Credit conditions in a boom and bust property market

Yvonne McCarthy & Kieran McQuinn
Central Bank of Ireland

Irish Economic Policy Conference,
Institute of Bankers, IFSC, January 31st 2014
Presentation overview

- Introduction to granular loan level information
  - Now collected within the central bank (CB) over the past 3 years,
  - Outline both from a research and policy perspective,
    - What it is currently used for and,
    - What it can be used for in the future.

- Tempted to suggest
  - If you want better bank data,
  - You need to experience a financial crisis!

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Specific application

- Credit and house prices
  - Notable changes in the funding of financial institutions,
  - How this has been examined

- Explicitly model changes in credit conditions
  - Allowing for household demand side considerations,
  - Estimate an index of mortgage credit availability (MMCI),
  - Capture changes in the supply function of credit.

- Given the role credit conditions can play
  - Outline some macroprudential possibilities.
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Changing nature of credit institutions funding

- Arguably the most profound impact on credit provision,
  - Domestically and internationally.

- Deeper and more integrated bond markets (within the Eurozone)
  - Abolition of exchange rate risk,
  - Substantial increase in market based funding - debt securities.

- Irish institutions particularly availed of this funding
  - Celtic tiger growth in the real economy since the mid-1990s,
  - Voracious demand for credit from Irish financial institutions.
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Figure 1: Private sector credit and deposit levels in the Irish financial system
### Summary Irish Residential Mortgage Market Statistics: 1990 - 2012

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding Level of Residential Lending</td>
<td>€ million</td>
<td>6,563</td>
<td>11,938</td>
<td>32,546</td>
<td>94,259</td>
<td>123,002</td>
<td>84,973</td>
</tr>
<tr>
<td>Total Value of Mortgages Issued</td>
<td>€ million</td>
<td>1,492</td>
<td>2,666</td>
<td>9,004</td>
<td>27,753</td>
<td>24,064</td>
<td>3,412</td>
</tr>
<tr>
<td>Average Mortgage Issued</td>
<td>€</td>
<td>42,856</td>
<td>54,094</td>
<td>111,355</td>
<td>231,206</td>
<td>271,154</td>
<td>184,113</td>
</tr>
<tr>
<td>Total Number of Mortgages Issued</td>
<td></td>
<td>34,812</td>
<td>49,288</td>
<td>80,856</td>
<td>120,037</td>
<td>88,747</td>
<td>18,532</td>
</tr>
<tr>
<td>House Prices</td>
<td>€</td>
<td>65,541</td>
<td>77,994</td>
<td>169,191</td>
<td>276,221</td>
<td>322,634</td>
<td>227,376</td>
</tr>
<tr>
<td>Housing Supply</td>
<td></td>
<td>19,539</td>
<td>30,575</td>
<td>49,812</td>
<td>80,957</td>
<td>78,027</td>
<td>8,428</td>
</tr>
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The Loan-Level Data

- Details of approximately 690,000 loans
- Can distinguish between loan & property level
- Data is a **snapshot in time**, 2011, rather than a time series
- At least 50 separate data fields, which can be organised along certain themes
- Cleaning was necessary (missing observations etc)
- See Kennedy and McIndoe Calder (2011) for more detail
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What we do

- For the four FMP Irish financial institutions
  - Over the period 2000 - 2011.

- Identify the main credit channels
  - For Irish house price movements.

- Using both the income survey and the loan level data

- Estimate the degree to which these conditions changed
  - Allowing for demand-side changes.
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Specific channels of credit

- Everyone knows about loan-to-value ratios
- Another significant channel - take a mortgage annuity $B_t$

$$B_t = \kappa Y_t \left( \frac{1 - (1 + R_t)^{-\tau}}{R_t} \right)$$

- $Y_t$ is disposable income, $R_t$ is mortgage interest rate and $\tau$ is the mortgage duration loan level.
- Solve for “$\kappa$”

$$\kappa = \frac{B_t}{Y_t \left( \frac{1 - (1 + R_t)^{-\tau}}{R_t} \right)}$$

- The proportion of income assumed to go on the mortgage repayment
  - We refer to this as the *income fraction*. 
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- Concept is akin to the more standard loan-to-income (LTI) ratio

  \[ \kappa = LTI \times \frac{1}{\left( \frac{1-(1+R_t)^{-\tau}}{R_t} \right)} \]

- However, we think it has an added richness as

- Unlike the LTI,
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Figure 2a: Easing of credit conditions (income fraction): 2000 - 2011
Figure 2b: Easing of credit conditions (loan to value ratio): 2000 - 2011
Figure 2c: Easing of credit conditions (mortgage term): 2000 - 2011
Figure 3: Income fractions by income quintile across the 4 covered institutions.
Figure 4: Easing of income fraction by source of loan
Figure 5: Income fractions and LTV by income quintile
What caused the changes in credit channels?

- Allowing for demand-side factors

  - Were there changes in credit conditions over the period?

  - Similar to the CCI of Fernandez-Corugedo and Muellbauer

  - We use time-dummies to proxy for changes in standards
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Modeling credit conditions

- Estimate a regression model
  - For both the income fraction and loan to value ratios.

- We allow for household level income and mortgage interest rates

- Along with, information on:
  - Age and gender of the household,
  - Educational attainment,
  - Employment status and category,
  - Whether the household has additional borrowings.
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Credit channel model estimates

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>( \kappa )</th>
<th></th>
<th>( \text{ltv} )</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>T-Stat</td>
<td>Coefficient</td>
<td>T-Stat</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.08</td>
<td>-11.20</td>
<td>1.22</td>
<td>5.78</td>
</tr>
<tr>
<td>((p/y)_i)</td>
<td>0.45</td>
<td>17.41</td>
<td>-0.54</td>
<td>-18.71</td>
</tr>
<tr>
<td>(r_i)</td>
<td>1.00</td>
<td>0.39</td>
<td>-6.99</td>
<td>-2.44</td>
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<tr>
<td><strong>Controls:</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>num</td>
<td>-0.05</td>
<td>-1.92</td>
<td>-0.04</td>
<td>-1.59</td>
</tr>
<tr>
<td>female</td>
<td>0.01</td>
<td>0.60</td>
<td>0.04</td>
<td>1.37</td>
</tr>
<tr>
<td>public</td>
<td>-0.02</td>
<td>-0.84</td>
<td>-0.04</td>
<td>-1.30</td>
</tr>
<tr>
<td>pdh</td>
<td>0.04</td>
<td>0.97</td>
<td>0.04</td>
<td>0.88</td>
</tr>
<tr>
<td>self</td>
<td>-0.01</td>
<td>-0.39</td>
<td>-0.03</td>
<td>-0.74</td>
</tr>
<tr>
<td>saving</td>
<td>-0.02</td>
<td>-1.02</td>
<td>-0.02</td>
<td>-0.82</td>
</tr>
<tr>
<td>ed – medium</td>
<td>-0.03</td>
<td>-0.87</td>
<td>-0.02</td>
<td>-0.37</td>
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<tr>
<td>ed – high</td>
<td>0.05</td>
<td>1.27</td>
<td>0.10</td>
<td>2.14</td>
</tr>
<tr>
<td>addition</td>
<td>-0.09</td>
<td>-2.37</td>
<td>-0.08</td>
<td>-1.82</td>
</tr>
<tr>
<td>age</td>
<td>-0.01</td>
<td>-6.05</td>
<td>-0.02</td>
<td>-12.76</td>
</tr>
<tr>
<td><strong>Year dummies:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>0.09</td>
<td>1.22</td>
<td>0.09</td>
<td>0.99</td>
</tr>
<tr>
<td>2002</td>
<td>0.08</td>
<td>1.01</td>
<td>0.12</td>
<td>1.35</td>
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<td>2003</td>
<td>0.03</td>
<td>0.39</td>
<td>0.11</td>
<td>1.23</td>
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<tr>
<td>2004</td>
<td>-0.02</td>
<td>-0.19</td>
<td>0.06</td>
<td>0.60</td>
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<tr>
<td>2005</td>
<td>0.10</td>
<td>1.19</td>
<td>0.23</td>
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<td>2006</td>
<td>0.08</td>
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<td>0.23</td>
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<tr>
<td>2007</td>
<td>0.18</td>
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<td>2008</td>
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<td>2.05</td>
<td>0.17</td>
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<td>-0.05</td>
<td>-0.50</td>
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N = 953
Figure 6: Irish mortgage market credit indicator (MMCI)
Macroprudential (MP) application?

- Prevent future credit-fuelled housing booms?

- Future research to look at the application of certain MP rules:

\[ \kappa^* = \bar{\kappa}^{2000-2004} + \lambda_{\kappa} (p^f_t - p_t) \]

\[ LTV^* = \bar{LTV}^{2000-2004} + \lambda_{LTV} (p^f_t - p_t) \]

- where:
  - \( \lambda \) is an adjustment rate specified by the authority and
  - \( p^f_t \) is the fundamental, as opposed to the actual, \((p_t)\), house price.

- Rules are counter-cyclical in nature
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Concluding comments

- Greater availability of micro, loan-level data
  - Increasingly central to both the
    - Regulatory and research functions of the CB.
  - Can be used to address a variety of key issues
    - Provision of credit in different markets,
    - Stress-testing of institutions.
  - Facilitates more intrusive supervision
  - Significant potential for well calibrated macroprudential rules
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