

# Expectations About Aggregate Outcomes

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- What represents “personal experiences”?
  - Local experiences affect expectations of nationwide house prices
    - Level of expected house price changes
    - Experienced variability affects expected variability
  - Personal employment status affects expected unemployment rates

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- What represents “personal experiences”?
  - Local experiences affect expectations of nationwide house prices
    - Level of expected house price changes
    - Experienced variability affects expected variability
  - Personal employment status affects expected unemployment rates
- Implications for expectation formation process?
  - Inconsistent with full information rational expectation
  - unrelated to proxies of informativeness
  - especially strong for respondents with low analytical ability

# Data

## NY Fed Survey of Consumer Expectations:

- Monthly panel, respondents remain in survey up to 1 year
- Started end of 2012
- 1,200 respondents per monthly module (about 8,100 unique respondents)
- Expectations about variety of aggregate economic variables, including house prices, unemployment
- Respondent characteristics, including living situation and numeracy score

# Approach

$$y_{it} = \alpha + \beta \text{Personal\_experience}_{it} + \gamma X + \varepsilon_{it}$$

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Step 2: Interpretation of  $\beta$ ?

- Full information rational expectations?
- Optimally use limited information?

# Housing Market Experience & Expectations

- National house price development:

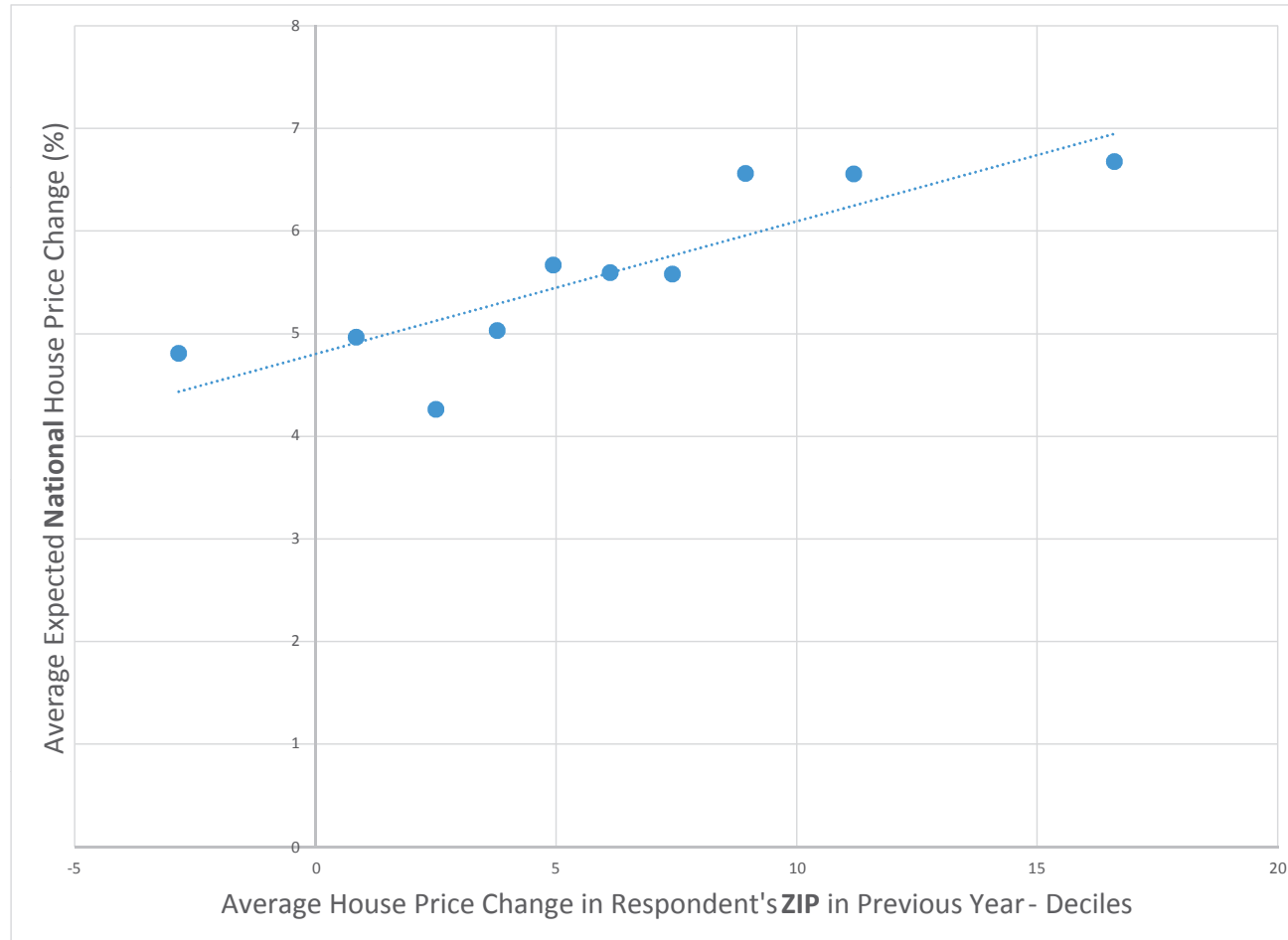
*“Next we would like you to think about home prices **nationwide**....  
By about what percent do you expect the average home price to  
increase/decrease over the next 12 month? Please give your best guess.”*

*Over the next 12 months, I expect the average home price to  
(increase/decrease) by \_\_\_\_\_ % .*

- Local house price development as proxy for experience
  - Zip code
  - State
  - MSA

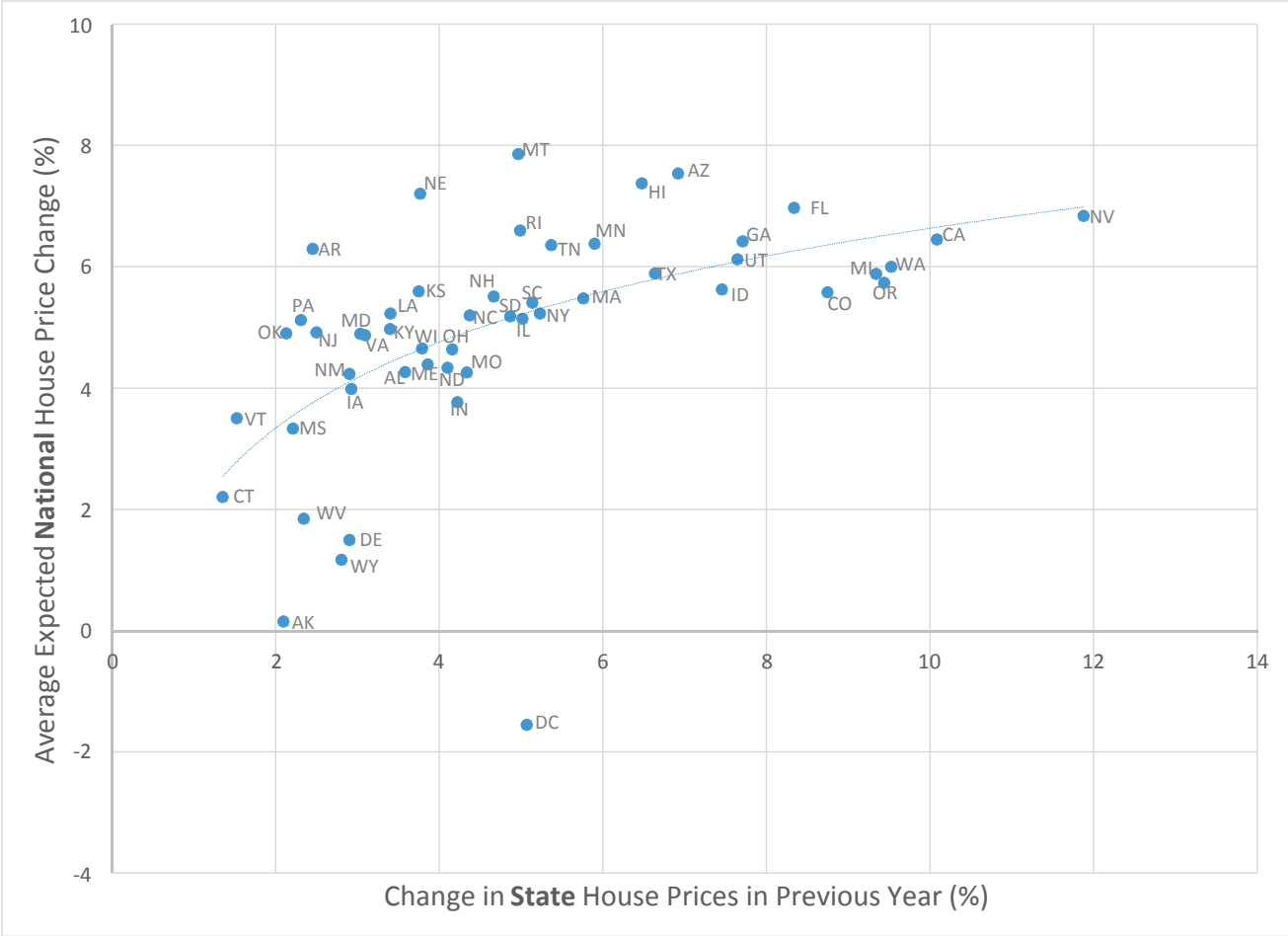


# Past House Prices and Expectations



- Expect higher **national** house prices when past **ZIP** level house price increase higher

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- Expect higher **national** house prices when past **state** level house price increase higher

# Past House Prices and Expectations

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	I ZIP	II MSA	III State
<b>Expected 1 Year Change in US House Prices</b>			
Past Local House Price Change	0.095*** (0.0181)	0.172*** (0.0332)	0.217*** (0.0412)
Time Fixed Effects	Y	Y	Y
Demographics	Y	Y	Y
Effect of 1 std	0.516	0.686	0.738
Effect of 1 std when weighted	0.635	0.838	0.809
Number of observations	6,032	6,925	8,104
R squared	0.0436	0.0388	0.0367
<b>Expected 1 Year Change in US House Prices in 2 Years</b>			
Past Local House Price Change	0.0886*** (0.0178)	0.116*** (0.0276)	0.144*** (0.0390)
Time Fixed Effects	Y	Y	Y
Demographics	Y	Y	Y
Effect of 1 std	0.483	0.465	0.493
Effect of 1 std when weighted	0.657	0.578	0.570
Number of observations	5,881	6,758	7,907
R squared	0.0602	0.0496	0.0494

- Expect higher **US** price changes when higher **local** price changes

# Informativeness of Past House Prices

	Expected 1 Year Change in US House Prices		
	I ZIP	II MSA	III State
Local House Price Change	0.0760*	0.182***	0.163**
* Low Co-movement with US House Prices	(0.0391)	(0.0425)	(0.0626)
Local House Price Change	0.135***	0.156***	0.195***
* Medium Co-movement with US House Prices	(0.0456)	(0.0386)	(0.0532)
Local House Price Change	0.0173	0.108	0.161*
* High Co-movement with US House Prices	(0.0310)	(0.0787)	(0.0839)
Medium Co-movement with US House Prices	-0.466 (0.468)	0.567 (0.457)	-0.00409 (0.665)
High Co-movement with US House Prices	0.147 (0.443)	0.963* (0.544)	0.00332 (0.620)
Time Fixed Effects	Y	Y	Y
Demographics	Y	Y	Y
Low vs. High Co-movement	-0.0587 (0.0482)	-0.0747 (0.0887)	-0.00150 (0.0877)
Number of observations	5,163	5,911	6,945
R squared	0.0447	0.0413	0.0374

- No difference by informativeness of past local price changes

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- So far: Experience measured by last year's house price return
- But: Experience in previous years may matter

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- Weighted average following Malmendier, Nagel (2010)
  - Weighting parameter  $\lambda$ : over- or underweight recent experiences
  - Fixed and individual specific horizon
- LASSO estimation using all yearly local house price changes



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→ Use measure of entire history of local price experiences

- Weighted average following Malmendier, Nagel (2010)
  - Weighting parameter  $\lambda$ : over- or underweight recent experiences
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- LASSO estimation using all yearly local house price changes

→ Recent experiences receive the most weight

→ Reliance on local experience unrelated to informativeness

## Closer Look: Weighted Average of Past Price Changes

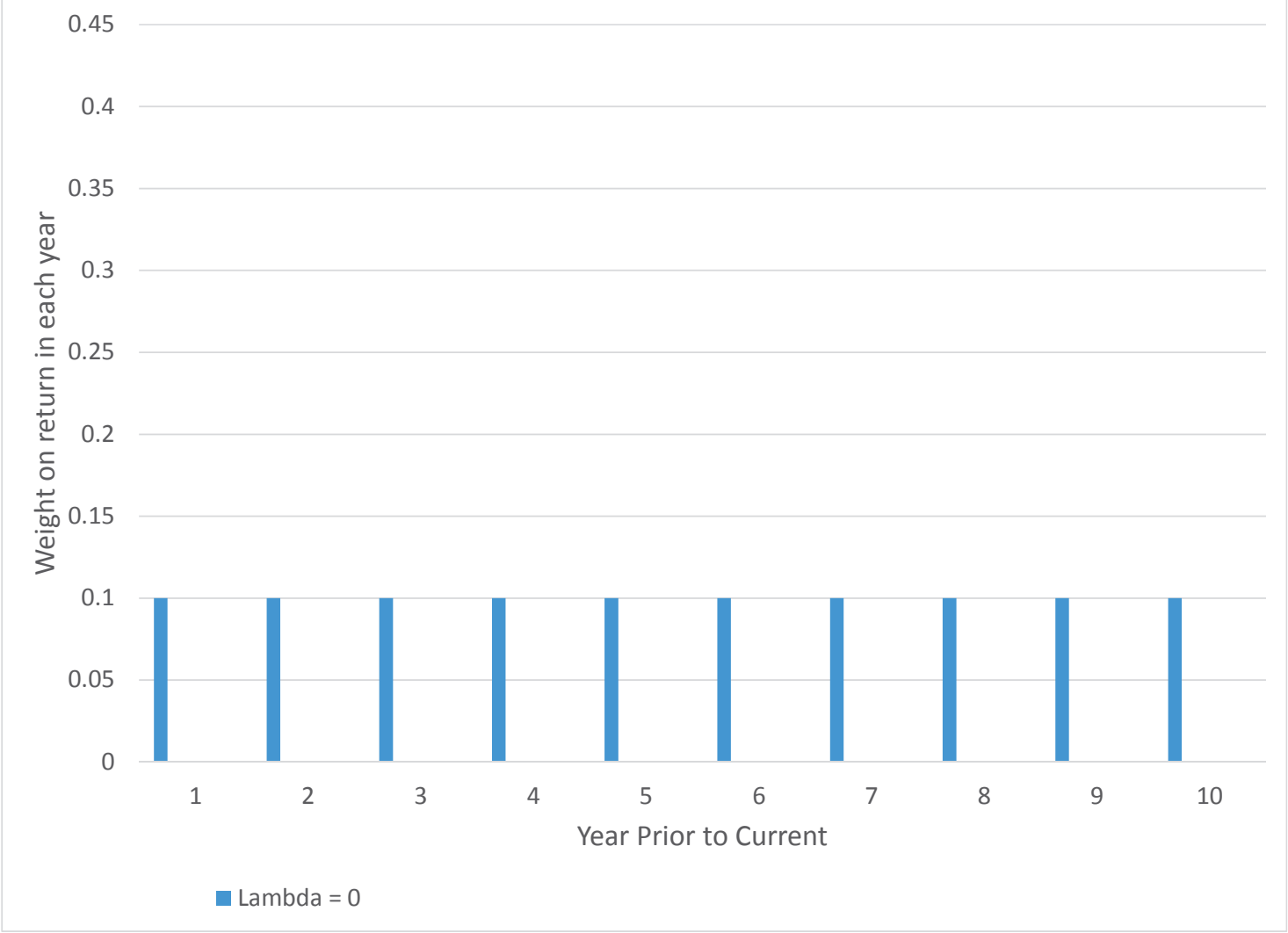
Experience,  $A_{it}$  as weighted average of past price changes ( $R_{t-k}$ )

$$A_{it} = \sum_{k=1}^{\text{horizon}_{it}-1} w_{it}(k, \lambda) R_{t-k}$$

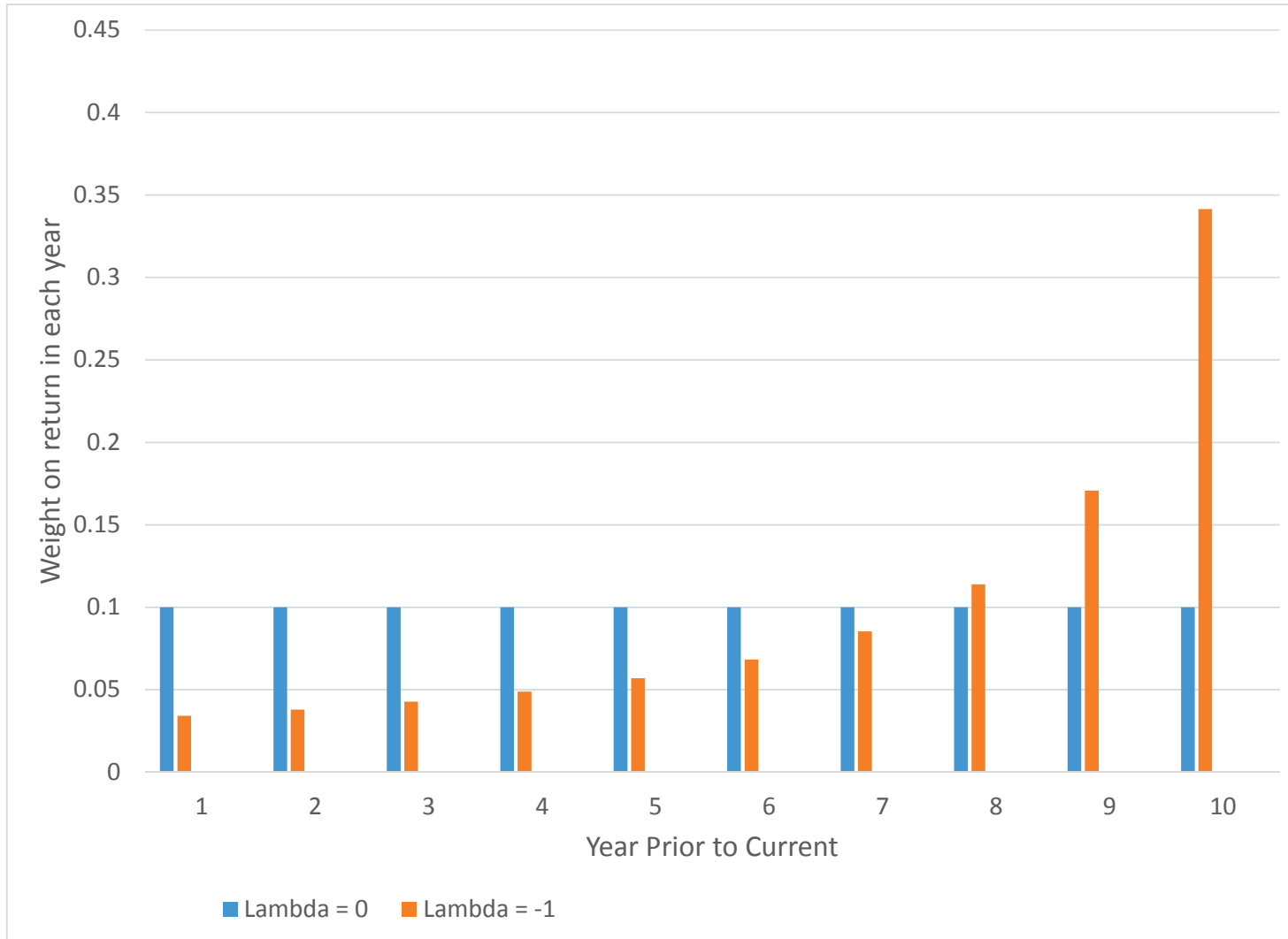
where

$$w_{it}(k, \lambda) = \frac{(\text{horizon}_{it} - k)^\lambda}{\sum_{k=0}^{\text{horizon}_{it}-1} (\text{horizon}_{it} - k)^\lambda}$$

# Weighting Parameter $\lambda$

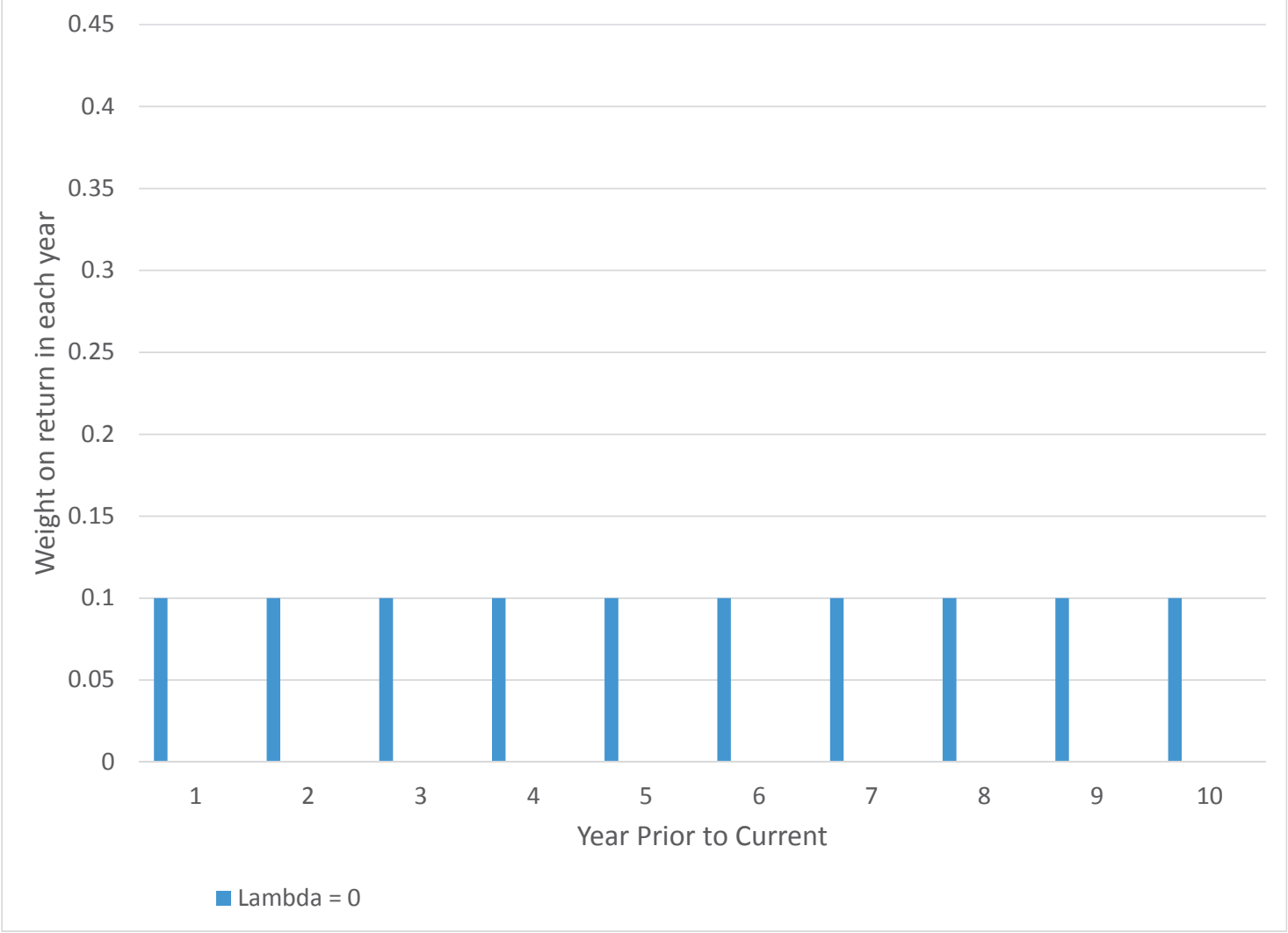


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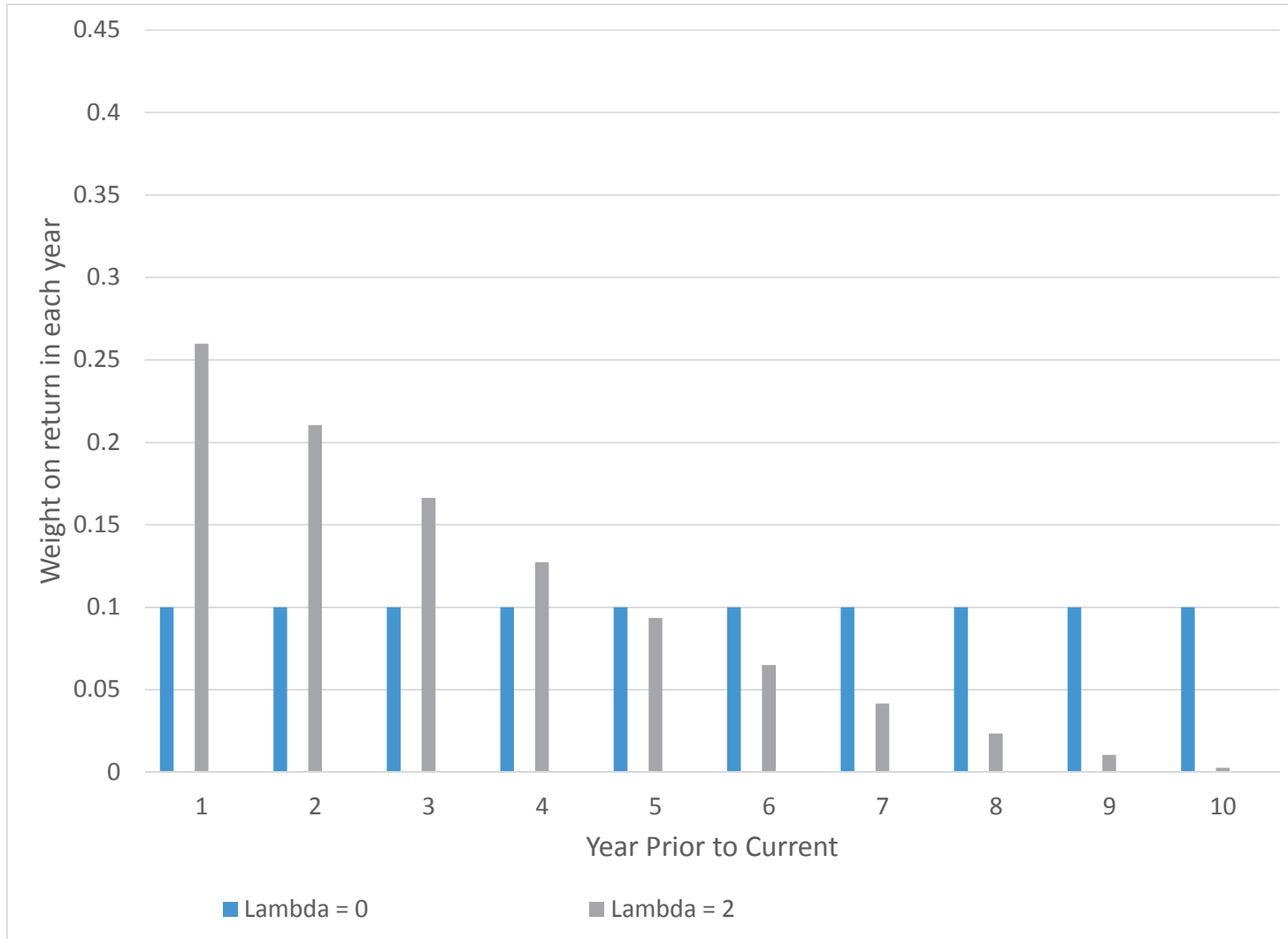


→ Negative  $\lambda$  overweights early experiences

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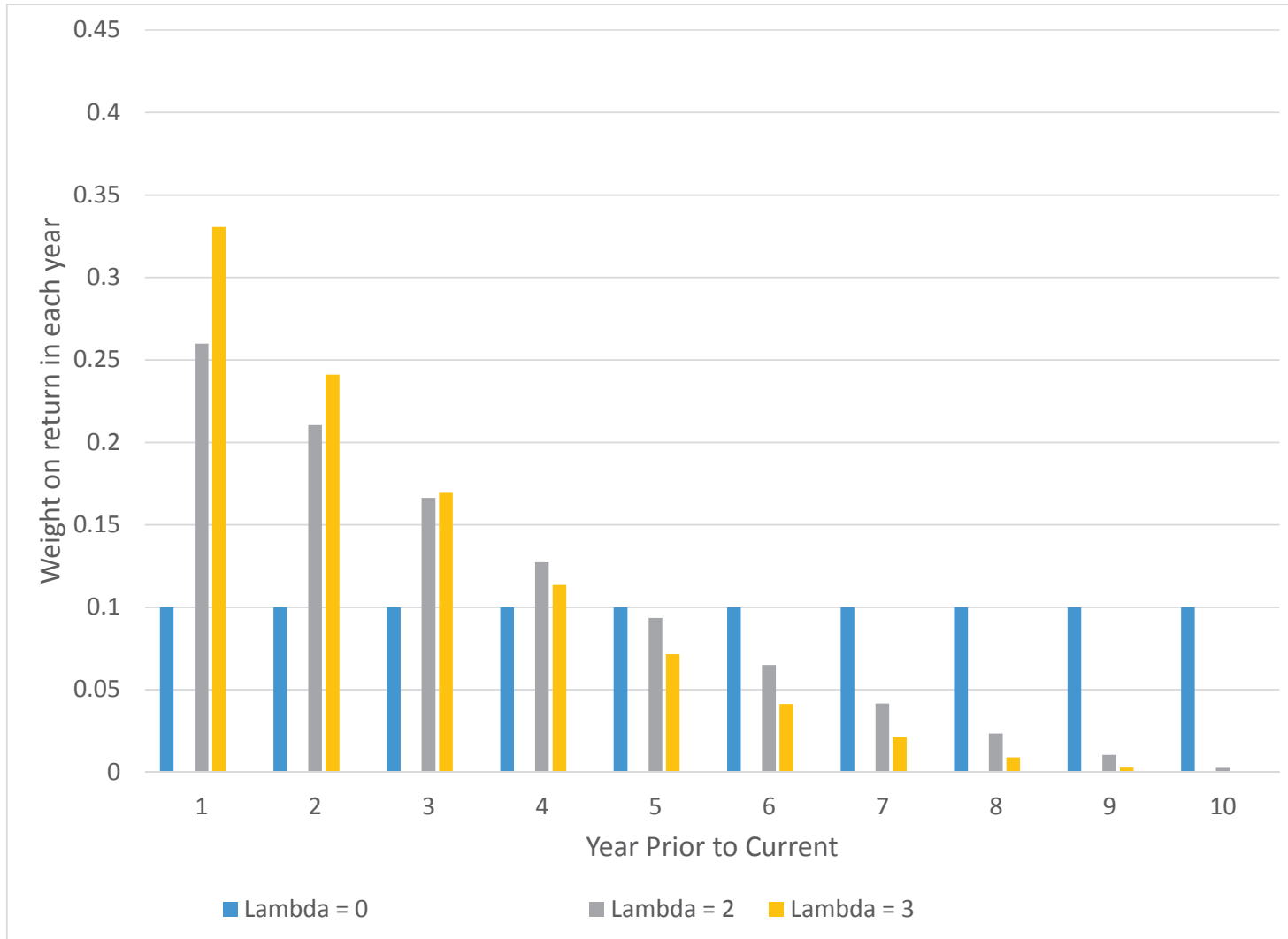


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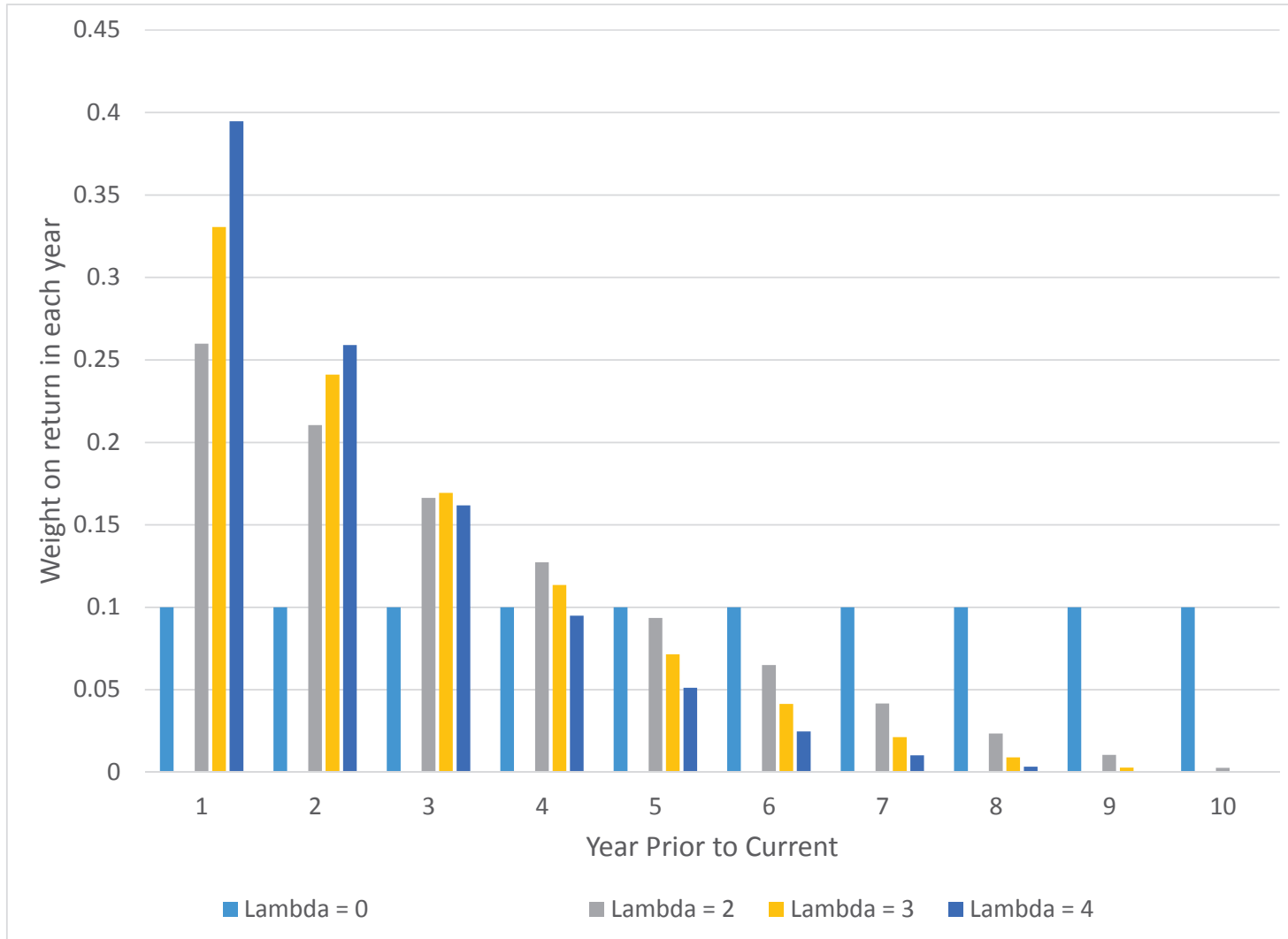
→ Positive  $\lambda$  overweights recent experiences

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# History of local price experiences

Effect of most recent local house price change on expectations

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# History of local price experiences

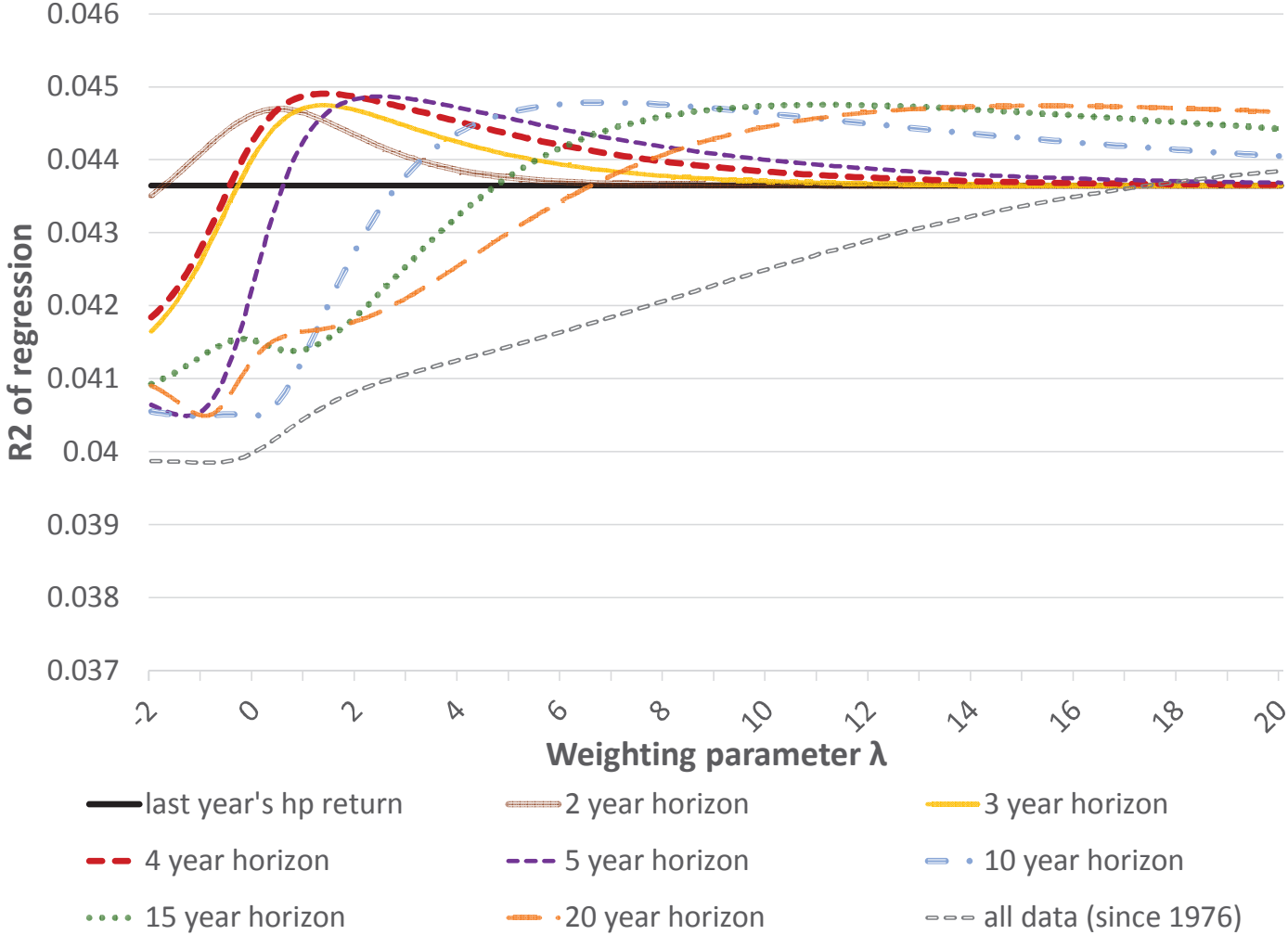
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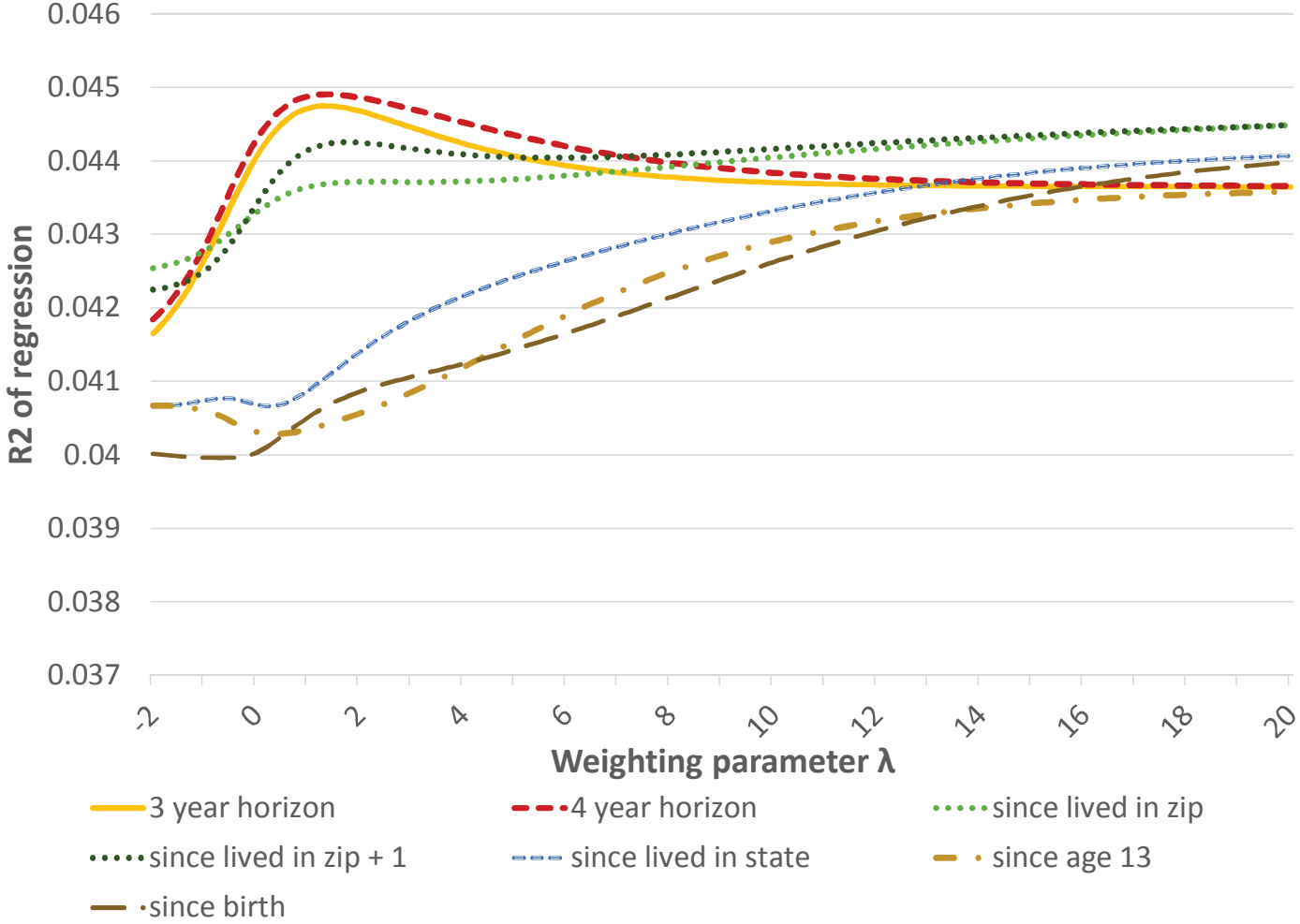
Effect of **history of local house price changes** on expectations

$$y_{it} = \alpha + \beta A_{i,t} + \gamma' X_{it} + \epsilon_{it}$$

# History of local price experiences



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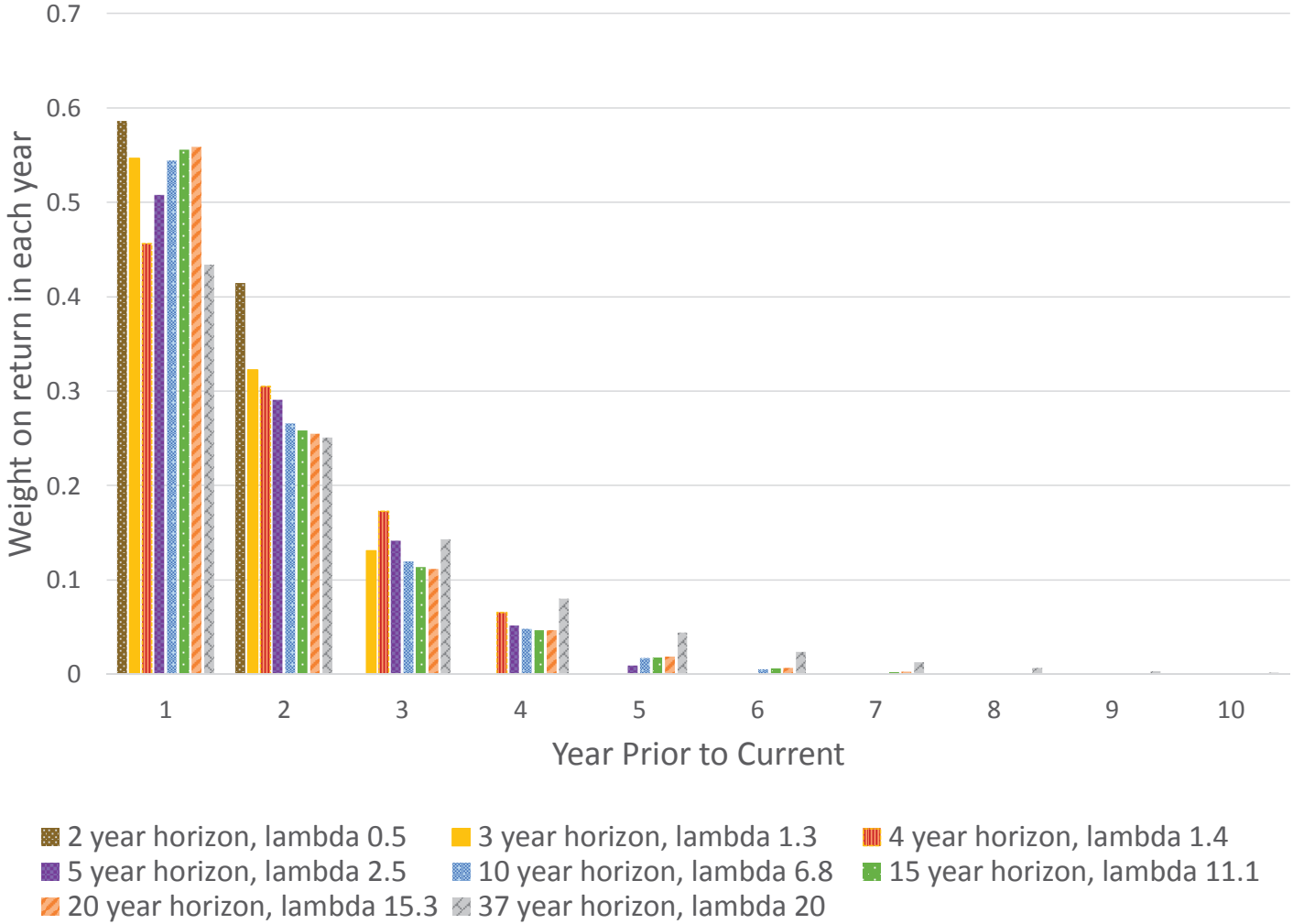


# History of local price experiences

Horizon	Best Fit Parameters for Weighted Past Experiences				
	R2	$\lambda$	Coefficient	Standard error of coefficient	Effect of 1 standard deviation
	(1)	(2)	(3)	(4)	(5)
2 years	4.470%	0.5	0.136	0.018	0.626
3 years	4.475%	1.3	0.149	0.022	0.638
4 years	4.490%	1.4	0.165	0.022	0.668
5 years	4.487%	2.5	0.160	0.025	0.654
10 years	4.478%	6.8	0.158	0.023	0.641
15 years	4.475%	11.1	0.157	0.023	0.636
20 years	4.474%	15.3	0.156	0.023	0.634
all data	4.385%	20.0	0.178	0.028	0.642
Number of Individuals	6,032				

→ Recent years more overweighted (higher  $\lambda$ ) for longer horizons

# History of local price experiences



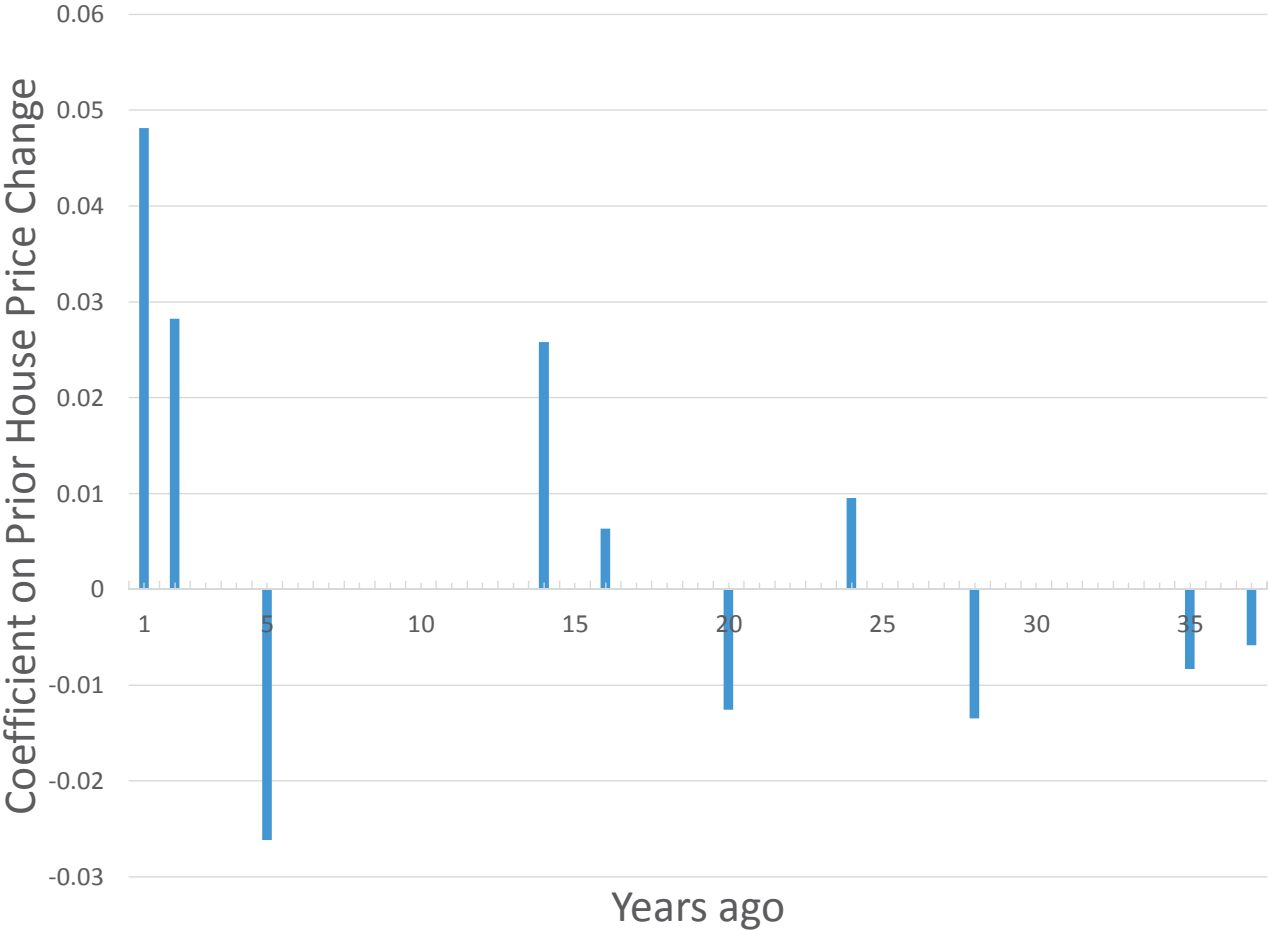
→ Recent years most relevant irrespective of horizon

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Number of Individuals	6,032				

→ Effect similar irrespective of horizon

# History of local price experiences: LASSO





# House Price Experience & Expected Variability

- So far: 1st moment
  - Does **level** past locally experienced house price changes affect the **level** of expected national house price changes?
- Now: 2nd moment
  - Does **variability** of past locally experienced house price changes affect the expected national **variability**?

# Distribution of Expected House Price Changes

*And in your view, what would you say is the percent chance that, over the next 12 months, the average home price nationwide will...*

- *increase by 12% or more*
- *increase by 8% to 12%*
- *increase by 4% to 8%*
- *...*
- *decrease by 8% to 12%*
- *decrease by 12% or more*

→ Measure of variability: standard deviation using midpoints

# Experienced and Expected Variability

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	Std of expected house price change		
	I	II	III
	ZIP	MSA	State
Std of house price changes since			
5 years ago	0.0489*** (0.0159)	0.0125 (0.0133)	0.0268 (0.0218)
10 years ago	0.0307*** (0.0103)	0.0236** (0.0109)	0.0143 (0.0104)
20 years ago	0.0370*** (0.00847)	0.0250** (0.0101)	0.0179 (0.0109)
1976 (all available data)	0.0391*** (0.0138)	0.0168 (0.0152)	0.0157 (0.0131)
Last year's house price change	Y	Y	Y
Demographics	Y	Y	Y
Number of observations	5830	6693	7835

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- Expect higher national volatility when higher local volatility

# Expectations as Experience Change

- **So far:** Cross-sectional and time variation in local experience
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- Ideally: As experience changes, how do respondents change their expectations?
- **Now:** Estimate effect of changing experience on labor market expectations
  - Personal experience: Employment status
  - Expectation: Expected likelihood of US unemployment increasing

# Employment Changes

		Current Employment Status					Total
		Employed	Looking for Work	Retired	Student	Out of Labor Force	
Previous Employment Status	Employed	32,197	<b>271</b>	200	50	95	32,813
	Looking for Work	<b>323</b>	1,436	136	30	88	2,013
	Retired	199	116	9,842	4	121	10,282
	Student	48	26	3	302	8	387
	Out of Labor Force	104	84	137	7	2,482	2,814
	New Entrant	5,636	418	1,490	68	492	8,104
	Total	38,507	2,351	11,808	461	3,286	56,413

→ Personal employment experience changes over time

→ Changes in expectations as experience changes



# Unemployment Expectations and Own Employment Status

	I	II
Employment Status		
Employed		
Looking for Work	1.442** (0.655)	1.447** (0.655)
Become Employed		
Become Unemployed		
Local Unemployment (Decile Indicators)		Y
Time Fixed Effects	Y	Y
Demographics	Y	Y
Individual Fixed Effects	Y	Y
Mean of dependent variable	37.87	37.87
Number of observations	60,700	60,700
Number of individuals	8,104	8,104

- More pessimistic when experiencing unemployment

# Possible Explanations: Who extrapolates?

- So far:
  - Local and personal experiences matter
  - Reliance on experiences unrelated to their informativeness
- Estimate differential effect of past experience by:
  - Numeracy & College
  - Homeownership
  - Age
- Relation to expectations about other outcomes
- Better understand underlying mechanism

# House Prices Expectations - By Numeracy

	Expected 1 Year Change in US House Prices		
	I ZIP	II MSA	III State
Past Local House Price Change * Low Numeracy	0.141** (0.0652)	0.273*** (0.0726)	0.317*** (0.0777)
Past Local House Price Change * Medium Numeracy	0.0951*** (0.0276)	0.163*** (0.0523)	0.210*** (0.0568)
Past Local House Price Change * High Numeracy	0.0563** (0.0217)	0.0990*** (0.0297)	0.157*** (0.0417)
Medium Numeracy	-1.016* (0.507)	-0.337 (0.550)	-0.429 (0.510)
High Numeracy	-1.006** (0.471)	-0.224 (0.509)	-0.364 (0.489)
Time Fixed Effects	Y	Y	Y
Demographics	Y	Y	Y
Low vs. High Numeracy	-0.0844 (0.0622)	-0.174*** (0.0638)	-0.160** (0.0652)
Number of observations	5752	6593	7695
R squared	0.0479	0.0399	0.0377

- Respondents with low numeracy extrapolate significantly more

# House Prices Expectations - By College

	Expected 1 Year Change in US House Prices		
	I ZIP	II MSA	III State
Past Local House Price Change * College	0.0784*** (0.0207)	0.144*** (0.0305)	0.181*** (0.0495)
Past Local House Price Change * No College	0.115*** (0.0334)	0.202*** (0.0560)	0.261*** (0.0465)
College	-0.221 (0.344)	-0.0733 (0.345)	0.122 (0.332)
Time Fixed Effects	Y	Y	Y
Demographics	Y	Y	Y
No College vs College	-0.0367 (0.0408)	-0.0578 (0.0592)	-0.0796 (0.0497)
Number of observations	6032	6925	8104
R squared	0.0438	0.0390	0.0369

- College graduates extrapolate less

# House Prices Expectations - By Ownership

	Expected 1 Year Change in US House Prices		
	I	II	III
	ZIP	MSA	State
	<b>By ownership</b>		
Past Local House Price Change * Homeowner	0.0842*** (0.0206)	0.161*** (0.0338)	0.198*** (0.0365)
Past Local House Price Change * Non-Homeowner	0.124** (0.0475)	0.203*** (0.0609)	0.281*** (0.0819)
Homeowner	-0.245 (0.480)	-0.435 (0.518)	-0.0990 (0.537)
Time Fixed Effects	Y	Y	Y
Demographics	Y	Y	Y
Difference Non-Homeowner vs Homeowner	-0.0395 (0.0547)	-0.0420 (0.0605)	-0.0831 (0.0715)
Number of observations	6,032	6,925	8,104
R squared	0.0438	0.0389	0.0369

- No effect of homeownership on extent of extrapolation
- Extrapolation unlikely due to reporting risk-adjusted expectations

# House Prices Expectations - By Age

	Expected 1 Year Change in US House Prices		
	I ZIP	II MSA	III State
Past Local House Price Change * Age 25-39	0.0497 (0.0507)	0.175*** (0.0534)	0.157*** (0.0535)
Past Local House Price Change * Age 40-49	0.155*** (0.0498)	0.207*** (0.0693)	0.294*** (0.0844)
Past Local House Price Change * Age 50-59	0.0632* (0.0322)	0.183*** (0.0505)	0.215*** (0.0683)
Past Local House Price Change * Age 60 plus	0.115*** (0.0270)	0.145*** (0.0387)	0.218*** (0.0428)
Age 40-49	-0.357 (0.575)	0.280 (0.678)	-0.514 (0.665)
Age 50-59	0.872 (0.609)	1.318** (0.615)	0.606 (0.617)
Age 60 plus	0.872 (0.578)	1.553*** (0.507)	0.735 (0.541)
Time Fixed Effects	Y	Y	Y
Demographics	Y	Y	Y
Difference Age 60 plus vs. 25-39	0.0653 (0.0540)	-0.0300 (0.0413)	0.0614 (0.0595)
Number of observations	6,028	6,921	8,099
R squared	0.0449	0.0392	0.0377

- No age differences before age 60

# Who extrapolates?

- So far:
  - Less sophisticated respondents (no college, low numeracy) extrapolate more
  - No difference by homeownership
  - No age differences below age 60

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- Same patterns for unemployment expectations



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→ Same patterns for unemployment expectations
- Additional results
  - No difference by region
  - No difference by peak-to-trough price changes during crisis
  - No difference by past standard deviation

# Other Expectations

	Percentage chance that the following will be higher in a year								
	I <i>Will be better off in a year</i>	II <i>Are better off than year ago</i>	III interest rates on savings	IV US stock prices	V Inflation 1 year	VI Inflation 3 years	VII government debt	VIII home prices	IX unemployment
<b>Panel A</b>									
Employment Status									
Employed	(omitted)					(omitted)			
Looking for Work	-0.0573** (0.0265)	-0.476*** (0.0380)	-0.253 (0.677)	-0.876 (0.640)	0.113 (0.111)	0.0802 (0.115)	45.60 (48.74)	-1.107** (0.514)	
Retired	-0.0618** (0.0273)	-0.222*** (0.0307)	0.332 (0.833)	-0.627 (0.751)	-0.000399 (0.111)	-0.175 (0.124)	-236.4 (236.2)	-0.589 (0.381)	
Student	-0.0800 (0.0719)	-0.362*** (0.0760)	-3.410* (1.909)	-3.353** (1.455)	0.0316 (0.263)	-0.112 (0.274)	64.44 (68.24)	1.019 (0.911)	
Out of Labor Force	-0.126*** (0.0329)	-0.277*** (0.0397)	-1.166 (1.057)	-1.895** (0.877)	-0.0814 (0.162)	-0.143 (0.191)	537.4 (533.8)	-0.0235 (0.626)	
Local Unemployment Indicators	Y	Y	Y	Y	Y	Y	Y	Y	
Demographics	Y	Y	Y	Y	Y	Y	Y	Y	
Time Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	
Individual Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	
Number of observations	60672	60663	60668	60147	52888	52881	52744	45281	
Number of individuals	8104	8103	8104	8104	7770	7752	7921	6038	
<b>Panel B</b>									
Prior Local House Price Change (ZIP code level)	0.00159 (0.00194)	0.000350 (0.00224)	-0.00896 (0.0679)	0.00205 (0.0744)	0.00828 (0.0337)	-0.00296 (0.0379)	-0.0523 (0.0385)		-0.0625 (0.0610)
Local Unemployment Indicators	Y	Y	Y	Y	Y	Y	Y		Y
Demographics	Y	Y	Y	Y	Y	Y	Y		Y
Time Fixed Effects	Y	Y	Y	Y	Y	Y	Y		Y
Number of observations/ individuals	6030	6025	6029	5985	6003	6003	5881		6032

- Expectations about other economic outcomes unaffected
- Not due to general sentiment

# Effect on Outcomes and Data Validation

- Effect on outcomes?
  - Own labor market expectations predictive of labor market transitions
  - Effect on intended actions in the housing market
- Data validation
  - Respondents have a good directional sense of past local price changes
  - Stronger extrapolation from recalled price changes
  - Seem to understand difference between nationwide and local house prices

# Conclusion

- Recent personal experience systematically affects expectations
  - Expected level of house prices
  - Expected variability of house prices
  - Increase in expected US unemployment when experiencing unemployment

# Conclusion

- Recent personal experience systematically affects expectations
    - Expected level of house prices
    - Expected variability of house prices
    - Increase in expected US unemployment when experiencing unemployment
  - Unrelated to proxy for information content
  - Stronger effect of past experience for less sophisticated respondents
  - No effect on expectations about other outcomes
- Consistent with naive extrapolation from personal experiences

# The Economic Effects of Social Networks: Evidence from the Housing Market

Mike Bailey  
Facebook

Rachel Cao  
Harvard

Theresa Kuchler  
NYU Stern

Johannes Stroebel  
NYU Stern

# Overview

- **Findings:** Provides empirical evidence for following story:
  - ① Individuals discuss property investments with friends, and adjust their expectations based on house price experiences within social network.
  - ② By influencing expectations, social interactions have a large effect on individual-level housing investment decisions:
    - Extensive margin
    - Intensive margin
    - Willingness to pay
- **Data:**
  - Social network data from Facebook
  - Survey about expectations
  - Housing Deeds data on housing markets investments

# Empirical Strategy and Data

**Friends' House Price  
Experiences**



**Beliefs about Local Housing  
Market Investments**



# Friend Experiences and Housing Market Expectations

## Geographically-Distant Friends' House Price Experiences

Facebook Social Graph  
+ House Price Movements  
in Friends' Location

**Social Interactions**



## Beliefs about Local Housing Market Investments

Survey on Facebook,  
1,242 Responses

# Empirical Strategy and Data

**Geographically-Distant Friends'  
House Price Experiences**

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**Social Interactions**



**Beliefs about Local Housing  
Market Investments**



**Individual Housing Market  
Investments**

# Empirical Strategy and Data

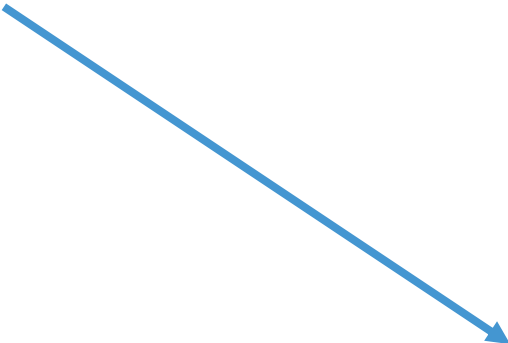
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**Individual Housing Market  
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# Friend Experiences and Housing Market Expectations

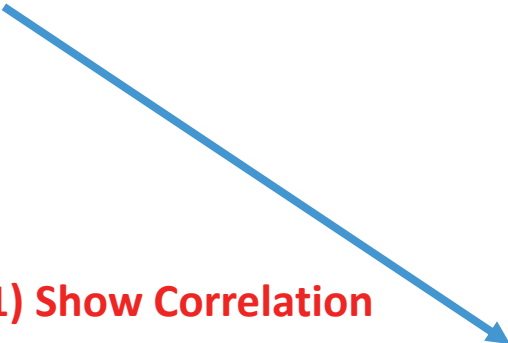
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**Beliefs about Local Housing  
Market Investments**



- 1) Show Correlation**
- 2) Argue Effect Through  
No Other Channel  
Except Expectations**

**Individual Housing Market  
Investments**

LA county deeds data,  
100,000s of observations

# Using Experience Shifters

- Second part of paper
  - Variation in friend experiences as shifter of expectations
  - Effect on housing investments
- Next session: House Price Beliefs and Mortgage Leverage Choice
  - Variation in friend experiences as shifter of expectations
  - Test effect of house price beliefs on mortgage leverage choice
- Challenges with this strategy
  - Credibly establish experience shifter
  - Rule out alternative channels