The Housing Market and the Irish Macroeconomy

Kieran McQuinn

*Macroeconomic Implications of Housing Markets*

European Commission, Brussels
November 30th, 2016
Overview

- The interaction between the Irish housing market and
  - The financial sector and the fiscal accounts

- Both the property and mortgage market are still in recovery mode

- Empirical analysis suggests both:
  - House prices and supply are below long-run equilibrium levels

- Presentation draws on two separate papers:
  1. “Macroprudential policy in a recovering property market: Too much too soon?”
     - with David Duffy and Niall Mc Inerney
  2. “Assessing the sustainable nature of housing-related taxation receipts: The case of Ireland”
     - with Diarmaid Smyth
The Housing Market and the Irish Financial Sector:

- Examine implementation of macroprudential policy in the Irish market
- Structural econometric model of Irish housing and mortgage markets
- To assess the impact of changes in credit conditions on
  - Both property and credit/mortgage markets
- Macroprudential policy operates via demand for new mortgages
- Main conclusion:
  - Policy exerts a contractionary impact on a recovering market
The Housing Market and the Irish Fiscal Accounts:

- Housing market dis-equilibrium and exchequer receipts
- Turbulent relationship between taxation and housing
- Using models of house prices and supply
  - Identify periods of dis-equilibrium
- Quantify revenue windfalls/losses
  - From the Irish property market
- Since the financial crisis:
  - EU and domestic policy developments since then
  - Fiscal rules, EU semester, budgetary councils
Irish Housing Market: A Current Assessment
Summary of House Prices and Housing Supply Models

- House price model (Kelly & McQuinn (2014))
  - Standard inverted demand function
  
  \[
  \ln p = \frac{\alpha_1}{\alpha_2} \ln \left( \frac{y}{\text{pop}} \right) - \frac{1}{\alpha_2} \ln \left( \frac{h}{\text{pop}} \right) - \ln uc + \frac{\alpha_3}{\alpha_2} \ln \text{pop}
  \]

- Housing supply (Duffy, Byrne & FitzGerald (2014))
  - Independent households = population forecasts $\times$ headship rate
    - Headship rate = rate of household formation
    - Proportion of individuals in an age cohort “head of household”
    - Micro data from either Census or QNHS

- Solution to both models = estimate of fundamental level
Since 2013 Irish economy has shown significant signs of recovery
- Dublin house prices increasing strongly since late 2012
- Regional prices beginning to increase in 2014

McQuinn (2014) suggests prices still below long-run equilibrium
- Market may be near to equilibrium in Dublin

However analysis of the supply-side suggests
- Supply well below equilibrium level (Duffy et al, 2014)
- 25,000 units required - actual supply = 14,500
- Outstanding mortgage stock continues to decline

Examination of credit aggregates reveals continuing declines
Actual and Fundamental Irish House Prices

Actual and Fundamental House Prices

Logs

2003 2005 2007 2009 2011 2013
4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9

Actual and Fundamental House Prices

Actual
Fundamental

McQuinn
Housing and Macroeconomy
November 30th, 2016
## Irish Housing Supply and Structural Demand

### Actual Housing Supply and Structural Demand 2008 - 2015

#### Units

<table>
<thead>
<tr>
<th>Year</th>
<th>Structural Demand</th>
<th>Actual Supply</th>
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<tbody>
<tr>
<td>2008</td>
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<td>2014</td>
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<td>2015</td>
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</tbody>
</table>

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**Graph:**

- **X-axis:** Year (2008 to 2015)
- **Y-axis:** Units
- **Legend:**
  - Structural Demand (Blue)
  - Actual Supply (Green)
Housing and the Financial Sector
The Irish Mortgage Market in Context

- Significant financial deregulation and liberalisation since 1980s
  - Removal of credit and interest-rate controls

- Late 1990s: most significant structural change in provision of credit
  - Ability of Irish banks to attract deposits from non-residents
  - International funding fueled increase in loan-to-deposits (LTD) ratio

- Credit supply schedule became flatter
  - Rising credit demand accommodated without increasing interest rates

- Substantial exposure to residential (and commercial) property market
  - Proliferation of mortgage products
  - Loans with longer maturities and higher LTVs and LTIs (Doyle, 2009)
Macroprudential Policy and the Housing Market

- Economic rationale:
  - Limit household leverage and income gearing
  - Lower leverage may lead to less speculation ("more skin in the game")
  - Dampen procyclicality of bank lending and financial accelerator effects
  - lower LTIs improve affordability providing greater resilience to income and interest rate shocks

- Costs:
  - Some agents are rationed out of the market
  - Calibration is difficult
  - Distort market outcome

- Central Bank of Ireland introduce
  - Limits on LTVs and LTIs in January 2015
A Structural Model of Mortgage and Housing Markets

- Inextricable link between Irish property and mortgage market
- Estimate a structural model of Irish housing and credit markets
  - Crucially allows for macroprudential policy
  - (Gerlach-Kristen and McInerney, 2014)
- Isolates supply and demand factors in mortgage and housing markets
- Jointly estimated using 3SLS to
  - Capture spillovers and instrument for potentially endogenous variables
- Use the model to simulate:
  - The potential impact of recently introduced mortgage restrictions
Mortgage Demand

- Model demand for new mortgages = f(house prices, household income, credit conditions and the cost of borrowing)

- Endogeneity of LTV and LTI?
  - Banks vary ratios in response to conditions in the housing market?
  - Remove demand-side changes in LTV and LTI

\[
\text{NewMortgages}_t = \alpha_1 + \beta_1 \text{NewMortgages}_{t-1} + \beta_2 \text{RMorRate}_t \\
+ \beta_3 \Delta \text{Income}_t + \beta_4 \Delta \text{HPrice}_{t-1} + \beta_5 \text{LTI}_t \\
+ \beta_6 \text{LTV}_t + \beta_7 \text{Spread}_t + \epsilon_{1,t}
\]

- Mortgage stock evolves according to perpetual inventory method
Simulation: Potential Impact of Mortgage Restrictions by percent 'Displaced'

% Deviation from Historical Baseline

New Mortgages

Mortgage Stock

House Prices

Completions

Housing Stock

Mortgage Rate
Housing and the Financial Sector - Conclusions

- Some Caveats
  - Model assumes raising and lowering LTI/LTV has symmetric effects
  - Macroprudential policy may work via expectations

- Overall
  - Macroprudential policies necessary for a stable housing/credit market
  - Simulations: suggest prices constrain housing supply ceteris paribus
  - Alter tenure choice putting upward pressure on rents

- Limits on LTV and LTI
  - More effective when house prices and credit growing strongly?
  - Rules regime where countercyclical macroprudential rules parameterised
  - Incorporating house price, credit and supply indicators
  - Ultimately rules better able to influence expectations?
Fiscal Accounts and Housing
In light of the post 2007 sharp contraction in both
  - Taxation receipts and housing activity

Empirically quantify
  - *Short-fall* in taxation receipts
  - Due to the underperformance of the housing market

Comment on the importance of granular level assessment
  - Given the more “macro/aggregate” type policy responses
General Government Debt

% of GDP

1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015

20 40 60 80 100 120
Sustainable Level of Taxation Receipts?

- Estimates of housing market equilibrium

- We relay the housing components of VAT, Stamps and CGT

- To key activity levels in the housing market
  - Prices and Supply

- To generate an equilibrium level of both we need
  - A model of house prices (Kelly and McQuinn (2014)) and
  - Long-run supply (Byrne, Duffy and FitzGerald (2014))
Modelling Taxation Components

- Housing components of CGT, stamp duty and VAT \((Q_t)\)
  - Specified as a function of house prices and supply

\[
Q_t = f(P_t, H_t)
\]

- All three items are modelled in log-linear manner

\[
c_t = \gamma_0 + \gamma_1 p_t + \gamma_2 h_t + \epsilon_t
\]

\[
v_t = \alpha_0 + \alpha_1 p_t + \alpha_2 h_t + \epsilon_t
\]

\[
s_t = \beta_0 + \beta_1 p_t + \beta_2 h_t + \epsilon_t
\]
Windfall Estimates for Capital Gains Tax

Fitted and Counterfactual

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Windfall Amount

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<td>Millions</td>
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<td>60</td>
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Fitted Value

CFactual

- McQuinn
- November 30th, 2016
Windfall Estimates for Stamp Duty

Fitted and Counterfactual

Windfall Amount

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November 30th, 2016

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Windfall Estimates for VAT

Fitted and Counterfactual

Fitted Value

CFactual

logs


3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25

Windfall Amount

Millions


-40
-20
0
20
40
60
### Table: Average Quarterly Actual and Windfall Levels €(m)

<table>
<thead>
<tr>
<th>Period</th>
<th>Actual</th>
<th>CGT Windfall</th>
<th>%</th>
<th>Stamp Duty Actual</th>
<th>Windfall</th>
<th>%</th>
<th>Actual</th>
<th>VAT Windfall</th>
<th>%</th>
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<tbody>
<tr>
<td>2006 - 2008</td>
<td>114.1</td>
<td>37.3</td>
<td>33</td>
<td>234.5</td>
<td>74.9</td>
<td>32</td>
<td>206.8</td>
<td>37.1</td>
<td>18</td>
</tr>
<tr>
<td>2010 - 2013</td>
<td>19.2</td>
<td>-9.9</td>
<td>-52</td>
<td>16.5</td>
<td>-19.5</td>
<td>-118</td>
<td>137.4</td>
<td>-18.7</td>
<td>-14</td>
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### Table: Total Actual and Windfall Levels €(m)

<table>
<thead>
<tr>
<th>Period</th>
<th>CGT Stamps</th>
<th>Actual</th>
<th>VAT</th>
<th>CGT Stamps</th>
<th>Windfall</th>
<th>VAT</th>
<th>%</th>
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<tbody>
<tr>
<td>2006 - 2008</td>
<td>1,368.9</td>
<td>2,814.4</td>
<td>2,481.2</td>
<td>447.1</td>
<td>899.4</td>
<td>445.1</td>
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<td>2010 - 2013</td>
<td>307.1</td>
<td>264.1</td>
<td>2,199.1</td>
<td>-158.7</td>
<td>-311.9</td>
<td>-298.6</td>
<td>-28</td>
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</table>
Implications for the Fiscal Framework?

- Strengthened fiscal framework (SGP)

- Gives prominence to headline aggregate concepts
  - GG balance, structural budget balance, GG debt to GDP

- Also, many countries have set-up fiscal councils
  - While these do improve fiscal discipline

- Irish experience argues for a parallel granular approach
  - Would GG deficit (and debt) ratios reflect
  - Underlying weakness of the public finances circa 2007?
Concluding Comments

- Over the past 30 years a number of periods where
  - Where housing market dis-equilibria has
  - Impacted on the public finances

- Concept of windfall gains is quite popular

- However, the post 2007 overcorrection of the property market
  - Related taxes artificially low?
  - Concept of windfall losses.

- Structural deficit overstated as a consequence?

- Modelling key taxation aggregates - forecasting perspective
  - IFAC working paper (Hannon, Leahy & O’Sullivan (2015)).
Thank You
Irish Mortgage Credit Market

Change and Total Stock of Mortgage Credit: 2004 - 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Stock</th>
<th>Annual Change</th>
</tr>
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<tbody>
<tr>
<td>2004</td>
<td>50000</td>
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</tr>
<tr>
<td>2006</td>
<td>60000</td>
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<td>2012</td>
<td>90000</td>
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<tr>
<td>2014</td>
<td>100000</td>
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McQuinn
Housing and Macroeconomy
November 30th, 2016
Breaking out the housing related component

- Exchequer tax data (1984 - present)
  - Seasonally adjusted

- Focus on property dependent taxes
  - VAT, stamps and CGT

- Breaking out property-related component:
  - Revenue Commissioners and Department of Finance data
Computing Exogenous Components of LTI and LTV

<table>
<thead>
<tr>
<th></th>
<th>$\Delta LTI_{raw_t}$</th>
<th>$\Delta LTV_{raw_t}$</th>
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<tbody>
<tr>
<td>$\Delta HPrices_{t-1}$</td>
<td>1.172 (3.4)</td>
<td></td>
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<tr>
<td>$\Delta HPrices_{t-3}$</td>
<td>-0.559 -1.9</td>
<td>-0.305 (-2.0)</td>
</tr>
<tr>
<td>$\Delta HPrices_{t-4}$</td>
<td></td>
<td>0.568 (2.8)</td>
</tr>
<tr>
<td>$\Delta Income_{t}$</td>
<td>-1.113 (-4.4)</td>
<td>-0.283 (-1.8)</td>
</tr>
<tr>
<td>$\Delta Income_{t-3}$</td>
<td></td>
<td>0.356 (1.8)</td>
</tr>
<tr>
<td>$\Delta Income_{t-4}$</td>
<td>0.775 (1.8)</td>
<td></td>
</tr>
<tr>
<td>$\Delta URate_{t-3}$</td>
<td>-0.182 (-1.8)</td>
<td>-0.009 (-1.7)</td>
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<td>$\Delta MorRate_{t-2}$</td>
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<tr>
<td>$\Delta MorRate_{t-4}$</td>
<td>-0.01 (-2.1)</td>
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<tr>
<td>Adj.R2</td>
<td>0.576</td>
<td>0.495</td>
</tr>
<tr>
<td>Sample</td>
<td>1988q1-2013q4</td>
<td>1988q1-2013q4</td>
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</table>
Mortgage Supply

- Assume banking sector is monopolistically competitive so
  - Lending rates are set as a (variable) markup over funding costs
  - Funding costs given by deposit rate and money market rate

- Markup determined by risk and balance sheet factors

- Risks:
  - Household specific, macroeconomic environment and
  - Liability structure

- ECM framework where the long-run equation:

  \[
  MorRate_t = \alpha + \beta_1 MMRate_t + \beta_2 DepRate_t + \beta_3 HHEquity_t \\
  + \beta_4 URate_t + \beta_5 LTD_t + \varepsilon
  \]
Housing Demand (House Prices)

- Inverted demand for housing
- Demand for housing services =
  \[ f(\text{Disposable income, user cost, credit conditions, unemployment}) \]
- Composite house price index using DoECLG, ESRI and CSO data
- ECM framework. Long-run estimated as:
  \[
  HPrices_t = \alpha + \beta_1 (HStock_t / Pop2534_t) + \beta_2 Income_t \\
  + \beta_3 User_t + \beta_4 (MorStock_t / Income_t) + \epsilon_t
  \]
Housing Supply

- Profitability of investment (Tobin’s Q)
  - House price-Building cost ratio
  - proxies value of housing relative to its replacement cost

- Two credit channels
  - User cost of capital (real nfc lending rate)
  - Credit conditions (construction credit growth rate)

- Output gap capture macroeconomic uncertainty

\[ \text{Completions}_t = \alpha + \beta_1 \text{Completions}_{t-1} + \beta_2 (HPrice_t / BCost_t) + \beta_3 \text{NFCRate}_t + \beta_4 \triangle \text{CLoans}_t + \beta_5 \text{Gap}_t + \beta_6 \text{Insolv}_t + \epsilon_t \]

- Housing Stock follows perpetual inventory approach
## Supply and Demand in the Irish Mortgage Market

<table>
<thead>
<tr>
<th>Mortgage Demand</th>
<th>Mortgage Supply</th>
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<tbody>
<tr>
<td>$\text{NewMortgages}_t$</td>
<td>$\frac{\Delta \text{MorRate}_t}{1}$</td>
</tr>
<tr>
<td>$\text{NewMortgages}_{t-1}$</td>
<td>0.672</td>
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<td>$\text{RMorRate}_t$</td>
<td>-0.025</td>
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<td>(-7.2)</td>
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<td>$\frac{\Delta \text{Income}}{1}_t$</td>
<td>0.782</td>
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<td>$\frac{\Delta \text{HPrices}}{1}_{t-1}$</td>
<td>0.534</td>
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<td>$\text{LTV}_t$</td>
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<td>$\text{LTI}_t$</td>
<td>0.371</td>
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<td>$\text{Spread}_t$</td>
<td>-0.063</td>
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<td>(-6.1)</td>
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<td>$\text{Constant}$</td>
<td>7.048</td>
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<td>(-9.8)</td>
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<th>Adj. R²</th>
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<td>$\text{Adj. R²}$</td>
<td>0.991</td>
<td>1988q1-2013Q4</td>
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<tr>
<td>$\text{Sample}$</td>
<td>0.891</td>
<td>1988q1-2013q4</td>
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## Supply and Demand in the Irish Housing Market

<table>
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<th>Housing Supply</th>
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<tbody>
<tr>
<td>( \Delta HPrices_t )</td>
<td>( Completions_t )</td>
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<tr>
<td>( HPrices_{t-1} )</td>
<td>-0.223</td>
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<tr>
<td></td>
<td>(-4.5)</td>
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<tr>
<td>( HStock_{t-1}/Pop2534_{t-1} )</td>
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<td>(-20.5)</td>
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<td>( UserCost_{t-1} )</td>
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<td>(-13.5)</td>
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<tr>
<td>( Income_{t-1} )</td>
<td>0.206</td>
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<td>(13.4)</td>
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<tr>
<td>( MorStock_{t-1}/Income_{t-1} )</td>
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<td>( \Delta Income_{t-1} )</td>
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<tr>
<td>( \Delta(MorStock_{t-1}/Income_{t-1}) )</td>
<td>0.205</td>
</tr>
<tr>
<td></td>
<td>(2.2)</td>
</tr>
<tr>
<td>( \Delta URate_t )</td>
<td>-0.098</td>
</tr>
<tr>
<td></td>
<td>(-2.3)</td>
</tr>
<tr>
<td>( \Delta URate_{t-1} )</td>
<td>-0.097</td>
</tr>
<tr>
<td></td>
<td>(-2.8)</td>
</tr>
</tbody>
</table>

| Adj. R\(^2\) | 0.783 | Adj. R\(^2\) | 0.984 |
| Sample        | 1988q1-2013Q4 | Sample        | 1988q1-2013q4 |
Simulating the Potential Impact of Mortgage Restrictions

- Model used to simulate the impact of mortgage proposals
  - Assumptions required as to how restrictions affect average LTV and LTI

- CBI (2014) shows distribution of mortgages by LTV and LTI

<table>
<thead>
<tr>
<th>LTV</th>
<th>% Vol. New Mortgages</th>
<th>LTI</th>
<th>% Vol. New Mortgages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 90%</td>
<td>12</td>
<td>Over 4.5</td>
<td>7</td>
</tr>
<tr>
<td>Between 85 and 90%</td>
<td>23</td>
<td>Between 4 and 4.5</td>
<td>6</td>
</tr>
<tr>
<td>Between 80 and 85%</td>
<td>9</td>
<td>Between 3.5 and 4</td>
<td>10</td>
</tr>
<tr>
<td>80% and below</td>
<td>56</td>
<td>3.5 and below</td>
<td>77</td>
</tr>
</tbody>
</table>

- Weighted average LTV and LTI are 84% and 3.6 respectively

- High-LTV and high-LTI borrowers “displaced” by restrictions?
  - Assume 25% and 50% of potential high-LTV/LTI borrowers exit mortgage market
  - Average LTV falls by 8 and 14 percentage points
  - Average LTI falls by 0.04 and 0.07
Budget Balance Ratios

General Government Balance
Exchequer Borrowing Requirement

% of GDP

-17.5
-15.0
-12.5
-10.0
-7.5
-5.0
-2.5
0.0
2.5
5.0

General Government Balance
Exchequer Borrowing Requirement