LTV Limit and Borrower Risk

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Motivation

- MPPs aim to mitigate the systemic risk associated with a housing boom.
- The most common policy targeting the housing sector is imposing loan-to-value (LTV) limits to housing loans.
- This LTV limit is designed to protect the banking system from risks associated with excessively leveraged borrowers.
- However, there are important transmission channels of LTV limits at the borrower level that are not well explored in the literature.
- Particularly, the different effects of LTV limit in the housing and credit markets on different borrower types.
- If such effects exist, what economic consequences do LTV limits have on borrower risk?

Literature

- Most of the literature focuses on the aggregate impact of LTV policies.
  - (Kuttner and Shim, 2013; Cerutti et al., 2015).
- One of the few exceptions are Igan and Kang (2011) who show, using survey data, that households were more likely to have dampened home price expectations and delayed home purchases in Korea after the introduction of an LTV limit (especially investors).
- To the best of my knowledge, there are only few recent papers that examine the side effects of an LTV limit on credit and .housing choices of affected borrowers
  - (Godoy de Araujo et al., 2016; Braggion et al., 2017; Tzur-Ilan, 2017)

This Paper

- Exploits the policy change that required banks to limit LTV (Hard LTV limit) according to the type of borrower.
- Examines the differential effects on households' choices in the credit and housing markets of different borrower types.
- In Particularly, if a hard LTV limit had any side effects regarding the borrower's risk.
- Uses a large and novel micro database with rich information on loans, borrowers, and acquired assets and tries to overcome the identification challenge where the treatment status is not observed.

Main Results

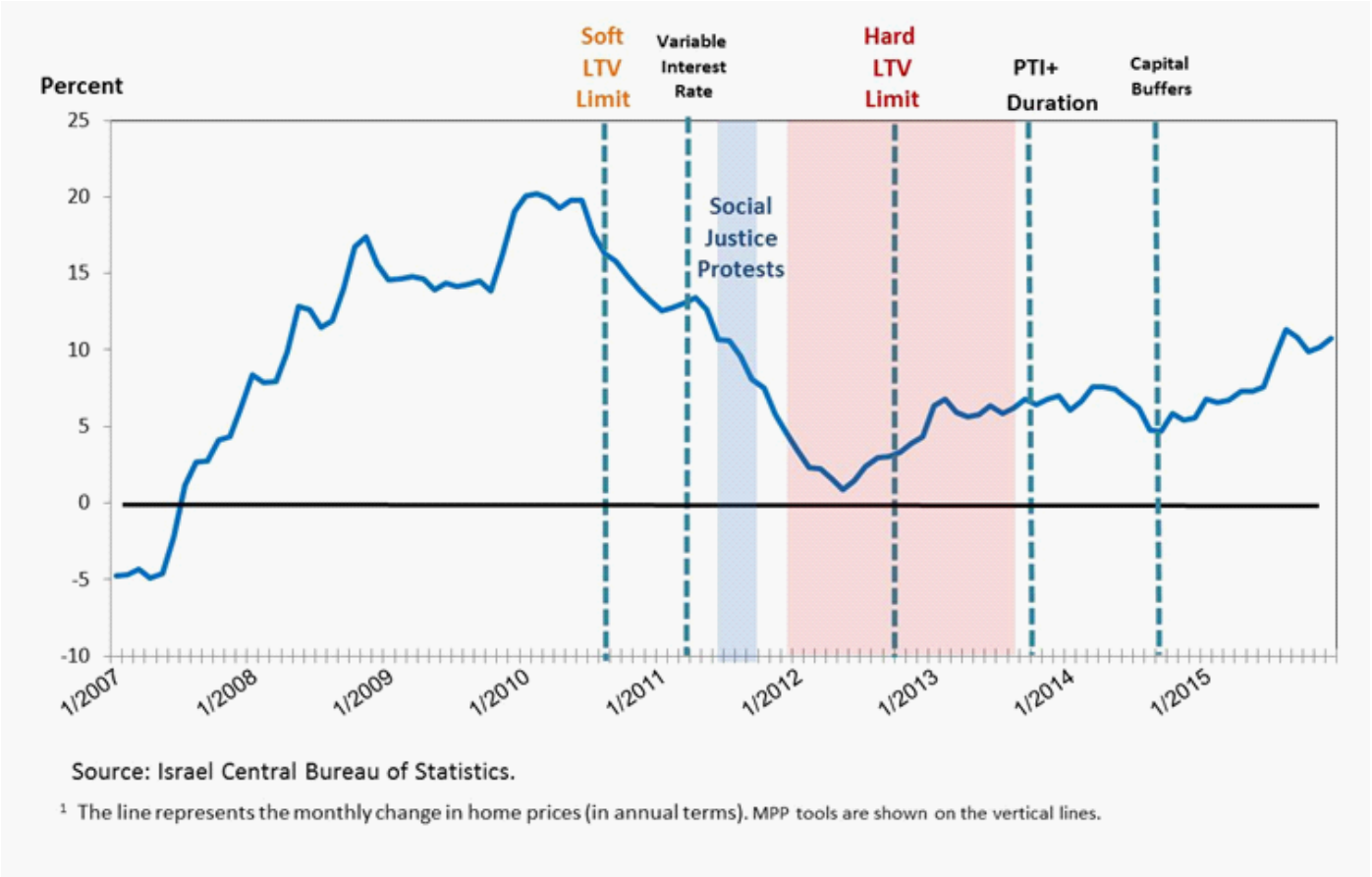
- No segment of the borrower types being crowded out of the credit and real estate markets.
- In terms of housing characteristics, affected borrowers bought lower quality assets, especially farther from the center.
- Investors had the highest elasticity reaction in each of the housing market characteristics.

Main Results (cont.)

- Counterintuitive results in the credit market.
- Due to the policy intervention, affected borrowers payed a higher interest rate and increased their term to maturity.
- Possible explanations:
- Due to the policy intervention, affected borrowers
  1. Bought riskier assets.
  2. Borrow unsecured credit.

The Housing Market in Israel and MPPs

The Rate of Change in Housing Prices in Israel, 01/2007-12/2015:



Source: Israel Central Bureau of Statistics.

[1] The line represents the monthly change in home prices (in annual terms). MPP tools are shown on the vertical lines.

LTV Limit

- In October 2012, the Supervisor of Banks in Israel required banks (the only mortgage providers) to limit the LTV ratio to:
  - 75% for First-Time Home Buyers.
  - 70% for Upgraders (who need to sell their first home within 18 month)
  - 50% for Investors (own two homes or more)

Data

1. Loan-level data from the Bank of Israel - mortgage contracts and borrower characteristics (104K obs. from Jan. 2012 to August 2013).

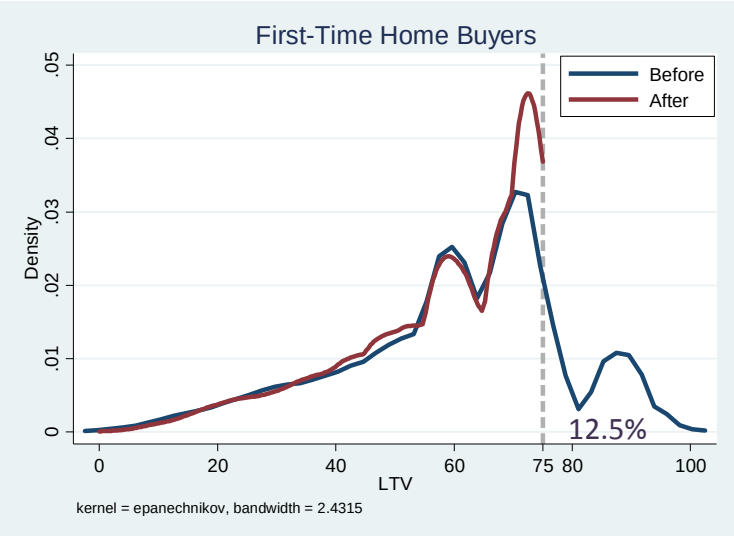
2. Housing unit characteristics from the Israel Tax Authority - (Merged: 34k obs.)

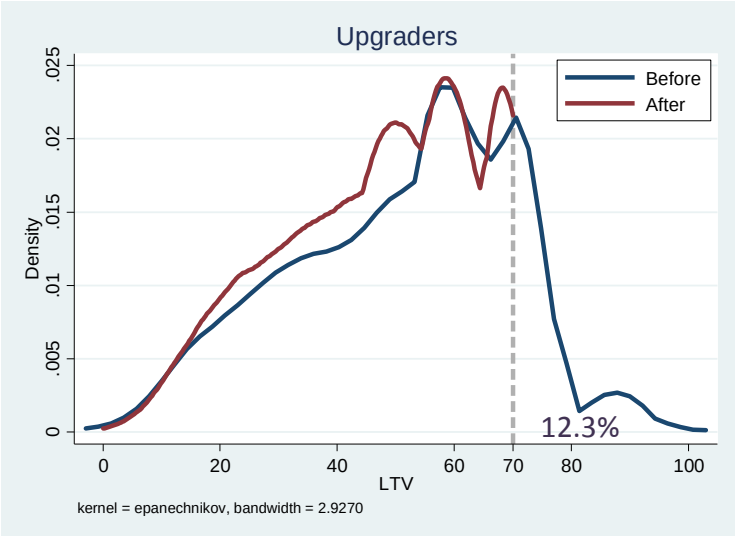
1+2 - Detailed information on the mortgage (interest rate, LTV, etc.), on the borrower (age, income) and on the housing unit (size, location etc.)

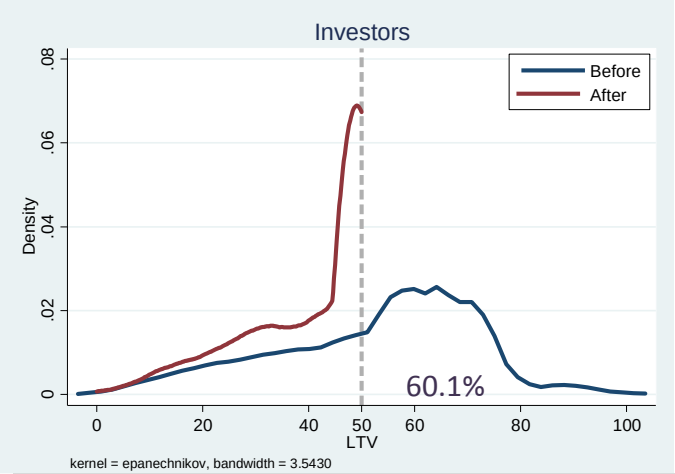
Sample Statistics - All borrowers

Median (before the LTV limit)	First Time Home Buyers	Upgraders	Investors	Diff Investors VS Home Buyers
% observations	46	39	15	
Borrower's Monthly Income (NIS)	12,100	14,420	17,500	5,400***
Borrower's age	34.5	41.2	43.1	8.6***
Home Price (NIS thousands)	960,000	1,260,000	995,000	35,000*
Area (square meters)	84.0	104.0	75.0	-9***
Rooms	4.0	4.0	3.0	-1***
Distance from Tel Aviv-Jaffa (KM)	28.8	29.9	40.7	11.8***
Neighborhood quality	11.0	12.0	10.0	-1***
LTV (%)	61.2	54.1	58.0	-3.22**
Average Interest Rate (%)	2.95	2.87	2.96	0.01
Loan Duration (Years)	23.8	22.2	18.0	-5.8***
Default Rates (%)	1.8	1.9	1.3	-0.5**

Changes in the LTV Distribution- by Buyer Types

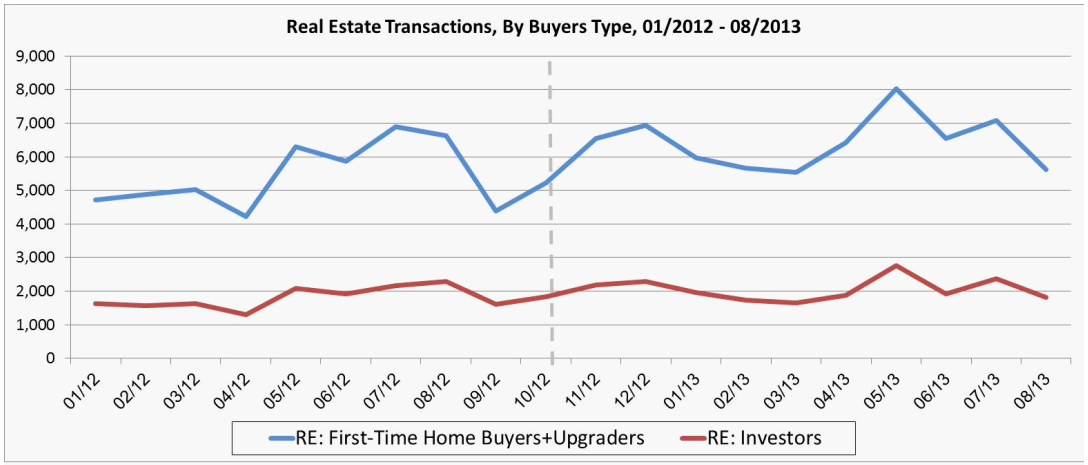


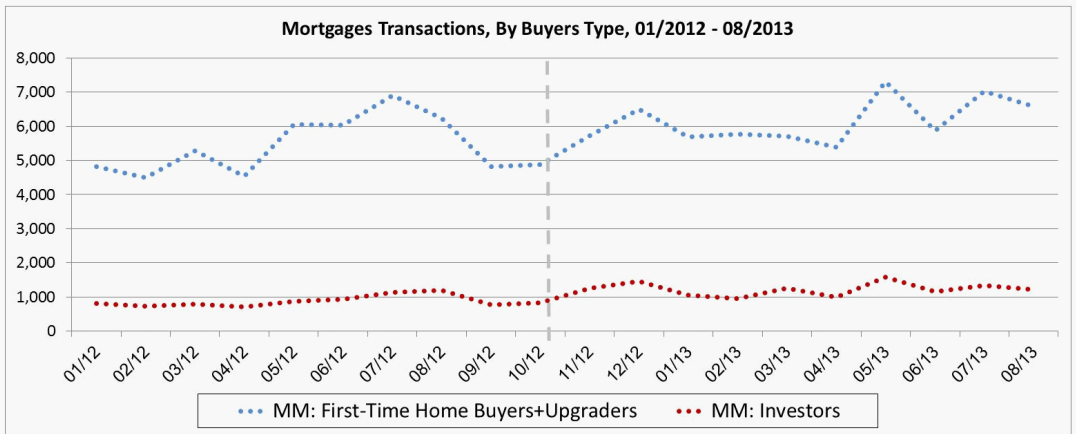




Did the LTV limit Change the Distribution of Borrowers?

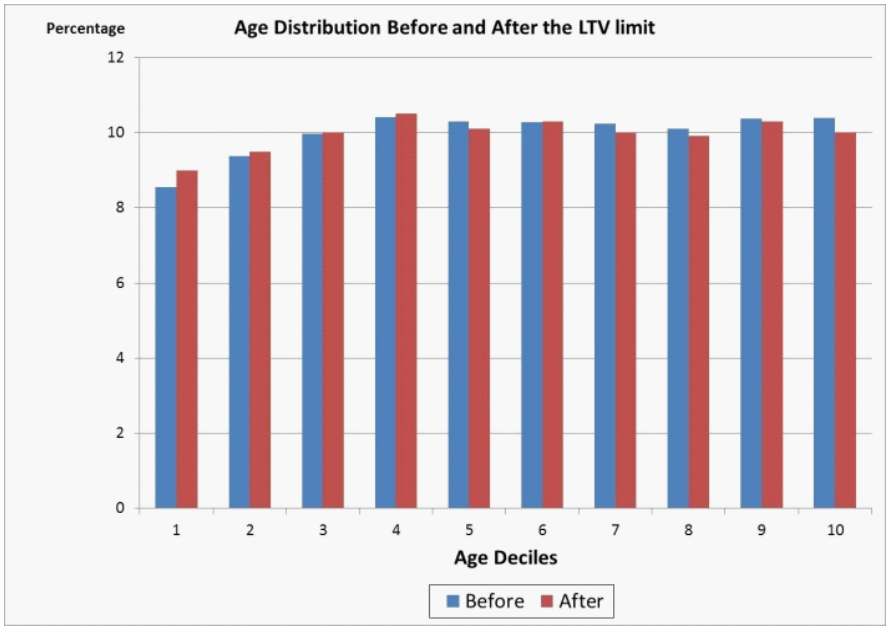
Activity in the RE and Mortgage markets, by borrower type:

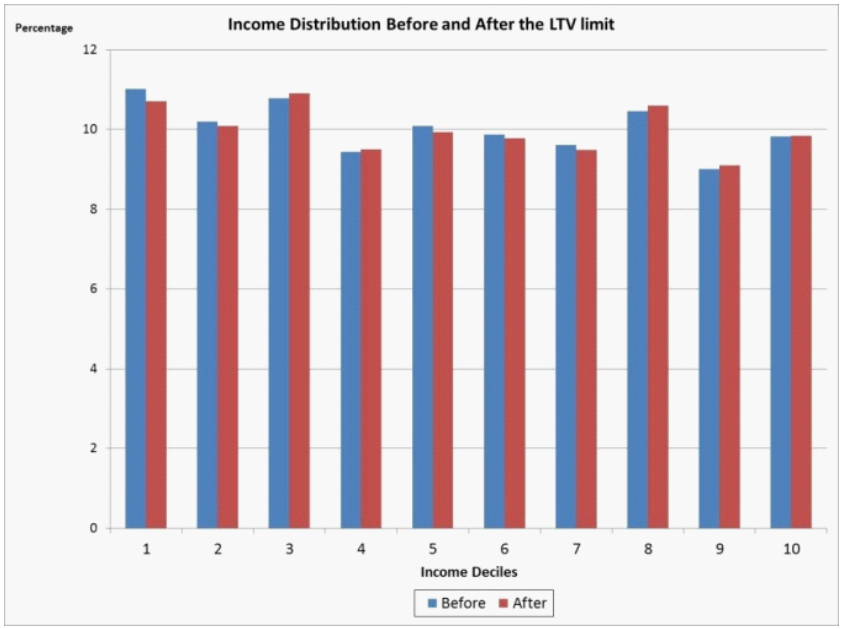




Did the LTV limit Change the Distribution of Borrowers?

Distribution of borrowers' characteristics before and after the LTV limit:





- No significant change in the distribution of the borrowers' characteristics.

Identifying Affected Borrowers

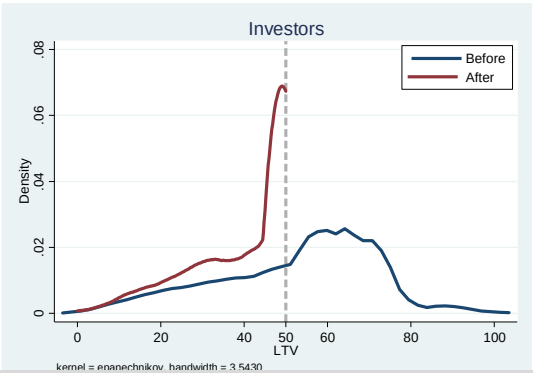
- This paper focuses on the policy's effect on the subset of borrowers constrained by the LTV limit.
- Treated Borrowers – would violate the LTV limit were they allowed to do so.
- However, the treatment status is observed only before the policy, while after the policy, we can no longer distinguish constrained borrowers based on their LTV ratio.
- The key contribution of this paper is the prediction of the borrower's leverage choices after the LTV limitation.

Prediction LTV Distribution

- Abadie (2005): "determine the treatment status from some individual characteristics observed in both period"
- Individual characteristic: Age and Income (Godoy et al.(2016))
- Other borrower characteristics have been tested

Prediction LTV Distribution - #2 Method

- Matching approach: examine households that are (slightly) .below the cutoff after the p olicy
- Match the closest household from the period before based on observed characteristics.
- with two groups:
  - Control group - households that chose the same LTV .ratio before the policy, slightly below the cutoff
  - Treatment group - households that chose before the limitation to be above the LTV cutoff.



Difference-in-Differences Matching using predicted LTV distribution

	First-Time Home Buyers 70-75 VS 75-80	Upgraders 65-70 VS 70-75	Investors 45-50 VS 50-55
Real home prices (NIS thousands)	**-78,504*** **	**-48,760** **	**-182,722*** **
	(15,252)	(16,901)	(27,522)
Size (square meters)	**-8.05*** **	**-3.1***	**-14.9*** **
	(2.19)	(2.42)	(3.01)
Distance from Tel Aviv (km)	**7.1*** **	**3.3** **	**12.0*** **
	(1.61)	(1.57)	(2.97)
Neighborhoods quality	**-1.2*** **	**-0.4**	**-2.0*** **
	(0.39)	**(0.43)**	**(0.57)**
Interest Rate (p.p.)	**0.41*** **	**0.15**	**0.62*** **
	(0.13)	(0.14)	(0.22)
Maturity (years)	**1.8*** **	**0.5**	**1.5*** **
	(0.45)	(0.42)	(0.59)
Default (p.p.)	**-0.2*** **	**-0.15*** **	**0.06**
	(0.06)	(0.05)	(0.07)
N	3,229	1,714	628

Difference-in-Differences Matching using predicted LTV distribution - Percentage Change

	First-Time Home Buyer	Upgraders	Investors
	70-75 VS 75-80	65-70 VS 70-75	45-50 VS 50-55
Real home prices (NIS thousands)	-0.10***	-0.05**	-0.22***
Size (square meters)	-0.09***	-0.03**	-0.14***
Distance from Tel Aviv (km)	0.14***	0.06**	0.24***
Neighborhoods quality	-0.12***	-0.04	-0.18***
Interest Rate (p.p.)	0.41***	0.15	0.62***
Maturity (years)	0.07***	0.02	0.09***
Default (p.p.)	-0.2***	-0.15***	0.06

Additional Perspectives

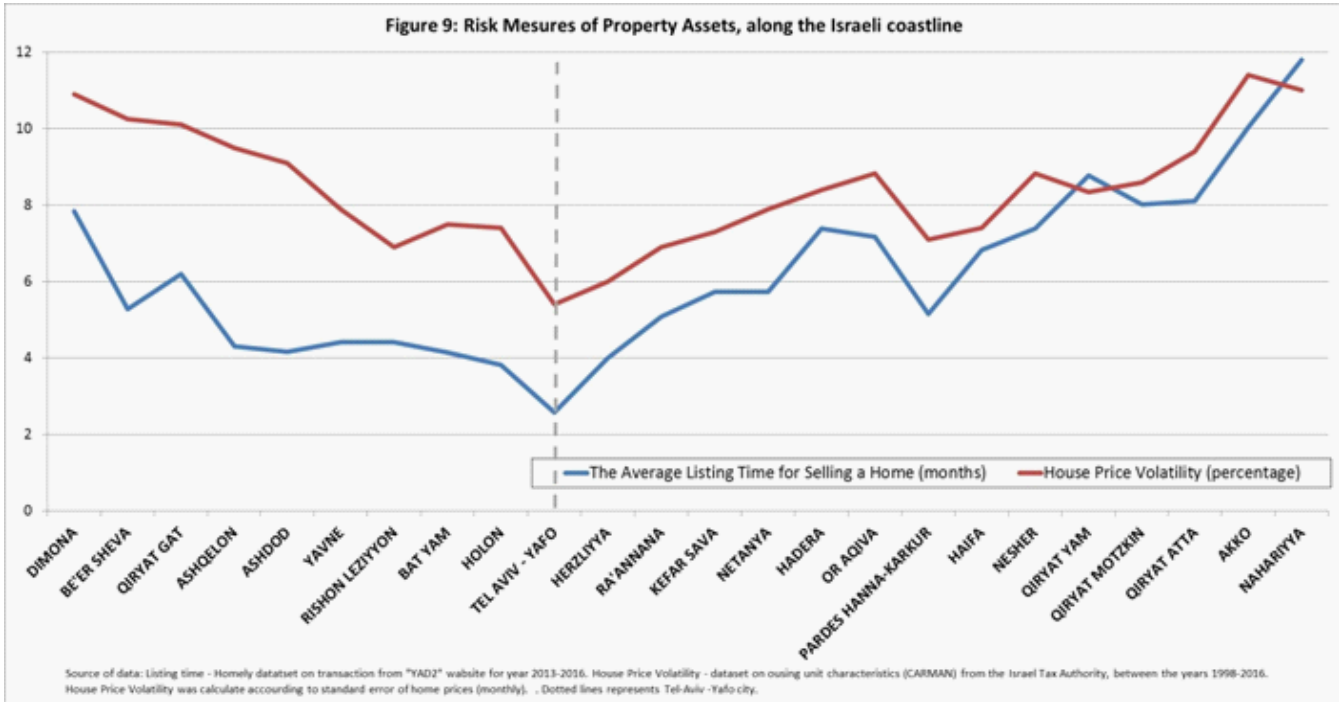
- Increase in the interest rate and maturity could have happened due to:

1. Borrowers buying assets farther from the center in riskier areas.
2. Increase in unsecured credit.

- MPPs intended to prevent households from overleveraging but those unintended consequences might increase the borrower's risk.
- To support this interpretation, we perform two additional analyses:

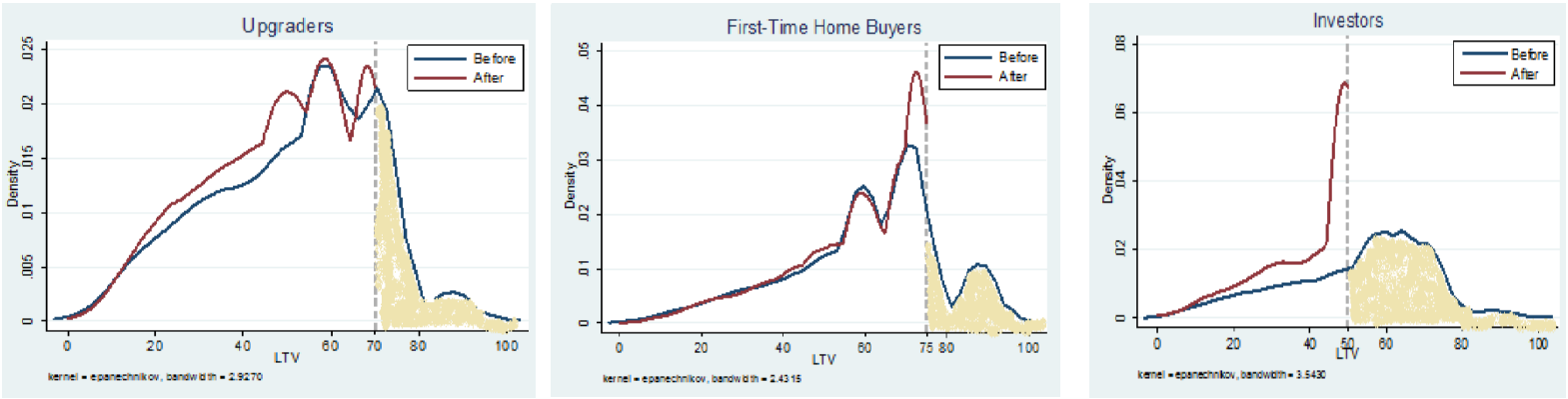
1. The change in property risk in different locations.
2. Shift in the demand for consumer credit.

Are Housing Assets farther from the center Riskier?



- The risk of housing assets increases the farther we move from the center
- Therefore, the LTV limit might actually encourages borrowers to move farther from the center, to riskier areas

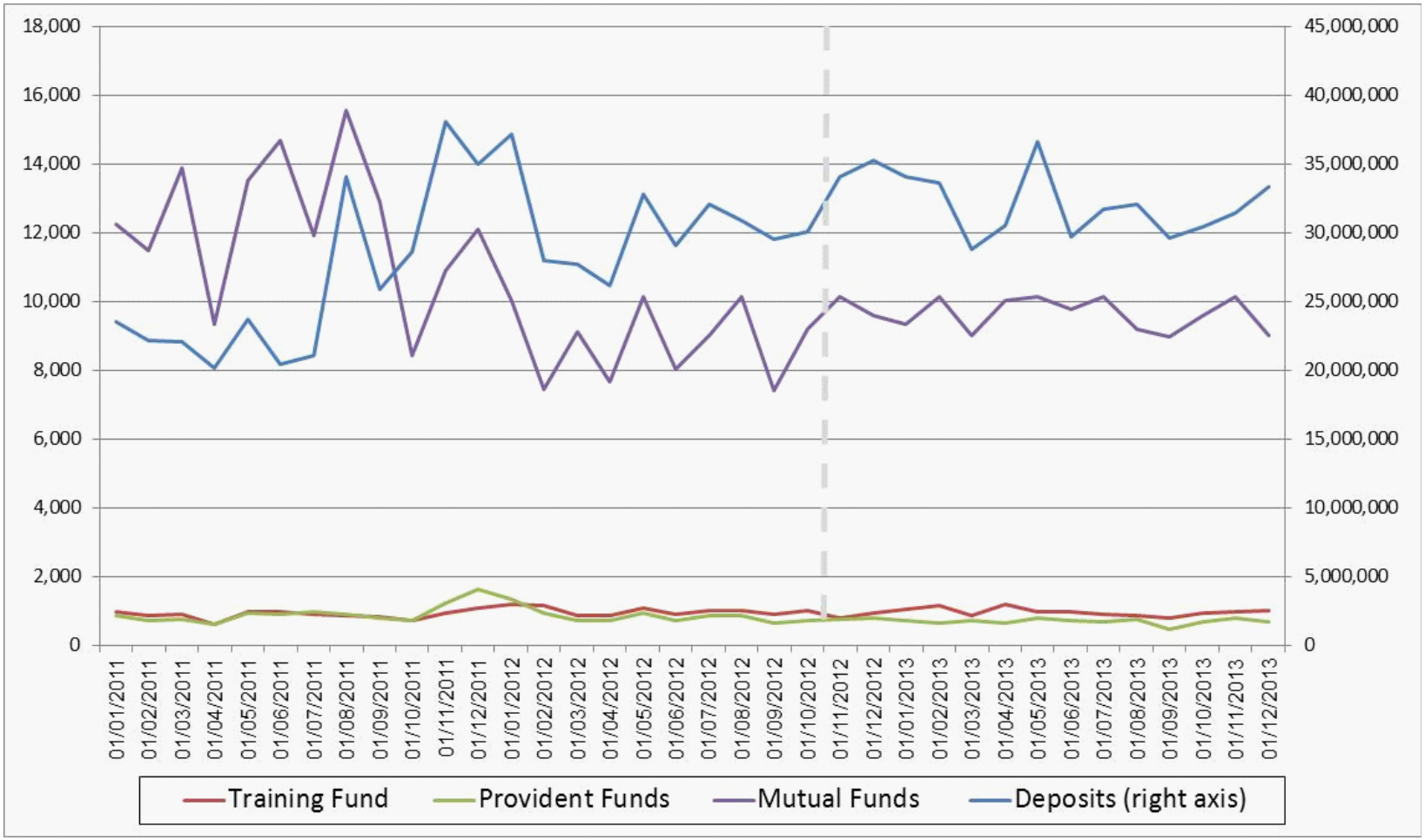
Shifts in the Demand for Consumer Credit



- Amount of mortgages above the cutoffs (before) $\approx$ NIS 10.3 billion (36% - FTHB, 33%- Upgraders, 31%-Investors).
- However, some borrowers lowered their loan amount
- Net amount of mortgages that were withdrawn from the market $\approx$ NIS 6.7 billion NIS.
- How did borrowers raise the additional amount of money?

Shifts in the Demand for Consumer Credit

Withdrawals from Several Financial Resources, 2011-2013:



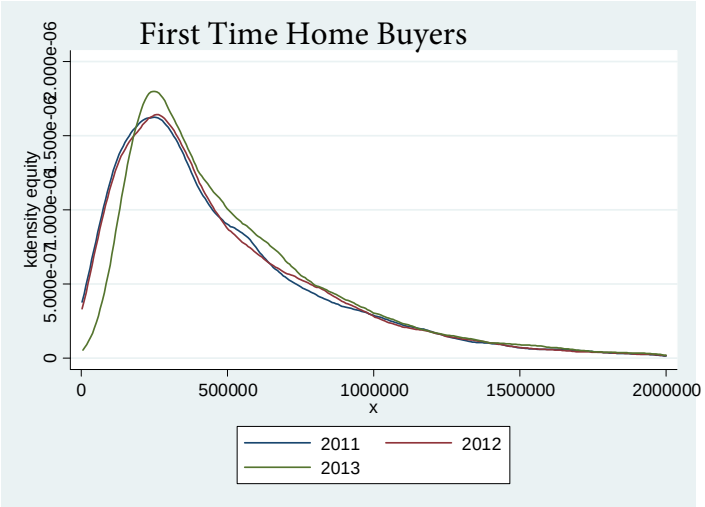
Shifts in the Demand for Consumer Credit

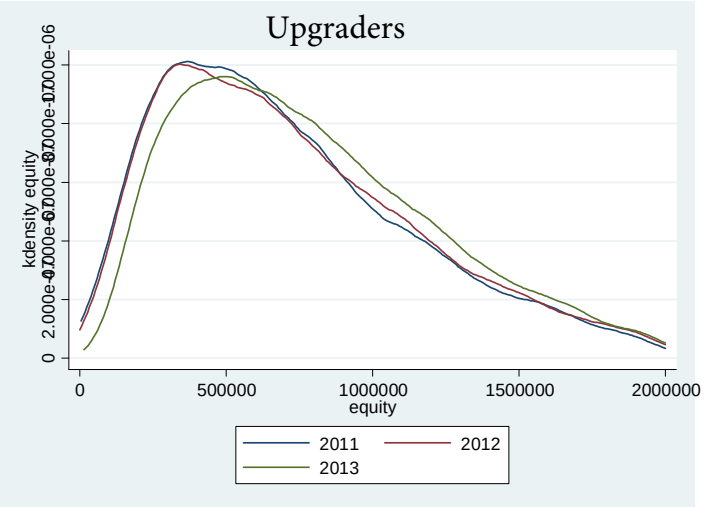
Changes in Mortgages and Consumer Credit, 01/2011-04/2014:

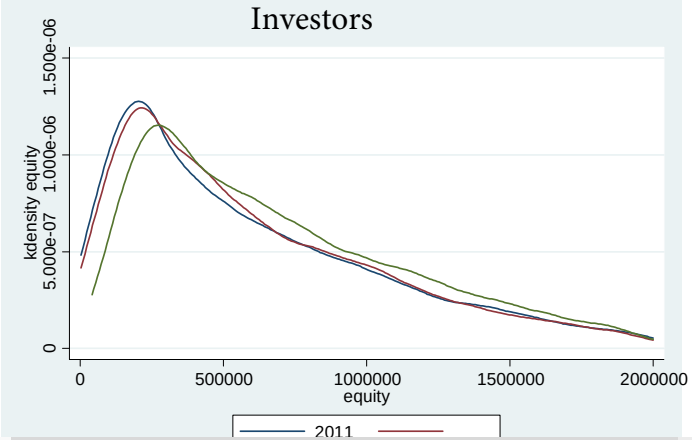
- Riskier credit: unsecured and short-term credit, more expensive, higher monthly payments and increasing overall exposure to risk of recession and unemployment.

Shifts in the Demand for Consumer Credit

Changes in downpayment Distribution before and after the LTV limit







Concluding Remarks

- LTV limit did not crowd out borrowers but encouraged them to buy cheaper and lower quality assets, especially farther from the center
- *Counterintuitive results in the credit market: higher interest rate and higher maturity, due to:*
  - *Riskier assets, farther from the center.*
  - *Increase in unsecured credit.*
- *While the objective of hard LTV limit was to reduce borrower risk, this paper finds that in certain respects it even increased.*
- *Understanding of market participants' response to LTV limits is crucial for the development of appropriate policy tools in the future.*