

Living with mortgage break fees

Toby Daglish and Nimesh Patel

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- 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

Sourcing Loans

- ▶ Deposits.

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Sourcing Loans

- ▶ Deposits.
- ▶ Wholesale money market.

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Interest Rate Risk

- ▶ Bills short maturities. Floating rates.

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Interest Rate Risk

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- ▶ Interest rate risk.
- ▶ Swaps.

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The Use of Swaps

- ▶ Fixed-floating swap.

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- ▶ Fixed-floating swap.
- ▶ Making fixed swap payments.

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The Use of Swaps

- ▶ Fixed-floating swap.
- ▶ Making fixed swap payments.
- ▶ Converted the borrower's loan.

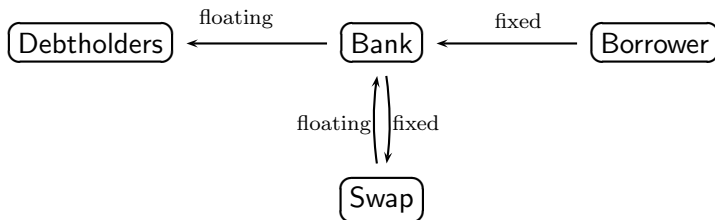
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Responding to a Break

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- ▶ Make a new loan, or
- ▶ Unwind the swap.

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Re-lending the Money

- ▶ Changes in interest rate.

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Re-lending the Money

- ▶ Changes in interest rate.
- ▶ Profit/Loss determined by retail rates.

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- ▶ Changes in interest rate.
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- ▶ Loss to bank. Break fee charged.

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Unwinding the Swap

- ▶ Net decline in business.

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Unwinding the Swap

- ▶ Net decline in business.
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The New Zealand Banks

- ▶ Optimal response.

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- ▶ Optimal response.
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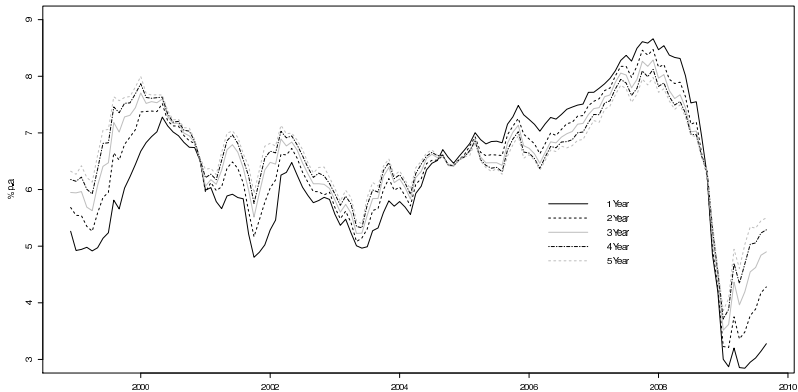
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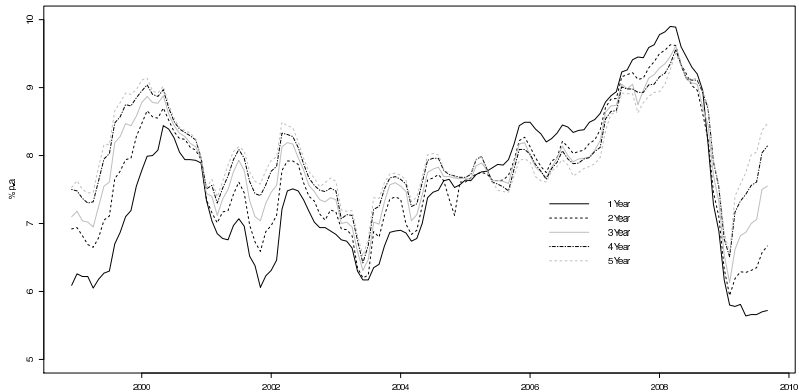
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- ▶ The fee under each methodology is a measure of the loss to the bank as a result of that particular response to a break.

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Wholesale Zero Rates



Retail Interest Rates



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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.

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- ▶ 1999 to 2004. Volatile movement. OCR
- ▶ 2005 to late 2007. Steadily increasing
- ▶ Plummeting rates. Global financial crisis.
- ▶ Rising spreads.

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Break Fees

- ▶ Sign of interest rate change.

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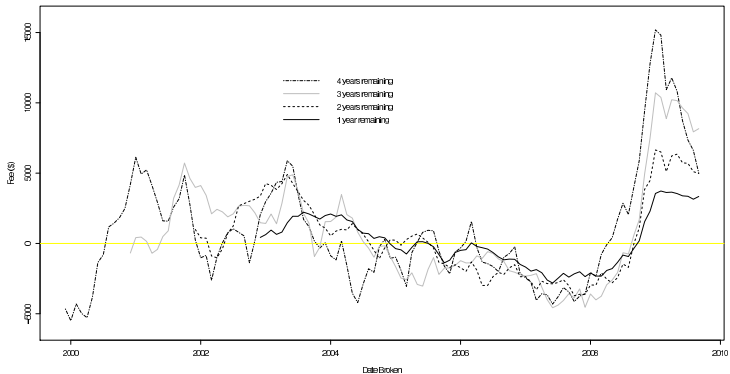
Break Fees

- ▶ Sign of interest rate change.
- ▶ 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



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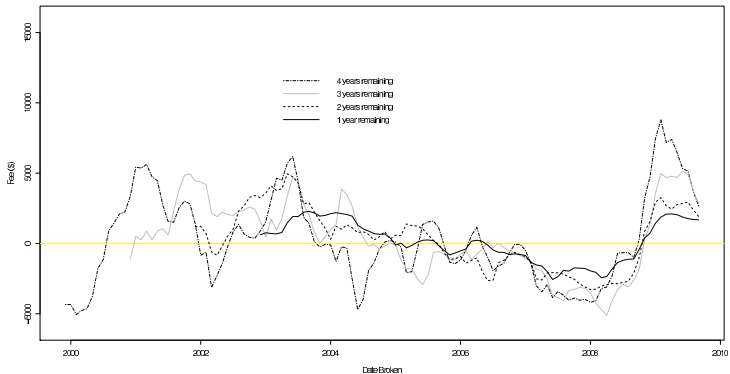
Wholesale Break Fee Characteristics

- ▶ Reflects interest rate movement.

Wholesale Break Fee Characteristics

- ▶ Reflects interest rate movement.
- ▶ 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.

5 Year Break Fees – Retail, \$100,000 Prepayment, 30 Year Term



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- ▶ Similar to wholesale break fee.

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- ▶ Smaller peak.
- ▶ At their peaks the size of the break fees for the retail and wholesale methodologies were 8% and 15% respectively.

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Should a Break Fee be Charged?

- ▶ Spiked to enormous levels.

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Should a Break Fee be Charged?

- ▶ Spiked to enormous levels.
- ▶ Too costly for most.

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- ▶ What would happen if fees are not charged?

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- ▶ What would happen if fees are not charged?
- ▶ Huge number of breaks.
- ▶ Lending would be a riskier business for banks.
- ▶ Higher lending rates overall.

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The Chance to Break Profitably

- ▶ Why borrow from a bank employing a wholesale methodology?

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The Chance to Break Profitably

- ▶ Why borrow from a bank employing a wholesale methodology?
- ▶ Opportunity to break profitably.

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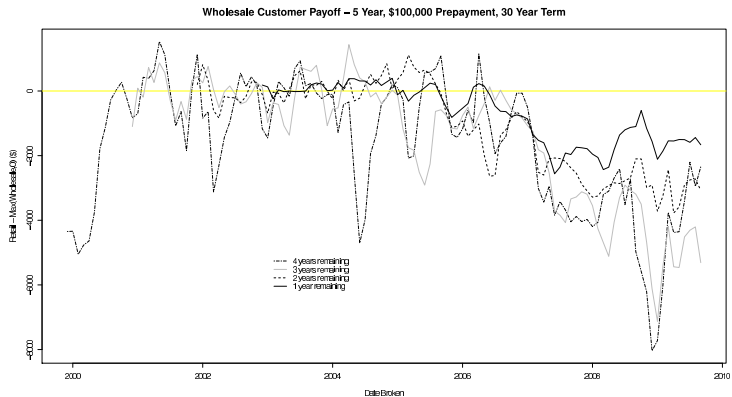
- ▶ Why borrow from a bank employing a wholesale methodology?
- ▶ Opportunity to break profitably.
- ▶ Gain to borrower. Equal to retail calculation.

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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.

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

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Interest rates

- ▶ Two components:

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 - ▶ Wholesale rate.
 - ▶ Credit spread.

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- ▶ These are *negatively correlated*.
 - ▶ Banks “buffer” customers against fluctuations.

Interest rates

- ▶ Two components:
 - ▶ Wholesale rate.
 - ▶ Credit spread.
- ▶ These are *negatively correlated*.
 - ▶ Banks “buffer” customers against fluctuations.
- ▶ Longer term rates are consistent with these processes.

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Deciding to break

- ▶ Household has option to refinance at any point.

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- ▶ Chooses to do this in order to minimise value of loan.
 - ▶ i.e. refinances when rates are low enough to be profitable after break fee.

Deciding to break

- ▶ Household has option to refinance at any point.
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- ▶ Can also (randomly) need to break mortgage.
 - ▶ Reflects job loss, house sale, etc.

Deciding to break

- ▶ Household has option to refinance at any point.
- ▶ Chooses to do this in order to minimise value of loan.
 - ▶ i.e. refinances when rates are low enough to be profitable after break fee.
- ▶ Can also (randomly) need to break mortgage.
 - ▶ Reflects job loss, house sale, etc.
- ▶ Bank forgives 20% prepayment.

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Model applied to NZ (and Australia)

$$dr_t = a_r(\mu_r - r_t)dt + \sigma_r r_t^{\gamma_r} dW_{rt}$$
$$ds_t = a_s(\mu_s - s_t)dt + \sigma_s s_t^{\gamma_s} dW_{st}$$

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μ_r	μ_s
a_r	a_s
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NZ		
μ_r	0.0468	μ_s
a_r	0.2024	a_s
σ_r	0.0257	σ_s
γ_r	0.2209	γ_s
		ρ

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	NZ		NZ
μ_r	0.0468	μ_s	0.0207
a_r	0.2024	a_s	3.4913
σ_r	0.0257	σ_s	0.0314
γ_r	0.2209	γ_s	0.2688
		ρ	-0.6780

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	NZ	Australia		NZ	Australia
μ_r	0.0468	0.0481	μ_s	0.0207	0.0186
a_r	0.2024	0.2998	a_s	3.4913	1.0587
σ_r	0.0257	0.0247	σ_s	0.0314	0.0184
γ_r	0.2209	0.4142	γ_s	0.2688	0.2597
			ρ	-0.6780	-0.4962

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- ▶ Both countries have similar long term wholesale rates and spreads (μ_r and μ_s).
- ▶ Australian retail rates are less volatile (γ_r), but volatility more sensitive to current level of r .
- ▶ NZ spreads are more volatile (σ_s big), but these are short term fluctuations (a_s also big).

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- ▶ We are using a model which has been fitted to dynamics of short term interest rates.

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- ▶ This does *not* necessarily match the yield curve exactly at any point in time.

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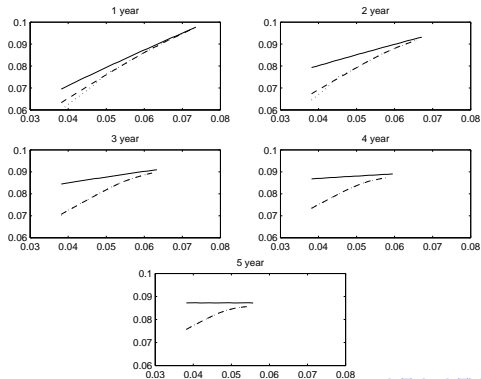
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- ▶ Alternative: fit model to yield curve rather than historical data.

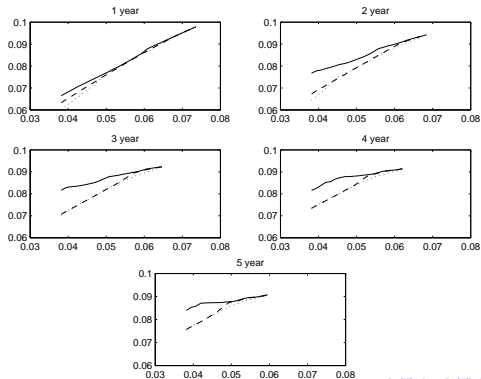
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- ▶ In particular, this model predicts that fluctuations in spreads will predominately affect short term rates.
- ▶ Alternative: fit model to yield curve rather than historical data.
- ▶ In the following slides, we adjust μ_r and μ_s to match 5 year rates as of December 2009.

Ruthless



20% Intensity



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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 \Rightarrow 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.

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- ▶ Household can choose term to fix for.

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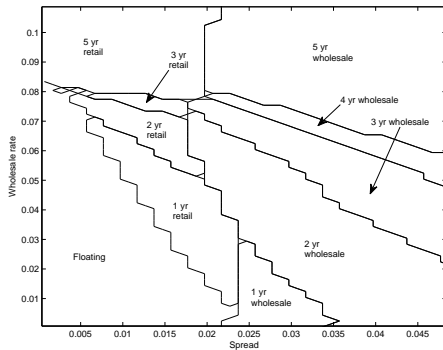
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- ▶ ... and opportunities:
 - ▶ Refinancing profitably (wholesale).

Optimal mortgage selection



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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.

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Economic significance

- ▶ Is this important?

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Economic significance

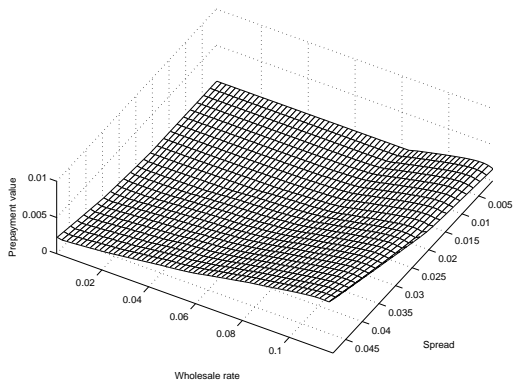
- ▶ Is this important?
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Economic significance

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

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Value gains



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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.

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- ▶ Positive:

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Conclusions

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