• PQ is the nominal GDP

• If V & Q are fixed, then M (money supply) causes inflation (a monetary phenomenon)
Why Home Owners Like (mild) Inflation?

• Homeowners with mortgages are debtors;
• Larger mortgage, longer repayment years remaining, larger the benefit.
• Mortgage monthly repayment $10,000 in 2004 = $3,365 in 2014 (if discount rate = 2%)
• Option to earn housing price appreciation;
• Very low risk due to the high leverage and moral hazard.

<table>
<thead>
<tr>
<th>Real $</th>
<th>2004</th>
<th>2005</th>
<th>...</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>If buy</td>
<td>$10,000</td>
<td>$9,804</td>
<td>...</td>
<td>$4,902</td>
<td>$4,102</td>
<td>$3,365</td>
</tr>
<tr>
<td>If rent</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$10,000</td>
</tr>
</tbody>
</table>
Exhibit 59
In high-inflation scenarios, higher real value payments in early periods are offset by lower real value payments in later periods.

Real value of payment
$ thousand

Principal of $100,000 paid over 10 periods
Fixed-rate mortgage in which nominal value of payment is the same throughout and equivalent to the payments made in period 0

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Mortgage Rate</th>
<th>Inflation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Inflation</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>High-Inflation</td>
<td>12%</td>
<td>10%</td>
</tr>
</tbody>
</table>

SOURCE: McKinsey Global Institute analysis
Inflation is a Crime

- Inflation by money supply is a crime!
- The first batch (bankers/borrowers) who got the money sure wins by buying land and housing;
- The last batch (employees) who fights for income increase to reduce the loss of purchasing power sure losses by paying higher rent, deteriorating living standards.
Why Land / Housing are Good Hedge of Inflation?

• Land and housing are excellent store of value
  – Limited supply, esp. land
  – High utility and commonly treasured
  – Durable, esp. land

• Land and housing are MONEY?
A Real Case of Land-Standard Money

- Hyperinflation caused the gold reichsmark US dollar exchange rate changed from 4.2:1 to 11 trillion:1
- Gustav Stresemann (and Hjalmar Schacht) ended the Reichsbank, and created a new currency, the rentenmark, backed by land rather than gold.
- To limit the total number of rentenmarks in circulation to 2.4 billion. (Ayres, 2014, p.88)
- The idea is from Karl Helfferich

Shortcomings of Holding Land / Housing

- Land and housing are NOT commonly used as money, because:
  - Non-divisible
  - Lumpy
  - Quality not standardisable
  - Latent defects, esp. housing
  - Immovable and illiquid
  - High transaction costs
  - Government interventions
Housing is NOT for USE, but for INFLATION HEDGE

• If Housing is for accommodation use, its housing value should be the discounted sum of future rental income:

\[ FV = (1 + r)^n \cdot PV \]
Income Approach of Housing Value

- The Discounted Cash Flow (DCF) Model:
  - $P_0$ is the present value
  - $a_t$ is the cash flow at time $t$
  - $r$ is the cost of capital (discount rate)
  - $T$ is the time of the last cash flow

\[
P_0 = \frac{a_1}{(1+r)^1} + \frac{a_2}{(1+r)^2} + \cdots + \frac{a_T}{(1+r)^T}
\]

\[
= \sum_{t=1}^{T} \frac{a_t}{(1+r)^t}
\]
Future Value to Present Value

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow</th>
<th>Discount Factor (10%)</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$50000</td>
<td>0.9091</td>
<td>$45450</td>
</tr>
<tr>
<td>2</td>
<td>$30000</td>
<td>0.8264</td>
<td>$24790</td>
</tr>
<tr>
<td>3</td>
<td>$20000</td>
<td>0.7513</td>
<td>$15030</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>$85270</strong></td>
</tr>
</tbody>
</table>
Annuity

- Annuity is a special case where each future cash flow is fixed
  - i.e. $a_t = a_1 = \text{constant}$
  - e.g. Fixed lease
- The DCF model becomes a Geometric Progression (GP)

$$
P_0 = \sum_{t=1}^{T} \frac{a}{(1+r)^t}
\quad = \frac{a}{r} \left[ 1 - (1+r)^{-T} \right]
$$
Annuity in Perpetuity

• Land cannot be destroyed nor depreciate.
• Annuity in perpetuity is a special case where future cash flow is not only fixed but is infinitely long
  – i.e. $T \rightarrow \infty$
  – e.g. freehold properties
• The formula is reduced to:

$$P_0 = \lim_{T \rightarrow \infty} \sum_{t=1}^{T} \frac{a}{(1+r)^t}$$

$$= \frac{a}{r}$$
Gordon Growth Model

- Cash flows are not fixed, but have a constant growth ($g$) pattern at each period

\[
P_0 = \frac{a}{(1+r)^1} + \frac{a(1+g)}{(1+r)^2} + \frac{a(1+g)^2}{(1+r)^3} + \ldots + \frac{a(1+g)^{T-1}}{(1+r)^T}
\]

\[
= \sum_{t=1}^{T} \frac{a(1+g)^{t-1}}{(1+r)^t}
\]

\[
= \frac{a}{r-g} \quad \text{if } T \to \infty \text{ and } r > g
\]

Further details, see
Brown and Matysiak (2000)
Yiu and Hui (2005)
An Example of Gordon Growth Model

• If a 500 sf housing unit, at Ma On Shan
• Let out at a monthly net rent $15,000 (i.e. a=$180,000 pa)
• If assuming g = inflation rate (about 4% pa)
• If the required rate of return is 6% (about long term low-risk corporate bond rate)
• i.e. r-g = 6%-4% = 2%
• The current housing yield rate is also about 2%
• Then by Gordon Growth Model, the price of the housing unit, $P = \frac{180,000}{(0.06-0.04)} = 9,000,000$
But How About When Housing is NOT only for USE?

• It works like gold, which can hedge inflation, and everyone trust it for exchange value;

• Then, how to estimate its value?
Diamond Water Paradox

• See Adam Smith’s (1776) Water-Diamond Paradox
  – Air is indispensable, very useful, but cannot generate any income;
  – Air is not an asset, though useful.
  – Diamond is useless (to me and to many people), but very valuable;
  – Diamond cannot generate income either;
  – Why diamond is expensive?
• Its Exchange Value!
## Rent v. Buy

<table>
<thead>
<tr>
<th>Rent</th>
<th></th>
<th>Buy</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial rental payment</td>
<td>$20,000</td>
<td>Down payment</td>
<td>$900,000</td>
</tr>
<tr>
<td>Total monthly rental payment</td>
<td>$10,000</td>
<td>Total monthly mortgage payment</td>
<td>$10,874</td>
</tr>
<tr>
<td>Annual maintenance and other cost</td>
<td></td>
<td>Total payments over 20 years</td>
<td>$2,000</td>
</tr>
<tr>
<td>Total payments over 20 years</td>
<td>$3,065,359</td>
<td></td>
<td>$2,649,754</td>
</tr>
<tr>
<td>Savings balance at end of 20 years</td>
<td>-$516,724</td>
<td>Appreciated home value at end of 20 years</td>
<td>$13,982,871</td>
</tr>
</tbody>
</table>

## Housing Supply is More Than Enough, if it’s NOT a Commodity

<table>
<thead>
<tr>
<th>Year</th>
<th>Private Housing</th>
<th>Subsidized Housing</th>
<th>Public Rental Housing</th>
<th>Total</th>
<th>Housing Stock – Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>542,000</td>
<td>36,000</td>
<td>533,000</td>
<td>1,111,000</td>
<td>-239,000</td>
</tr>
<tr>
<td>1993</td>
<td>833,000</td>
<td>186,000</td>
<td>677,000</td>
<td>1,696,000</td>
<td>-10,000</td>
</tr>
<tr>
<td>2003</td>
<td>1,258,000</td>
<td>395,000</td>
<td>679,000</td>
<td>2,332,000</td>
<td>251,000</td>
</tr>
<tr>
<td>2013</td>
<td>1,458,000</td>
<td>391,000</td>
<td>766,000</td>
<td>2,616,000</td>
<td>195,200</td>
</tr>
</tbody>
</table>

Taking into account the existence of 86,000 subdivided units, there can be almost 300,000 housing units owned not for genuine accommodation use.
Housing Futures – Commodity Pricing

http://www.recharts.com/cme.html
References

- Ricardo, David (1911)
- Alonso, William (1964) Location and Land Use,
The End

comments are welcome.

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