Rural-Urban Migration, Structural Transformation, and Housing Markets in China

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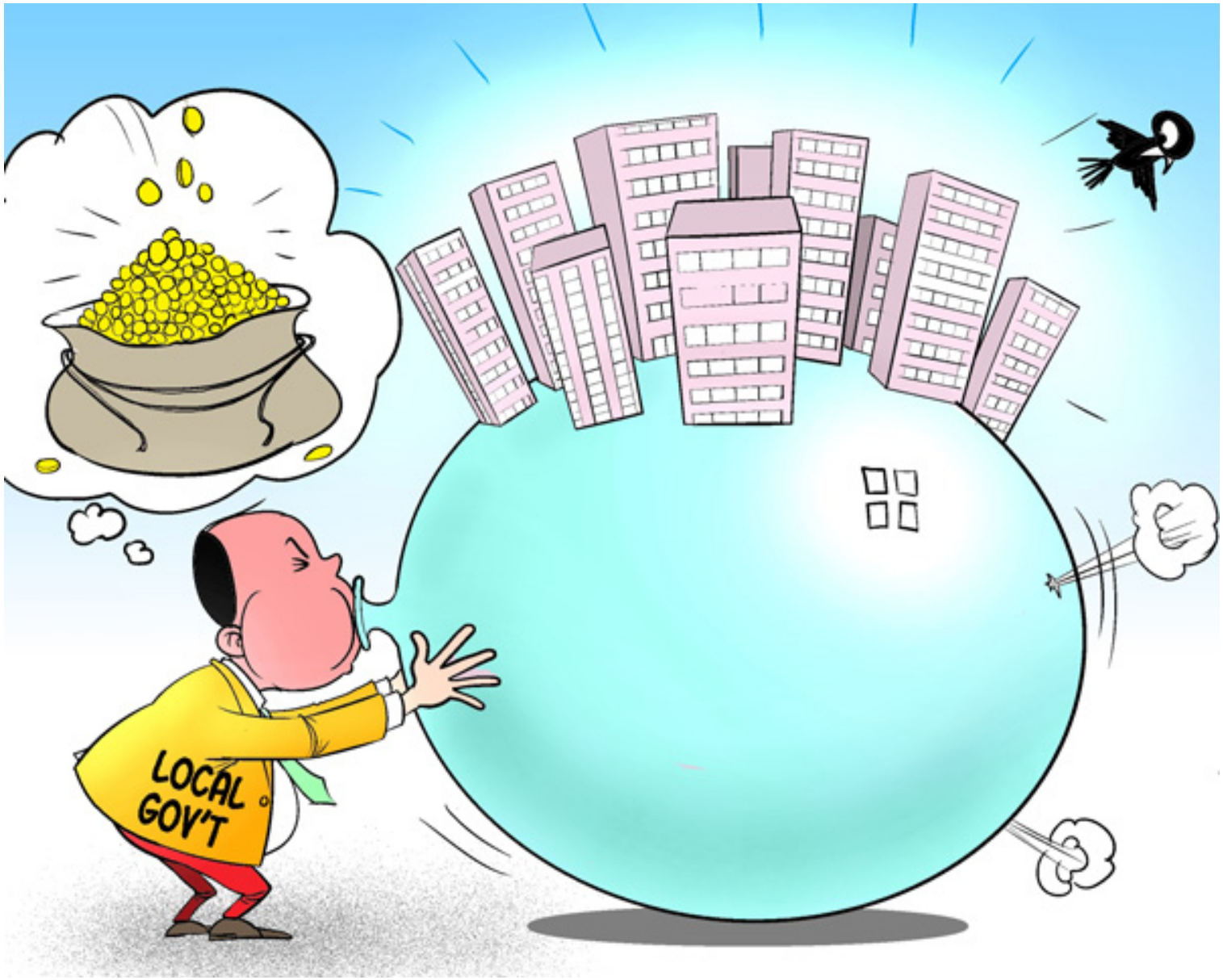
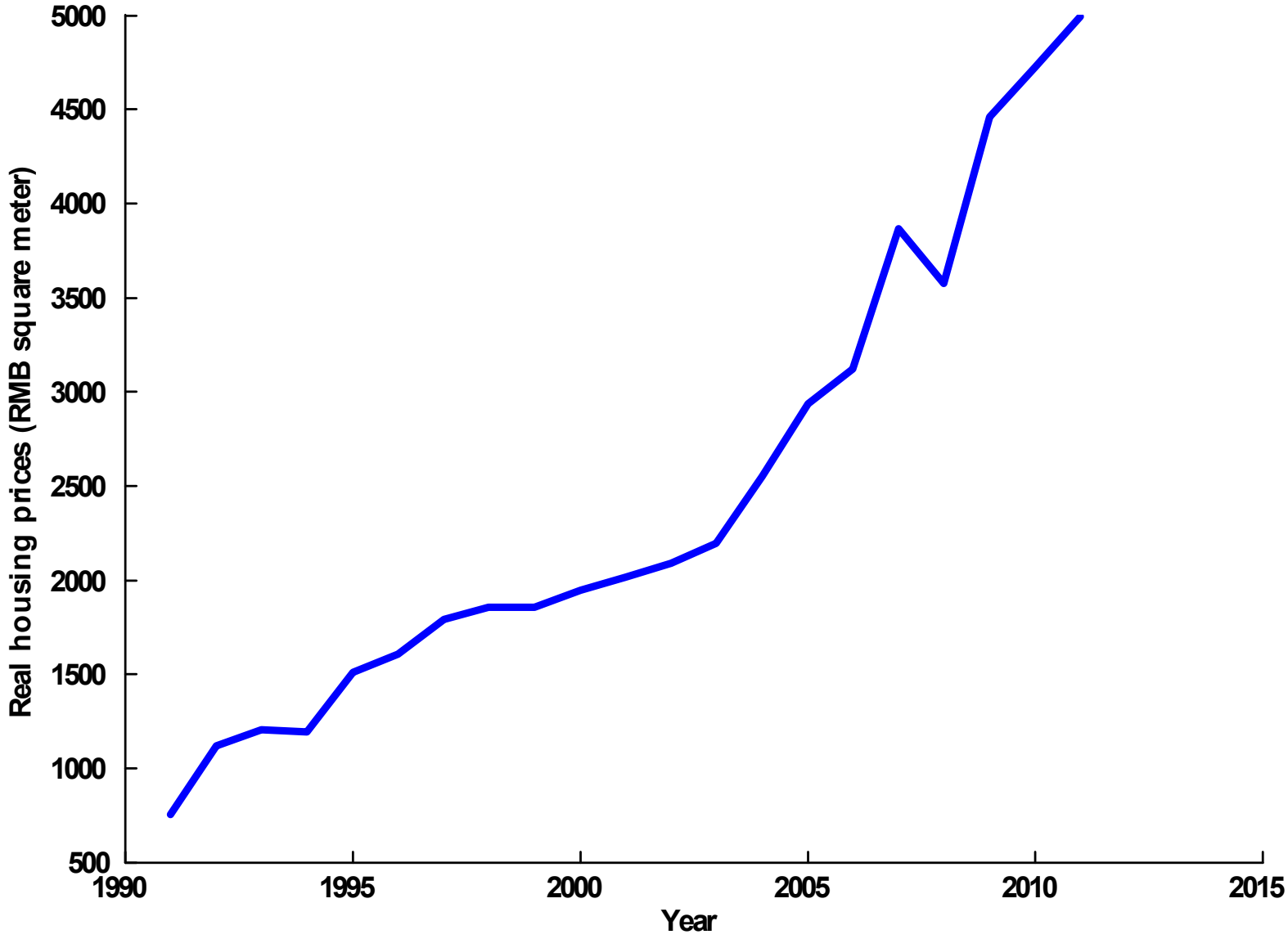
China Housing Boom

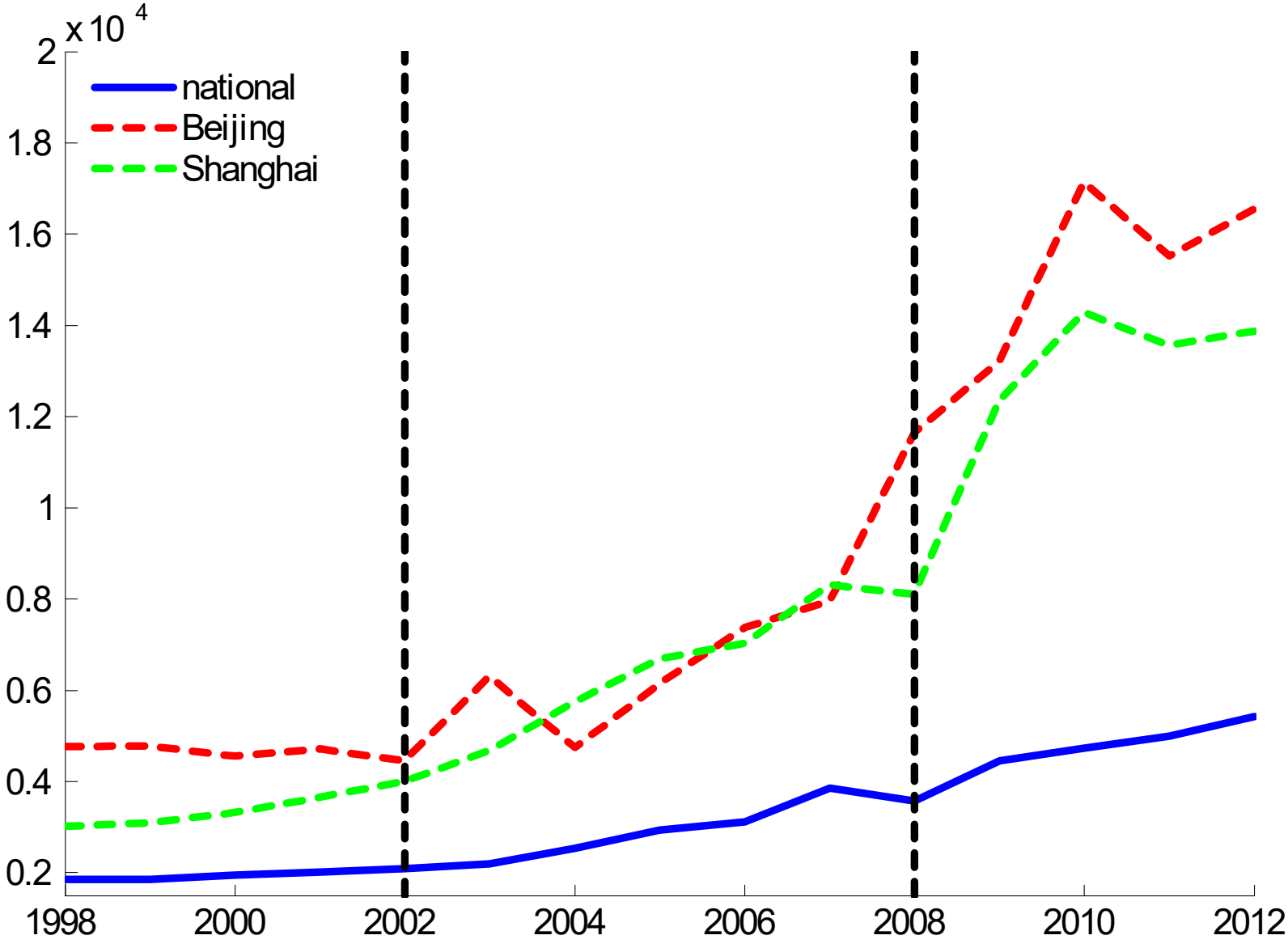


Housing Prices in China (National Index)



Source: National Bureau of Statistics of China

Motivation: Large Cities v.s. National



Source: National Bureau of Statistics of China

Is this housing boom a bubble?

Is this housing boom a bubble?

Maybe,

Is this housing boom a bubble?

Maybe, or maybe not

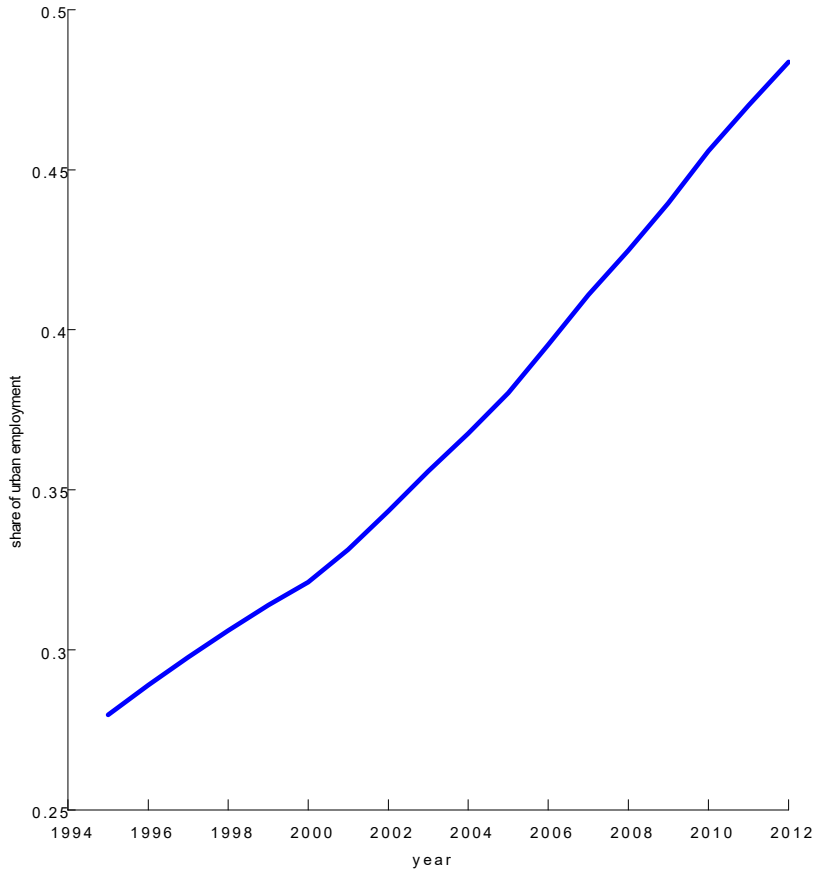
Is this housing boom a bubble?

Maybe, or maybe not

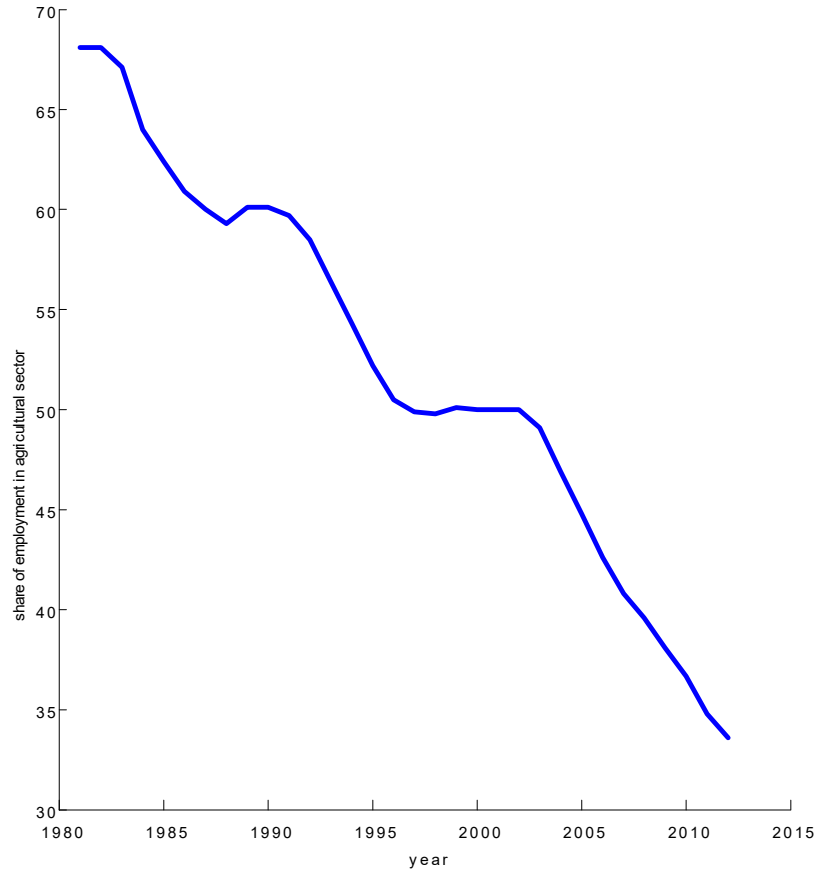
We explore whether the process of **structural transformation** can account for a major portion of the housing boom, even for large cities in China

Structural Transformation and Urbanization in China

Fraction of Urban Employment

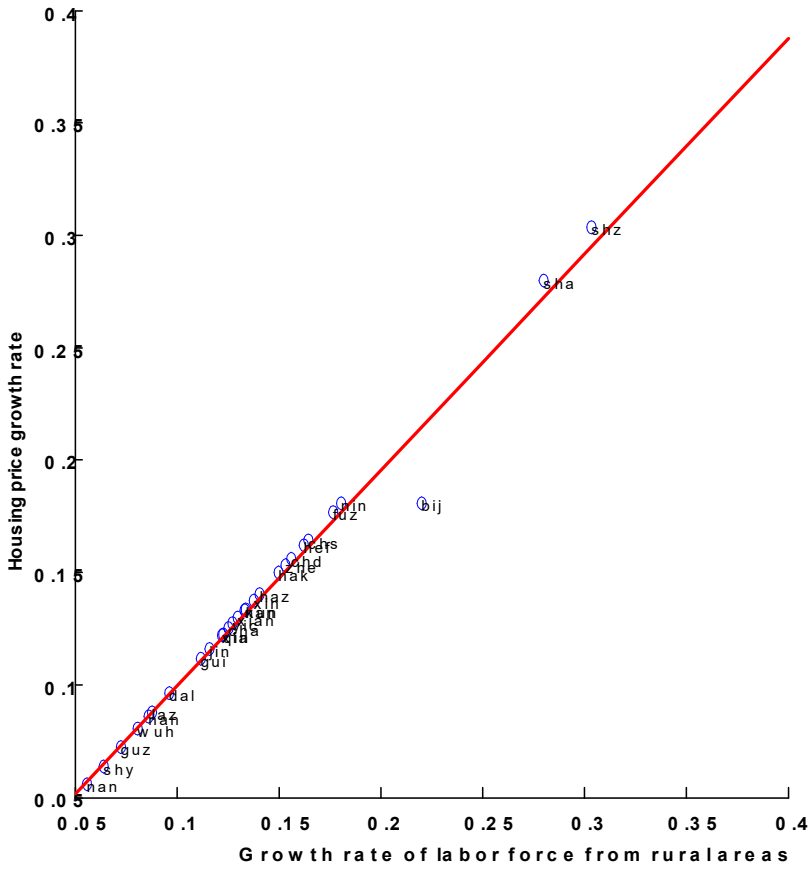


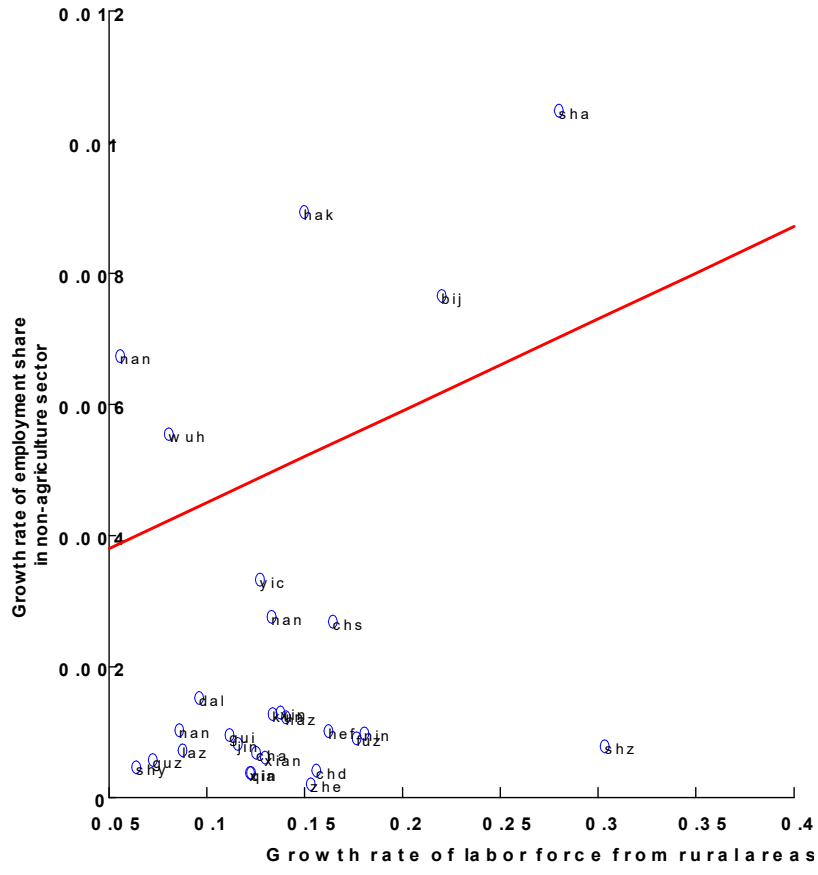
Agricultural Employment Share



Source: National Bureau of Statistics of China

Large City Migration, Employment, and Housing Prices





Source: National Bureau of Statistics of China

What do we do

- Want to quantify the role of structural transformation played in China's housing boom using a model of housing and migration.
- Three important channels
  1. **Structural transformation** that increases productivity, urban income and ability to pay.
  2. **Inelastic housing supply** due to heavily regulated land supply and entry of real estate developers.
  3. **Continual rural-urban migration** that fosters an ongoing increase in the demand for urban housing.

Main Findings (I): Aggregate Model

- The process of structural change accounts for:
  - 80.5% of housing and 14.5% of land prices over 1998-2012
  - 85.9% and 35.9% over 1998-2007
- Supply conditions account for 60+% of changes in housing prices and 40% of land prices
- Productivity (income) accounts for 20+% of the changes in housing and 50% in land prices
- Access to credit has limited impact

Main Findings (II): City Model (Beijing & Shanghai)

- The model accounts for 82.8% of housing and 36.2% of land price movements in Beijing, and 60.2% and 55.0% in Shanghai.
- While supply conditions continue to be crucial, productivity growth becomes more important in explaining Shanghai's housing prices.
- Land supply becomes more important in explaining Beijing's housing prices during 2008-2012.
- In both cities, the role played by productivity is enhanced during 2008-2012.

Roadmap

- Literature Review
- Institutional Background
- Theoretical Framework
- Quantitative Analysis
  - National-level
  - Multiple City
- Conclusions

Literature

- **Structural Transformation:** Laitner (2000), Hansen-Prescott (2001), Ngai-Pissaridis (2004), Gollin et al. (2002), Kongsamut et al. (2003), Casselli-Coleman (2001), Duarte-Restuccia (2010), Buera-Koboski (2009, 2012), Herrendorf et al. (2013).
- **Dynamic rural-urban migration:** Lucas (2004), Bond-Riezman-Wang (2014)
  - House prices and cities: Davis-Heathcote (2005), Glaeser et al. (2005)
  - Growth in China: Brandt-Hsieh-Zhu (2008), Song-Storesletten-Zilibotti (2011)
- **China housing**:
  - Bubbles: Wu-Gyourko-Deng (2012), Chen-Wen (2014), Fang-Gu-Zhou (2014), Fang-Gu–Xiong-Zhou (2015)
  - Signaling values: Wei-Zhang-Liu (2012)

Migration and Housing Policies in China

Migration Policies in China

- China had a household registration system "hukou" to control migration between urban and rural areas

- Open policy reforms started in 1978.

Migration Policies in China

1. **"Leave land without leaving home" (1978-1983)**
   - Migration flows within rural areas were allowed.
   - Excessive agricultural workers were absorbed by TVEs.
2. **"Leave both land and home" (1984-1994)**
   - Rural workers started to move to bigger cities, including megalopolises.
3. **Highly active stage (post-1995):**
   - Abandonment of the centrally planned food and housing allocation system.
   - Temporary work permits in large cities in eastern coastal areas.

Housing Policies in China: From Planned to Market

1. **Probation and experiment stage (1978-1988)**
   - Limited access to urban housing markets.
   - Public housing rents adjusted to rising construction costs.
2. **Further urban housing reform (1988-1998)**
   - Ownership of private housing purchased from the public sector recognized.
   - Two options: Paying the market price for complete ownership of unit, and paying the "standard price" (subsidized) only provided partial ownership.
3. **Current stage of urban housing reform (post-1998)**
   - Replace material distribution of housing by monetary transfers.
   - Cheap-rent housing provided for lowest income households.

Basic Features

- Two regions: city and rural
- Two types of goods: manufactured (produced in the city), and agricultural goods (produced in the rural area)
- Agents: workers (rural or city), housing developers and a government.
- Workers (continuum and infinitely-lived):
  - Inelastically provide 1 unit of labor.
  - All identical except their disutility costs of migration $\epsilon \tilde{} F(\epsilon)$.

Issues Ignored in the Paper

Design a **conservative benchmark**:

- Rule out bubbles in the baseline setting with housing as a necessity and without secondary market trading.
- Ignore precautionary or speculative motives of housing investments.
- Focus only on extensive margin via migration flow rather than intensive margin via quantity or quality of housing.
- Put aside small city to large city migration.
- Hybrid tenure decisions: owning/renting with a consol mortgage with fractional downpayment.
- Not allow for endogenous timing of housing demands and vacancies.

Equilibrium Housing Prices

$$q_t = \frac{\Psi_t}{(1-\alpha)\left(A_t^h\right)^{\frac{1}{1-\alpha}}}\left[\frac{\triangle F(\epsilon_t^*)}{\ell_t}\right]^{\frac{\alpha}{1-\alpha}}$$

- **Direct effects:**
  (+) cost (developer entry fees, Ψ_t and A_t^h)
  (-) incremental urban land supply (ℓ_t)
- **Indirect effects:** via net migration flows, $\triangle F(\epsilon_t^*)$
  (+) urban manufacturing productivity
  (+) access to mortgage financing

Calibration

Calibration (I)

- Preferences: Housing as a necessity (**no speculative demand**)

$$U(c_t^m, c_t^f, h_t) = \begin{cases} [\theta(c_t^m)^\rho + (1-\theta)(c_t^f)^\rho]^{\frac{1}{\rho}} & \text{if} \quad h_t \geq 1 \\ -\infty & \text{otherwise} \end{cases}.$$

- Mobility cost: Follows Pareto distribution $[1, \infty)$:

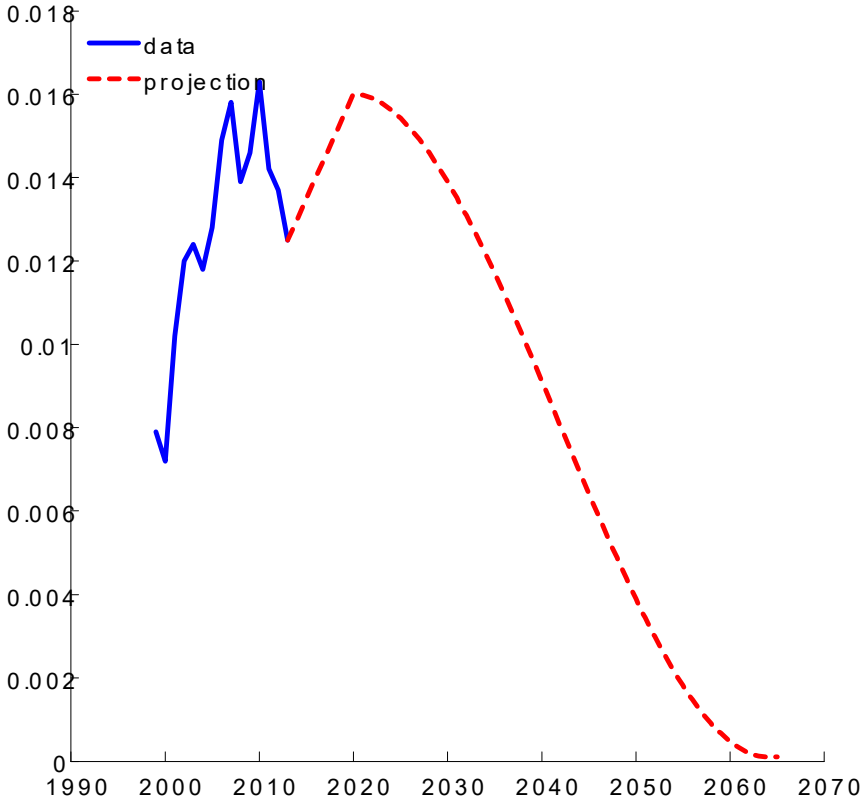
$$F(\epsilon) = 1 - \left(\frac{1}{\epsilon}\right)^{\lambda}.$$

Urban Employment Projection

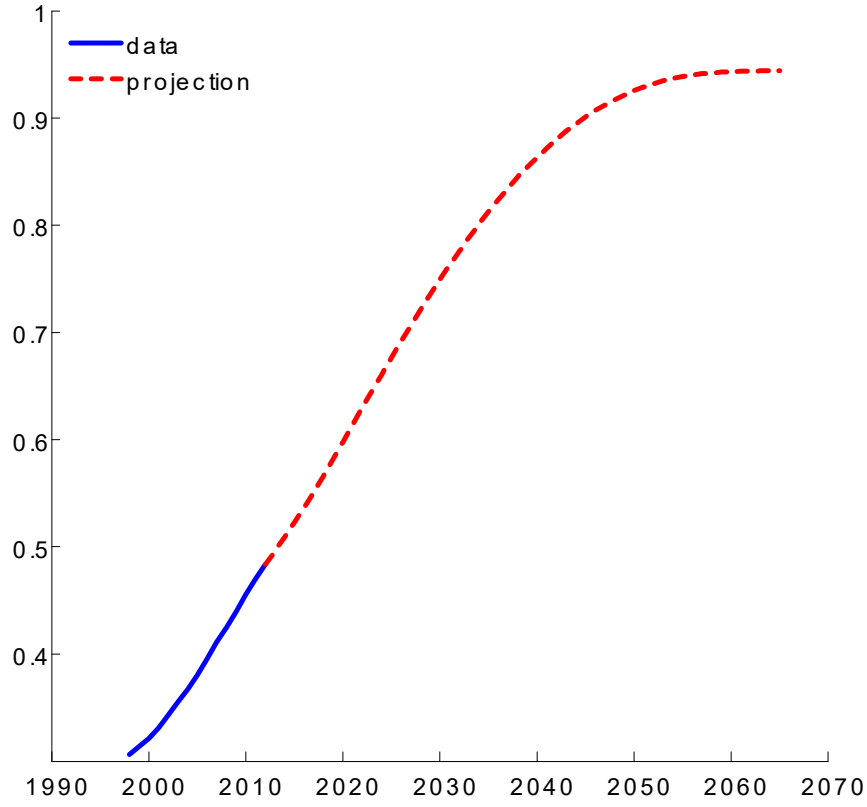
Structural transformation is completed by 2065.

Findings are robust with a slower projection, 2100.

Migration Flow



Fraction of Urban Employment



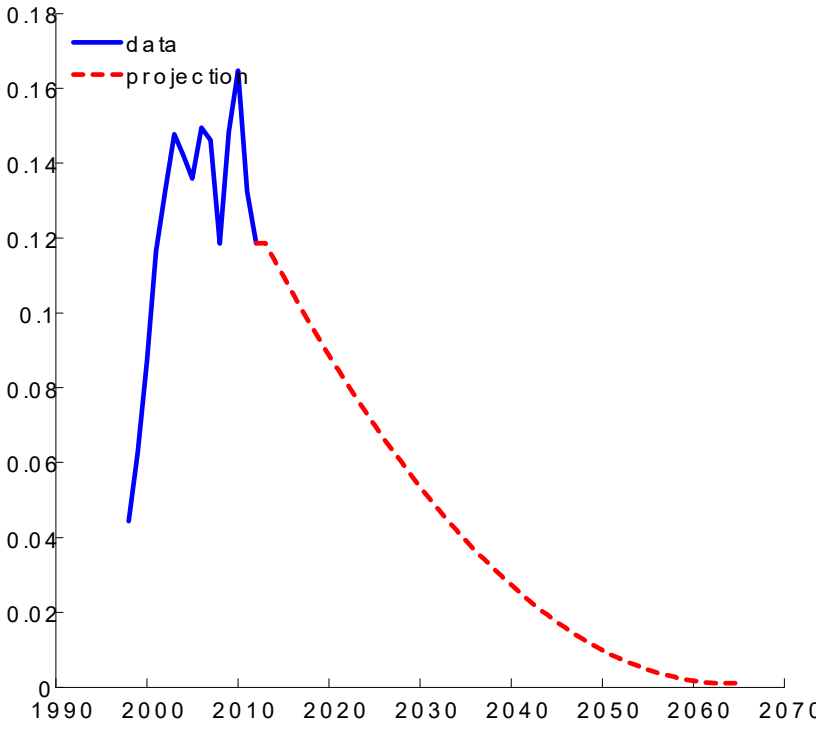
Source: National Bureau of Statistics of China and Model Implied Data

Residential-land Supply Projection

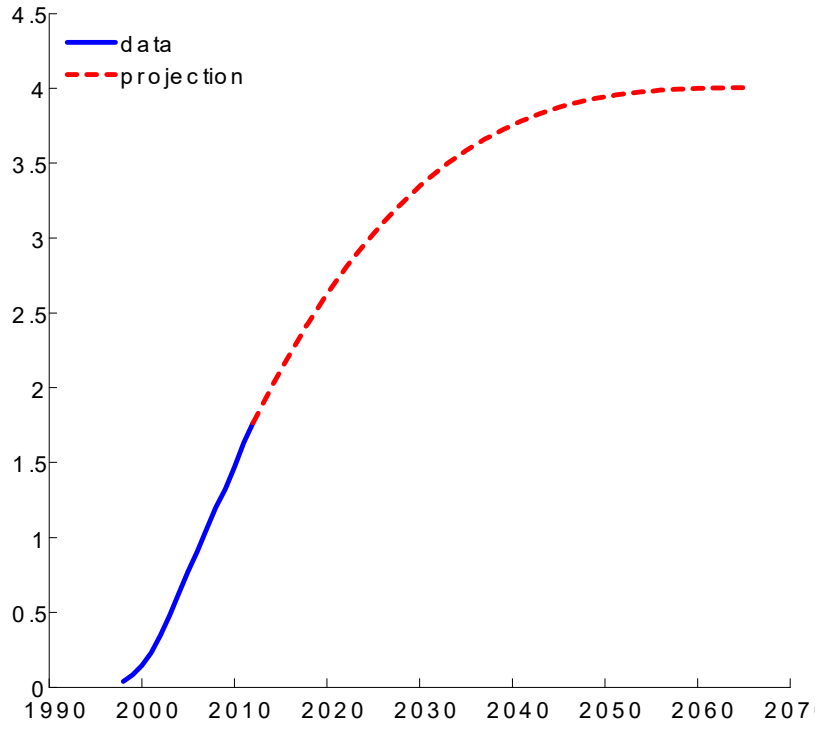
Land markets fully privatized in 2002 (sales through auctions).

$$\text{Residential land supply} = \frac{\text{land space purchased by real-estate enterp.}}{\text{total real for inhabitation, mining and manuf.}}$$

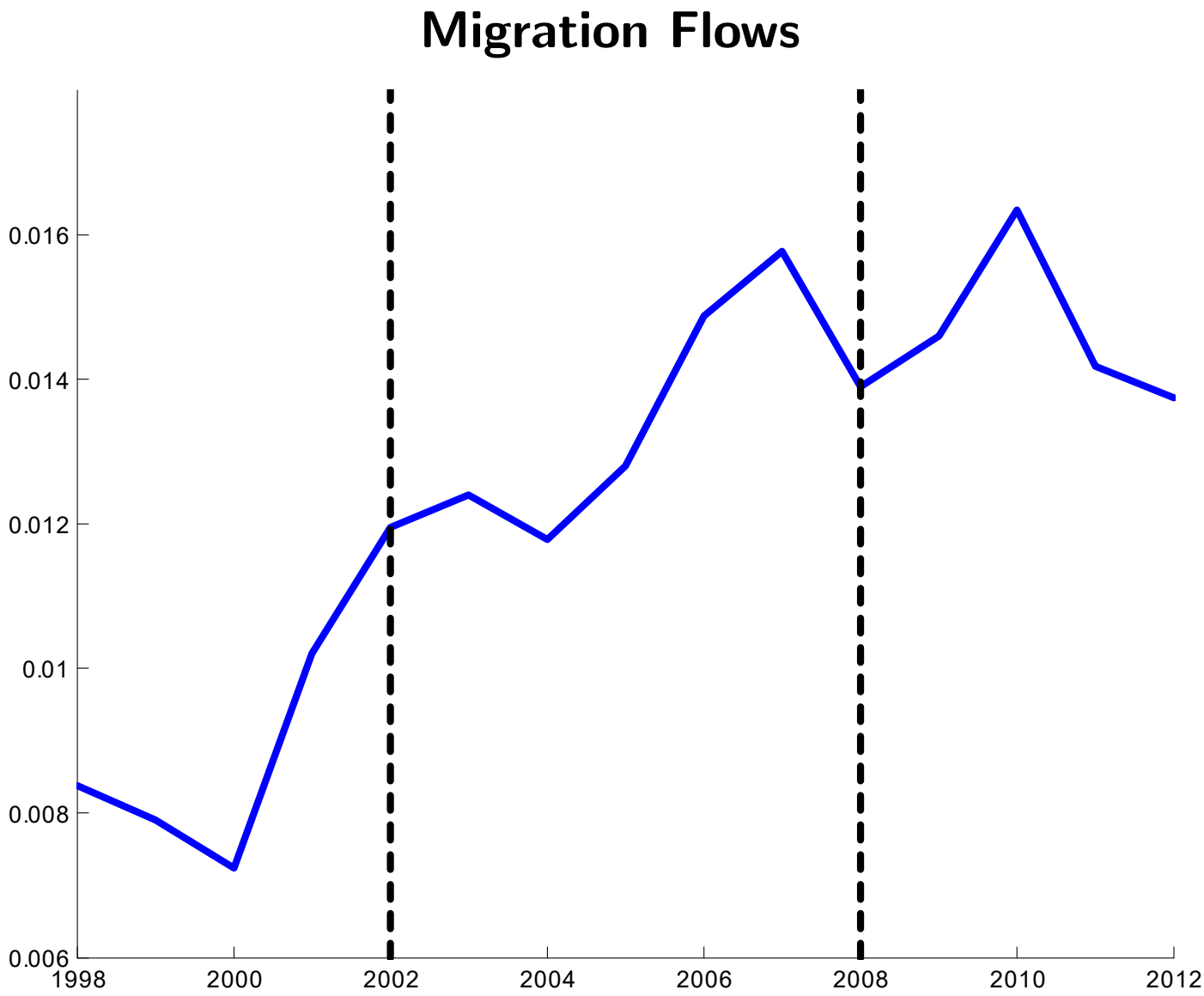
Net Residential Land Supply



Accumulated Land Supply



Migration Flows



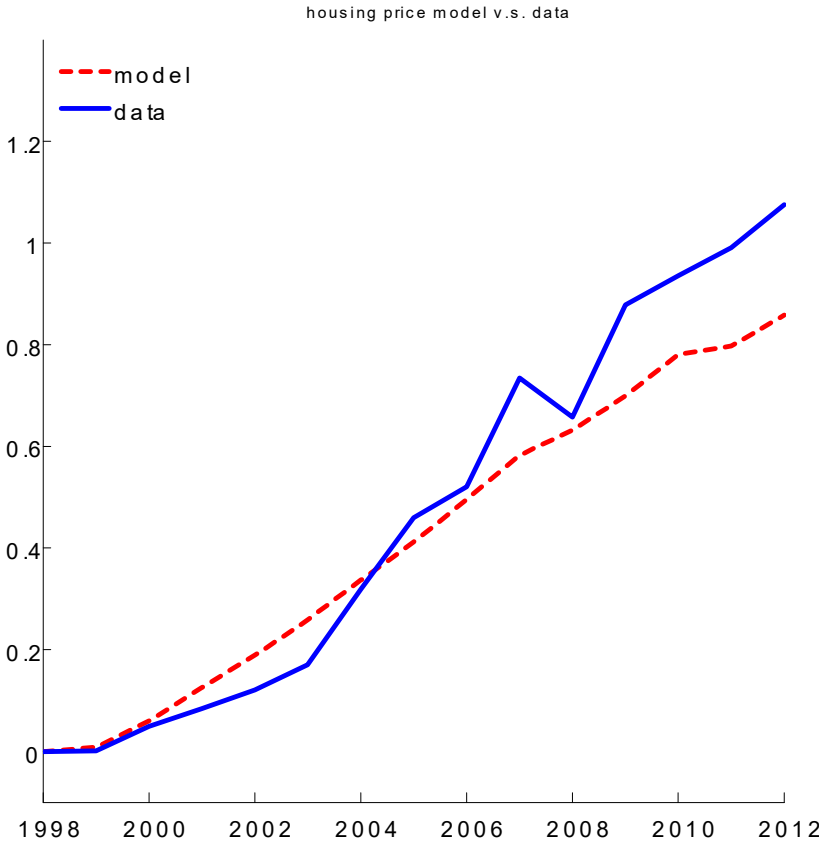
Source: Model implied data

Manufacturing productivity $\{A_t^m\}_{t=1998}^{2065}$ is computed to match the

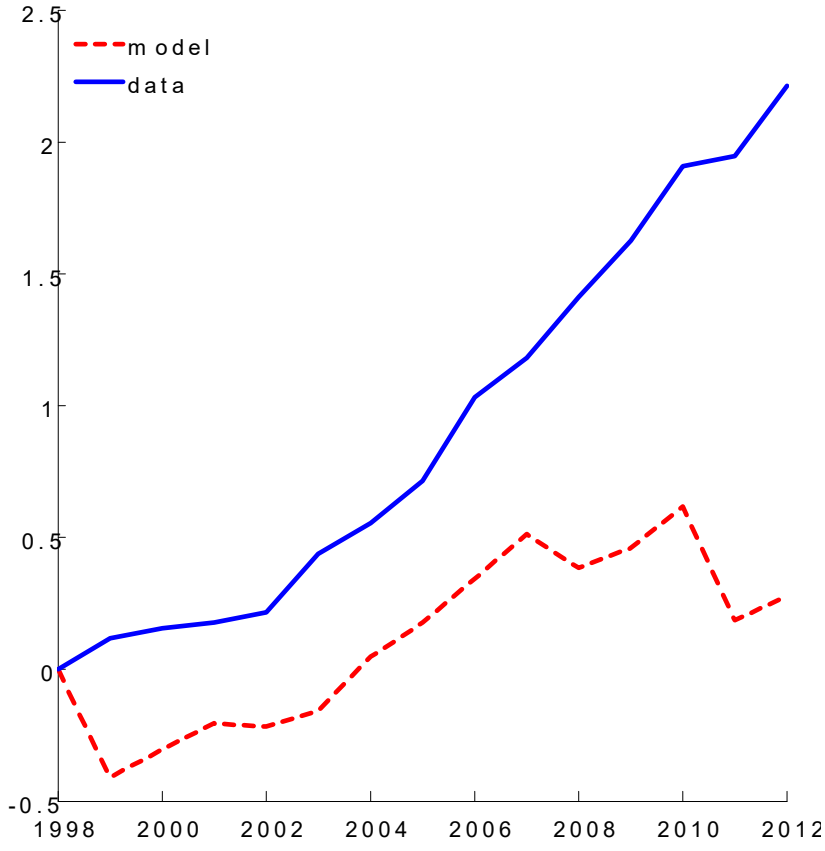
Quantitative Findings: National

Quantitative Findings: Model vs. Data

Housing Prices



Land Prices



Source: National Bureau of Statistics of China and Model Implied Data

Quantitative Findings

Model Prediction 1998-2012: National

	Housing (%)		Land (%)	
	Data	Model	Data	Model
Ave. growth:1998-2012	9.7	6.4	16.0	3.4
Ave. growth:1998-2007	9.1	6.6	13.0	6.5
Ratio of 2012/1998	2.93	2.36	9.14	1.32
Ratio of 2007/1998	2.08	1.79	3.26	1.67
	Success	NMSE	Success	NMSE
1998-2012	0.60	0.0190	0.18	0.5662
1998-2007	0.67	0.0062	0.53	0.1985
1998-2002	2.35	0.0016	3.32	0.1107
2003-2007	0.36	0.0082	0.68	0.2192
2008-2012	0.31	0.0263	0.29	0.6241

Quantitative Findings: Decomposition

Decomposition of Key Indicators

	Period	Entry Fee	Land supply	Downpay	Prod.
Housing Prices	1998-2012	26.7%	36.0%	15.6%	21.7%
	1998-2002	34.5%	34.6%	18.9%	12.0%
	2003-2007	28.4%	32.0%	14.6%	25.0%
	2008-2012	10.9%	38.6%	8.0%	42.5%
Land Prices	1999-2007	18.2%	22.3%	6.0%	48.6%
	1999-2002	20.2%	25.9%	7.9%	46.2%
	2003-2007	15.6%	13.2%	4.4%	54.9%
	2008-2012	18.3%	17.0%	8.0%	56.7%

Quantitative Findings: Decomposition

- **Supply factors** are the most important factor for increases in housing prices (62.7%) and land prices (40.5%).
- **Productivity(income)** accounts for about 20% of the changes in housing prices, and 50% of land prices.
- Productivity becomes more important over time for both housing and land prices, while supply factors become less important in housing prices.
- The contributions of access to credit to all indicators are below 20%.

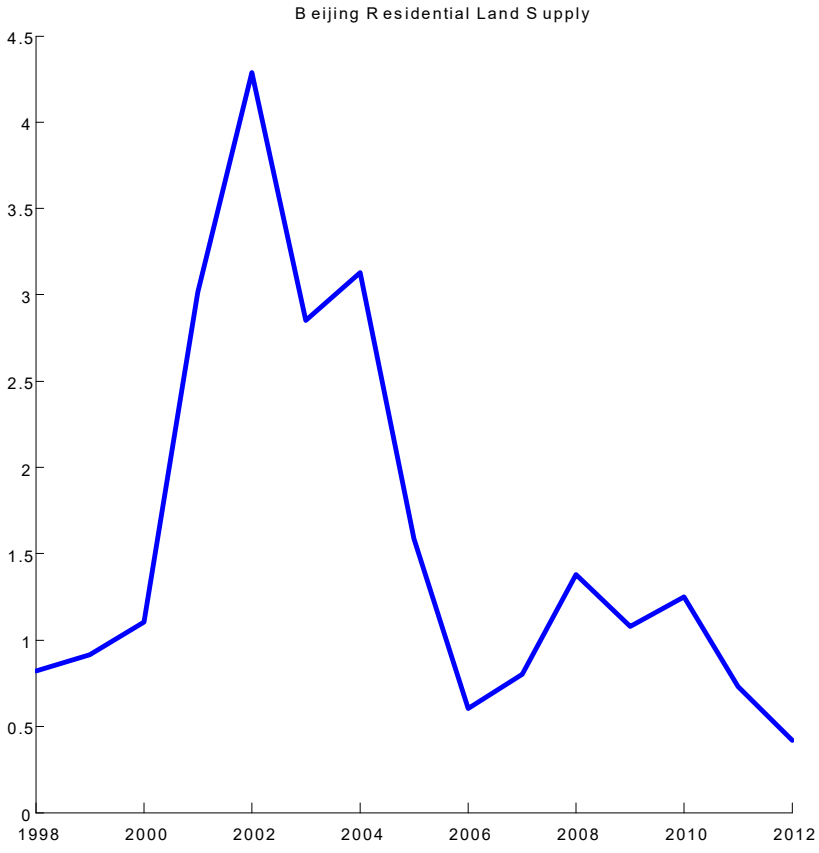
Quantitative Findings: Cities

Multiple City Framework

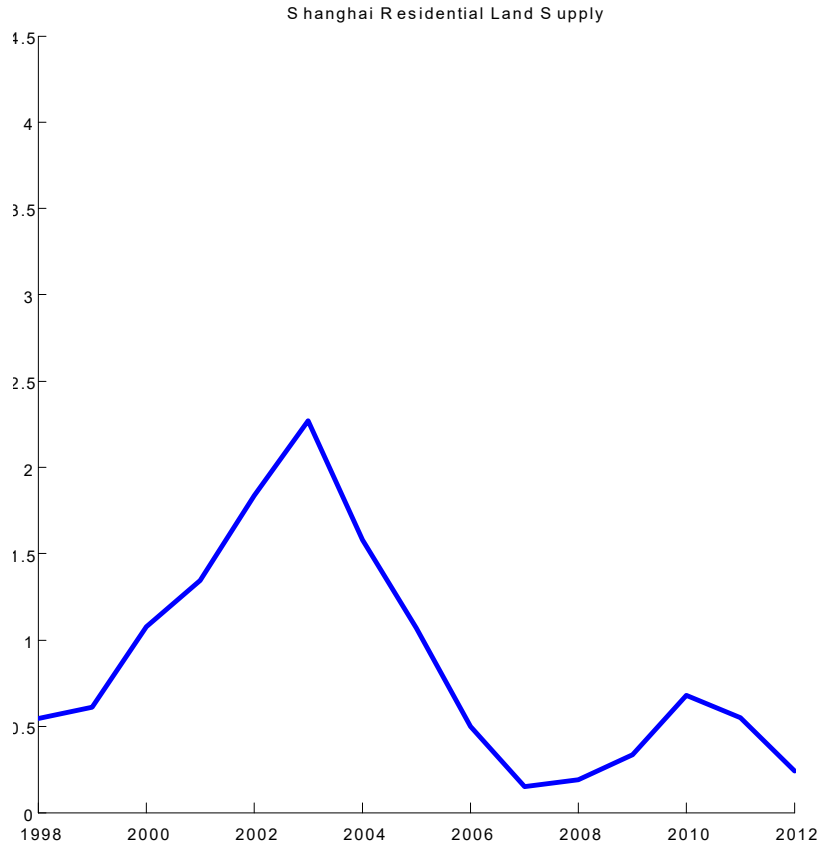
- Suppose there are cities $I > 1$. All of the cities are identical, having access to the same technology to produce manufactured goods that can be costlessly traded across cities.
- The cities differ in two aspects:
  1. the relative productivity of the manufacturing sector.
  2. the availability of land (exogenously) supplied by the government.
- City selection is determined by lottery
- The city labor markets are segmented because labor mobility across cities is not permitted.
- Housing supply side is modeled the same way as the aggregate model.

Residential Land Supply

Beijing

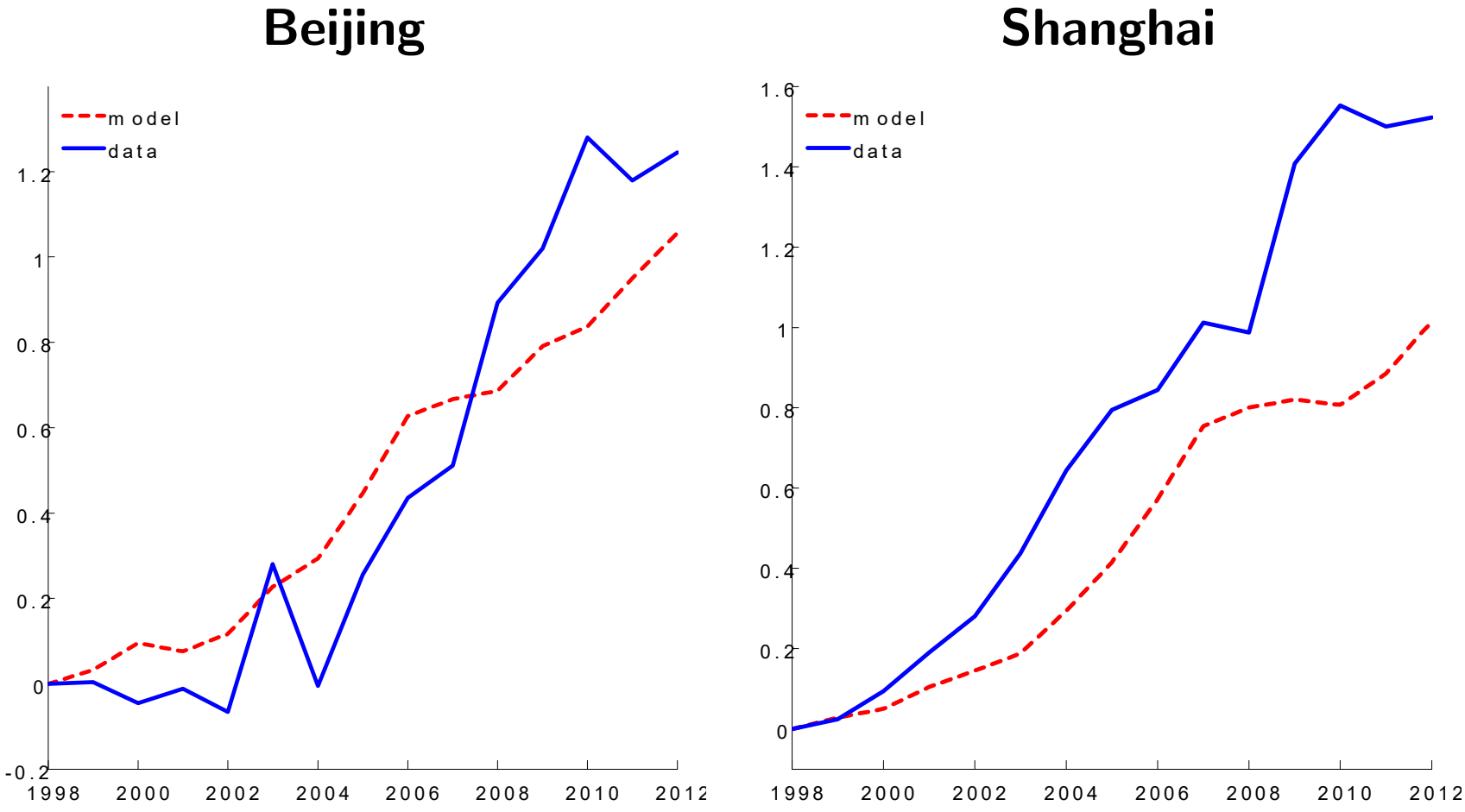


Shanghai



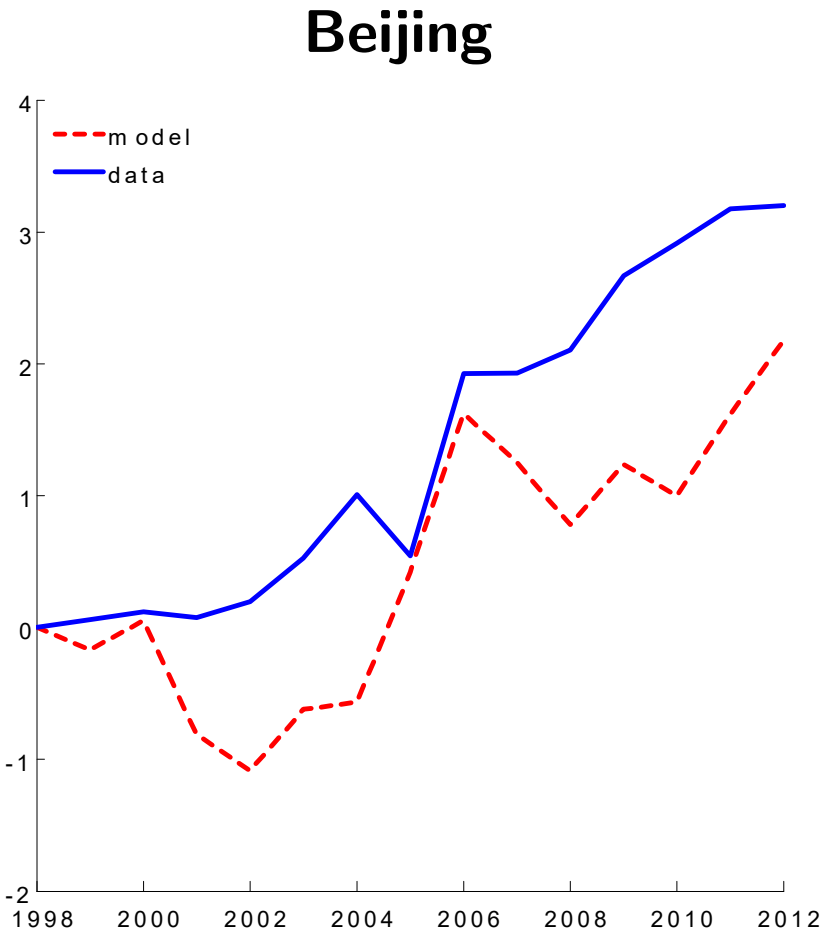
Source: National Bureau of Statistics of China

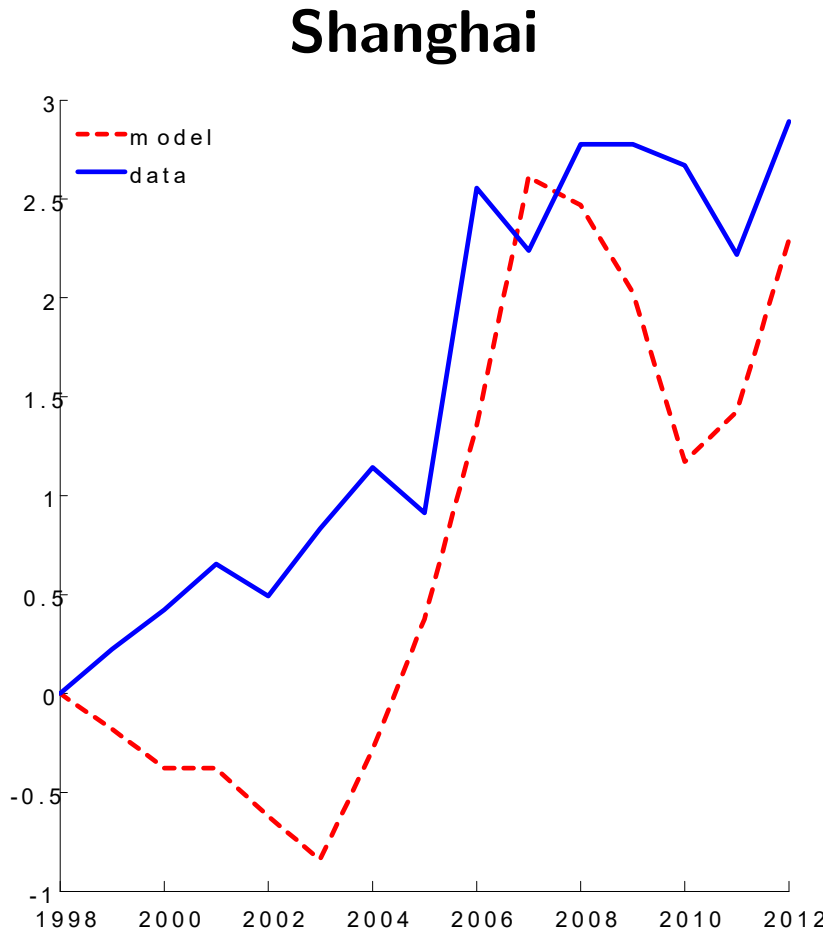
Housing Prices: Model vs. Data



Source: National Bureau of Statistics of China and Model Implied Data

Land Prices: Model vs. Data





Source: National Bureau of Statistics of China and Model Implied Data

Model Prediction 1998-2012: Beijing

Model Prediction 1998-2012: Beijing

	Housing (%)		Land (%)	
	Data	Model	Data	Model
Ave growth:1998-2012	4.50	8.1	26.2	26.0
Ave growth:1998-2007	2.16	7.32	23.6	18.0
Ratio of 2012/1998	3.25	2.87	24.5	8.87
Ratio of 2007/1998	1.67	1.95	6.89	3.50

	Success Rate	NMSE	Success Rate	NMSE
1998-2012	0.55	0.0540	0.74	0.5399
1998-2007	1.84	0.0313	1.39	0.1929
1998-2002	4.54	0.0137	49.0	0.2037
2003-2007	0.87	0.0401	2.11	0.1923
2008-2012	0.23	0.0606	1.50	0.5620

Model Prediction 1998-2012: Shanghai

Model Prediction 1998-2012: Shanghai

	Housing (%)		Land (%)	
	Data	Model	Data	Model
Ave growth:1998-2012	12.4	8.1	19.4	39.4
Ave growth:1998-2007	11.4	9.5	27.6	61.2
Ratio of 2012/1998	4.48	2.76	18.0	9.92
Ratio of 2007/1998	2.75	2.12	9.39	13.61

	Success Rate	NMSE	Success Rate	NMSE
1998-2012	0.41	0.1605	1.28	0.2950
1998-2007	0.47	0.0545	1.59	0.3939
1998-2002	0.25	0.0062	0.85	0.3209
2003-2007	1.07	0.0676	2.91	0.3969
2008-2012	0.15	0.1974	4.54	0.2701

Decomposition: Beijing

Decomposition of Key Indicators (Beijing)

	Period	Entry Fee	Land supply	Downpay	Prod.
Housing Prices	1998-2012	28.8%	31.4%	17.9%	21.9%
	1998-2002	28.2%	33.1%	16.1%	22.6%
	2003-2007	27.6%	23.6%	21.5%	27.3%
	2008-2012	19.0%	28.6%	0.4%	51.9%
Land Prices	1999-2007	13.1%	10.8%	12.6%	63.5%
	1999-2002	14.3%	3.6%	21.3%	60.8%
	2003-2007	16.0%	17.2%	2.0%	64.8%
	2008-2012	3.3%	14.4%	11.4%	70.9%

Decomposition: Shanghai

Decomposition of Key Indicators (Shanghai)

	Period	Entry Fee	Land supply	Downpay	Prod.
Housing Prices	1998-2012	28.3%	24.9%	17.7%	29.1%
	1998-2002	29.0%	29.3%	19.5%	22.2%
	2003-2007	31.4%	24.8%	19.0%	24.9%
	2008-2012	12.9%	6.7%	1.1%	79.4%
Land Prices	1999-2007	24.3%	22.8%	14.2%	38.7%
	1999-2002	30.8%	12.9%	8.5%	47.8%
	2003-2007	24.6%	31.5%	20.6%	23.2%
	2008-2012	16.4%	9.4%	13.5%	60.7%

Quantitative Findings: Decomposition

- **Supply conditions are** the most important drivers, accounting for more than 50% housing price growth in both cities.
- **Land supply** and **productivity** together capture more than 70% of land price growth in each city.
- **Productivity** become more important over time for explaining housing price movements during the last subperiod.
- **Land supply** becomes more important in explaining Beijing's housing prices during 2008-2012.

Conclusions

Summary

- The role of structural transformation played in the rapid growth of housing and land prices in very important
- The aggregate model accounts for 80.5% of housing prices and 14.5% of land prices from 1998-2012
- The performance improves substantially during the pre-financial tsunami period 1998-2007, accounting for 85.9% and 35.9% of housing and land price movements, respectively.
- **Structural transformation** and the resulting **rural-urban migration** are sizeable driver of housing prices over the period of 1998-2012.

Policy Implications

- China's housing prices do not seem to be at odds with **market fundamentals**.
- If it is desired to cool down the housing market, proper control of **land prices** may be more appropriate.
- For larger cities, if it is desired to slow down the growth of house prices, **supply policies** are more important than credit controls.