Lessons from the Boom-Bust Cycle of the Greek Real Estate: Three ways to assess equilibrium
Agenda

1. Putting the Real Estate Cycle into Context
2. Thinking in terms of Residential Real Estate Equilibrium
3. Thinking in terms of Commercial Real Estate Equilibrium
1 Putting the Real Estate Cycle into Context

2 Thinking in terms of Residential Real Estate Equilibrium

3 Thinking in terms of Non Residential Real Estate Equilibrium
The Real Estate Sector is important because it is tightly linked to both construction & credit expansion.

Source: Bank of Greece, ELSTAT, Piraeus Bank Research
Hence, it’s fair to say that until its collapse real estate / construction was one of the key driving forces of economic activity.
All that “irrational exuberance” led to a strong price rally, only to be followed by a spectacular crush

**Residential Real Estate Price Index**  
(annual % change)

**Commercial Real Estate Price Index**  
(annual % change)
Putting the Greek Boom - Bust Cycle into a Global Context:
Results from an Event Study

Real House Prices Index (level)

Highlights

- Looking at real estate boom–bust cycles in 16 countries between 1970 - 2019, we conclude that the boom phase of Greek Real Estate market wasn’t “exceptionally strong”.
- On the contrary, the bust phase was one of the most severe incidents recorded in history.
Reverse – engineering the Demand & Supply Nexus since 1999

Notarial deeds of real estate transactions Vs Residential Price Index

( % change) ( % change)

A Buyers’ market

Beginning a new cycle?

A Sellers’ market

Sellers have not lowered prices enough to attract buyers

Buyers are having increasing difficulties following the market higher

Source: Bank of Greece, ELSTAT, Piraeus Bank Research
Putting the Real Estate Cycle into Context

Thinking in terms of Residential Real Estate Equilibrium

Thinking in terms of Commercial Real Estate Equilibrium
(I) A simple Affordability assessment approach:
House prices at least 7% undervalued

Residential Affordability Ratio, $RAR_{2010}$ ($2010 = 100$)

$RAR_{t}^{2010} = 100 \times \frac{RP_{t}}{HDI_{t} \times \frac{RP_{t=2010}}{HDI_{t=2010}}}$

Where:
- $HDI$: Household Disposable Income, current prices at time $t$
- $RP$: Residential price at time $t$
- $HDI_{t=2010}$: Household Disposable Income, current prices at base year 2010
- $RP_{t=2010}$: Residential price at base year 2010

Source: Bank of Greece, ELSTAT, Piraeus Bank Research
(II) An Econometric approach:
House prices to grow by 8.2% in 2020 and 7.4% in 2021, declining gradually to 3% by 2027

\[ RRE_{\text{growth}_t} = C_1 \text{RGDP}_{\text{growth}_t} + C_2 \text{RRE}_{\text{growth}(t-1)}, \quad \text{at time } t \]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Coefficient (beta)</th>
<th>t – Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGDP_{\text{growth}_t}</td>
<td>0.67</td>
<td>2.43**</td>
</tr>
<tr>
<td>RRE_{\text{growth}(t-1)}</td>
<td>0.63</td>
<td>4.82**</td>
</tr>
<tr>
<td>Adjusted R - squared</td>
<td>0.78</td>
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** Statistical significant at 5% level, p-value < 0.05

\text{RRE}_{\text{growth}_t}: \text{Residential price index, } \% \text{ change at time } t
\text{RGDP}_{\text{growth}_t}: \text{Real GDP, } \% \text{ change at time } t

Source: Bank of Greece, ELSTAT, Piraeus Bank Research
(III.a) Maximum Borrowing Capacity approach*

The aim of the approach is to estimate the value of real estate according to economic fundamentals without any reference to observed house prices.

In a nutshell, we compute the house prices implied by the maximum amount households’ can safely borrow from a bank given:

- their disposable income
- mortgage rates
- prevailing levels of Loan to Value

The mathematical formula of the model is:

\[ P_t = \varphi^{-1} \cdot \frac{f(i_t, N) \cdot \alpha \cdot Y_t}{H} \]

where,
- \( P_t \): Implied House Price per sq. meter
- \( \varphi \): Loan to Value ratio
- \( \alpha \): Debt Service to Income ratio
- \( Y_t \): Disposable Income
- \( H \): House Size (in sq. meters)
- \( f(i_t, N) \): Present value formula based on interest rates and mortgage maturity

(III.b) Maximum Borrowing Capacity approach: Model Inputs

Inputs to the Model

- House Size \((H)\): 80 sq. meters
- Loan Maturity \((N)\): 20 years
- Loan to Value \((\varphi)\): 70%
- Debt Service to Income \((\alpha)\): 35%

Household Disposable Income

\(\%\) growth rate

Mortgage rates

\%(\)

Source: Bank of Greece, ELSTAT, Eurostat, Piraeus Bank Research
(IV) Maximum Borrowing Capacity Model: Estimation Results

**Highlights**

- From 2000 to 2010, Greek residential real estate prices were easily affordable only for households in the upper 20% & 10% of decile of disposable income level. Conversely, they were overvalued by 12-35% for middle class income levels.

- Model valuations based on mean disposable income show that house prices were undervalued by 14% in 2018 and 10% in 2019.

- For households with disposable income in the upper 30% of the income distribution the undervaluation is even more pronounced at 34% in 2019.
According to our projections for household disposable income growth and the expected evolution of mortgage rates for the next 8 years we anticipate house prices to increase by 3.5% per annum reaching pre-crisis levels no sooner than 2027.
1 Putting the Real Estate Cycle into Context

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3 Thinking in terms of Commercial Real Estate Equilibrium
A simple Affordability assessment approach:
Office prices at least 4% undervalued

Commercial Affordability Ratio, CRAR_{2010} \ (2010 = 100)

\[ CRAR_t^{2010} = 100 \times \frac{CRP_t}{DI_t} \cdot \frac{CRP_{t=2010}}{DI_{t=2010}} \]

Where:
- DI: Disposable Income, current prices at time t
- CRP: Commercial price at time t
- DI_{t=2010}: Disposable Income, current prices at base year 2010
- CRP_{t=2010}: Commercial price at base year 2010

* Office price index
1995 – 2010 data: Piraeus Bank estimate

Source: Bank of Greece, ELSTAT, Piraeus Bank Research
### Estimation Output

<table>
<thead>
<tr>
<th>Coefficient (beta)</th>
<th>t – Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGDP_grwth (t)</td>
<td>0.83</td>
</tr>
<tr>
<td>CRE_grwth (t - 1)</td>
<td>0.48</td>
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<tr>
<td>Adjusted R - squared</td>
<td>0.75</td>
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</tbody>
</table>

### Commercial Real Estate Price Outlook*

(annual % change)

**CRE prices to grow by 4.8% in 2020 and 4.4% in 2021, declining gradually to 2.7% by 2027**

Source: Bank of Greece, ELSTAT, Piraeus Bank Research
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