Living with mortgage break fees

Toby Daglish and Nimesh Patel

June 21, 2010
Sourcing Loans

- Deposits.
Sourcing Loans

- Deposits.
- Wholesale money market.
Interest Rate Risk

- Bills short maturities. Floating rates.
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- Bills short maturities. Floating rates.
- Interest rate risk.
- Swaps.
The Use of Swaps

- Fixed-floating swap.
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- Fixed-floating swap.
- Making fixed swap payments.
The Use of Swaps

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- Making fixed swap payments.
- Converted the borrower’s loan.
Debtholders $\xrightarrow{\text{floating}}$ Bank $\xleftarrow{\text{fixed}}$ Borrower
Bank Activity
Break Fee Calculation
Recent Interest Rate Behaviour
Break Fees
Optimal Breaking
A model for mortgage refinancing
Estimates
Optimal refinancing
Choosing a mortgage
Economic significance
Conclusion

Debtholders  floating  Bank  fixed  Borrower

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Swap  floating  fixed
Responding to a Break

Two possible responses.
Responding to a Break

- Two possible responses.
- Make a new loan, or
Responding to a Break

- Two possible responses.
- Make a new loan, or
- Unwind the swap.
Re-lending the Money

- Changes in interest rate.
Re-lending the Money

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- Profit/Loss determined by retail rates.
Re-lending the Money

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- Fall in rates.
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- Loss to bank. Break fee charged.
Unwinding the Swap

Net decline in business.
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The New Zealand Banks

- Optimal response.
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- ASB, BNZ and National Bank base the calculation on the first response (retail methodology).
- ANZ, Kiwibank and Westpac base the calculation of the second response (wholesale methodology).
- The fee under each methodology is a measure of the loss to the bank as a result of that particular response to a break.
Wholesale Zero Rates

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Recent Interest Rate Behaviour

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Recent Interest Rate Behaviour

- Large swings in interest rates over the past decade has lead to volatile movement in break fees.
- 1999 to 2004. Volatile movement. OCR
- 2005 to late 2007. Steadily increasing
- Rising spreads.
Break Fees

- Sign of interest rate change.
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- Magnitude of the interest rate change, the size of prepayment and the remaining payments.
Break Fees

- Sign of interest rate change.
- Magnitude of the interest rate change, the size of prepayment and the remaining payments.
- The following break fee calculations are for a five year fixed term, a prepayment of $100,000 and a mortgage term of 30 years.
5 Year Break Fees – Wholesale, $100,000 Prepayment, 30 Year Term

- 4 years remaining
- 3 years remaining
- 2 years remaining
- 1 year remaining

Date (yr)

Fee ($)
Wholesale Break Fee Characteristics

- Reflects interest rate movement.
Wholesale Break Fee Characteristics

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- The fee was volatile for the first half of the decade, non-existent while rates were rising and then spiked once the financial crisis struck.
Retail Break Fee Characteristics

- Similar to wholesale break fee.
Retail Break Fee Characteristics

- Similar to wholesale break fee.
- Smaller peak.
Retail Break Fee Characteristics

- Similar to wholesale break fee.
- Smaller peak.
- At their peaks the size of the break fees for the retail and wholesale methodologies were 8% and 15% respectively.
Should a Break Fee be Charged?

- Spiked to enormous levels.
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- Spiked to enormous levels.
- Too costly for most.
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- Lending would be a riskier business for banks.
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- Too costly for most.
- What would happen if fees are not charged?
- Huge number of breaks.
- Lending would be a riskier business for banks.
- Higher lending rates overall.
The Chance to Break Profitably

Why borrow from a bank employing a wholesale methodology?
The Chance to Break Profitably

- Why borrow from a bank employing a wholesale methodology?
- Opportunity to break profitably.
The Chance to Break Profitably

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- Gain to borrower. Equal to retail calculation.
The Chance to Break Profitably

- Why borrow from a bank employing a wholesale methodology?
- Opportunity to break profitably.
- Gain to borrower. Equal to retail calculation.
- Not the case for wholesale calculation.
Wholesale Customer Payoff – 5 Year, $100,000 Prepayment, 30 Year Term

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- 3 years remaining
- 2 years remaining
- 1 year remaining

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Living with mortgage break fees
Lessons from America?

- American mortgage has two options:
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  - Refinance (costlessly) when rates fall.
  - Default when house price falls.
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  - Default when house price falls.
- Mortgages well studied – can be priced using real-options analysis.
- Empirical support for households behaving optimally.
Interest rates

- Two components:
Interest rates

- Two components:
  - Wholesale rate.
  - Credit spread.
Interest rates

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- These are *negatively correlated*.
  - Banks “buffer” customers against fluctuations.
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- Longer term rates are consistent with these processes.
Deciding to break

- Household has option to refinance at any point.
Deciding to break

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- Chooses to do this in order to minimise value of loan.
  - i.e. refines when rates are low enough to be profitable after break fee.
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  - Reflects job loss, house sale, etc.
- Bank forgives 20% prepayment.
Model applied to NZ (and Australia)

\[
dr_t = a_r(\mu_r - r_t)dt + \sigma_r r_t^\gamma r_t dW_{rt} \\
ds_t = a_s(\mu_s - s_t)dt + \sigma_s s_t^\gamma s_t dW_{st}
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<th>( \mu_r )</th>
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Both countries have similar long term wholesale rates and spreads ($\mu_r$ and $\mu_s$).
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Australian retail rates are less volatile($\gamma_r$), but volatility more sensitive to current level of $r$. 
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Australian retail rates are less volatile ($\gamma_r$), but volatility more sensitive to current level of $r$.

NZ spreads are more volatile ($\sigma_s$ big), but these are short term fluctuations ($a_s$ also big).
We are using a model which has been fitted to dynamics of short term interest rates.
Health Warning

- We are using a model which has been fitted to dynamics of short term interest rates.
- This does *not* necessarily match the yield curve exactly at any point in time.
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In particular, this model predicts that fluctuations in spreads will predominately affect short term rates.
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- Alternative: fit model to yield curve rather than historical data.
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- In particular, this model predicts that fluctuations in spreads will predominately affect short term rates.
- Alternative: fit model to yield curve rather than historical data.
- In the following slides, we adjust $\mu_r$ and $\mu_s$ to match 5 year rates as of December 2009.
Ruthless

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Living with mortgage break fees
20% Intensity

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Living with mortgage break fees
Comments

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- Since old mortgage has *higher* payments, old mortgage value is actually dependent on shorter maturity rates as well as new rate.
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Prospect of suboptimal prepayment reduces time value of option ⇒ raises rate household pays off at . . .
Comments

▶ Yield curve - low/high spreads indicate very steep curve.
▶ Since old mortgage has *higher* payments, old mortgage value is actually dependent on shorter maturity rates as well as new rate.
▶ Prospect of suboptimal prepayment reduces time value of option ⇒ raises rate household pays off at . . .
▶ Also, for upward (downward) sloping curve, short maturities are more important because household doesn’t expect to hold for full term.
Choosing a mortgage

- Household can choose term to fix for.
Choosing a mortgage

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- ... and opportunities:
  - Refinancing profitably (wholesale).
Optimal mortgage selection

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Living with mortgage break fees
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If spread is high, wholesale break fee makes more sense: may be able to refinance if retail rate falls, but wholesale rate rises.
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As rates rise, fixing for longer and longer makes sense: option to refinance more valuable than risk.

If spread is high, wholesale break fee makes more sense: may be able to refinance if retail rate falls, but wholesale rate rises.

If spread is low, lower risk retail break fee makes more sense.
Economic significance

- Is this important?
Economic significance

- Is this important?
- Do NZ refinancing options matter?
Economic significance

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- Do NZ refinancing options matter?
- Do NZ mortgage selections matter?
Economic significance

- Is this important?
- Do NZ refinancing options matter?
- Do NZ mortgage selections matter?
- If so, when?
Value gains

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Living with mortgage break fees
Comments

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- Biggest gains are where wholesale break fees are optimal.
Comments

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- Low rate environments (where floating optimal) not much gain.
- Biggest gains are where wholesale break fees are optimal.
- Customers may have a preferred bank depending on rates.
Conclusions

Positive:
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- Positive:
  - Large (economically significant).
Conclusions

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- Volatile.
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  - Households in NZ do have refinancing options, particularly for wholesale break fees.
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- **Normative:**
  - Households in NZ do have refinancing options, particularly for wholesale break fees.
  - Looking forward . . . may be opportunities with wholesale.