Malaysia’s House Price Dynamics: The Role of Fundamentals

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21 March 2016

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Rapid increase in Malaysia’s house price in recent years

House prices increased by 9.6% during 2010-2014, almost 3 times faster than the average increases during 2001-2009

Source: National Property Information Centre, NAPIC
Objectives of the research

To understand dynamics of the Malaysian house prices: 3 Key Questions

1. What are the drivers of the fundamental house price?
   - Role of interest rate and credit?

2. Was the increase in house prices in line with fundamentals?
   - Did house prices diverged from the fundamentals? If so, when did this occur?
   - What were the speed and duration of adjustment in prices towards the fundamental level?

3. How do the dynamic interactions between house prices and other variables in the model look like?
## Literature review

<table>
<thead>
<tr>
<th>Country</th>
<th>Data</th>
<th>Elasticity of house prices relative to selected variables (LR equation)</th>
<th>Demand variables</th>
<th>Supply variables</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 Asia-Pacific Glindro et al. (2008)</td>
<td>1993-2006</td>
<td>RGDP (0.36)</td>
<td>Real int. rate (-0.03)</td>
<td>Mortgage/GDP (0.37)</td>
<td>Land supply (0.08)</td>
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<td>Equity price index (-0.22)</td>
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<td>REER (0.55)</td>
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<td>Inst. factor (0.14)</td>
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<tr>
<td>11 European Ganoulis &amp; Giuliodori (2011)</td>
<td>1970-2004</td>
<td>Real disposable income percapita (1.0 to 1.5)</td>
<td>Real mortgage rate (-1.0 to -2.0)</td>
<td>Real mortgage debt percapita (0.2 to 0.3)</td>
<td>Housing stock, const cost (Not sig)</td>
</tr>
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<td></td>
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<td></td>
<td>Real stock price, population above 24 yrs (not sig.)</td>
</tr>
<tr>
<td>Finland Oikarinen (2009)</td>
<td>1975-2006</td>
<td>RGDP (0.35)</td>
<td>-</td>
<td>Credit/GDP (0.28)</td>
<td></td>
</tr>
<tr>
<td>Spain Gimeno &amp; Carrascal (2010)</td>
<td>1984-2009</td>
<td>Real income/household (1.02)</td>
<td>Nominal int rate (0.0)</td>
<td>Real credit/household (0.25)</td>
<td></td>
</tr>
<tr>
<td>Malaysia Glindo et al. (2008)</td>
<td>1993-2006</td>
<td>RGDP (0.41)</td>
<td>Real int. rate (0.01)</td>
<td>Mortgage/GDP (0.24)</td>
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<tr>
<td>Malaysia Ibrahim &amp; Law (2014)</td>
<td>1999-2011</td>
<td>RGDP (-0.20) Not sig.</td>
<td>Nominal ST money mrkt rate (-0.1)</td>
<td>Real bank loans (0.72)</td>
<td></td>
</tr>
</tbody>
</table>
Long-run equation of house prices is specified as in equation (1):

\[
lrhp_t = \beta_0 + \beta_1 ly_t + \beta_2 R_t + \beta_3 lcredy_t + \varepsilon_t
\]

where,

\(\lrhp_t\) = natural log of real house prices (+ve)

\(ly_t\) = natural log of real income (+ve)

\(LR_t\) = lending rate (-ve)

\(lcredy_t\) = natural log of housing loans to income ratio (+ve)
Estimation procedures

1. Data and model specification
   - Quarterly data (1999-2014), 64 observations
   - Unit root & cointegration tests

2. Estimation of the long-run house prices
   
   Applying DOLS method, Equation (1)

   $$ lrhp_t = \beta_0 + \beta_1 ly_t + \beta_2 R_t + \beta_3 lcred_yt + \sum_{i=-k}^{+k} \phi_i \Delta X_{t-i} + \varepsilon_t $$

3. Short-run dynamic behavior (ECM)

4. Dynamic causal interactions (Impulse response functions)
### Unit Root Tests

<table>
<thead>
<tr>
<th>Variables</th>
<th>Integration order</th>
<th>ADF</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>X</td>
<td>ΔX</td>
</tr>
<tr>
<td><strong>Real house price</strong></td>
<td>LRHP</td>
<td>I(1)</td>
<td>0.0957</td>
</tr>
<tr>
<td><strong>Real GDP (s.a.)</strong></td>
<td>LYSA</td>
<td>I(1)</td>
<td>-3.4275*</td>
</tr>
<tr>
<td><strong>Avg. lending rate</strong></td>
<td>LR</td>
<td>I(0)</td>
<td>-5.0768***</td>
</tr>
<tr>
<td><strong>Housing loans to GDP (s.a.)</strong></td>
<td>LLOANYSASA</td>
<td>I(1)</td>
<td>-2.3196</td>
</tr>
<tr>
<td><strong>Real construc. cost</strong></td>
<td>LRCC</td>
<td>I(1)</td>
<td>-3.1461</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>LPOP</td>
<td>I(1)</td>
<td>-1.9706</td>
</tr>
<tr>
<td><strong>Housing start</strong></td>
<td>LHSTART</td>
<td>I(1)</td>
<td>-2.8695</td>
</tr>
<tr>
<td><strong>Housing stock</strong></td>
<td>LHSTOCK</td>
<td>I(0)</td>
<td>-6.1530***</td>
</tr>
<tr>
<td><strong>Equity price index</strong></td>
<td>LKLCI</td>
<td>I(0)</td>
<td>-3.3531*</td>
</tr>
</tbody>
</table>

Note: Tests for level variables include both constant and trend terms, while the test for first-differenced variable include only the constant term; All variables in natural log form, except for interest rates; ‘s.a.’ refers to seasonally-adjusted series *** , ** and * denote significance at 1%, 5% and 10% significance levels respectively.
# Cointegration Tests

<table>
<thead>
<tr>
<th>System</th>
<th>Variables</th>
<th>No of cointegrating equations at 0.05 level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Trace</td>
</tr>
<tr>
<td>1</td>
<td>LRHP, LYSA, LR, Lloanysa</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>LRHP, LYSA, LR, Lloanysa, GFC dummy</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>LRHP, LYSA, LR, Lloanysa, LRCC</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>LRHP, LYSA, LR, Lloanysa, LRCC, GFC</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>LRHP, LYSA, Lloanysa, LPOP</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>LRHP, LYSA, LR, Lloanysa, LPOP</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>LRHP, LYSA, LR, Lloanysa, LPOP, Lhstart</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>LRHP, LYSA, Lloanysa, Lhstart</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>LRHP, LYSA, LR, Lloanysa, Lhstart, GFC</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: The lag order is set to 2, which is sufficient to render the error terms serially correlated.

LRHP = natural log of real house prices; LYSA= natural log of seasonally adjusted real GDP; LR= nominal lending rate; Lloanysa= natural log of seasonally adjusted housing loans to GDP ratio; LRCC=natural log of real construction cost; LPOP= natural log of population; Lhstart= natural log of housing starts; GFC= dummy variable (2007-2009)
Long-run equations

System 2:
\[ lrhp_t = -7.019 + 0.809lysata_{**} + 0.096lr_{**} + 0.365lloanysa_{*} - 0.11gfc_{***} \]

System 4: Add real const.cost
\[ lrhp_t = -5.222 + 0.587lysata_{***} + 0.073lr_{**} + 0.353lloanysa_{*} + 0.207lrcc_t - 0.082gfc_{***} \]

Observations:
- Income and credit: significant and correct sign (+ve)
- Construction cost: not significant
- Interest rates: +ve relationship
- GFC dummy: significant and correct sign (-ve)

Note:
Reporting results with DOLS; Optimal lead and lag order for the DOLS estimator is based on SIC
GFC dummy variable (2007-2009)
***, ** and * denote significance at 1%, 5% and 10% significance levels respectively
Long-run equations

System 5: without int rate; add pop
\[ lrhp_t = 34.352 + 2.084lysa_{t}^{***} + 0.873lloanysa_{t}^{***} - 5.713lpop_{t}^{***} \]

System 6: add int rate
\[ lrhp_t = 39.192 + 2.182lysa_{t}^{***} - 0.028lr_t + 0.825lloanysa_{t}^{***} - 6.263lpop_{t}^{***} \]

System 8: System 5 plus housing starts
\[ lrhp_t = 34.294 + 2.075lysa_{t}^{***} + 0.883lloanysa_{t}^{***} - 5.706lpop_{t}^{***} + 0.003lhstart_{t} \]

System 9: with GFC
\[ lrhp_t = -7.21 + 0.649lysa_{t}^{***} + 0.096lr_{t}^{***} + 0.739lloanysa_{t}^{***} + 0.036lhstart_{t} - 0.091gfct_{t}^{***} \]

Observations:
- Adding population variable: significant but incorrect sign (\(-ve\))
- Housing start: not significant

Note:
Reporting results with DOLS; Optimal lead and lag order for the DOLS estimator is based on SIC
GFC dummy variable (2007-2009)
***, ** and * denote significance at 1%, 5% and 10% significance levels respectively
Core long-run model

System 2: LRHP, LYSA, LR, Lloanysa, Crisis dummy

\[ lrhp_t = -7.019 + 0.809\text{lysa}_{t}^{***} + 0.096lr_{t}^{***} + 0.365lloanysa_{t}^{**} - 0.11gf_{c}^{***} \]

Correct sign (+ve) and significant:
1% increase in income increases house prices by 0.81%

Lending rate has a positive sign and is significant at 1%:
100 basis point increase in nominal lending rate is related to 9.6% increase in house prices

Correct sign (+ve) and significant:
1% increase in mortgage to gdp ratio increases house prices by 0.36%

Correct sign (-ve) and significant

Note: ***, ** and * denote significance at 1%, 5% and 10% significance levels respectively
Actual versus fundamentals (System 2)
Error-correction model

\[
\Delta \text{lrhp}_t = -0.241 \varepsilon_{t-1} + 0.439 \Delta \text{lrhp}_{t-4} + 0.517 \Delta \text{lysa}_t - 0.017 \Delta \text{lr}_{t-4} + 0.226 \Delta \text{lloanysa}_t \\
+ 0.160 \Delta \text{lloanysa}_{t-2} - 0.108 \Delta \text{lloanysa}_{t-3} - 0.006 \\
(0.000) \quad (0.000) \quad (0.027) \quad (0.020) \quad (0.013) \quad (0.018) \quad (0.098) \quad (0.104) \\
\]

\[ R^2 = 0.463 \quad \text{Adj R}^2 = 0.390 \quad F = 6.292 \ (0.000) \]
Causal dynamic interactions

Response of LRHP to LYSA

Response of LRHP to LR

Response of LRHP to Lloanysa

Response of LYSA to LRHP

Response of LR to LRHP

Response of Lloanysa to LRHP

Note: Results from VAR in level terms; VAR lag order is set at 3, sufficient for error terms to be uncorrelated
Conclusion

1. What are the drivers of the fundamental house price?
   - House price driven primarily by demand factors (income, availability of loans and interest rates)

2. Was the increase in house prices in line with fundamentals?
   - Some misalignments, but these episodes were short-lived. Exception was the recent episode from mid-2013 onwards
   - Error correction term was significant, with house prices adjusting quickly to fundamentals

3. How do the dynamic interactions between house prices and other variables in the model look like?
   - House prices increased following positive shocks in income and credit
   - Financial accelerator mechanism
References


THANK YOU!

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Trends in house prices and selected key variables
Evolution of measures implemented: Gradual and pragmatic approach

Legend

- Govt measures
- BNM measures

Jan-10: Reintroduction of 5% RPGT if sells <5 years
Nov-10: 70% LTV cap (individuals)
Jan-11: 10% RPGT if sells <2 years
Dec-11: 60% LTV cap (non-individuals)
Jan-12: Guidelines on Responsible Financing
Apr-12: Higher floor price for foreigners (RM250k to RM500k)
Jan-13: 15% RPGT if sells < 2 years
Jul-13: 25 years max tenure for housing loans
Oct-13: Budget 2014 (property measures)
Nov-13: Prohibition of lending for DIBS
Jan-14: 30% RPGT if sells < 3 years; Price transparency
Apr-14: RM1m floor price for foreigners
Trends in RGDP, house prices and ALR
Motivation and introduction

- Sharp increase in Malaysian house prices during 2009-2012
  - Rate of growth in house prices almost trebled to 9.6% (2000-09: 3.4%)
  - Negative implications on housing affordability, given slower rate of increase in income

- Home ownership rate is relatively high at 76% in 2014
  - HK (51%); Japan, US, UK, Australia, Canada (61-69%), Singapore (89%)

- Households are heavily leveraged, with mortgages accounting for about 40% of household debt
  - High household debt of 88.4% of GDP

- Housing wealth is one of the important determinant of private consumption
  - Housing and financial wealth contribute about one-third to private consumption
Malaysian households are highly indebted, and is among the highest in emerging Asia
Faster growth in house prices relative to income led to a worsening of housing affordability

In recent years, house prices grew at a faster pace compared to income... leading to broad-based worsening of affordability across most major states

<table>
<thead>
<tr>
<th>Location</th>
<th>2009</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuala Lumpur</td>
<td>4.6</td>
<td>5.4</td>
</tr>
<tr>
<td>Penang</td>
<td>4.0</td>
<td>5.2</td>
</tr>
<tr>
<td>Johor</td>
<td>3.7</td>
<td>4.2</td>
</tr>
<tr>
<td>Selangor</td>
<td>3.6</td>
<td>4.0</td>
</tr>
<tr>
<td>Malaysia</td>
<td>4.4</td>
<td>4.4</td>
</tr>
</tbody>
</table>

House Prices and Household Income

- Median house prices
- Median household income

%CAGR

0 2 4 6 8 10 12

2004-2007 2009-2014

2.5 3.2 7.9 7.3

In recent years, house prices grew at a faster pace compared to income... leading to broad-based worsening of affordability across most major states.

*The house price-to-income ratio is widely used for evaluation of urban markets, recommended by the World Bank and United Nations and is used by the Harvard University Joint Center for Housing Studies.