

Expectation Channel of Mortgage Policy

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Conventional Credit Constraint (CC) Channel. LTV/PTI affects borrowing and prices *mechanically*:

Looser caps $\Rightarrow$ Borrowing $\uparrow \Rightarrow$ House prices $\uparrow$

But, policies can work as *signals* and directly alter households' expectations:

Looser caps as a **Signal** $\Rightarrow$ Expectations $\uparrow \Rightarrow$ Borrowing & House prices $\uparrow$

It is hard to separate these two channels as they are bundled:

Not only signals, but credit constraints themselves can also alter expectations (e.g., Johnson 2020; Kuang et al. 2026)

To separate the two channels, we need:

1. A nationwide policy signaling the government's stance
2. Both types of areas: Large expectation & small credit shocks, and vice versa
3. A credit instrument driven by expectations but orthogonal to LTV/PTI regulations

Korea's 2014 LTV/PTI relaxation delivers exactly this

1. First nationwide, unprecedented relaxation pattern
2. Explicitly framed as a housing-market stimulus
3. **Two types of areas:** “high expectation, low credit” vs. “low expectation, high credit”
4. A unique housing credit system **orthogonal** to LTV/PTI regulations — Chonseil system

After the 2014 relaxation:

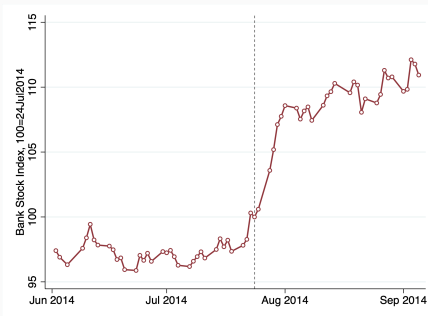
1. **House prices & expectations** rose more in *expectation*-sensitive areas, not in credit-relaxed areas
: Price divergence appeared in **week 1**, before new lending rules took effect
2. **Chonse**i-financed speculative purchases surged in expectation-sensitive areas
& Unconstrained mortgages, cash purchases, and flipping also increased in those same areas

Alternative explanations (e.g., housing supply, interest rates, business cycle, and overall real-estate booms) are ruled out.

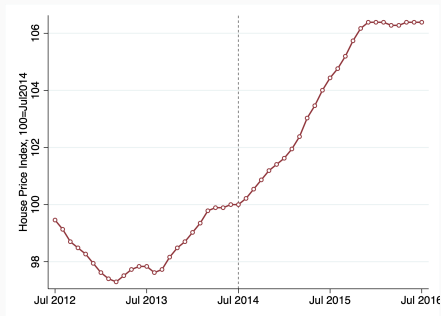
2014 LTV/PTI Relaxation

Announced July 24, implemented August 1, 2014

1. First *nationwide* relaxation — prior policies were local and countercyclical
2. Raised LTV/PTI caps to unprecedented levels (e.g., LTV: 50% → 70% in Seoul)
3. Explicitly framed as a housing-market “stimulus” — officially, to “normalize the housing market”



(a) Daily Bank Stock Prices
(jump on announcement $\Rightarrow$ unanticipated)



(b) Monthly House Prices
(already recovering $\Rightarrow$ not a weak market)

Signal Measure: What Is a Speculation Area?

To identify **expectation-sensitive** areas, we exploit the “Speculation Area” designation:

- Before 2012, districts were designated to curb (i) price growth and (ii) speculative purchases
- The **strictest** anti-housing-boom measure in Korea
- Once designated: stricter LTV/PTI *and* higher capital-gains tax
- Hand-collected from Ministry of Economy & Finance announcements

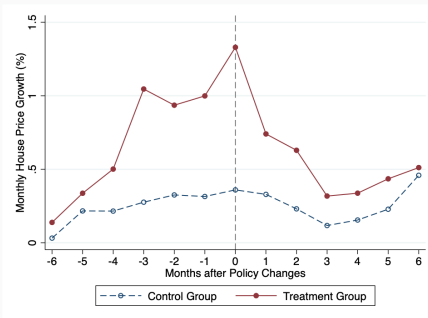
Note: “Speculation Area” is a misnomer — designation was based solely on house-price growth.

Two Exposure Measures: Signal Exposure

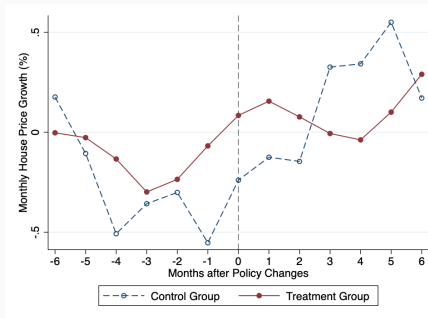
We use **DiD** with two exposure measures: **signal exposure** and **constraint exposure**.

Signal exposure: Months designated as a “Speculation Area” before 2012

Stronger past booms (higher expectations) $\Rightarrow$ Longer designation $\Rightarrow$ More suppressed expectations by sustained intervention $\Rightarrow$ *More primed to rebound* when policy reversed in 2014



(a) Designation of Speculation Area
(boom triggers designation; then cools)

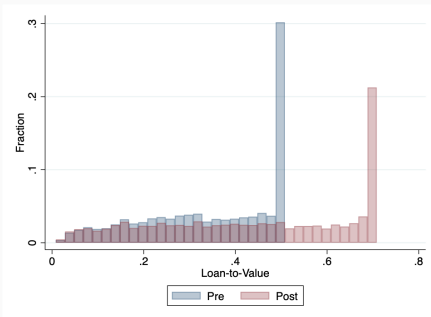


(b) De-Designation of Speculation Area
(no rebound $\Rightarrow$ beliefs stay suppressed)

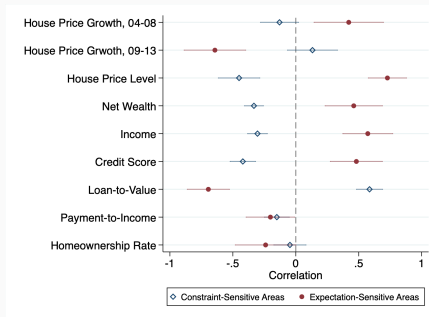
Two Exposure Measures: Constraint Exposure

Constraint exposure: Share of pre-2014 mortgage loans originated within 2 pp of the LTV/PTI caps

LTV binds, not PTI: pre-2024 PTI was slack ($>100\text{M KRW}$, interest-only).



(a) LTV at Origination
(loans bunch at the cap $\Rightarrow$ LTV binds)



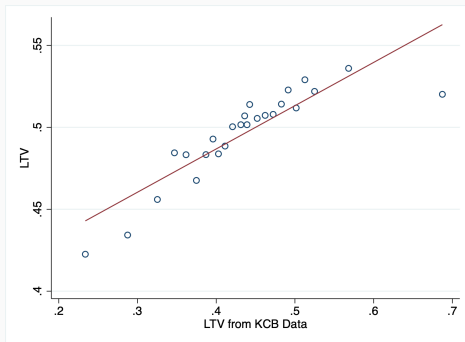
(b) Geographic Characteristics
(the two area types have opposite profiles)

Data: Mortgage Originations — Source

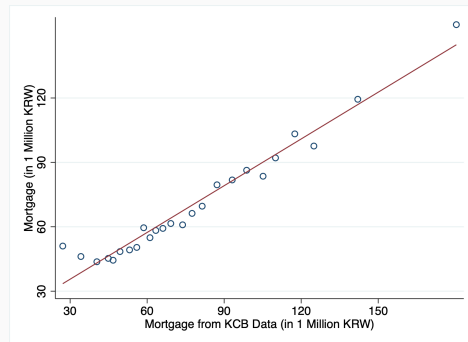
- Unlike the US, South Korea has **no centralized** mortgage-origination database
- **Loan-level** originations from a major Korean commercial bank:
 - August 2012 – July 2016
 - loan amount, LTV, PTI, other loans in the LTV calculation, neighborhood-level address
 - $\approx$ **45%** of all residential mortgage originations nationwide

Data: Representativeness of the Bank Sample

Bank-based measures line up with Korea Credit Bureau (KCB) balance data:



(a) Loan-to-Value Ratio



(b) Loan Amount

- **City-district / province level:**
 - House prices & transactions: Korean Real Estate Board (REB)
 - Homeownership: 2010 Census | Income, credit score, age: KCB (Dec 2012)
 - Price expectations: 2013 & 2014 Survey of Housing Finance
 - Household net wealth: 2014 Korean Housing Survey
- **Housing-unit level:** Sales & Chonseil from MOLIT, matched for buy-to-let, aggregated by district

Focus on apartments: $\approx 65\%$ of the housing stock (2010), the prime target of housing policy.

Summary Statistics

- Constraint exposure $\approx 51\%$ (caps bind)
- Signal exposure heavily skewed: $P10 = P50 = 0$, but $P90 = 64$ months

	N	Mean	SD	P10	P50	P90
<i>Panel A. City-District-Level Data</i>						
Constraint Exposure (%)	252	51.0	10.3	38.8	50.4	63.6
Signal Exposure (Months)	252	18.8	25.9	0.0	0.0	64.0
Signal Exposure, Seoul Capital Area (Months)	79	45.9	25.1	10.0	48.0	66.0
Speculative Homeownership (%)	244	18.4	8.7	8.4	17.2	29.8
Homeownership Rate (%)	244	60.9	14.1	46.2	62.1	77.7
Mean Loan-to-Value Ratio (%)	252	50.2	3.5	45.7	50.8	54.0
Mean Payment-to-Income Ratio (%)	252	37.2	3.4	33.4	36.7	42.0
Mean Annual Income (Million KRW)	252	27.3	2.2	25.5	26.6	29.7
Mean Credit Score	252	5.7	0.3	5.4	5.7	6.1
Mean Age	252	44.0	2.9	41.1	43.1	48.8
<i>Panel B. City-District $\times$ Year-Month-Level Data</i>						
Originated Mortgage Amount (Billion KRW)	3,231	15.9	19.5	0.2	8.2	46.0
Monthly House Price Growth (%)	3,297	0.3	0.4	-0.1	0.2	0.7
Housing Transactions	3,325	349.3	243.7	71.0	305.0	697.0
Speculative Housing Transactions	3,325	114.4	97.7	10.0	86.0	263.0

Empirical Strategy: Difference-in-Differences

Static DiD — estimated separately for each exposure measure:

$$\Delta \log y_{ct} = \beta \underbrace{Exposure_c \cdot Post_t}_{\text{signal or constraint}} + \gamma X_c \cdot Post_t + \alpha_c + \alpha_{p,t} + \varepsilon_{ct}$$

- c = city district, p = province, t = year-month; $Post_t = 1(t \geq \text{Aug 2014})$
- y_{ct} : house-price or credit growth (expectations test: y = individual price optimism)
- α_c district FE, $\alpha_{p,t}$ province $\times$ time FE $\Rightarrow$ identification is within province
- X_c : age, credit score. SEs clustered at life-zone ($\approx$ US commuting zone)

Dynamic DiD — one coefficient per period (event study):

$$\log y_{ct} = \sum_{k \neq \text{Jul2014}} \beta_k 1(t = k) Exposure_c + \alpha_c + \alpha_{p,t} + \varepsilon_{ct}$$

Assumption: absent the reform, high-/low-exposure districts trend in parallel $\Rightarrow \beta_k \approx 0$ pre-reform

Main Result 1: House Prices and Expectations

Price expectations rose more in expectation-sensitive areas

(Survey of Housing Finance, Aug 2013 & Aug 2014)

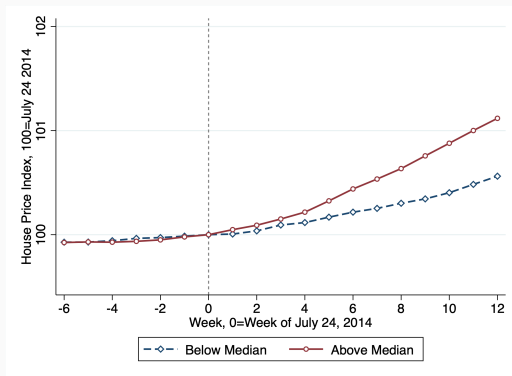
Dep. Var:	Price Optimism (=1 if expects stable/rising prices)		
	(1)	(2)	(3)
Signal Exposure $\times$ Post	0.0179** (0.0069)	0.0183*** (0.0060)	0.0161*** (0.0057)
Signal Exposure	-0.0240*** (0.0056)	-0.0179** (0.0082)	-0.0142* (0.0080)
Post	0.1067*** (0.0084)	0.1070*** (0.0049)	0.1042*** (0.0061)
Province FEs		✓	✓
Controls			✓
Adj. R^2	0.0177	0.0191	0.0270
#Obs	6,276	6,276	6,276

Main Result 1: House Prices and Expectations

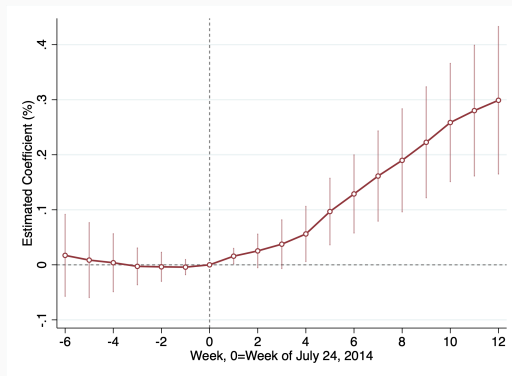
House prices rose more in expectation-sensitive areas

Divergence appears in week 1 — before the new caps took effect (Aug 1)

(weekly log house-price index, Korean Real Estate Board)



(a) Below vs. Above Median



(b) DiD

Main Result 1: House Prices and Expectations

House prices rose more in expectation-sensitive areas, not in credit-sensitive areas

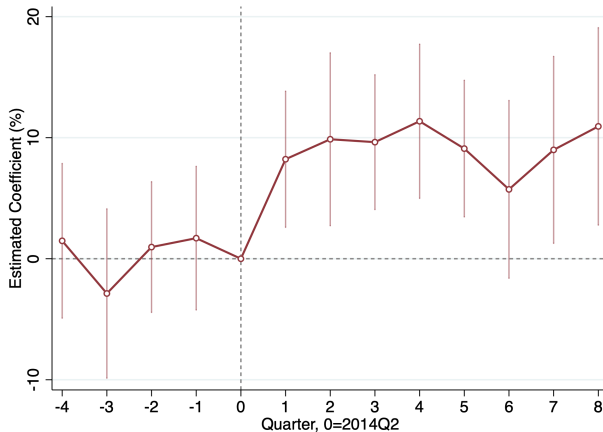
Col 5: signal exposure $\Rightarrow +0.046$ pp/month ($\approx 15\%$ of the 0.3% average)

LHS Variable =	Monthly House Price Growth (%)				
	(1)	(2)	(3)	(4)	(5)
Signal Exposure $\times$ Post	0.065*** (0.019)		0.057** (0.025)	0.031** (0.015)	0.046** (0.019)
Constraint Exposure $\times$ Post		-0.080** (0.034)	-0.028 (0.040)	0.055 (0.042)	0.035 (0.049)
City District FEs	✓	✓	✓	✓	✓
Year-Month FEs	✓	✓	✓		
Province $\times$ Year-Month FEs				✓	✓
Controls					✓
Adj. R^2	0.477	0.472	0.477	0.599	0.600
#Obs	3,216	3,216	3,216	2,931	2,931

Main Result 2: Credit Growth — Official Mortgages

Mortgage origination expanded in credit-relaxed areas, not in expectation-sensitive areas

So the price divergence is **not** mechanical mortgage expansion



Main Result 2: Credit Growth — Unregulated Chonseil Credits

Chonsei: Korea's Unique Housing Credit System

- Tenant pays a lump-sum deposit (60–80% of home value) to landlord in lieu of monthly rent
- Deposit is returned in full at the end of the lease (typically 2 years)
- Interest-free, peer-to-peer, and **completely outside LTV/PTI regulation**

Why is this useful for identification?

- Chonseil credit is **unaffected by LTV/PTI regulations** — the use of Chonseil credit cannot be attributed to changes in credit constraints
- Buyers purchase homes for **speculative purposes** — what matters is expected future prices, not housing services

Thus, a surge in Chonseil-financed purchases is likely driven by changes in expectations!

Why Chonsei isolates the expectations channel:

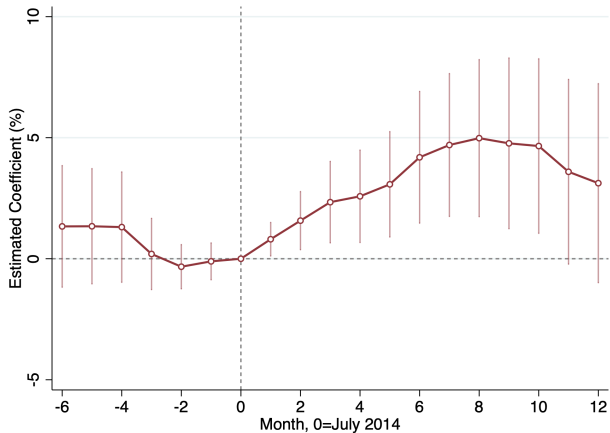
1. **Speculative:** deposits are interest-free, indefinite-maturity loans that finance non-owner-occupied purchases and amplify housing returns
2. **Banks prohibit combining** Chonsei deposits with mortgages $\Rightarrow$ landlords prefer interest-free Chonsei; the observed response is a **lower bound** on expectation-driven credit
3. **Unregulated:** shadow credit outside all formal LTV/PTI policy

$\therefore$ Chonsei-financed buy-to-let = housing speculation **independent of LTV/PTI**.

Main Result 2: Credit Growth — Unregulated Chonseis Credits

Housing credits orthogonal to LTV/PTI caps surged in expectation-sensitive areas

Chonseis-financed buy-to-let = a home purchase followed by a Chonseis contract within 6 months



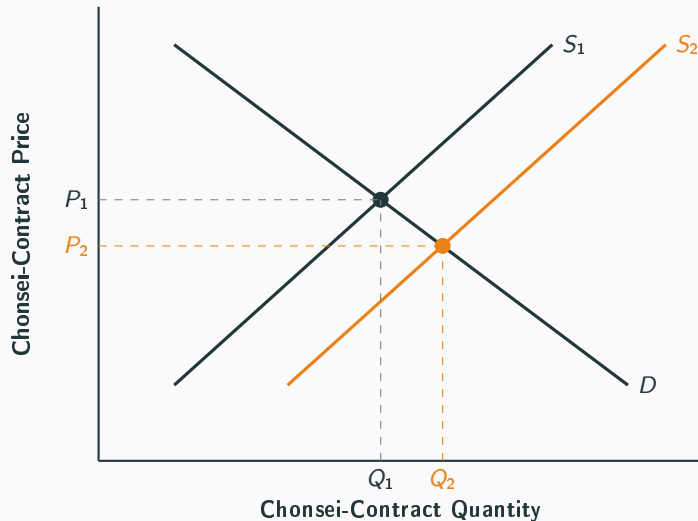
Main Result 2: Credit Growth — Unregulated Chonse Credits

Homeownership fell in expectation-sensitive areas — homes bought by investors, not occupiers

Dep. Var:	Homeownership Rate (%)		
	(1)	(2)	(3)
Signal Exposure $\times$ Post, Std	-2.601*** (0.437)	-0.798* (0.436)	-0.916** (0.447)
City District FEs	✓	✓	✓
Year FEs	✓		
Province $\times$ Year FEs		✓	✓
Controls			✓
Adjusted R^2	0.768	0.850	0.857
#Obs	826	751	751

Additional Evidence: Supply vs. Demand of Chonseil Arrangement

Landlords supplying Chonseil arrangements vs. Tenants demanding Chonseil arrangements



Additional Evidence: Supply vs. Demand of Chonseil Arrangement

According to Jing, Park, and Zhang (2024), the equilibrium *implicit* rate Int_E equates the costs of Chonseil and monthly rental:

$$\underbrace{(Dep_C - Dep_R) \cdot Int_E}_{\text{Chonseil cost}} = \underbrace{Rent}_{\text{Monthly rental cost}} \Rightarrow Int_E = \frac{Rent}{Dep_C - Dep_R}$$

In reality the market rate Int_M is *lower* than Int_E , so Chonseil is cheaper than monthly rental:

$$(Dep_C - Dep_R) \cdot Int_M < Rent, \quad \text{i.e., } Int_M < \frac{Rent}{Dep_C - Dep_R}$$

The **Chonseil discount** is the gap between the equilibrium implicit rate and the market rate:

$$\text{Chonseil Discount} \equiv \frac{Rent}{Dep_C - Dep_R} - Int_M = Int_E - Int_M$$

where Dep_C = Chonseil deposit, Dep_R = deposit under the monthly-rental contract.

Additional Evidence: Supply vs. Demand of Chonseil Arrangement

Chonseil became relatively cheaper than rental — landlords' supply drives it, not tenant demand

Dep. Var:	Chonseil Discount (%)			
	(1)	(2)	(3)	(4)
Signal Exposure $\times$ Post, Standardized	0.0400** (0.0175)	0.0748*** (0.0178)	0.0468*** (0.0173)	0.0444** (0.0177)
City FEs	✓	✓		
Year-Month FEs	✓			
APT FEs			✓	✓
Province $\times$ Year-Month FEs		✓	✓	✓
Controls				✓
Adjusted R^2	0.211	0.217	0.401	0.402
#Obs	330,864	330,864	330,864	330,864

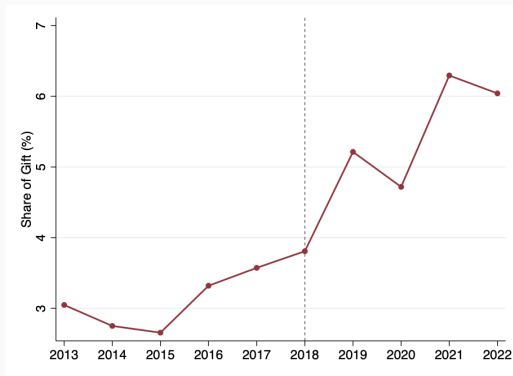
Additional Evidence: Expectation-Driven Transactions

Transactions insulated from LTV/PTI caps *also* rose in expectation-sensitive areas
unconstrained mortgages (≥ 2 pp below caps) · cash purchases (no mortgage) · flipping (resale within 24 months)

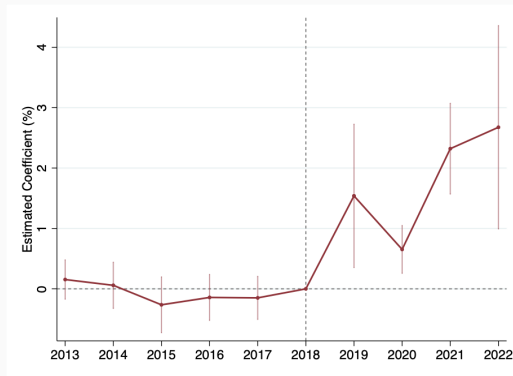
LHS Variables =	% Changes in		
	Unconstrained Mortgages (1)	Cash Home Purchases (2)	Flipping Home Purchases (3)
Signal Exposure $\times$ Post	2.748** (1.345)	6.021*** (2.005)	5.210*** (1.157)
City District FEs	✓	✓	✓
Year-Month FEs	✓	✓	✓
Adjusted R^2	0.559	0.160	0.319
#Obs	3,018	4,674	4,636

Additional Evidence: Revealed Speculation from the 2018 Tax Reform

After the 2018 tax reform, housing gifts surged in expectation-sensitive areas



(a) Aggregate



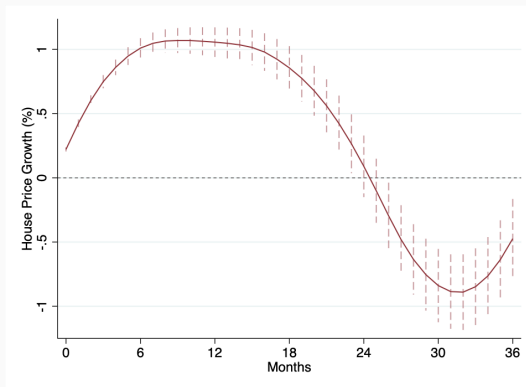
(b) DiD

Alternative Channels and Robustness

Concern	Response	
Monetary policy	Price divergence appeared in week 1, before the Aug 14 BoK rate cut; expectation-sensitive areas are not historically rate-sensitive	
Macro shocks	Commercial real-estate prices show no differential response; expectation-sensitive areas are not differentially exposed to business cycles	
Housing supply	Permits expanded in expectation-sensitive areas after 2014; supply was not unusually constrained	
Income shocks	Income trends and unemployment rates remained flat in expectation-sensitive areas after 2014	
Market Segmentation	Signal exposure remains significant when controlling for Chonsei-prevalent areas; the two sets of districts do not fully overlap	
Outliers	Results unchanged when restricting to Seoul Capital Area and excluding Gangnam, Seocho, and Songpa	

Robustness: Monetary Policy

House prices respond to rate changes only gradually — too slow to drive the immediate divergence



$$\text{1st Stage: } \Delta \text{Rate}_{KR,t} = \alpha + \delta_1 \Delta \text{Rate}_{CN,t} + \delta_2 \Delta \text{Rate}_{US,t} + \varepsilon_t$$

$$\text{2nd Stage: } \Delta \text{House Prices}_{t+h} = \gamma + \beta_h \widehat{\Delta \text{Rate}_{KR,t-1}} + \nu_{t+h}$$

Expectation-sensitive areas respond *less* to rate changes (2nd-stage interaction > 0)

Dep. Var:	L24.Rates			L36.Rates		
	1st Stage (1) Δr	1st Stage (2) $\Delta r \times \text{Sig}$	2nd Stage (3) ΔHP	1st Stage (4) Δr	1st Stage (5) $\Delta r \times \text{Sig}$	2nd Stage (6) ΔHP
Δr_{US}	0.0943*** (0.0002)	-0.0120*** (0.0042)		0.1104*** (0.0003)	-0.0134*** (0.0048)	
Δr_{CN}	1.0359*** (0.0013)	0.0266*** (0.0095)		1.0023*** (0.0021)	0.0090** (0.0039)	
$\Delta r_{US} \times \text{Signal Exposure, Std}$	0.0006*** (0.0002)	0.1178*** (0.0003)		0.0011*** (0.0003)	0.1380*** (0.0002)	
$\Delta r_{CN} \times \text{Signal Exposure, Std}$	-0.0038*** (0.0010)	0.9852*** (0.0019)		-0.0057*** (0.0016)	0.9764*** (0.0006)	
$\widehat{\Delta r}$			-1.5721*** (0.5594)			-0.8305** (0.3725)
$\Delta r \times \widehat{\text{Signal Exposure}}$			1.3516*** (0.3188)			0.6163*** (0.1669)
Constant	-0.1876*** (0.0010)	-0.0928*** (0.0325)	4.0899*** (0.1782)	-0.1637*** (0.0021)	-0.0853*** (0.0289)	4.0102*** (0.1844)
Adjusted R^2	0.7899	0.7631	0.0257	0.7541	0.7421	0.0075
#Obs	16,686	16,686	16,686	16,686	16,686	16,686

Robustness: Business Cycle

GDP growth moves prices, but not differentially by signal exposure

Dep. Var:	Monthly House Price Growth (%)				
	(1)	(2)	(3)	(4)	(5)
ΔGDP	0.0686*** (0.0079)	0.0686*** (0.0080)	0.0909*** (0.0090)	0.0911*** (0.0090)	
$\Delta\text{GDP} \times \text{Signal Exposure, Std}$	-0.0027 (0.0023)	-0.0027 (0.0023)	-0.0041 (0.0025)	-0.0041 (0.0025)	
L. ΔGDP					0.0439*** (0.0130)
L. $\Delta\text{GDP} \times \text{Signal Exposure, Std}$					-0.0090*** (0.0027)
Quarter FEs		✓		✓	✓
Year FEs			✓	✓	✓
Adjusted R^2	0.0191	0.0218	0.105	0.108	0.0962
#Obs	18,567	18,567	18,567	18,567	18,567

Commercial real estate — macro-sensitive but LTV/PTI-exempt — shows no divergence

Dep. Var:	Monthly Commercial Real Estate Price Growth (%)				
	(1)	(2)	(3)	(4)	(5)
Signal Exposure $\times$ Post, Std	-0.009 (0.0063)		-0.0121 (0.0077)	-0.0071 (0.0111)	-0.0039 (0.0124)
Constraint Exposure $\times$ Post, Std		0.0007 (0.0121)	-0.009 (0.0137)	-0.0075 (0.0199)	-0.0127 (0.0241)
City District FEs	✓	✓	✓	✓	✓
Year-Month FEs	✓	✓	✓		
Province $\times$ Year-Month FEs				✓	✓
Controls					✓
Adjusted R^2	0.129	0.128	0.129	0.143	0.142
#Obs	4,567	4,567	4,567	3,826	3,826

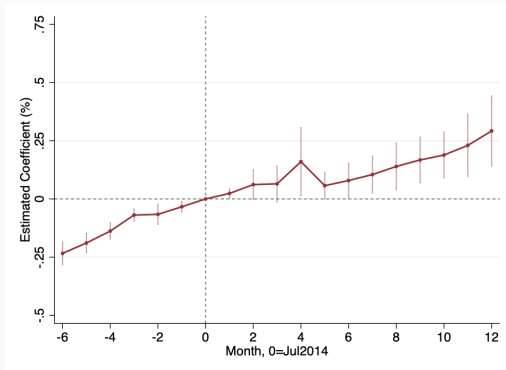
Robustness: Historical Supply

Pre-reform, supply not differentially constrained across signal exposure				
Dep. Var:	Ln(Permit)		Ln(Relative Permit)	
	(1)	(2)	(3)	(4)
ΔPrice	0.0097** (0.0039)	0.0070** (0.0034)	0.0096** (0.0040)	0.0064* (0.0034)
$\Delta\text{Price} \times \text{Signal Exposure, Std}$	0.0005 (0.0032)	-0.0006 (0.0035)	0.0012 (0.0032)	0.0000 (0.0036)
City FEs	✓	✓	✓	✓
Year FEs	✓		✓	
Province $\times$ Year FEs		✓		✓
Adjusted R^2	0.9511	0.9727	0.9453	0.9696
#Obs	390	390	390	390

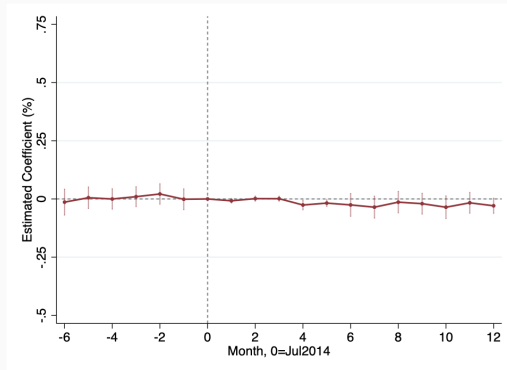
After 2014, permits *expanded* in expectation-sensitive areas — not a supply shortage

Dep. Var:	Ln(Permit)		Ln(Relative Permit)	
	(1)	(2)	(3)	(4)
Signal Exposure $\times$ Post, Std	0.2968* (0.1480)	0.2596** (0.1196)	0.2992* (0.1489)	0.2589** (0.1202)
City District FEs	✓		✓	
Year FEs	✓		✓	
Province $\times$ Year FEs		✓		✓
Adjusted R^2	0.6157	0.4193	0.7199	0.3635
#Obs	306	306	306	306

Income and unemployment trends flat across signal exposure



(a) Income



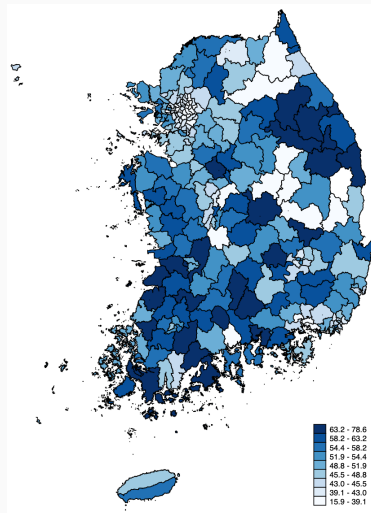
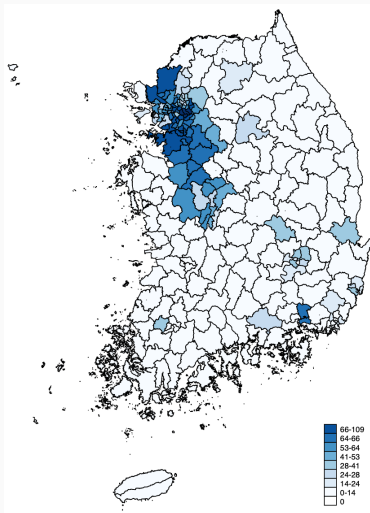
(b) Unemployment

Signal exposure survives controlling for Chonseil prevalence

Dep. Var:	Monthly House Price Growth (%)				
	(1)	(2)	(3)	(4)	(5)
Signal Exposure $\times$ Post, Std	0.0653*** (0.0194)		0.0508** (0.0247)	0.0277 (0.0176)	0.0464** (0.0215)
Chonseil Prevalence $\times$ Post, Std		0.0707** (0.0269)	0.0304 (0.0316)	-0.0183 (0.0450)	-0.00480 (0.0454)
City District FEs	✓	✓	✓	✓	✓
Year-Month FEs	✓	✓	✓		
Province $\times$ Year-Month FEs				✓	✓
Controls					✓
Adjusted R^2	0.477	0.474	0.477	0.599	0.600
#Obs	3,216	3,216	3,216	2,931	2,931

Robustness: Outliers

The two exposures spread across the country, picking out different regions



Holds within the Seoul Capital Area and after dropping Gangnam, Seocho, Songpa

Dep. Var:	Monthly House Price Growth (%)			
	(1)	(2)	(3)	(4)
Signal Exposure $\times$ Post, Std	0.0511*** (0.0142)	0.0357** (0.0143)	0.0475*** (0.0176)	0.0634** (0.0247)
Sample	SCA	SCA	SCA	SCA Excl. Outliers
City District FEs	✓	✓	✓	✓
Year-Month FEs	✓			
Province $\times$ Year-Month FEs		✓	✓	✓
Controls			✓	✓
Adjusted R^2	0.563	0.570	0.571	0.560
#Obs	1,330	1,330	1,330	1,273

Mortgage policy operates through two distinct channels:

1. **Credit constraint channel:** Looser caps $\Rightarrow$ Borrowing $\uparrow \Rightarrow$ House prices $\uparrow$
2. **Expectation channel:** Looser caps as a Signal $\Rightarrow$ Expectations $\uparrow \Rightarrow$ Borrowing & House prices $\uparrow$

Key findings:

1. House prices rose more in expectation-sensitive areas, not in credit-relaxed areas
2. Price divergence appeared in week 1, before new lending rules took effect
3. Borrowing/home purchases unaffected by LTV/PTI policies surged in expectation-sensitive areas

Policy implication: The effectiveness of mortgage policy depends not only on its technical parameters, but also on the **signals** it sends to markets