

Do Falling Housing Prices Influence Labor-Market Slack? Evidence from the Household Side

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Research Question & Positioning

- **Motivation:** China's housing boom (2000–2020) and post-2021 correction ("Three Red Lines" policy) offer a natural shock to household balance sheets.
- **Research Question:** Do falling housing prices increase labor-market slack by tightening household debt constraints?
- **Key Mechanism:** Liquidity-constraint channel: negative housing wealth shock \Rightarrow higher labor supply among indebted households.
- **Positioning:**
 - Builds on demand-side studies linking housing prices to aggregate slack (Mian & Sufi, 2014; Diamond, 1982).
 - Shifts focus to the household supply side, examining how debt burdens affect individual labor-market outcomes such as employment and work effort.

- **Household data:** China Family Panel Studies (CFPS, 2010–2022), including employment, income, debt, housing ownership, and demographic characteristics.
- **City-level data:**
 - Constructed panel of over 300 prefecture-level cities, 2010–2022.
 - *Housing prices* from the *China Real Estate Index System (CREIS)*.
 - *GDP per capita, urbanization, real estate investment, and population density* from official provincial and municipal Statistical Yearbooks.
- **Key variables:**
 - y_{ict} : employment indicator (1 = employed).
 - $\ln P_{ct}$: log city-level housing price.
 - $\text{DebtRatio}_{i,pre}$: pre-shock debt-to-income ratio.
 - Slack_{ct} : unemployment rate or $(1 - \text{employment rate})$.
- Merge CFPS households with city-level shocks \Rightarrow household–city–year panel.

Macro First Stage: IV Construction

First-stage specification:

$$\Delta \ln P_{ct} = \alpha + \beta_1 IV_{ct} + \lambda_c + \lambda_t + \eta_c \cdot t + \varepsilon_{ct}$$

Instrument:

$$IV_{ct} = (\text{National housing price downturn}_t) \times \left(\frac{\text{Average real estate investment}_{c, 2015-2019}}{\text{Average GDP}_{c, 2015-2019}} \right)$$

Definitions:

- $\Delta \ln P_{ct}$: annual log change in city-level housing price.
- λ_c : city fixed effects.
- λ_t : year fixed effects.
- $\eta_c \cdot t$: city-specific linear trend capturing long-run growth paths.

First-stage results: $F = 12.81, p < 0.001$; $\text{Coef}(IV_{ct}) = -2.43 (p < 0.001)$.

Cities more exposed to real estate experienced significantly larger housing price declines during the national downturn.

Macro Second Stage & Results

Second Stage:

$$\Delta y_{ct} = \beta_1 \widehat{\Delta \ln P_{ct}} + \eta_c \cdot t + \lambda_c + \lambda_t + \varepsilon_{ct}$$

- **Outcomes:** city-level unemployment rate (main measure of slack) and sectoral employment shares.
- **Unemployment:** effect of housing price decline remains statistically insignificant.
- **Sectoral employment responses:**
 - **Construction:** $+0.205$ ($p = 0.027$) \Rightarrow significant increase in construction employment share.
 - **Real estate:** -0.025 ($p = 0.059$) \Rightarrow significant moderate decline in real estate employment share.
 - **Manufacturing:** $+0.128$ ($p = 0.132$) \Rightarrow positive but statistically insignificant.
- **Interpretation:** Housing price declines did not increase overall unemployment, but triggered a clear **sectoral reallocation of labor** \Rightarrow away from real estate and toward construction-related industries (structural adjustment rather than aggregate job loss.)

Macro Results Table

Table 1. Effects of Housing Price Declines on Sectoral Employment Shares (2SLS)

	$\Delta \ln P_{ct}$	Construction	Real Estate	Manufacturing
Panel A: First Stage				
IV_{ct}	-2.43*** (0.68)			
F-statistic	12.81			
Panel B: Second Stage				
$\widehat{\Delta \ln P_{ct}}$		0.205** (0.091)	-0.025* (0.013)	0.128 (0.085)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City-specific trends	Yes	Yes	Yes	Yes
Observations	2,460	2,460	2,459	2,460
Clusters (city)	286	286	286	286

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors are in parentheses and clustered at the city level.

Micro Mechanism: Debt Constraints and Labor Supply Response

1. Baseline regression:

$$y_{ict} = \beta_1 \widehat{\Delta \ln P_{ct}} + \mathbf{X}'_{ict} \delta + \lambda_c + \lambda_t + \varepsilon_{ict}$$

2. Heterogeneity by household debt:

$$y_{ict} = \beta_1 \widehat{\Delta \ln P_{ct}} + \beta_2 (\widehat{\Delta \ln P_{ct}} \times \text{DebtRatio}_{i,pre}) + \beta_3 \text{DebtRatio}_{i,pre} + \mathbf{X}'_{ict} \delta + \lambda_c + \lambda_t + \varepsilon_{ict}$$

- y_{ict} : household labor outcomes(employment status or weekly work hours)
- $\widehat{\Delta \ln P_{ct}}$: predicted city-level housing price change (negative values indicate price declines), estimated from the macro IV stage.
- $\text{Debt}_{i,pre}$: pre-shock household indebtedness measured in two ways:
 - continuous debt-to-income ratio, and
 - categorical dummy (low / medium / high)
- \mathbf{X}_{ict} : individual controls (age, education, marital status, gender,etc).

Micro Baseline Results Table

Table 2. Household Labor Responses to Predicted Housing Price Declines

	Employed _{ict}	Workhours _{ict}
$\widehat{\Delta \ln P_{ct}}$	-0.163 (0.240)	-5.161 (13.86)
Age	-0.00080*** (0.00007)	-0.416*** (0.029)
Education (years)	-0.00438*** (0.0010)	-0.099 (0.102)
Married	0.081*** (0.013)	-0.099 (0.911)
Male	0.079*** (0.007)	5.511*** (0.756)
City FE	Yes	Yes
Year FE	Yes	Yes
Observations	17,600	8,988
Clusters (city)	117	115

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses, clustered at the city level.

Micro Heterogeneity By Household Debt

2. Heterogeneity by household debt:

$$y_{ict} = \beta_1 \widehat{\Delta \ln P_{ct}} + \beta_2 (\widehat{\Delta \ln P_{ct}} \times \text{DebtRatio}_{i,pre}) + \beta_3 \text{DebtRatio}_{i,pre} + \mathbf{X}'_{ict} \delta + \lambda_c + \lambda_t + \varepsilon_{ict}$$

• 2.1 Employment:

- **Continuous debt ratio:** $\widehat{\Delta \ln P_{ct}}$ effect is negative and significant ($\beta_1 = -1.07$, $p = 0.004$); interaction term also negative and significant ($\beta_2 = -0.14$, $p < 0.01$).
- **High-debt dummy:** the main effect remains negative ($\beta_1 = -0.90$, $p = 0.05$), and the interaction term is also negative and significant ($\beta_2 = -2.05$, $p = 0.04$)

Interpretation: Higher-debt households exhibit a **stronger negative employment response** to housing price declines, consistent with **debt-overhang or liquidity-constraint mechanisms** operating on the **extensive margin of labor supply**.

Employment Heterogeneity

Table 3. Employment Heterogeneity by Household Debt

	Employed _{ict}	
$\widehat{\Delta \ln P_{ct}}$	-1.07*** (0.36)	-0.90** (0.44)
DebtRatio _{i,pre}	-0.00 (0.00)	
DebtHigh _{i,pre}		0.03 (0.02)
$\widehat{\Delta \ln P_{ct}} \times \text{DebtRatio}_{i,pre}$	-0.14*** (0.02)	
$\widehat{\Delta \ln P_{ct}} \times \text{DebtHigh}_{i,pre}$		-2.05** (1.00)
City FE	Yes	Yes
Year FE	Yes	Yes
City-specific trend	Yes	Yes
<i>Observations</i>	1,431	1,431

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses, clustered at the city level.

2. Heterogeneity by household debt:

$$y_{ict} = \beta_1 \widehat{\Delta \ln P_{ct}} + \beta_2 (\widehat{\Delta \ln P_{ct}} \times \text{DebtRatio}_{i,pre}) + \beta_3 \text{DebtRatio}_{i,pre} + \mathbf{X}'_{ict} \boldsymbol{\delta} + \lambda_c + \lambda_t + \varepsilon_{ict}$$

- **2.2 Workhours:**

- Continuous debt ratio: interaction term is **negative and significant** ($\beta_2 = -21.17$, $p = 0.017$). More indebted households **increase work hours more** when prices fall.
- **High-debt dummy:** interaction term is also negative but statistically insignificant ($\beta_2 = -47.46$, $p = 0.61$), suggesting that the response is not concentrated among the top-debt group.

Interpretation: Households with higher pre-shock debt levels increase work hours more strongly when housing prices fall, consistent with a **liquidity-constraint mechanism** operating on the **intensive margin of labor supply**.

Workhours Heterogeneity

Table 4. Workhour Heterogeneity by Household Debt

	Workhours _{ict}	
$\widehat{\Delta \ln P_{ct}}$	79.36 (53.43)	50.60 (61.46)
DebtRatio _{i,pre}	-0.02 (1.11)	
DebtHigh _{i,pre}		-2.63 (2.29)
$\widehat{\Delta \ln P_{ct}} \times \text{DebtRatio}_{i,pre}$	-21.17** (8.70)	
$\widehat{\Delta \ln P_{ct}} \times \text{DebtHigh}_{i,pre}$		-47.46 (91.37)
City FE	Yes	Yes
Year FE	Yes	Yes
Individual controls	Yes	Yes
<i>Observations</i>	831	831

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses, clustered at the city level.

Research Hurdles & Next Steps

Current challenges:

- **Data limitation:** only one post-2021 CFPS wave available, providing limited post-shock employment observations.
- **Identification robustness:** need to test alternative shock definitions (e.g., policy-based IVs, ruggedness exposure IV).
- **Heterogeneity analysis:** explore variation by homeownership, region, and liquidity constraints.

Next steps:

- Incorporate alternative measures of labor-market slack (e.g., vacancy-to-unemployment ratio V/U).
- Extend to a multi-year event-study framework to trace dynamic responses once later CFPS waves (2023+) become available.
- Refine empirical tables and begin drafting the manuscript.