

INDEPENDENT VALUATION, MORTGAGE COLLATERAL AND NEGATIVE EQUITY: A COUNTER-FACTUAL ANALYSIS

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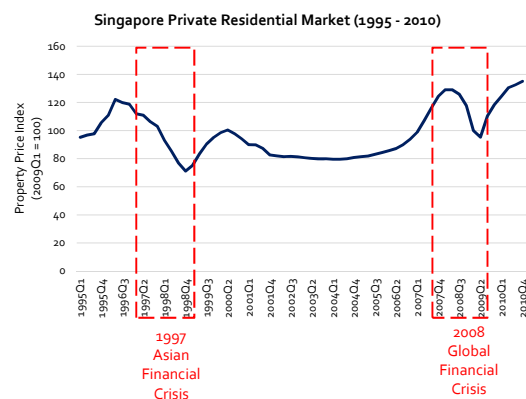
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Background & Motivation

- Financial crises led to sharp price declines in Singapore's residential market
 - Issue of negative equity poses systematic risk for banks
- Buffer against negative equity depends critical on the mortgage origination Loan-to-Value (LTV) ratios
- Market practice: valuations based on transaction prices



Current Market Valuation Practice

- Common practice for banks to adopt property transaction prices as the appraised values for mortgage financing (Lentz and Wang, 1998; Gwin and Maxam, 2002)
- Initial mortgage origination LTV ratio is computed using transaction price (Ong, Neo & Spieler, 2005)
- Concerns of property owners inflating property prices to obtain a higher loan amount → higher loan amount increases the likelihood of lender absorbing a loss
- Mortgage loan portfolios are marked to market using overall property price index (URA PPI)

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Objectives

- To conduct a counterfactual analysis on how a change in mortgage collateral valuation – where mortgage loans are based on independent valuations obtained prior to transactions – would affect negative equity for mortgagee banks
- To evaluate the use of Automated Valuation Model (AVM) and publicly available price index in monitoring changes in mortgage collateral values

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Literature Review

- AVM is commonly adopted for portfolio valuation, mortgage origination valuation and analysis of risk in mortgage refinancing across various countries (Downie & Robson, 2007)
- Limited research on the use of AVM in Singapore's mortgage lending market
- AVM is typically used by bank lenders for less risky mortgage approval applications, such as mortgages of lower value and lower LTV ratios (Downie & Robson, 2007)
- High LTV ratios and housing price premiums results in higher default rates and foreclosures (Ong, Neo & Spieler, 2005)

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Hypotheses

- Hypothesis 1: Adopting independent valuations prior to transactions in a rising market provides a larger buffer against negative equity (NE)
- Hypothesis 2: Marking-to-market of mortgage portfolios using AVM versus using publicly available price index for re-estimating the change in property price leads to lower negative equity (NE) incidences
- Hypothesis 3: Various market segments (mass property and high-end property market) are likely to perform differently under hypothesis 1

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Research Methodology

- Counter-factual analysis approach:
 - “Counterfactual 1”: mortgage origination value based on AVM valuation prior to transaction date
 - “Counterfactual 2”: mortgage origination value will be based on either the actual transacted price or AVM valuation, whichever is lower.
- Focus on private non-landed residential transactions in Singapore from 1995 to 2010, spanning across two major financial crisis (1997 Asian Financial Crisis & 2008 Global Financial Crisis)

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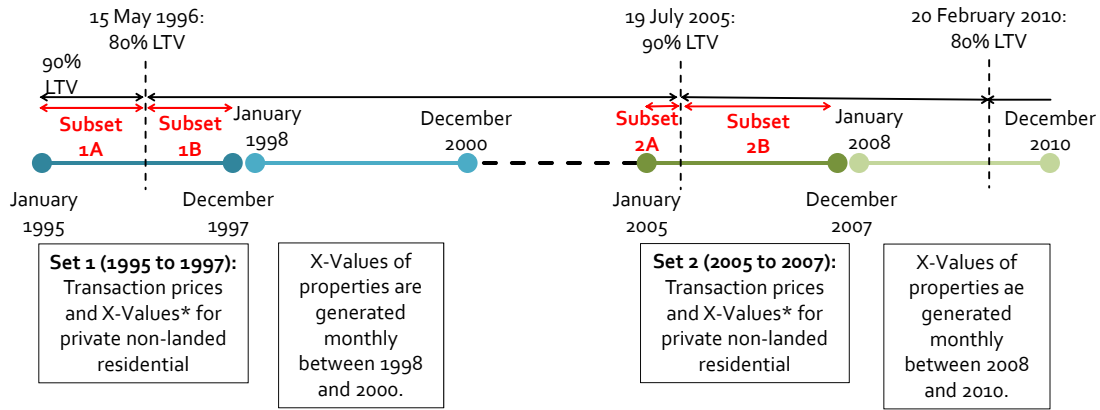
Research Methodology

- AVM valuations (**X-Value**) are obtained from SRX (<https://www.srx.com.sg>)
- X-Value launched in 2014
 - Database consists of transaction information from Urban Redevelopment Authority (URA) and Building and Construction Authority (BCA) and real estate agencies
 - Derived through Comparable Market Analysis where comparables are selected
 - Hedonic regression and algorithms in the system make adjustment to individual property characteristics
 - Prices are brought forward to current day using the SRX Property Price Index for transactions that occur in the past year
- SRX generates X-Values for transactions one day prior to transaction date, using only data and information up to that date
- X-values are estimated monthly over period of study

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Research Methodology

Overview of Research Design & Methodology

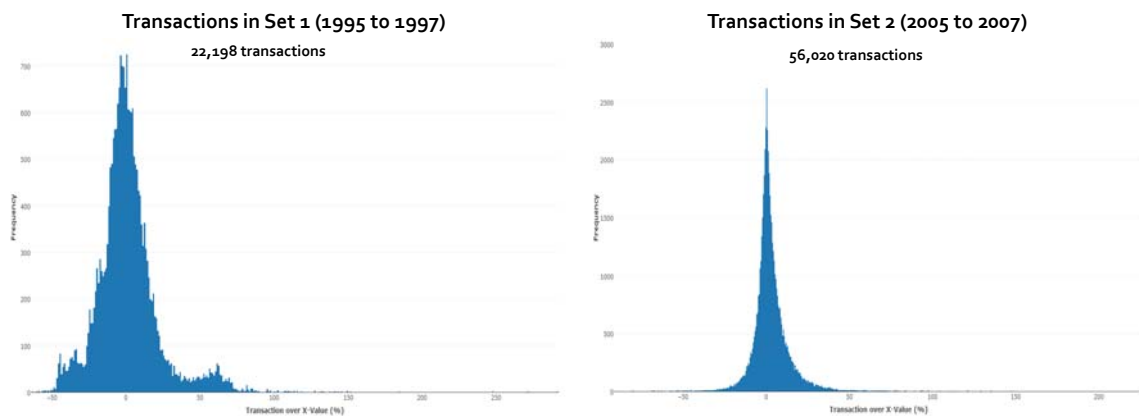


* X-Values are generated prior to transaction date

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Results & Implications

Transaction-over-X-Value (TOX) Distribution



- Less normally distributed and X-Value have a wider variation from the actual transacted price
- More centralised and evenly spread out from its centre

$$TOX = \frac{\text{Transacted Price} - X - \text{Value prior Transacted Date}}{X - \text{Value prior Transacted Date}}$$

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Percentage of Negative Equity Mortgages from 1998 to 2000 for Transactions in Set 1 (AFC 1995 – 1997)

% of Mortgage Portfolio that experience Negative Equity Issue across 1998 to 2000 for Transactions in Set 1 (Overall Trend)	Original – Mortgage Origination Value based on Transacted Price	Counterfactual 1 – Mortgage Origination Value based on X-Value prior to Transacted Date	Difference between Counterfactual 1 and Original (Relative to Original)
Mean	38.06%	42.38%	4.32%
Median	30.45%	34.92%	2.62%
StDev	21.78%	21.25%	4.44%
SE Mean	3.63%	3.54%	0.74%
Min	8.77%	19.74%	-2.95%
Max	80.05%	84.80%	12.78%
95% CI	(30.69%, 45.42%)	(35.19%, 49.57%)	(2.82%, 5.82%)

- URA transactions data started from 1995
- No SRX data during that time period

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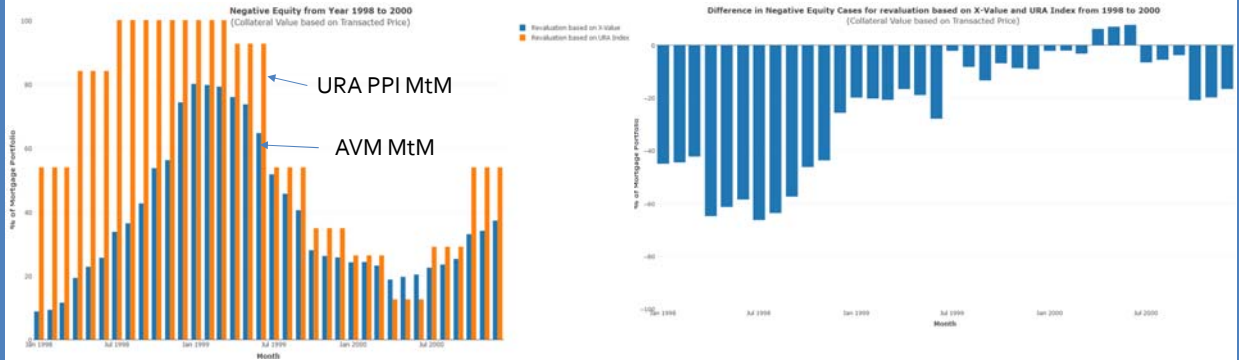
Percentage of Negative Equity Mortgages from 2008 to 2010 for Transactions in Set 2 (GFC 2005 – 2007)

% of Mortgage Portfolio that experience Negative Equity Issue across 2008 to 2010 for Transactions in Set 2 (Overall Trend)	Original – Mortgage Origination Value based on Transacted Price	Counterfactual 1 – Mortgage Origination Value based on X-Value prior to Transacted Date	Difference between Counterfactual 1 and Original (Relative to Original)
Mean	5.15%	4.25%	-0.91%
Median	3.90%	3.23%	-0.74%
StDev	3.61%	2.78%	0.88%
SE Mean	0.60%	0.46%	0.15%
Min	0.97%	1.26%	-2.55%
Max	13.81%	11.26%	0.58%
95% CI	(3.93%, 6.38%)	(3.31%, 5.19%)	(-1.20%, -0.61%)

- Adoption of independent valuation prior to transaction as the basis of collateral valuation result in **marginally lower negative equity incidences** as opposed to using transacted price

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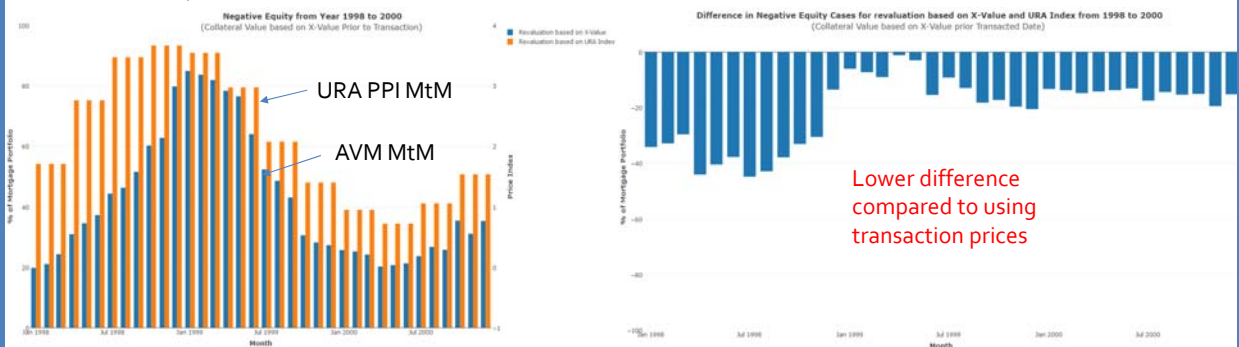
Effect of Marking-to-Market for Mortgage Portfolios using X-Value and URA PPI based on **Original Transaction Prices** (Set 1: AFC)



- Negative equity appears to be **more severe** when the mark-to-market uses URA PPI as compared to X-Value
- Close to 67% more negative equity incidences when using URA PPI as compared to using X-Value for portfolio mark-to-market in July 1998.

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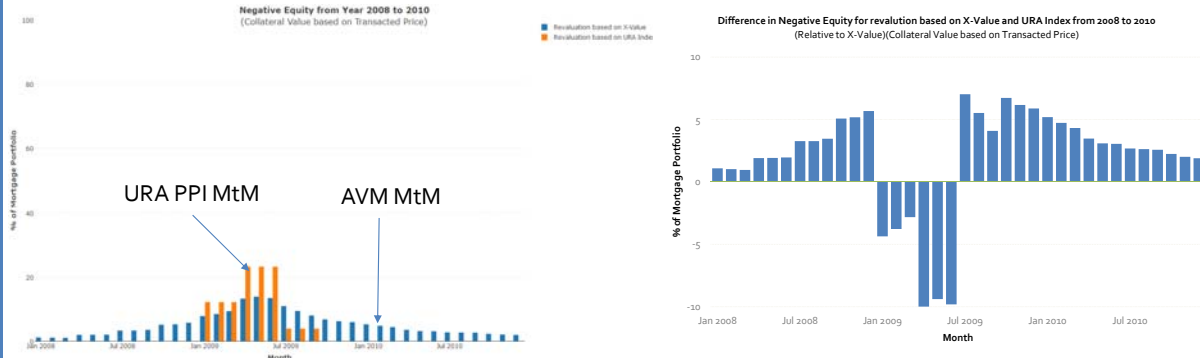
Effect of Marking-to-Market for Mortgage Portfolios using X-Value and URA PPI based on **X-Values** (Set 1: AFC)



- Same finding: Negative equity appears to be more severe when the mark-to-market uses URA PPI as compared to X-Value
- BUT **lower differences** in negative equity between MtM methods over time

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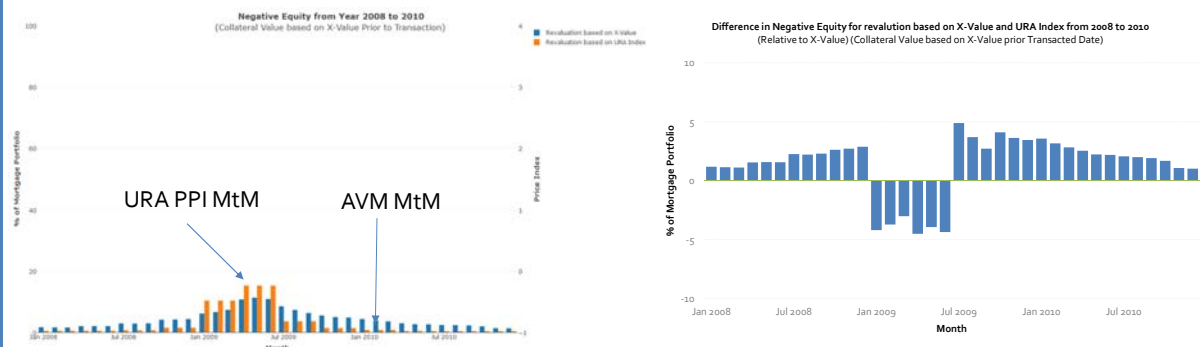
Effect of Marking-to-Market for Mortgage Portfolios using X-Value and URA PPI based on **Original Transaction Prices** (Set 2 GFC)



- AVM MtM picks up negative equity cases earlier; cases persist longer than URA PPI MtM
- Lumpier and higher number of negative equity cases using URA PPI MtM
- 10% more negative equity incidences when using URA PPI as compared to using X-Value for re-estimation of value in April 2009.

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Effect of Marking-to-Market for Mortgage Portfolios using X-Value and URA PPI based on **X-Values** (Set 2 GFC)

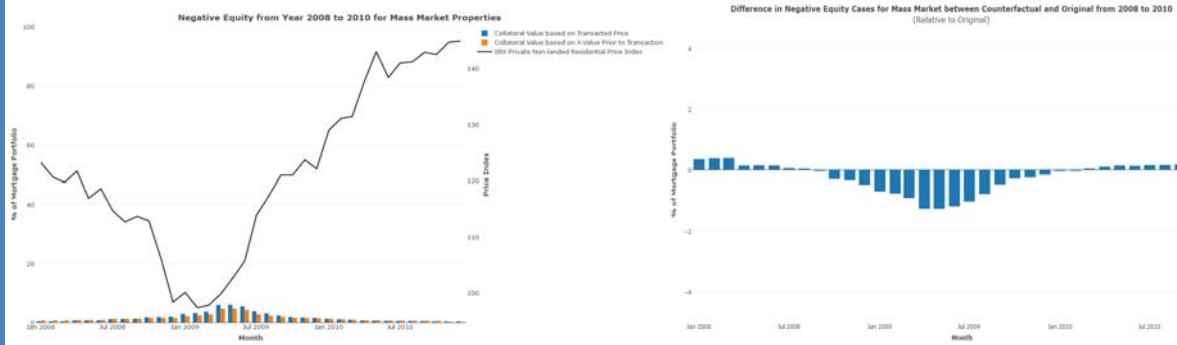


- Less obvious differences in negative equity cases between MtM methods when mortgage portfolios are originated using AVM
- **Lower differences** in MtM methods when portfolios are based on independent valuations

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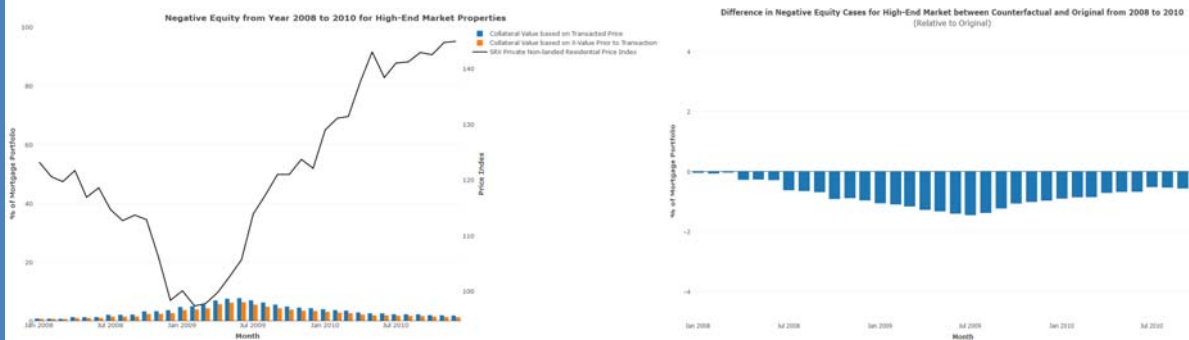
Effect on Market Segment

Percentage of Mortgage Portfolio that experience Negative Equity Issue across 2008 to 2010 for **Mass Market Properties** Transactions in **Set 2 GFC**



- Mass market segment: transactions with transacted price that falls within the 25th percentile to 75th percentile
- Comparing the Counterfactual 1 relative to Original, there is **fewer occurrence** of negative equity cases when the mortgage origination value is based on X-Value prior to transacted date

Percentage of Mortgage Portfolio that experience Negative Equity Issue across 2008 to 2010 for **High End Market Properties** and Transactions in **Set 2 GFC**



- High End market segment: transactions with transacted price above 75th percentile
- Comparing the Counterfactual 1 relative to Original, there is **lower occurrence** of negative equity cases when the mortgage origination value is based on X-Value prior to transacted date

Conclusion

- (H1) Does basis of mortgage collateral value (actual transaction price or valuation) matter?
Mixed evidence
 - Higher incidences of negative equity (NE) in AFC sample
 - Marginally lower incidences in GFC sample
- (H2) Does basis of marking to market for mortgage portfolios matter? **Yes**
 - AVM mark-to-market picks up negative equity cases earlier (GFC period) compared to URA PPI MtM.
 - MtM using URA PPI shows lumpier and higher magnitude NE cases
 - Differences in MtM matter less when originations are based on independent valuations
 - MtM basis matters less when mortgage loans are originated using independent valuations
- (H3) Does market segment matter? **Yes**
 - Independent valuations matter more for high end properties

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Acknowledgment

- Mr Jeremy Lee (Co-founder & Chief Technology Officer)
StreetSine Technology Group for provision of dataset

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