Profit Testing a retail lending portfolio

Conor O’Dowd

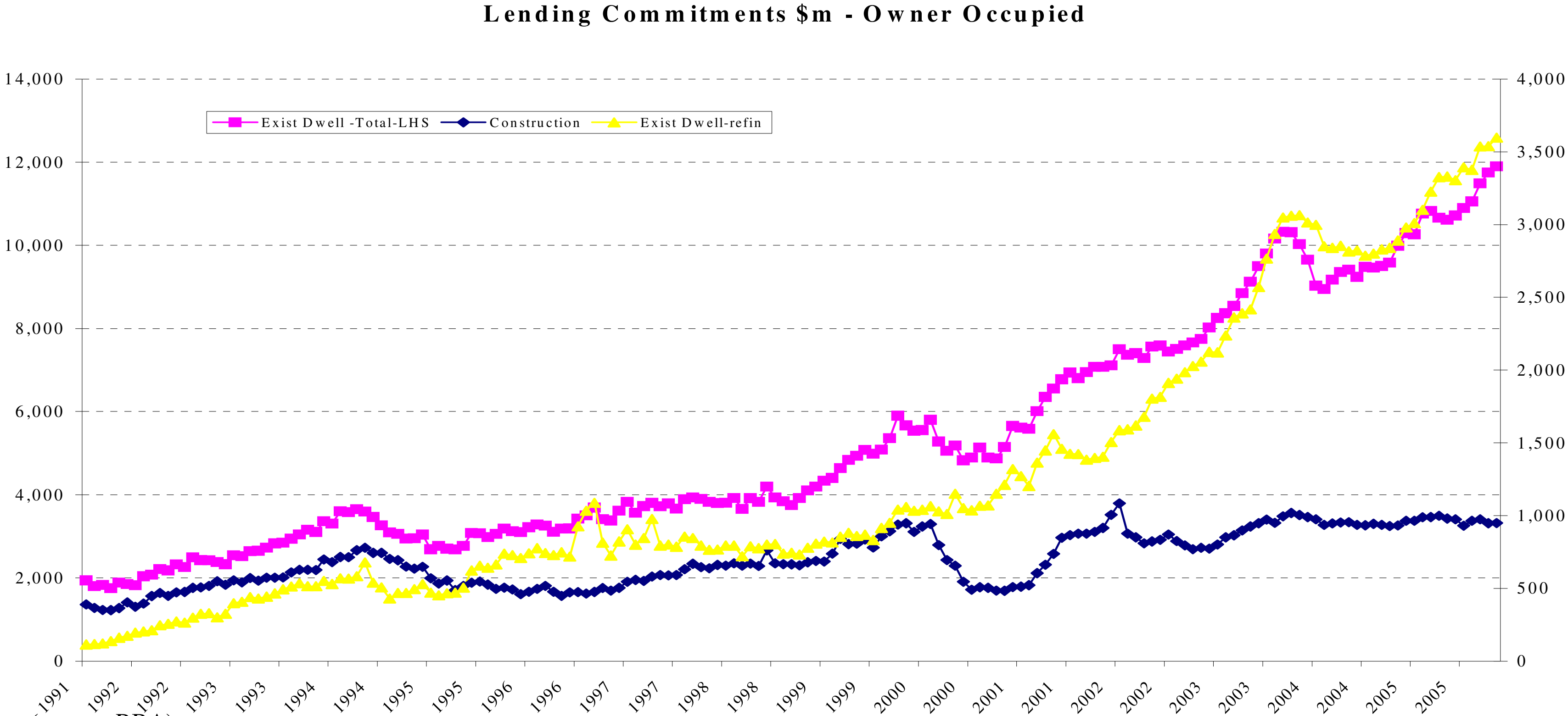
Eamon Kelly

1. The Changing Face of Mortgage Lending

Mortgages are key to banks ongoing profitability

- Retail loans represent a significant portion of the net profit for major Australian banks
- **Profit = volume x interest margin – expenses**
- All are under pressure:
  - Volume: market share competition, property market softened
  - Interest margin: honeymoon rates, new competition for deposits
  - Expenses: increased use of brokers
- **At stake - continued profit of core retail business**

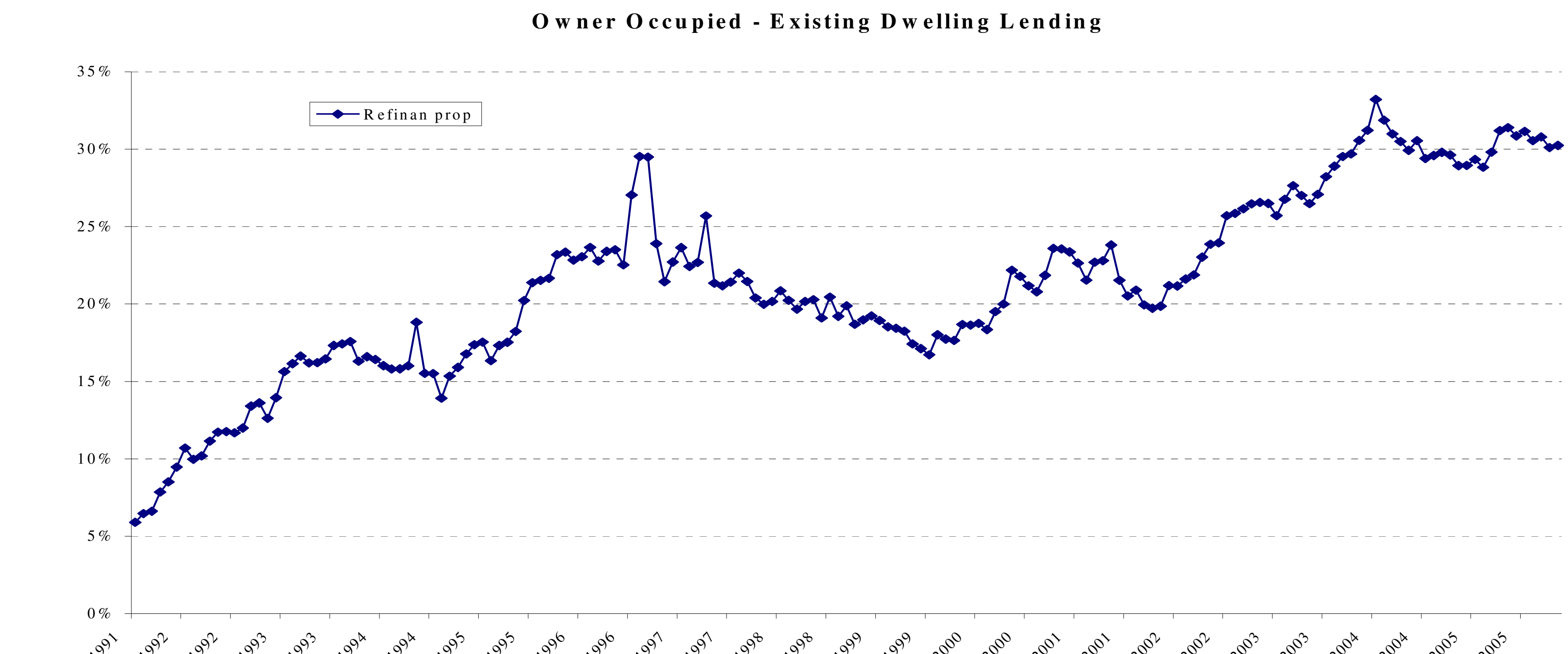
Volume trends – Owner occupied lending



(source: RBA)

- All of the growth comes from financing for existing dwellings
- Dropped after peak in late 2003, turnaround in mid 2005, continues to grow

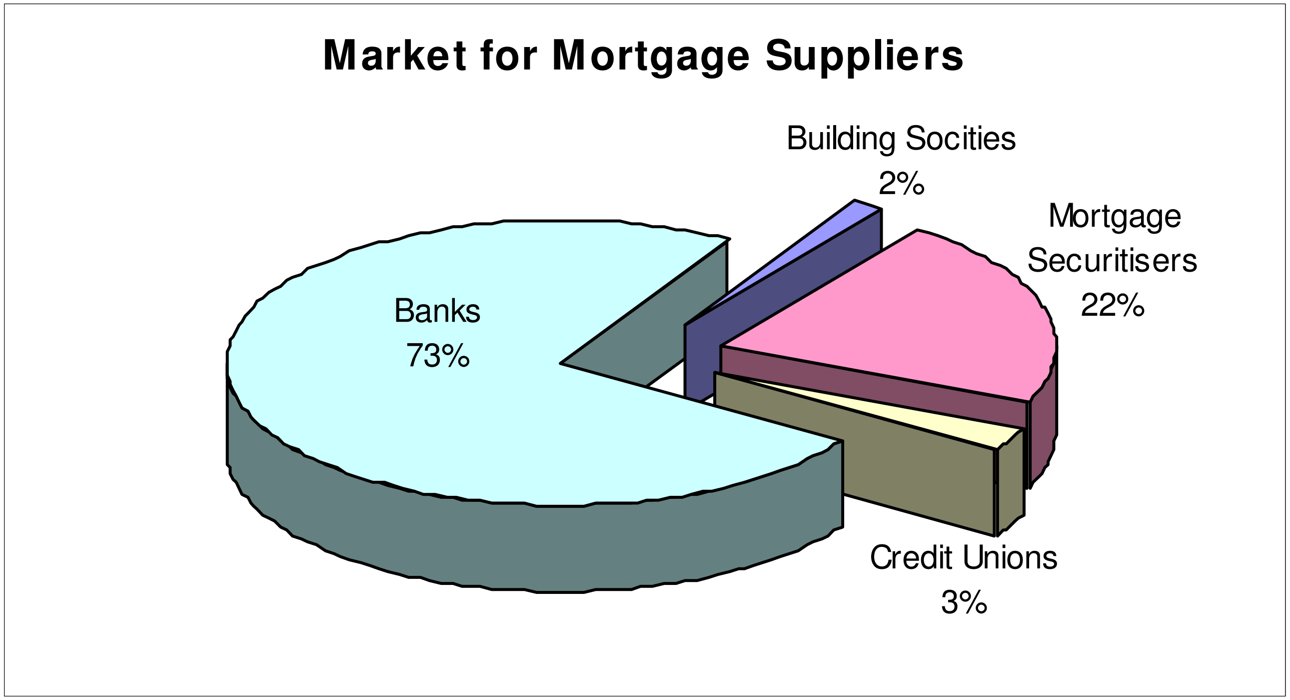
Volume trends – Owner occupied refinancing



(source: RBA)

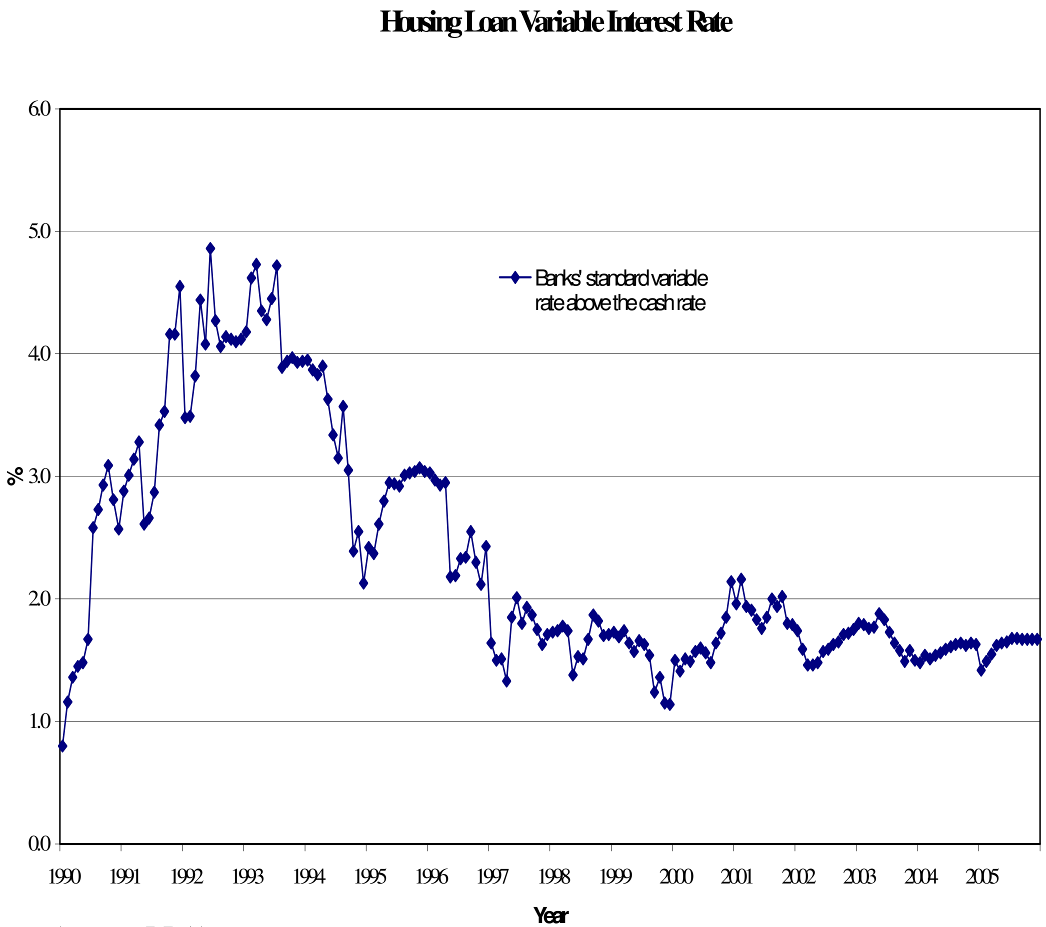
- Rapid growth from single digits to low 20's by mid 90's. Relatively stable to late 2001. Rapid growth to peak in late 2003.
- Drop from peak in 2003 to mid 2005, slight turnaround

Competitive pressures – new entrants



- Banks still hold the largest share of the residential mortgage market, but the market is very competitive
- Non-bank originators (and foreign banks) are taking more of the bigger mortgages.
- More aggressive competition for existing business

Competitive pressures – margins & income sources



(source: RBA)

- Margins driven down in the mid to late 90's – little room to move at present
- Banks turning more to non-interest income

Competitive pressures – product & lending practices

Chasing non-conforming market, mainly via product development

- Low-doc loans, no-deposit loans
- Reverse mortgages – rapid growth

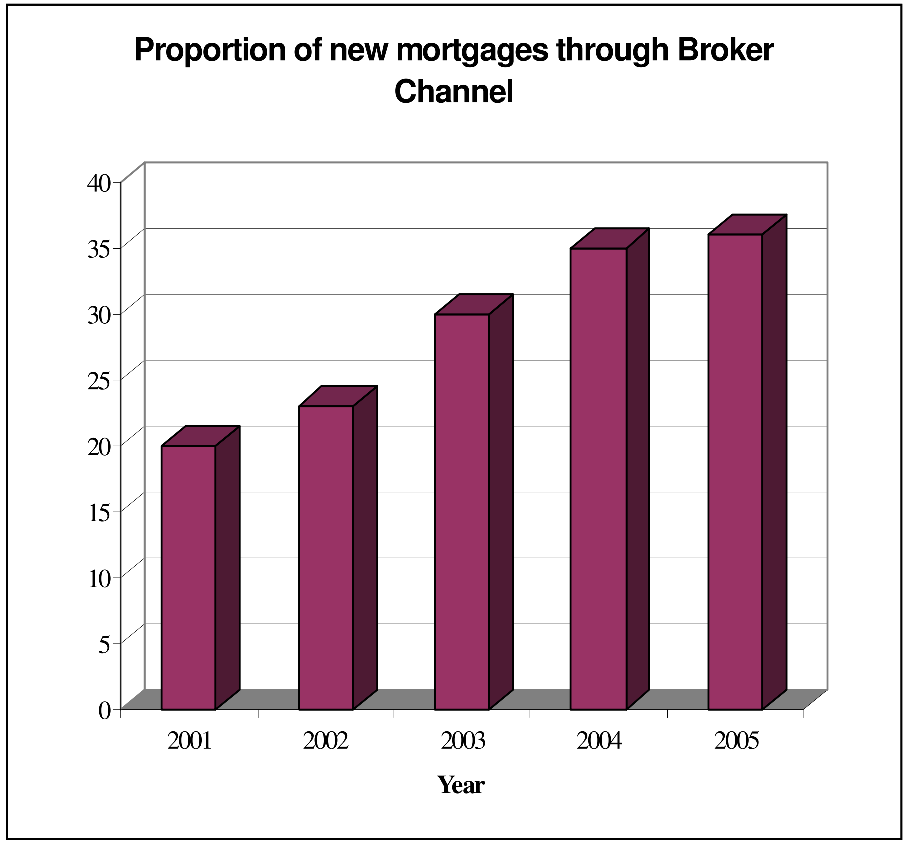
Easing of lending criteria:

- higher debt servicing ratios (30% to 50%)
- higher LVR's (eg investors >100%)
- borrowers with impaired credit histories

Distribution – growth in mortgage broking

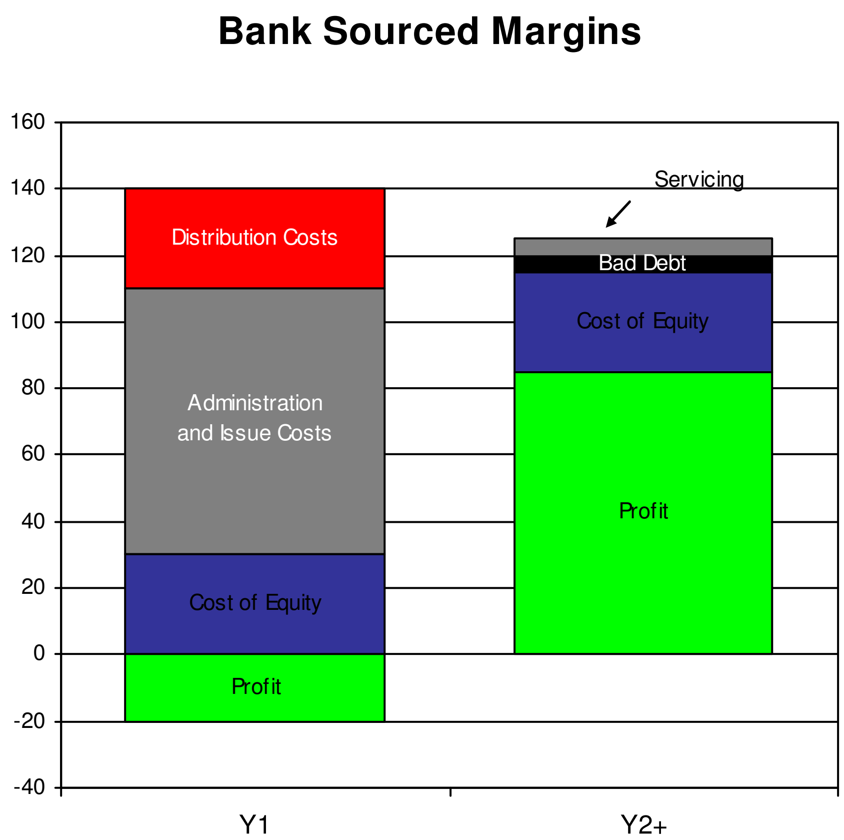
- Usage of the mortgage broker distribution channel grew rapidly (predicted 50% 2010)
- Overseas broker origination is:
  - UK 60%
  - US 70%
- There are around 500 active Mortgage Broker groups active in Australia, and thousands of other smaller or inactive brokers

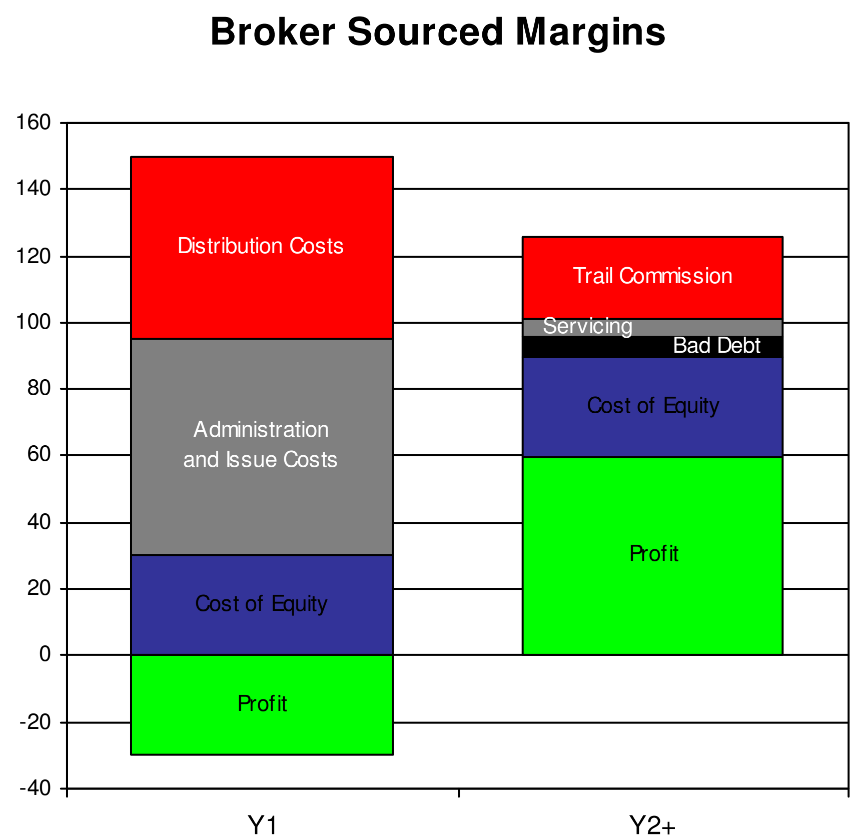
(source Market intelligence strategy centre MISC, Goldman Sachs, IBISWorld)



(source: RBA, Financial Review & CFR annual report, IBISWorld)

Distribution - Broker costs squeeze already tight margins





Note: Total margins are lower on average for broker originated loans due to aggressive competition

2006+ a significant challenge for mortgage lenders

• **Future levels of interest rates**	Increase last week – increases sensitivity of customers
• **House price bubble**	Eased but no ‘real’ growth expected, and spot corrections due
• **Reducing rate of housing credit growth**	Fully factored into the share price targets of analysts?
• **Chasing growth in new markets**	non-conforming margins already show signs of pressure
• **Owner occupied refinancing still at historical high**	Is churn being optimally managed – broker, product ***and*** customer angles?
• **Credit risk cycle turning**	Off radar?

Key challenge facing lenders

1. **Protecting/Maintaining profit from current business**
- Analyse the value of current base – by product, channel & customer segment
- Churn a key destroyer of value, but are there any customers you are happy to lose?
- Understanding current business feeds into strategy for future business

2. **Developing valuable future business**
- Key drivers of value:
  - Volume of business written
  - Profitability of business, and
  - Retention of business
- Utilise knowledge of value drivers from existing business

2. Retail Mortgage Profitability Model

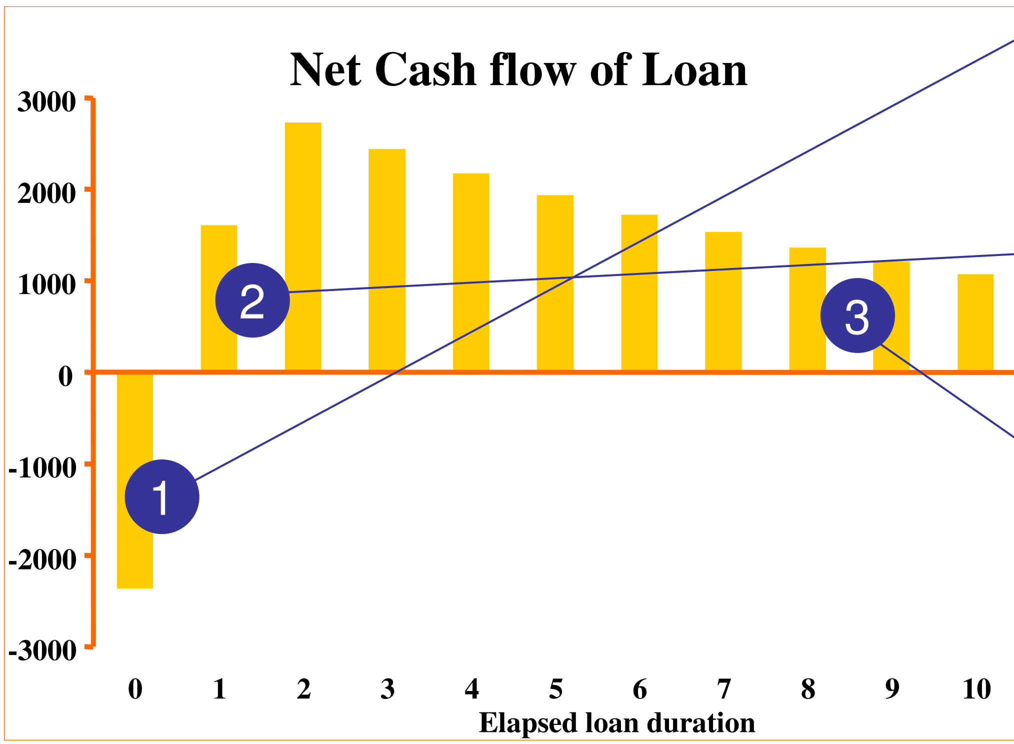
Retail Mortgage Profitability Model

Our Objectives

- Using readily available data, can we utilise actuarial techniques to build a comprehensive picture of where and how profit emerges?
- Potential actuarial techniques of interest:
  - Embedded value techniques
  - Real Options
  - Dynamic Financial Analysis (stochastic approach)
  - Data mining / statistical modelling

Our final approach uses elements of all the above.

Analysis of a single loan



1. Upfront costs depends largely on **distribution channel** (***d***)

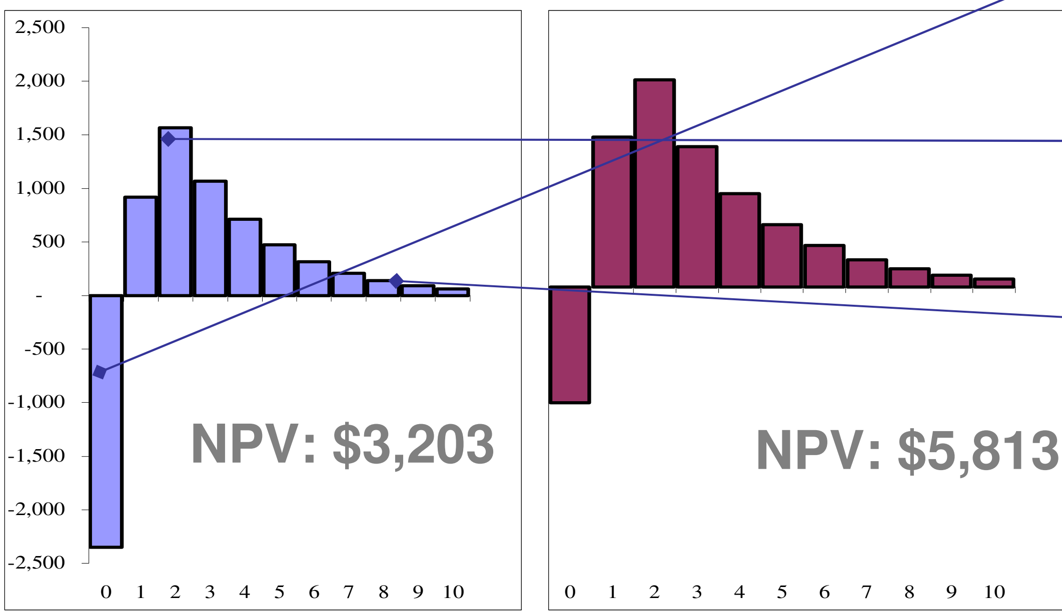
2. Initial cash flow depends largely on **product terms** (***p***)

3. Strength of downstream earnings depends largely on **customer characteristics** (***c***)

Profitability changes over time, with the predominant force also changing - from channel to product to customer characteristics

Example: Effect of Channel on an "average" loan

Broked **Branch**



Upfront commission increases acquisition costs

Trailing commission reduces profit stream

What is not addressed:
- Types of customers
- Size of loans
- Expected duration of relationship

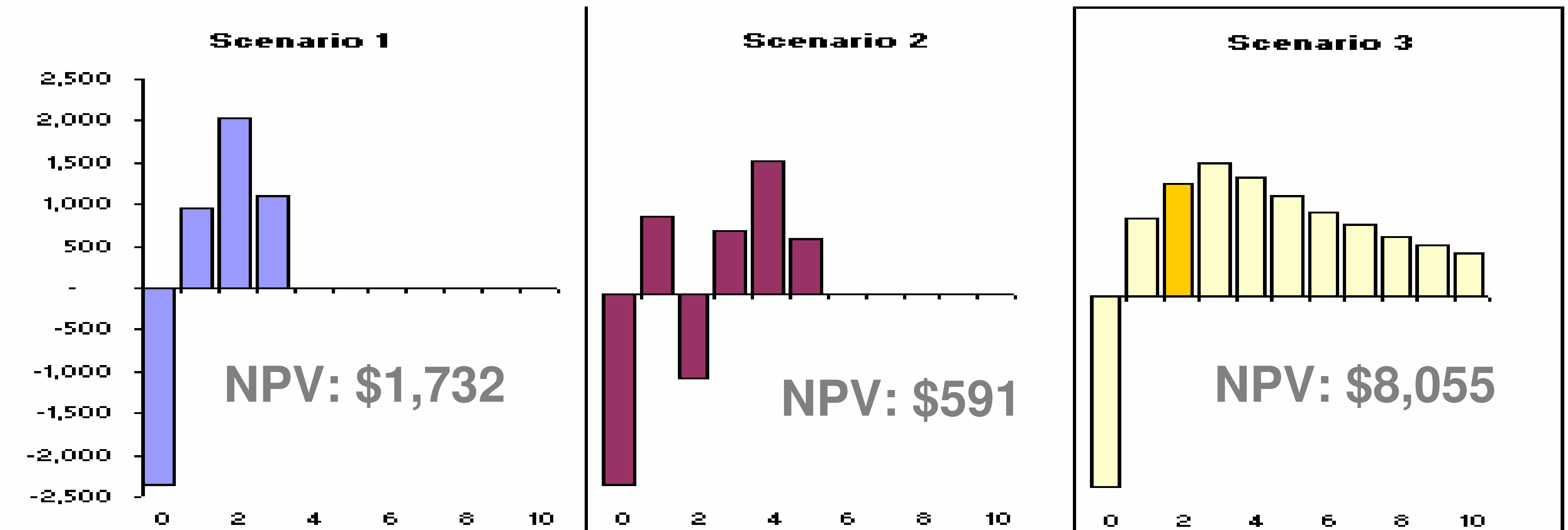
The effect of channel seems fairly simple - but method of fixed cost allocation is key to fair comparisons

There is no such thing as an average loan…

Scenario 1:
Customer refinances with a competitor after 3 years

Scenario 2:
Customer refinances through a broker after honeymoon period expires

Scenario 3:
Customer moves to flexible discounted product, leaves after 10 years



Future customer behaviour is key to understanding where value originates

Analysing profitability of a home loan book

Embedded Value Techniques

- Problem looks much like a classic "traditional life insurance" one…
  - Front end loading of costs leads to "new business strain"
  - "Lapse rate" is key to profitability
  - Product features are important in defining entitlements but not critical to overall profitability
  - New business volumes depend on competitor behaviour and economic conditions

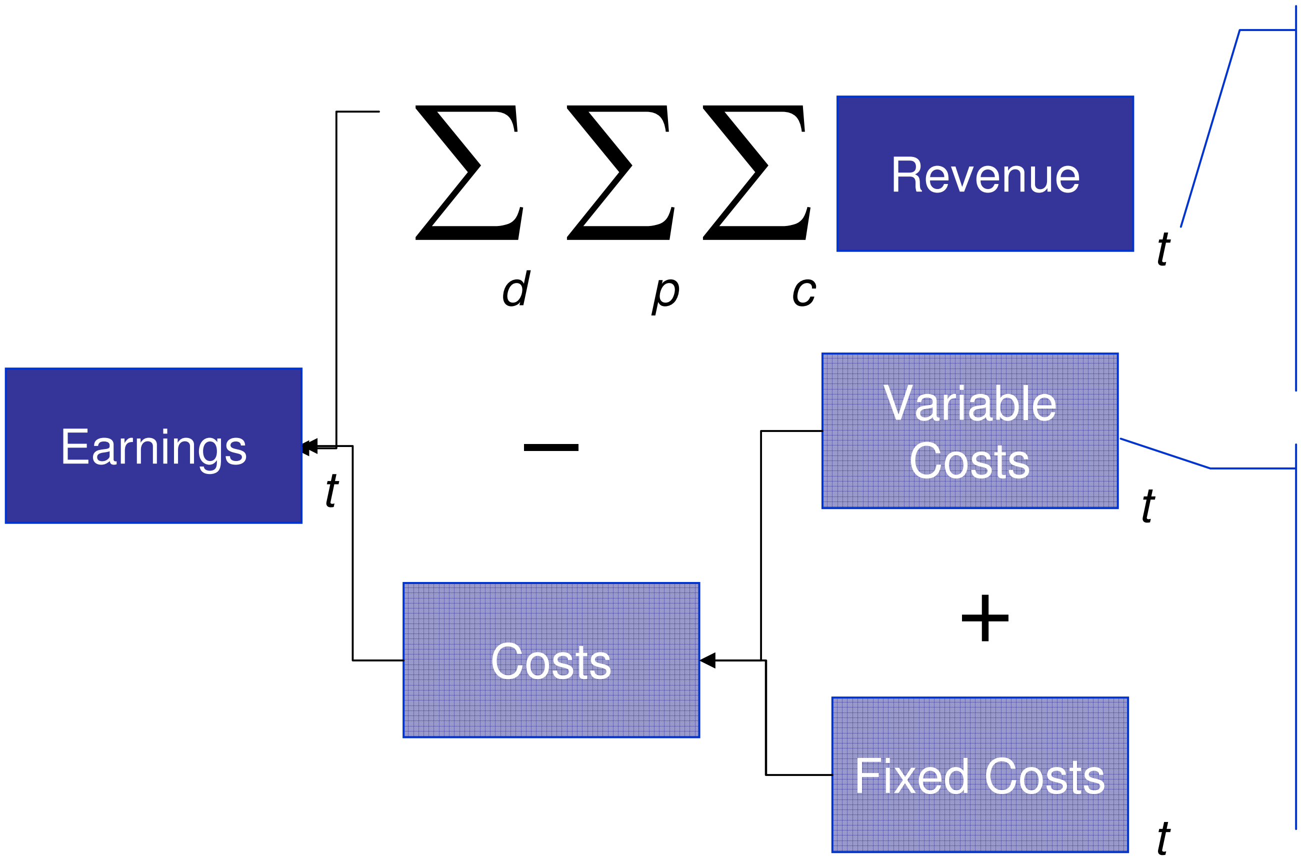
- But there are significant differences…
  - Lapses are super-important and have few penalties
  - Economic conditions greatly affect behaviour
  - Experience is highly volatile and driven by customer, channel and competitor actions
  - Change happens over months, maybe years, but not decades!

Building the Profitability Model

- Start with a deterministic embedded value approach:
  - Project future cash flow from existing and new business over a number of years
  - Model by origination year (***i***) and financial year (***t***)
- Also model:
  - By product (***p***)
  - By channel (***d***)

  since these determine the cash flows for in-force business
  - By customer segment (***c***) since this has a substantial effect on drawdown, repayment/prepayment, and churn.

Retail mortgage profitability model

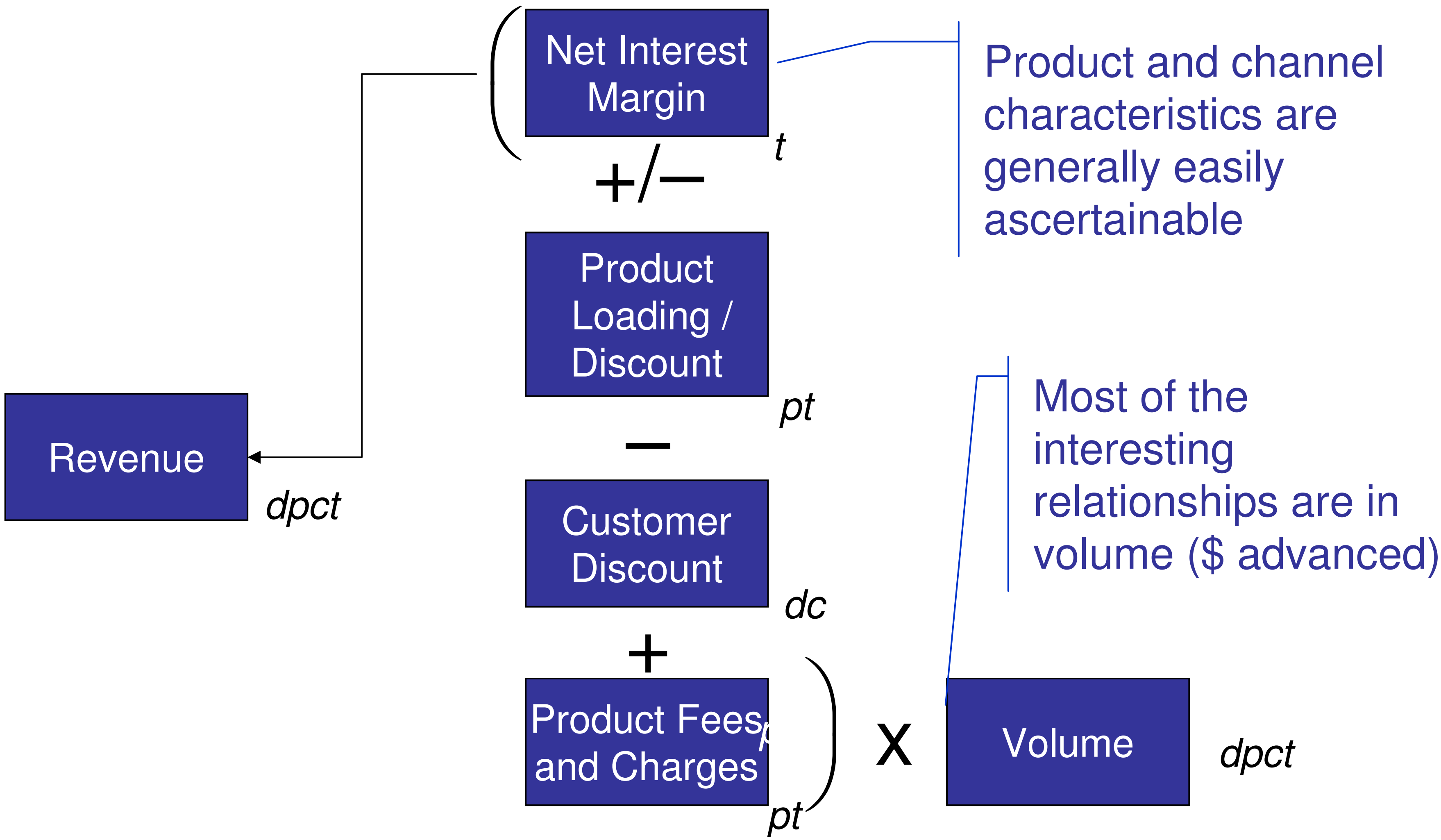


We are also analysing over time (financial period and elapsed loan duration)

Robust cost allocation methodology is a success factor, but we are going to concentrate on revenue here

The model is potentially complex, analysing within “cells” made up of individual combinations of customer, product and channel segments

Retail mortgage profitability model



Volume requires more careful analysis

Factors affecting change in volume

Change in Volume ← First home-buyer Drawdowns - Expiries
\+ Drawdowns on Purchase - Discharges on Sale
\+ Drawdowns on Refinance - Discharges on Refinance
\+ Existing Loan Drawdowns - Repayments/ prepayments
\- Credit defaults

A. 1st Time buyers

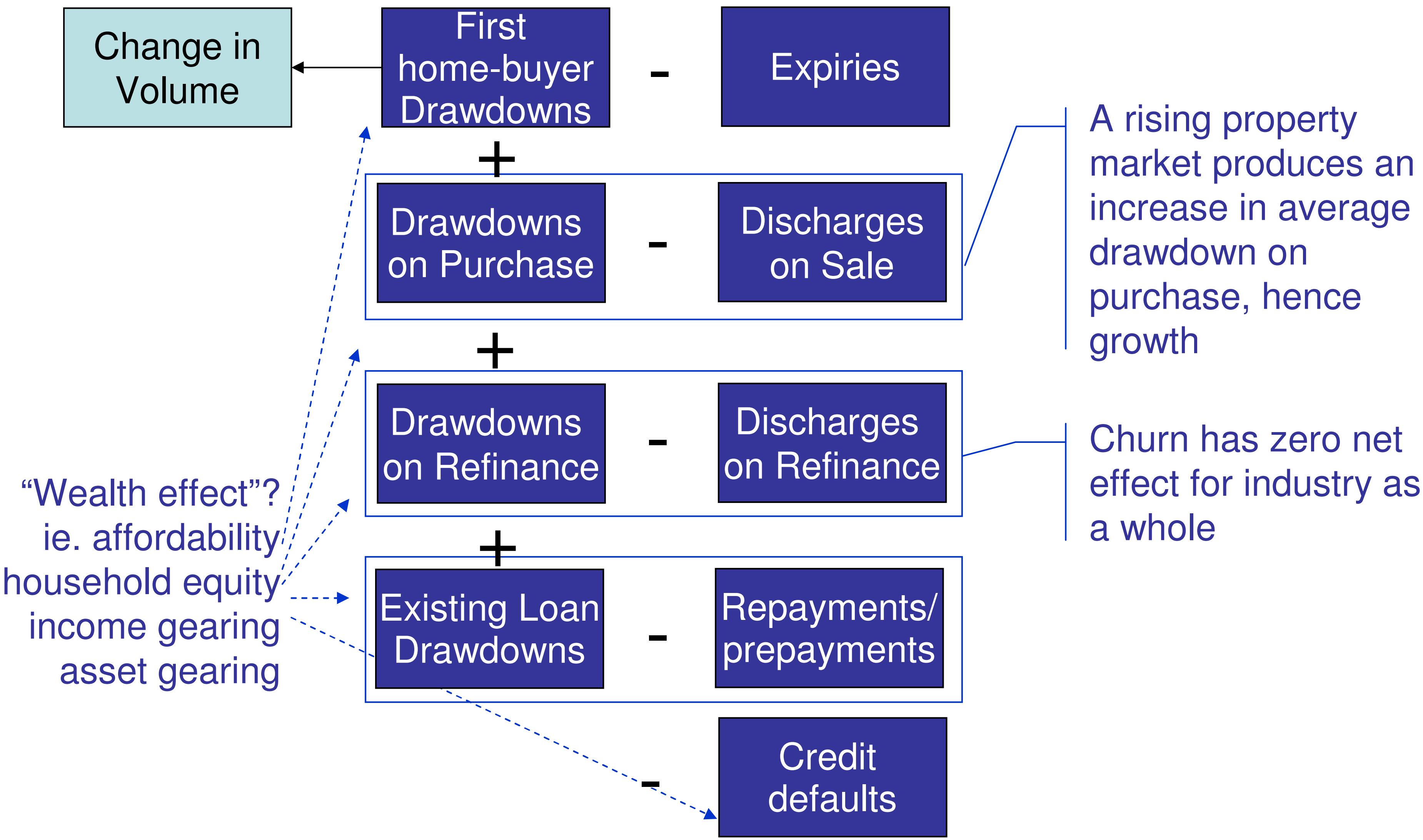
B. Property Market Turnover

C. Refinance (with switch of lender) = ‘churn’

D. Existing customer refinance

E. Credit Defaults

Factors affecting change in volume



Economic effects are readily evident, though how some might affect outcomes is obscure

Economic relationships drive both direct and indirect effects on the portfolio

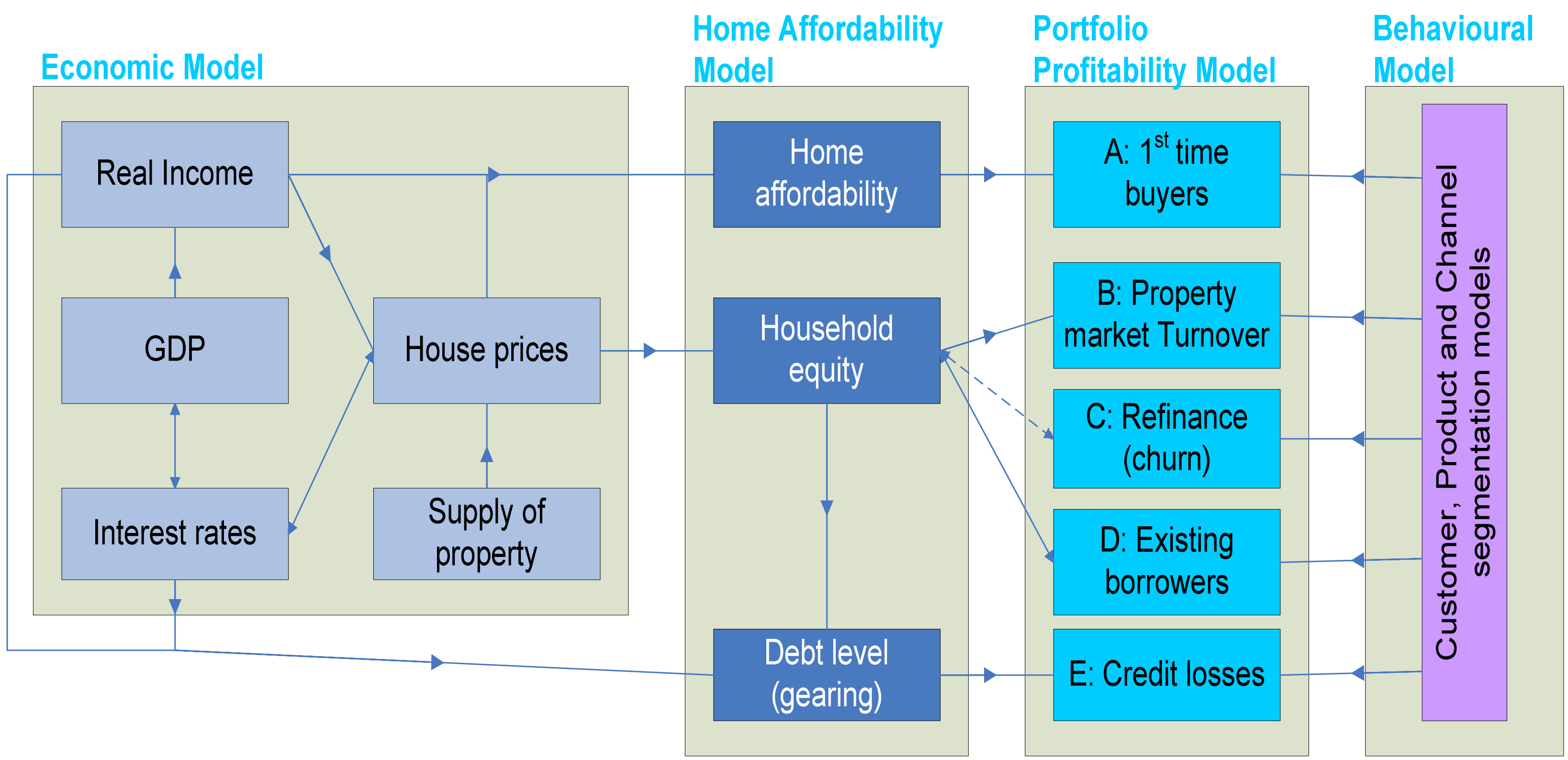
Economic relationships

- Property prices affect affordability and average new loan size
- Interest rates affect serviceability and housing demand (and eventually supply)
- Household equity affects growth in lending from existing customers and may affect propensity to churn and buy/sell

It is necessary to separate out these very powerful effects on past growth and profitability, as the future will be very different

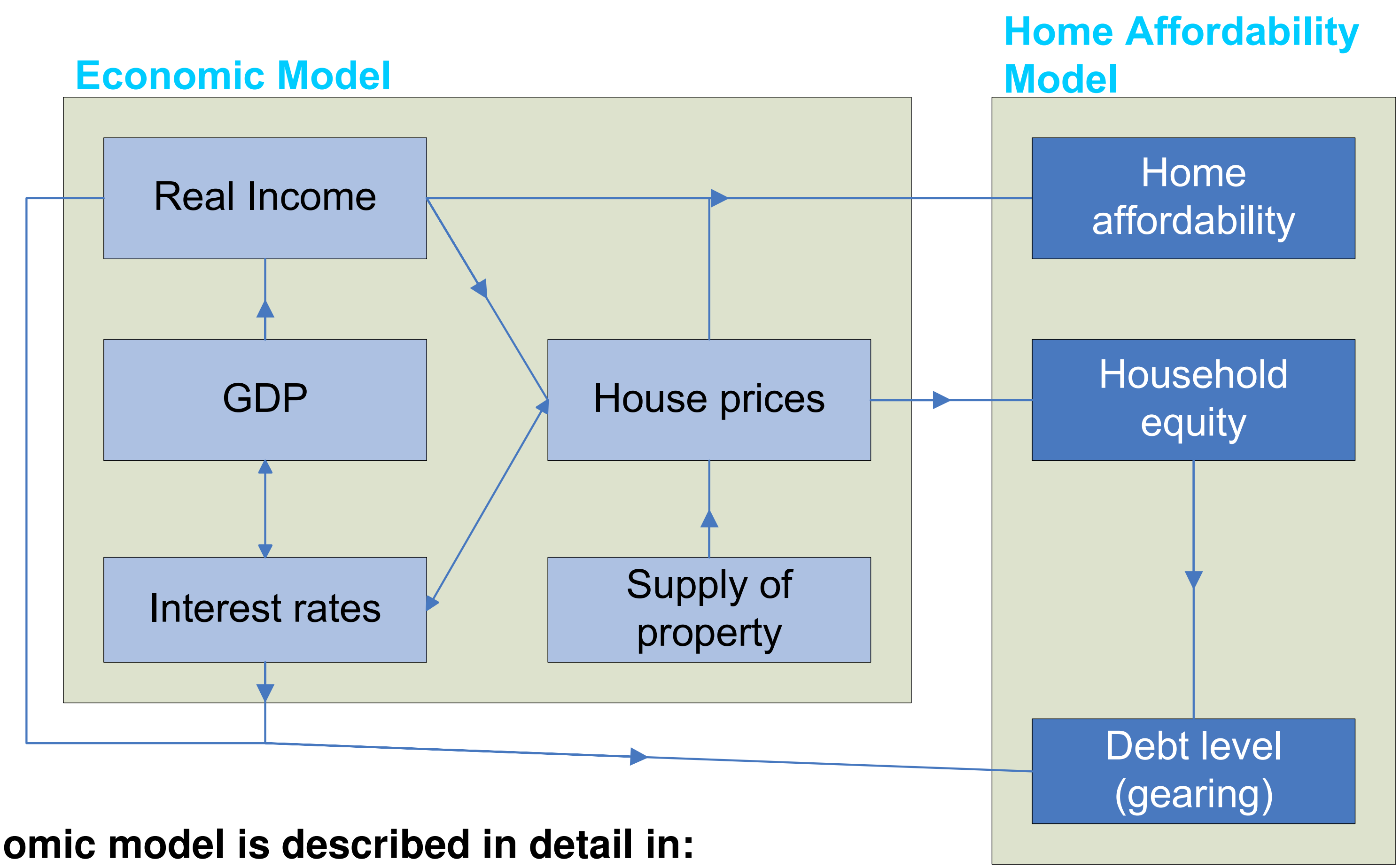
Retail mortgage profitability model

…so there are in fact four components to the model



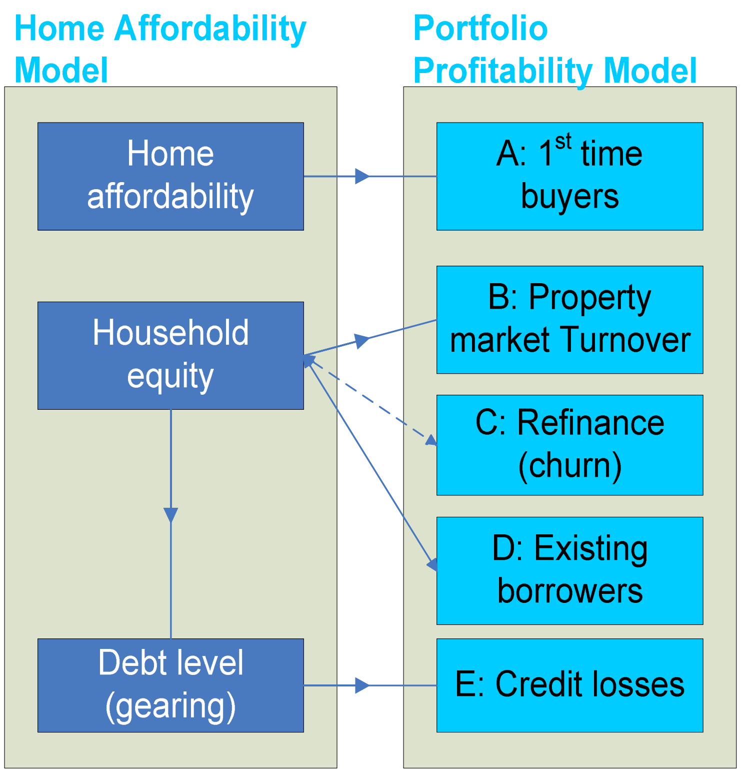
We have already talked about the portfolio profitability model in detail

Economic Model



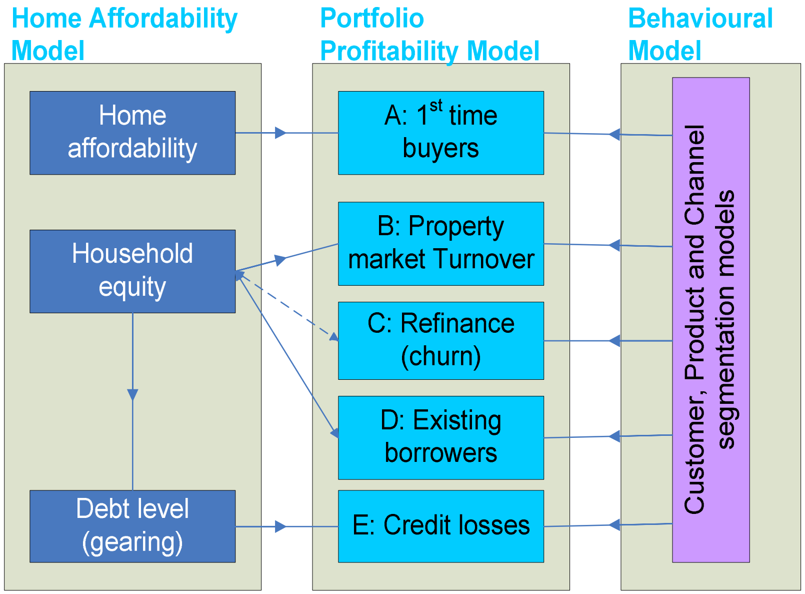
The economic model is described in detail in:
Kelly and Smith (2005) IAAust XV GI Seminar

Home Affordability Model



- Past outcomes for key economic variables are combined with past household income and expenditure patterns (produced by ABS)
- Effect is to produce past KPIs of affordability (eg. income gearing ratio) against which past behaviour can be measured

Fitting the model

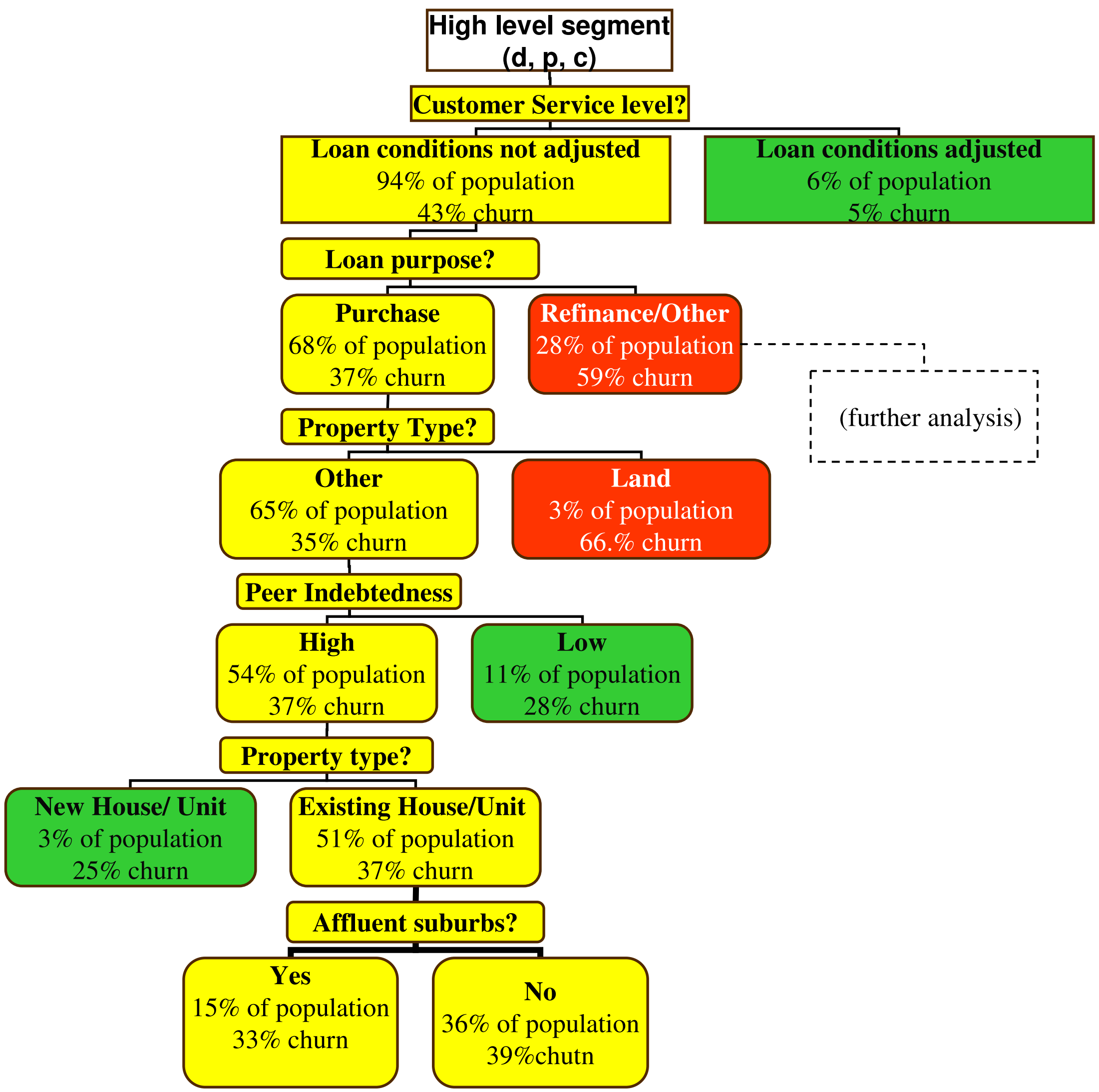


- Past outcomes (eg. churn rate) are fitted by channel/product/customer (***d,p,c***) segment ,using as predictive variables:
  - Economic indicators (eg. house prices)
  - Home affordability KPIs (eg. income gearing)
  - Characteristics of *d*, *p*, *c*

Behavioural characteristics are normalised for effects of the past economic environment

Segmentation Model

Variable: Churn Rate t=12-36 months



- Our model uses an initial GLM to fit economic and the most significant behavioural factors
- Economically-normalised data is then data mined using standard segmentation techniques
- Progressive segmentation is much more powerful than GLM as there are too many factors and cells to manually fit
- Final model is fed back into GLM for final fit

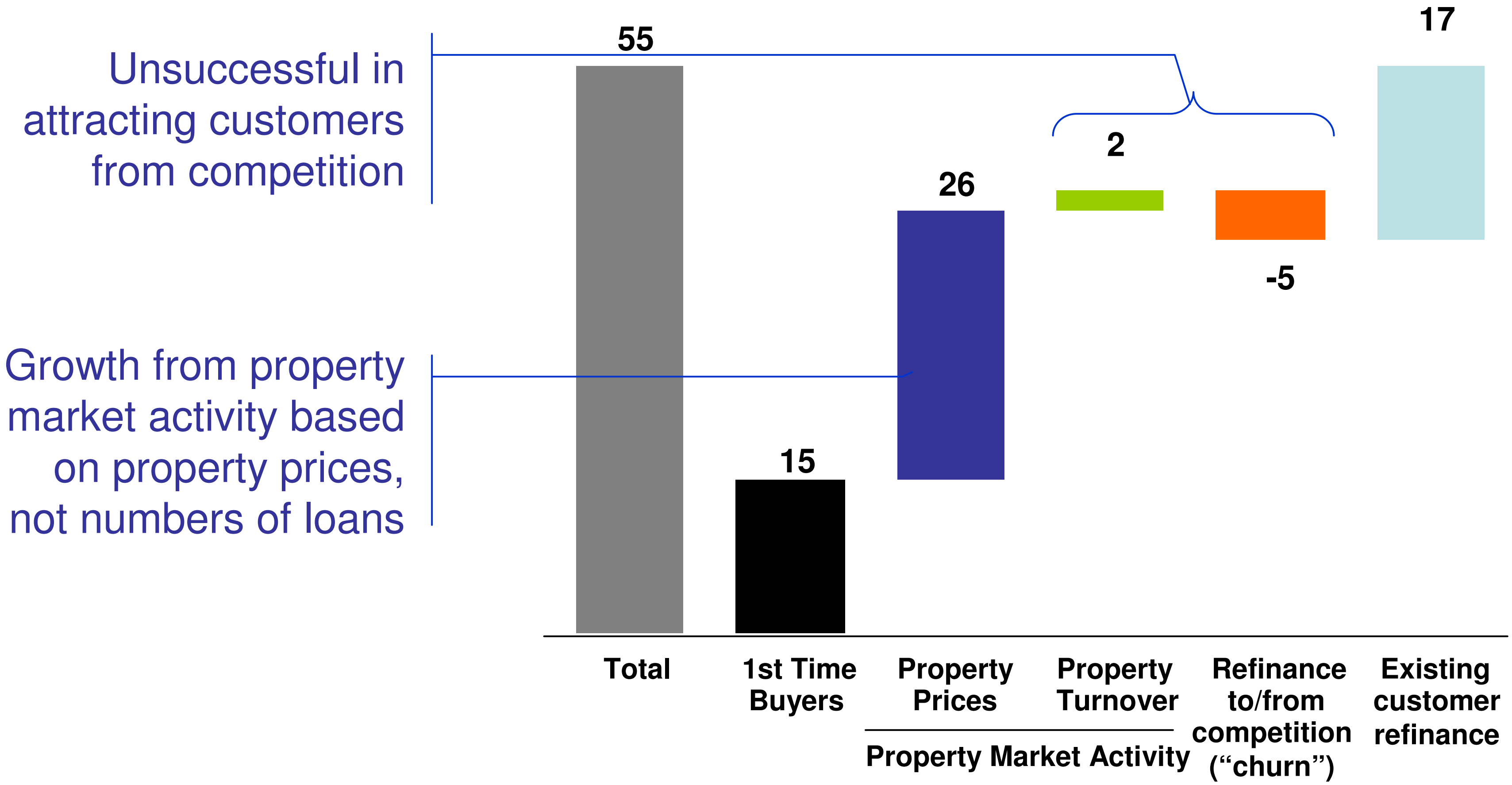
Uses of the model

- Economic Model (VECM) relationships produce ***coherent economic scenarios*** for key variables (interest rates, house prices etc.)
- Scenarios can also cover business drivers such as churn rates or effect of product or channel growth strategies

- Key uses of the model include:
  - Risk-based pricing
  - Strategic risk analysis for home loan book
  - Dynamic Provisioning and credit loss stress testing
  - Mortgage insurance strategy

Realistic scenarios can be fed through the fully segmented model very quickly, producing high level results on management KPIs.

Example output – past growth analysis for Product X

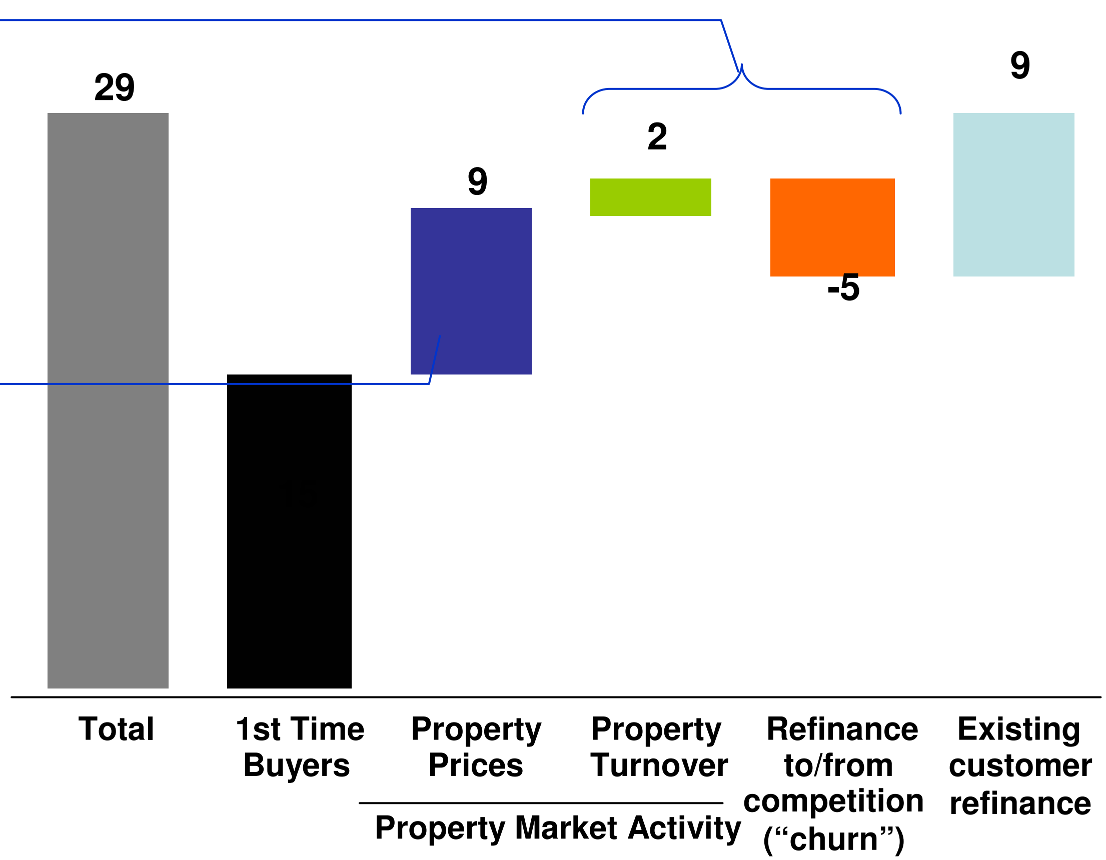


By isolating the effect of economic factors, the sources of volume growth can be better understood, and flowed through to revenue and costs

Example output – future growth for Product X

Assumes no change in competitive position

Future property growth equal to AWE reduce total growth by about half



Future economic scenarios are easily fed through the model to produce high level results

Profit Testing a retail lending portfolio

Conor O'Dowd
Eamon Kelly