

# Housing Market Responses to Transaction Taxes: Evidence From Notches and Stimulus in the UK

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# Transaction Taxes

- ▶ Asset transaction taxes are widely debated, but understudied
  - ▶ Poterba 2002; Matheson 2011; European Commission 2013
  - ▶ Recent debate motivated by the crisis in financial and housing markets
- ▶ Different kinds of asset transaction taxes
  - ▶ Securities transaction tax, currency transaction tax, bank transaction tax, house transaction tax
- ▶ **Housing transaction taxes** are by far the most widespread
  - ▶ 38 US states, 27 OECD countries, many developing countries

# Housing Transaction Taxes

- ▶ It has been argued that housing transaction taxes are less distortionary than financial transaction taxes
  - ▶ House transactions are less frequent
  - ▶ House transactions are less international
  - ▶ Enforcement is relatively good
  - ▶ May explain the popularity of housing transaction taxes
- ▶ Housing transaction taxes often create quasi-experimental variation useful for evaluating its distortionary effects
  - ▶ Separates them from financial transaction taxes
- ▶ The UK version of this tax: **Stamp Duty Land Tax (SDLT)**

# Advantages of our Setting

- ▶ **Large administrative dataset:**
  - ▶ Universe of stamp duty tax returns in the UK from 2004-2012 (about 10 million property transactions)
- ▶ **Quasi-experimental variation:**
  - ▶ Tax schedule produces large **price notches** (discrete jumps in tax liability at cutoff prices)
  - ▶ Anticipated tax changes create **time notches** (discrete jumps in tax liability at cutoff dates)
  - ▶ **Permanent reforms** and **stimulus (tax holiday)** affect houses in specific price ranges

# Two Broad Findings

1. Transaction taxes are extremely distortionary
  - ▶ Distorts the price, volume, and timing of house transactions
  - ▶ Laffer rate of 4–7% (Pareto bound)
  - ▶ Marginal cost of funds is orders of magnitude larger than for conventional taxes
2. Temporary transaction tax cuts are enormously effective as fiscal stimulus
  - ▶ Large boost during stimulus, smaller slump after stimulus
  - ▶ Substantial GDP effects (1 dollar per dollar of tax cut) due to complementarities between moving house and spending
  - ▶ Relevant for transaction subsidies (e.g. US homebuyer tax credit)

# Literature

## 1. Transaction taxes

- ▶ Property transaction taxes  
Dachis et al. 2012; Besley et al. 2013; Kopczuk & Munroe 2014
- ▶ Capital gains taxes (stock, housing)  
Feldstein et al. 1980; Auerbach 1988; Burman & Randolph 1994;  
Cunningham & Engelhardt 2008; Shan 2011

## 2. Fiscal stimulus

- ▶ Stimulus effects of tax rebates  
Shapiro & Slemrod 2003; Johnson et al. 2006; Agarwal et al. 2007
- ▶ Stimulus and reversal effects of car transaction subsidies  
Mian & Sufi 2012

# Outline

Introduction

Stamp Duty Land Tax

Data

Results

- Static Notches: House Price Responses

- Moving Notches: Dynamics of House Price Responses

- Stimulus: Timing and Extensive Responses

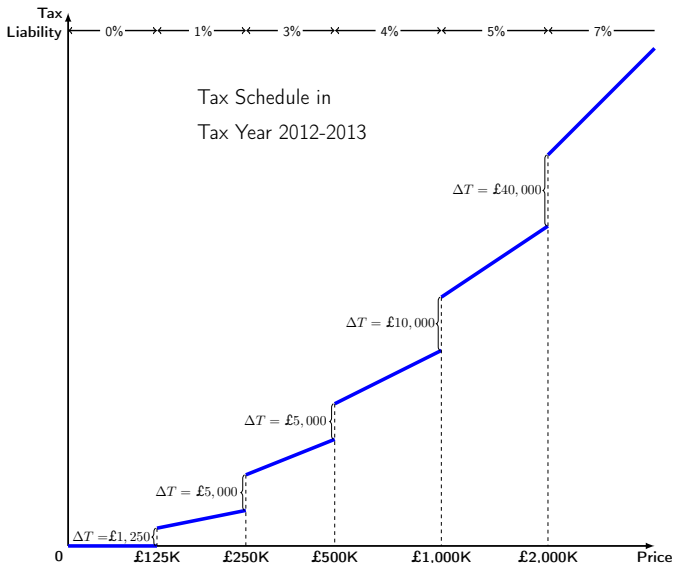
- Stimulus: Household Spending & GDP Effects

- Long Run Revenue and Welfare Effects

Conclusions

# UK Stamp Duty: Notches

- Tax on the total sale price of property; remitted by the buyer





# UK Stamp Duty: Reforms & Stimulus

Date Range Price Range	1 Dec 2003 to 16 Mar 2005	17 Mar 2005 to 22 Mar 2006	23 Mar 2006 to 2 Sep 2008	3 Sep 2008 to 31 Dec 2009	1 Jan 2010 to 5 Apr 2011	6 Apr 2011 to 21 Mar 2012	22 Mar 2012 to April 2013
0 - £60K	0	0	0	0	0	0	0
£60K - £120K	1						
£120K - £125K							
£125K - £175K		1	1	1	1	1	
£175K - £250K		1					
£250K - £500K	3	3	3	3	3	3	3
£500K - £1000K	4	4	4	4	4	4	4
£1000K - £2000K						5	5
£2000K - ∞						7	

# UK Stamp Duty: Reforms & Stimulus

Date Range Price Range	1 Dec 2003 to 16 Mar 2005	17 Mar 2005 to 22 Mar 2006	23 Mar 2006 to 2 Sep 2008	3 Sep 2008 to 31 Dec 2009	1 Jan 2010 to 5 Apr 2011	6 Apr 2011 to 21 Mar 2012	22 Mar 2012 to Present
0 - £60K	0	0	0	0	0	0	0
£60K - £120K	1						
£120K - £125K							
£125K - £175K		1					
£175K - £250K		1					
£250K - £500K	3	3	3	3	3	3	3
£500K - £1000K	4	4	4	4	4	4	4
£1000K - £2000K						5	5
£2000K - ∞						5	7

## ▶ Stimulus: Stamp Duty Holiday 3 Sep 2008 - 31 Dec 2009

- ▶ First notch moved temporarily from £125K to £175K, eliminating taxes in a 50K range
- ▶ Beginning of holiday was unanticipated
- ▶ End of holiday was anticipated (time notch at New Year 2010)

▶ Results

## UK Stamp Duty: Compliance

- ▶ HMRC estimates put the stamp duty tax gap between 4-5% (lower than for most other taxes in the UK)
- ▶ Evasion through side payments associated with substantial risk
  - ▶ Collusion between multiple players difficult to sustain (Kleven, Kreiner, and Saez 2009)
  - ▶ Lag between agreeing and completing a house contract further complicates evasion
- ▶ Tax base includes “everything” except freestanding “extras” → potential evasion by overvaluing such items

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- Stimulus: Household Spending & GDP Effects

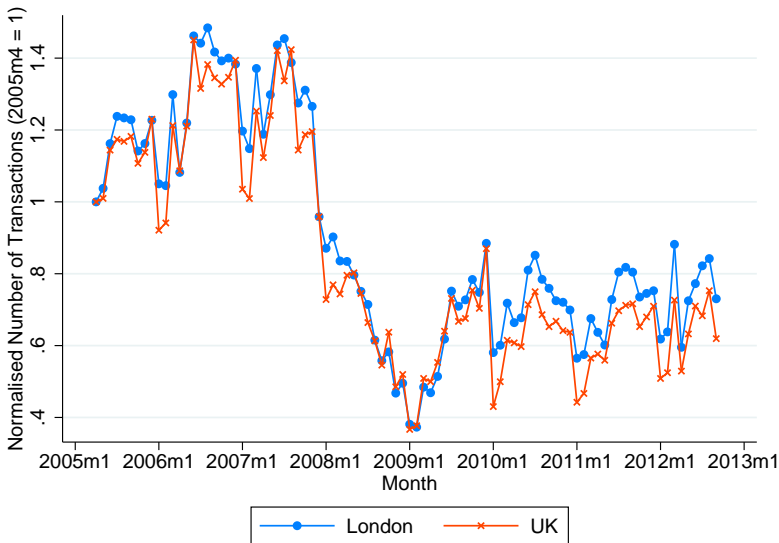
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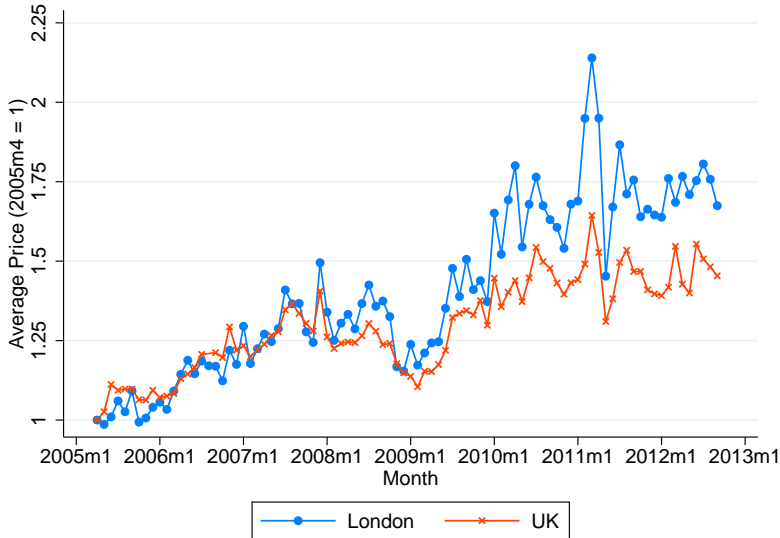
# Data

- ▶ First-time access to administrative stamp duty records from Her Majesty's Revenue and Customs (HMRC)
- ▶ Universe of stamp duty land tax returns ( $\approx$  all transactions) in the UK from 2004-2012
- ▶ About 10 million transactions
- ▶ Rich tax return information; little information outside the return

# Data Spanning the Collapse of the Housing Market



# Prices Have Recovered in London, But Not the UK Overall



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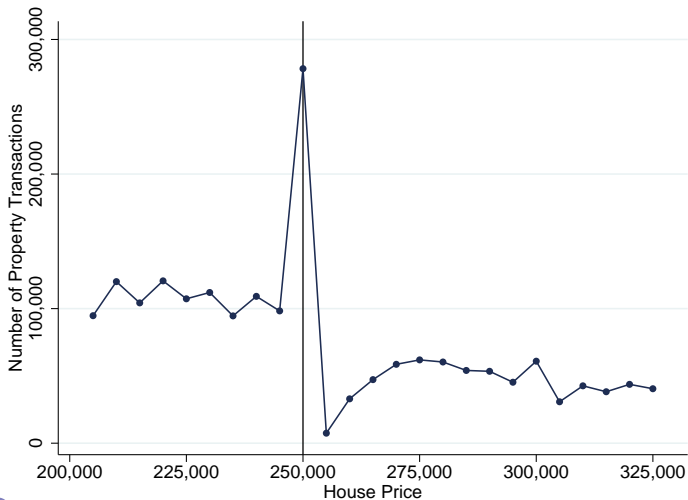
# House Price Responses to Notches

## Conceptual Framework

- ▶ Notches create **bunching** and **holes** in the house price distribution
- ▶ House price = price per unit  $\times$  units of quality-adjusted housing
- ▶ What drives observed house price bunching?
  - ▶ House quality
  - ▶ Price bargaining (but not standard price incidence)
  - ▶ Timing of transaction (thresholds are nominal)
  - ▶ Evasion
- ▶ House price elasticity is similar to taxable income elasticity
  - ▶ sufficient statistic for revenue; not necessarily for deadweight loss

▶ Conceptual Density

# House Price Responses to £250K Notch, 2004-2012

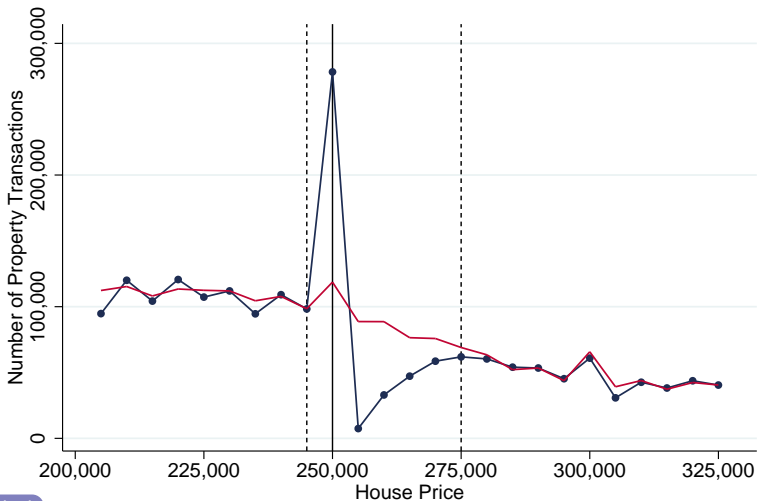


▶ Method

▶ Conceptual

▶ Mansions

# House Price Responses to £250K Notch, 2004-2012



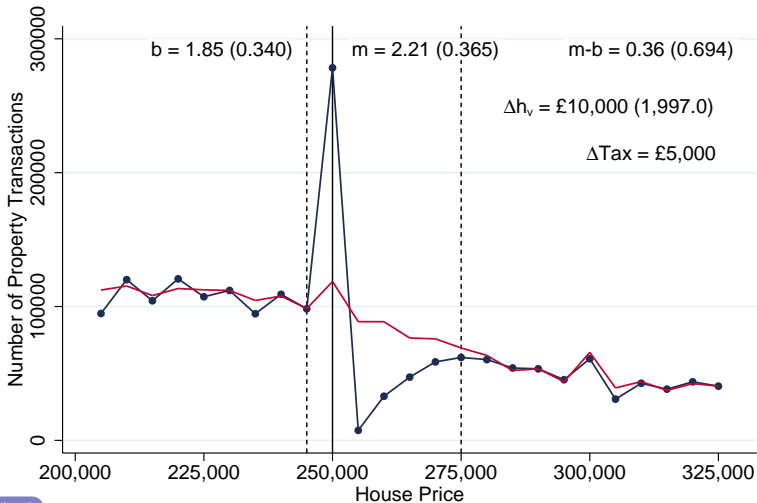
▶ Method

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—●— Actual Distribution    — Counterfactual Distribution

# House Price Responses to £250K Notch, 2004-2012



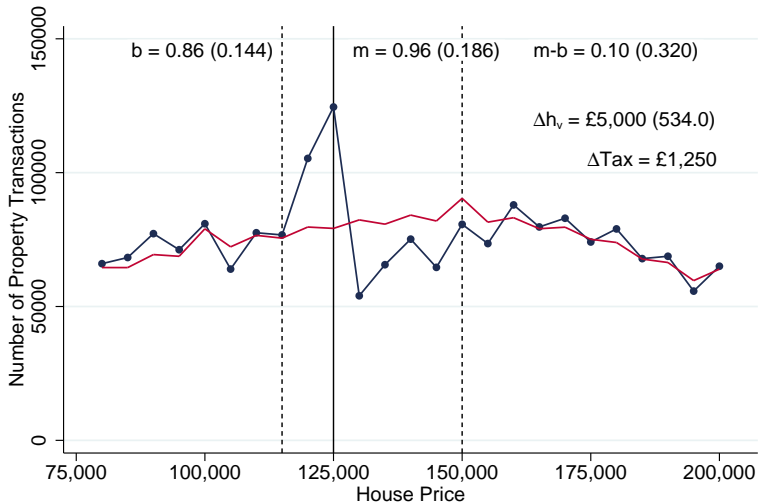
▶ Method

▶ Conceptual

▶ Mansions

—●— Actual Distribution    — Counterfactual Distribution

# House Price Responses to £125K Notch, 2006-2008



▶ Method

—●— Actual Distribution

— Counterfactual Distribution

▶ Other Periods

# House Price Responses

## Summary

### ▶ Bunching and holes:

- ▶ Large and sharp bunching just below notches
- ▶ Large holes above notches
- ▶ Holes are larger than bunching, consistent with the presence of extensive responses

### ▶ House price responses:

- ▶ Average house price response =  $2-5 \times$  tax jump
- ▶ Largest house price response (end of hole)  $\geq 5 \times$  tax jump
- ▶ Liquidity constraints are likely to play an important role

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# Dynamics of House Price Responses

Notch moving from £120,000 to £125,000

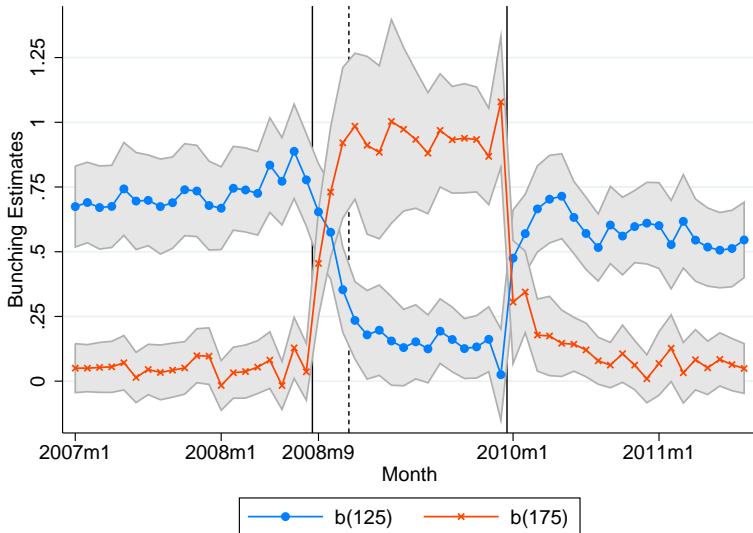


# Dynamics of House Price Responses

Notch moving from £125,000 to £175,000 and back again

# Dynamics of House Price Responses

## Monthly Bunching Estimates Over Time



# Dynamics of House Price Responses

## Summary

- ▶ **Build-up of bunching** when notches are introduced
  - ▶ Holiday start (unanticipated): bunching at £175K builds up in 3 months
  - ▶ Holiday end (anticipated): bunching at £125K builds up in 1-2 months
- ▶ **Disappearance of bunching** when notches are removed
  - ▶ Holiday start (unanticipated): bunching at £125K disappears in 4 months
  - ▶ Holiday end (anticipated): bunching at £175K disappears immediately
- ▶ Little indication of optimization frictions
  - ▶ With anticipation, almost zero inertia
  - ▶ Without anticipation, small inertia  $\approx$  contract completion lag

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**Stimulus: Timing and Extensive Responses**

Stimulus: Household Spending & GDP Effects

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# Stimulus: Timing and Extensive Responses

## Conceptual Framework

- ▶ The stamp duty holiday was an unanticipated stimulus program with a pre-announced end date
- ▶ Such stimulus has two conceptual effects on house purchases:
  - ▶ **Timing response:** intertemporal substitution by those who would have purchased a house anyway
  - ▶ **Extensive response:** house purchases that would not have taken place otherwise
- ▶ Key questions:
  - ▶ What is the total stimulus effect?
  - ▶ How much of it is driven by timing?
  - ▶ How quick is reversal?

▶ Reform

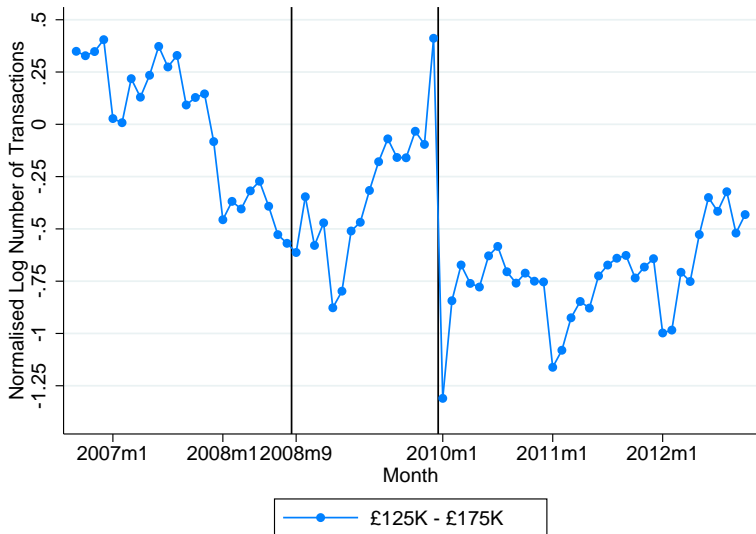
# Stimulus: Timing and Extensive Responses

## Empirical Approach

- ▶ Difference-in-differences approach
- ▶ **Naive baseline:**
  - ▶ Compare treated range 125K-175K to nearby control range
  - ▶ Treatment is endogenous to price responses to notches
- ▶ **Dealing with endogeneity:**
  - ▶ Widen treated range to include responding ranges on each side (intent-to-treat)
  - ▶ Adjust for price responses to notches using bunching estimates

# Stimulus: Timing and Extensive Responses

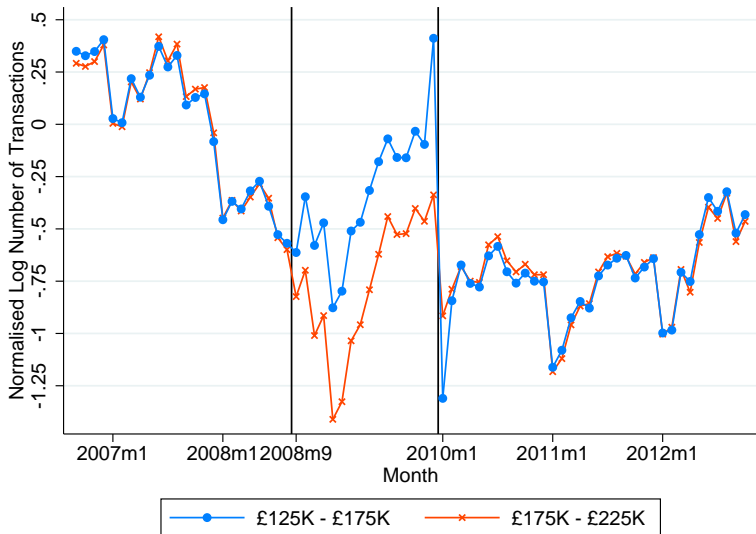
## Raw Time Series



▶ Short Term Timing

# Stimulus: Timing and Extensive Responses

## Naive Diff-in-Diff

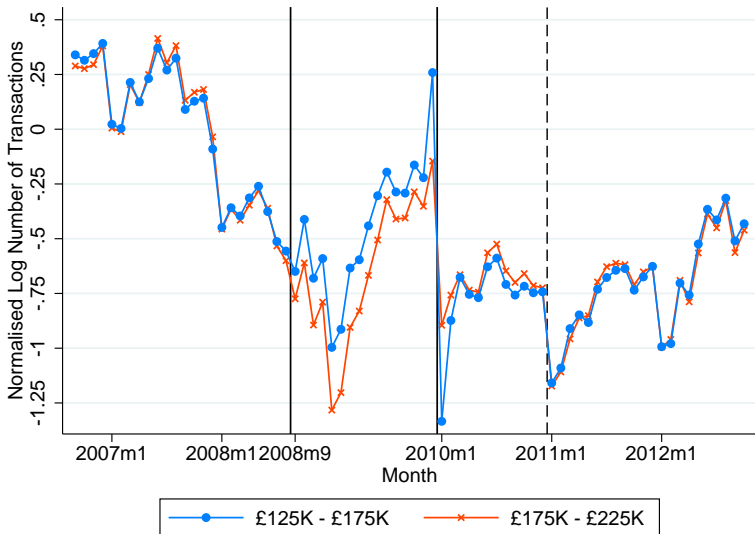


▶ Short Term Timing



# Stimulus: Timing and Extensive Responses

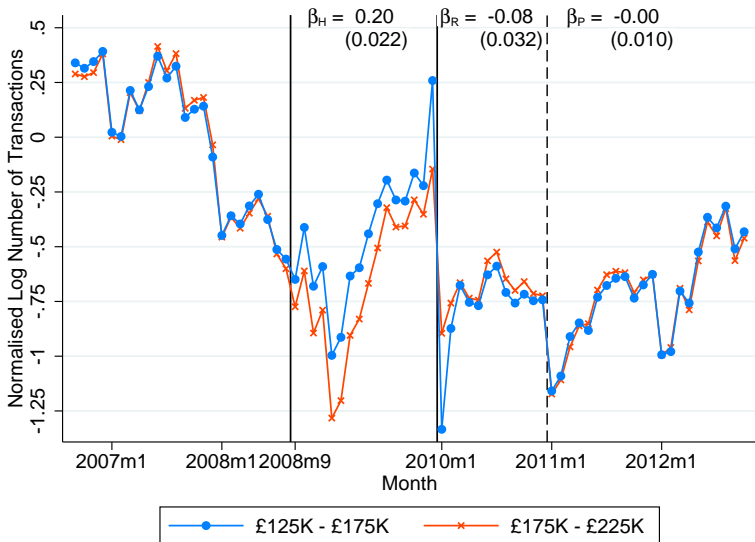
Diff-in-Diff Adjusting for Bunching Responses



► Short Term Timing

# Stimulus: Timing and Extensive Responses

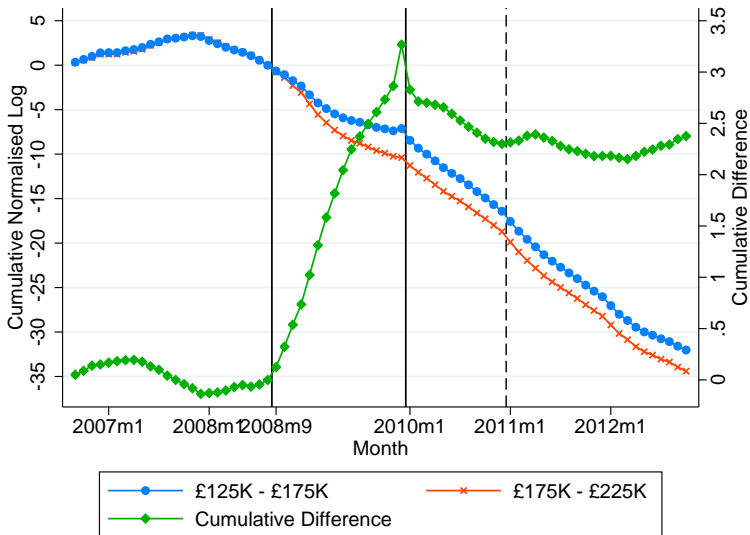
Diff-in-Diff Adjusting for Bunching Responses



► Short Term Timing

# Stimulus: Timing and Extensive Responses

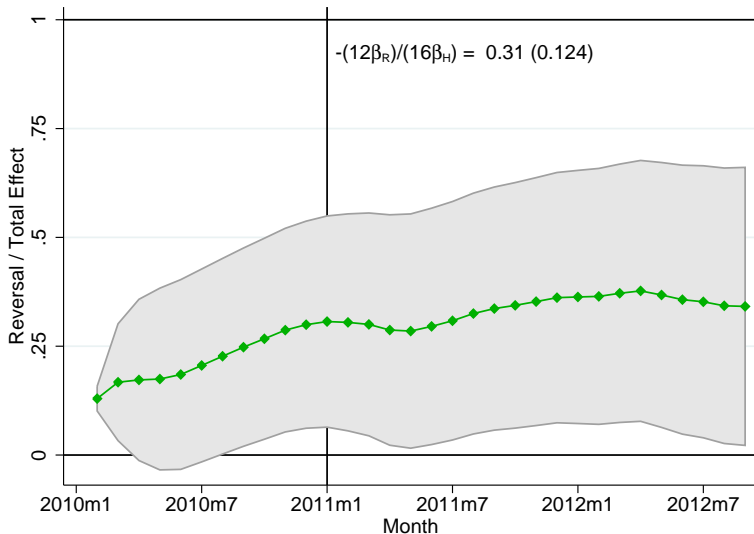
Diff-in-Diff Adjusting for Bunching Responses (Cumulative Effect)



▶ Short Term Timing

# Stimulus: Timing and Extensive Responses

Reversal / Total Stimulus Effect (Sensitivity to Reversal End Date)



# Stimulus: Timing and Extensive Responses

## Summary

- ▶ Housing stimulus increases activity during the 16 months of the program (timing + extensive margin) [20% per month]
- ▶ But reduces activity for about 12 months after the program (timing) [8% per month]
- ▶ Reversal is less than 50% of stimulus effect
  - ▶ Differ from Mian and Sufi (2012) on US car market stimulus
- ▶ Why stimulate house purchases during crisis?
  - ▶ Homeowner mobility too low during crisis
  - ▶ Moving house triggers spending on repairs, renovations, durable goods and commissions → increase in GDP
  - ▶ Other housing market spillovers (including house prices)

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## Immediate Effect of Stimulus on Real Economy

- ▶ Lower-bound: stimulus effect only through moving-related spending (not including multiplier effects)
- ▶ Using consumption data, we estimate that a house purchase triggers spending of 5% of the house value
- ▶ Effect on GDP per dollar of tax cut  $\Delta GDP/\Delta Tax \approx 1$
- ▶ Work on fiscal stimulus through income tax rebates find smaller effects ( $\Delta GDP/\Delta Tax \approx 0.2 - 0.7$ )
  - ▶ Success of stamp duty holiday relies on (i) strong responsiveness of house purchases to this tax, (ii) strong complementarities between moving house and spending

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# Long Run Revenue and Welfare Effects

## Conceptual Framework

### ► Marginal cost of public funds

$$MCF = -\frac{dW}{dT} = \frac{1}{1 - \frac{t}{1+t} (\bar{\epsilon} + \bar{\eta})}$$

### ► Laffer rate (Pareto Bound)

$$t_L = \frac{1}{\bar{\epsilon} + \bar{\eta} - 1}$$

- $\bar{\epsilon} \equiv$  intensive margin elasticity wrt  $1 + t$ 
  - $\bar{\epsilon}$  from house price notches (upper bound)
- $\bar{\eta} \equiv$  extensive margin elasticity wrt  $1 + t$ 
  - $\bar{\eta} = 14.3$  from stamp duty holiday (permanent effect)
  - $\bar{\eta} = 23.2$  from earlier permanent reform Estimates

# Long Run Revenue and Welfare Effects

## Results

Bracket (£000s)	Rate (%)	$\bar{\epsilon}$	Marginal Cost of Funds	
			$\bar{\eta} = 14.3$	$\bar{\eta} = 23.2$
125 – 250	1	0.16	1.17	1.31
250 – 500	3	0.08	1.72	3.11
500 – 1,000	4	0.04	2.23	9.42
1,000 – 2,000	5	0.09	3.18	L
2,000 –	7	0.13	17.86	L
<b>Laffer Rate <math>t_L</math></b>		0.16	7.43	4.47

- ▶ UK income tax: MCF = 1.2 overall; 1.1–2.7 across distribution
- ▶ US income tax: MCF = 1.1 overall

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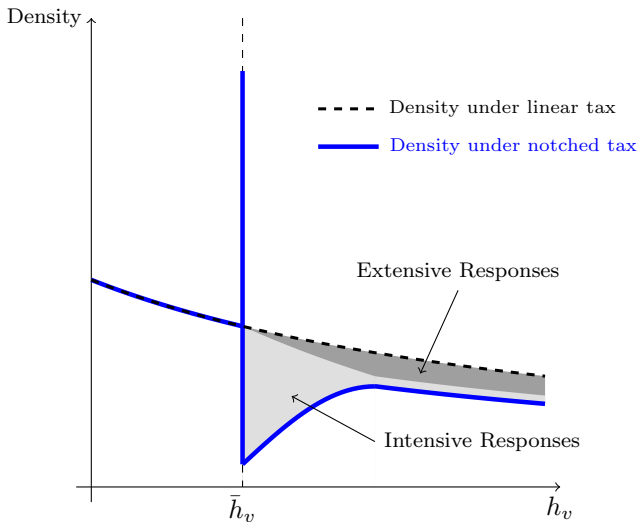
- ▶ First comprehensive study of the distortions created by property transaction taxes (which are ubiquitous)
- ▶ We have benefitted from
  - ▶ First-time access to complete UK transaction tax records
  - ▶ Compelling variation from notches, reforms, and stimulus
- ▶ We find that property transaction taxes are extremely distortionary
  - ▶ Bad long run policy
  - ▶ Transaction tax cuts / subsidies provide effective stimulus
  - ▶ Note: this is not about notches
- ▶ Remaining question: effects on asset-price bubbles and volatility
  - ▶ Difficult to identify; our study increases the burden of proof

## Appendix

# Appendix Slides

# Effect of Notch on House Price Distribution

## Intensive & Extensive Responses



▶ House Price Responses

▶ 250K

## Estimating the Counterfactual Distribution

- Use a flexible polynomial to estimate  $g_0(h_v)$ , excluding data around the notch:

$$c_i = \sum_{j=0}^q \beta_j (z_i)^j + \sum_{r \in \mathcal{R}} \eta_r I \left\{ \frac{\bar{h}_v + z_i}{r} \in \mathbb{N} \right\} + \sum_{k=\bar{h}_v^-}^{\bar{h}_v^+} \gamma_k I \{i = k\} + \mu_i$$

where  $c_i$  is count of transactions in price bin  $i$ ,  $q$  is the order of the polynomial,  $z_i$  is the distance between bin  $i$  and the cutoff  $\bar{h}_v$ ,  $\bar{h}_v^-$  is the lower bound of the excluded range,  $\bar{h}_v^+$  is the upper bound of the excluded range,  $\mathbb{N}$  is the set of natural numbers,  $\mathcal{R} = \{500, 1000, 5000, 10000, 25000\}$  is a set of round numbers multiples,  $I \{\cdot\}$  is the indicator function, and  $\mu_i$  is the error term.

# Appendix

## Estimates of the Counterfactual Distribution, Bunching, and Holes

- ▶ Estimate of counterfactual distribution:

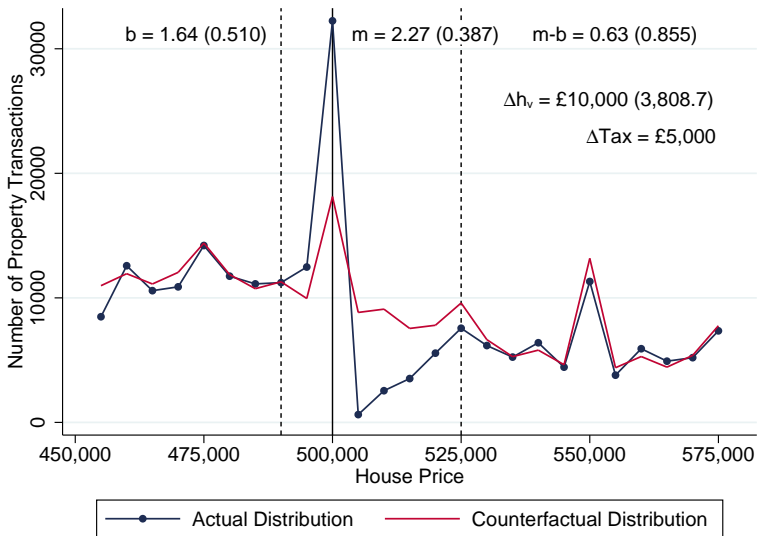
$$\hat{c}_i = \sum_{j=0}^q \hat{\beta}_j (z_i)^j + \sum_{r \in \mathcal{R}} \hat{\eta}_r I \left\{ \frac{\bar{h}_v + z_i}{r} \in \mathbb{N} \right\}$$

- ▶ Estimates of excess bunching and hole (missing mass):

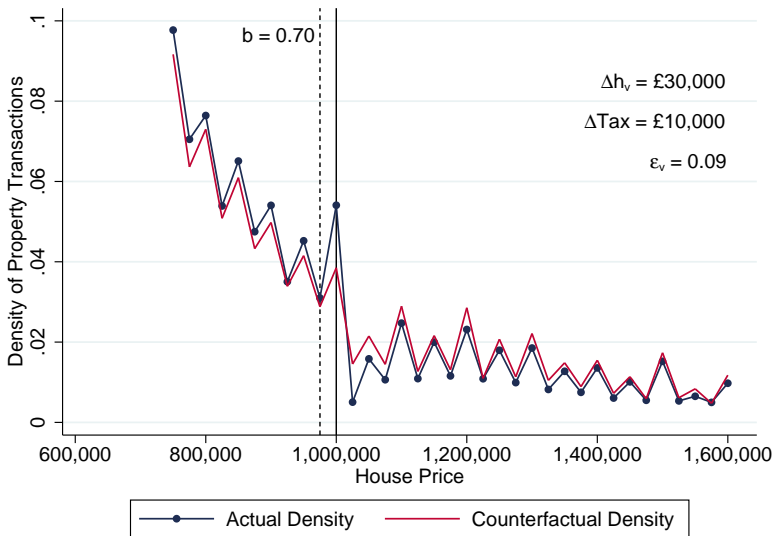
$$\hat{B}(\bar{h}_v) = \sum_{i=\bar{h}_v^-}^{\bar{h}_v} (c_i - \hat{c}_i) \quad \text{and} \quad \hat{M}(\bar{h}_v) = \sum_{i>\bar{h}_v}^{\bar{h}_v^+} (\hat{c}_i - c_i)$$



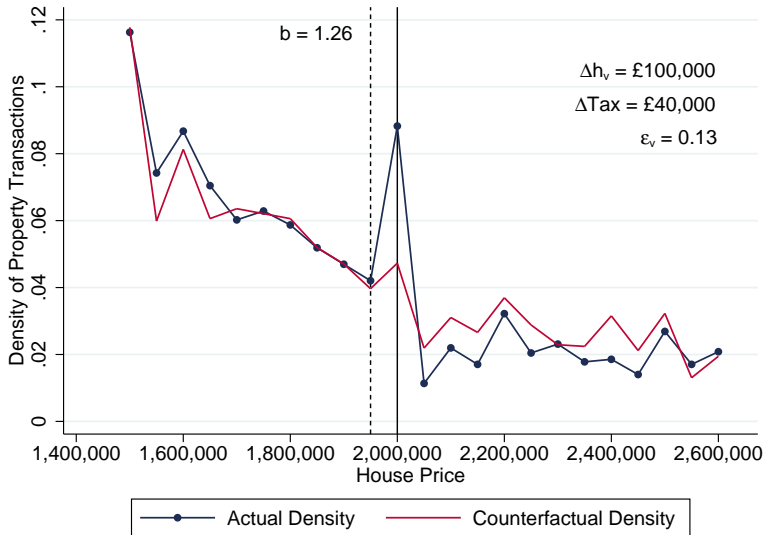
# House Price Responses to £500K Notch, 2004-2012



# House Price Responses to £1,000K Notch, 2011-2012

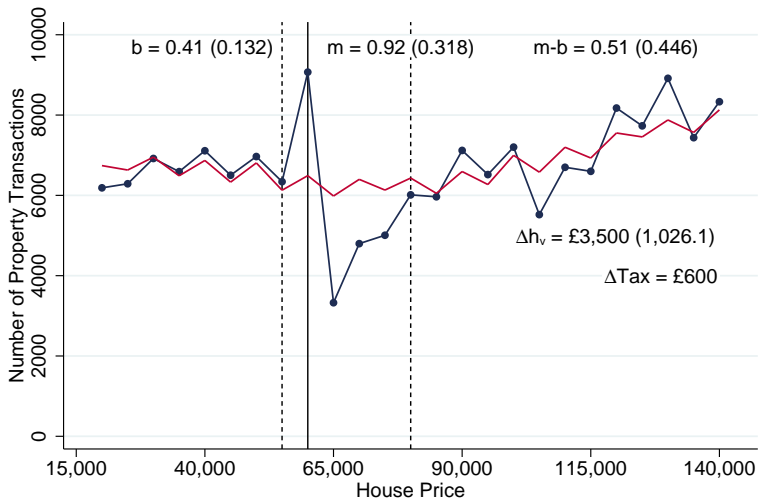


# House Price Responses to £2,000K Notch, 2012



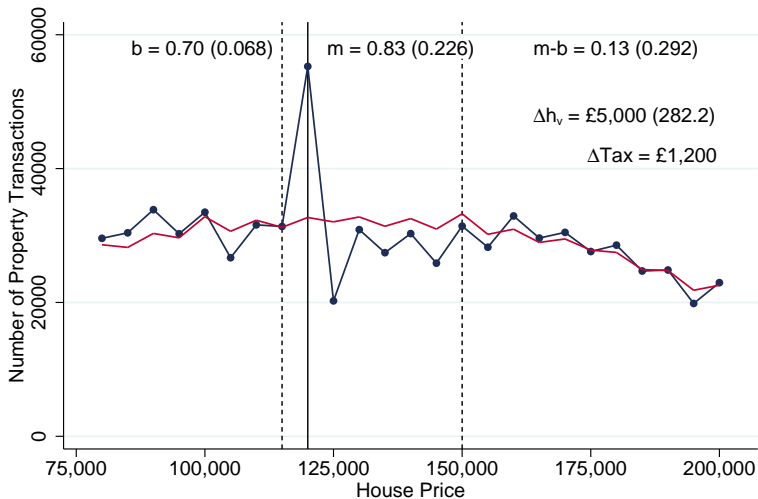
# Static Price Notches: Bunching and Holes

Notch at £60,000; 1 Nov 2004 - 16 Mar 2005



# Static Price Notches: Bunching and Holes

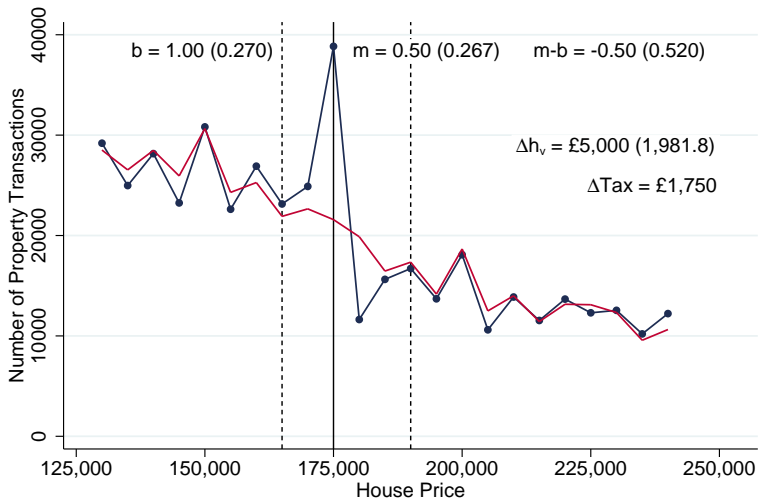
Notch at £120,000; 17 Mar 2005 - 22 Mar 2006



—●— Actual Distribution    — Counterfactual Distribution

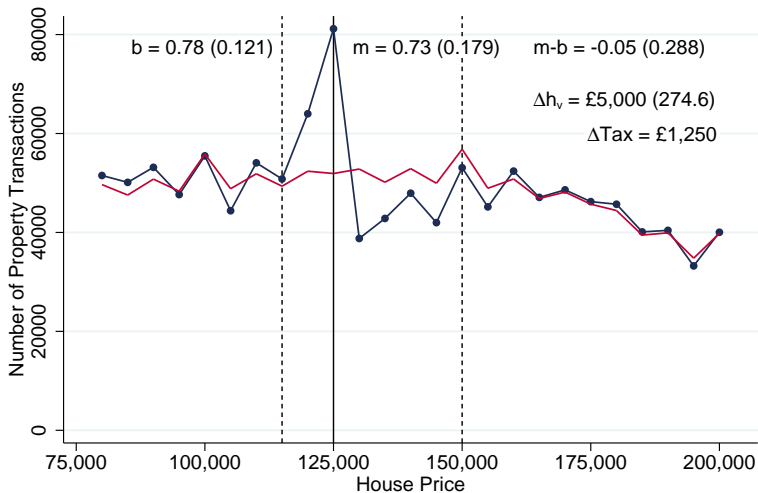
# Static Price Notches: Bunching and Holes

Notch at £175,000; 3 Sep 2008 - 31 Dec 2009



# Static Price Notches: Bunching and Holes

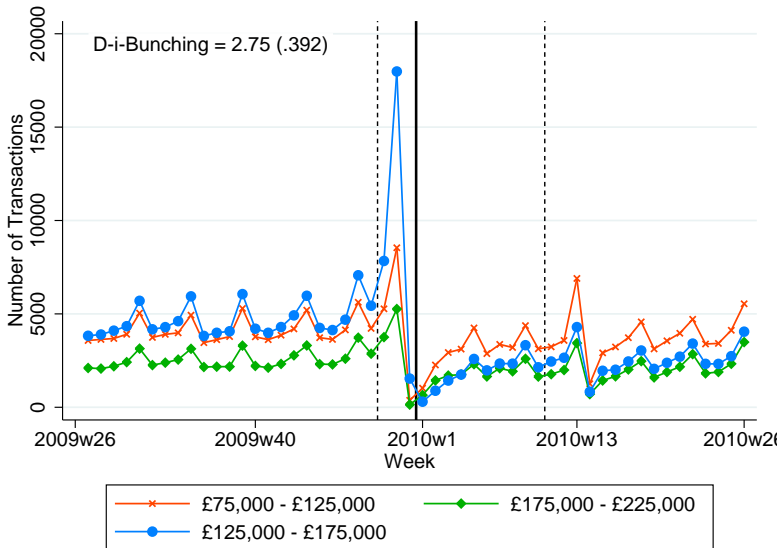
Notch at £125,000; 1 Jan 2010 - 31 Oct 2012



—●— Actual Distribution    — Counterfactual Distribution

# Time Notch: Short-Term Timing Effects

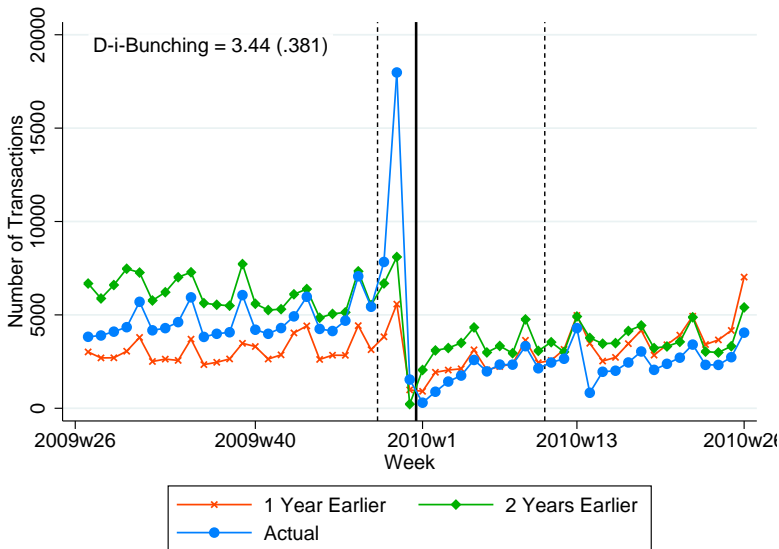
Difference-in-Bunching with Price Range Counterfactuals





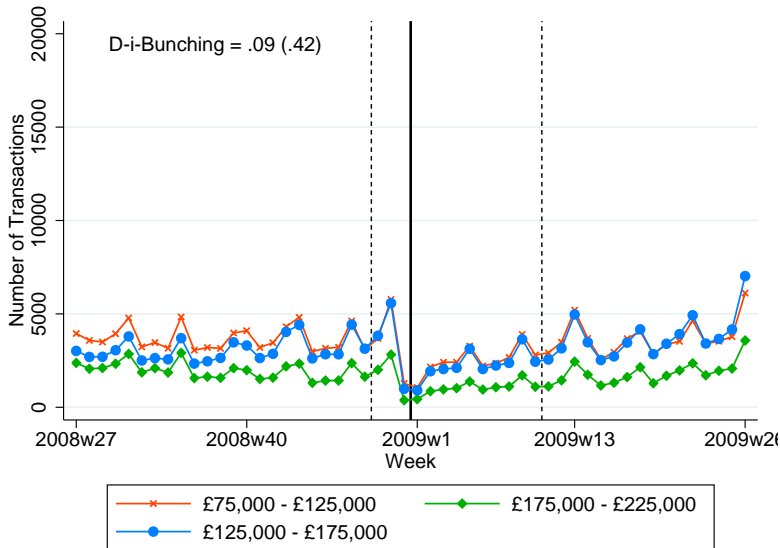
# Time Notch: Short-Term Timing Effects

## Difference-in-Bunching with Time Period Counterfactuals



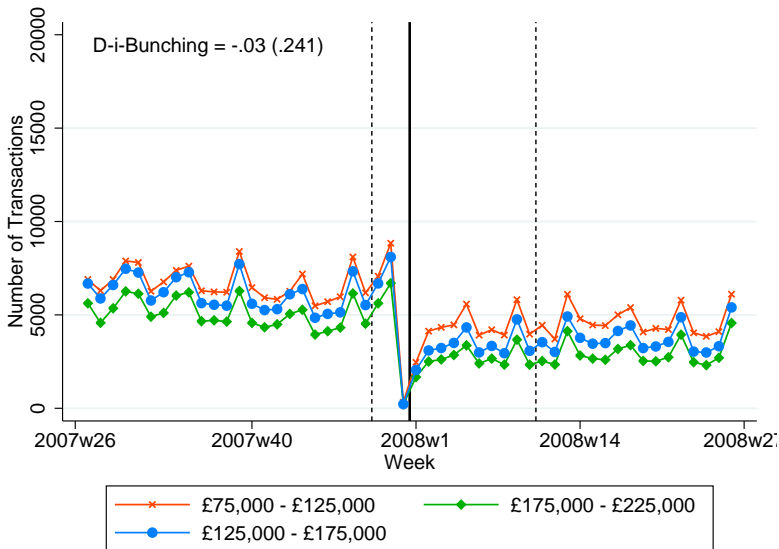
# Time Notch: Short-Term Timing Effects

Placebo Difference-in-Bunching 1: Price Range Counterfactuals 1 Year Earlier



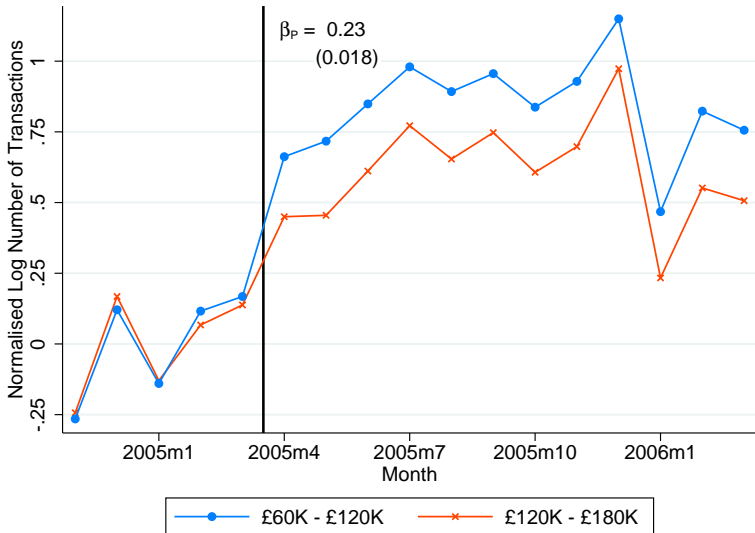
# Time Notch: Short-Term Timing Effects

## Placebo Difference-in-Bunching 2: Price Range Counterfactuals 2 Years Earlier



# Permanent Reform: Extensive Responses

Diff-in-Diff Adjusting for Bunching Responses



# Permanent Reform: Extensive Responses

Diff-in-Diff Adjusting for Bunching Responses (Cumulative Effect)

