



DEMYSTIFYING THE CHINESE HOUSING BOOM

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CONSTRUCTION BOOM ACROSS CHINA



GHOST TOWN IN INNER MONGOLIA



GRAVE CONCERNS

- A gigantic housing bubble in China is about to crash and eventually trigger a world economic crisis

The lack of reliable statistics about basic questions:

- How much have housing prices in China appreciated in the last decade?
- Were home buyers deep in debt?
- Was housing out the reach of typical households?

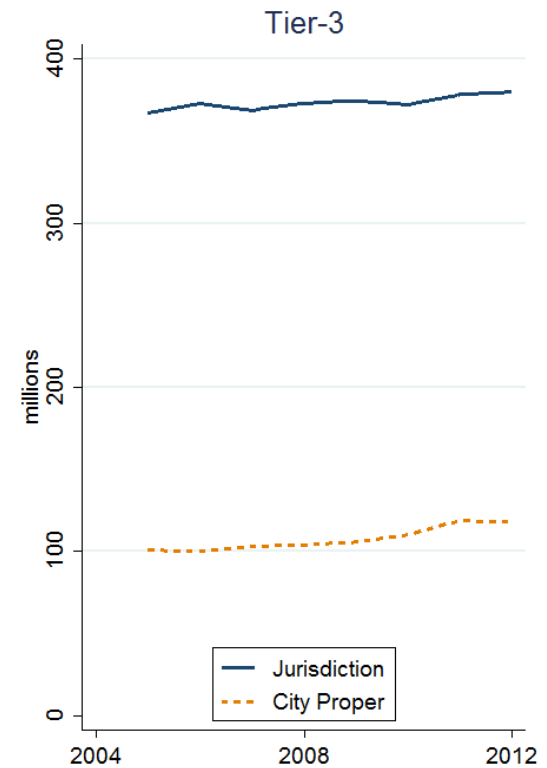
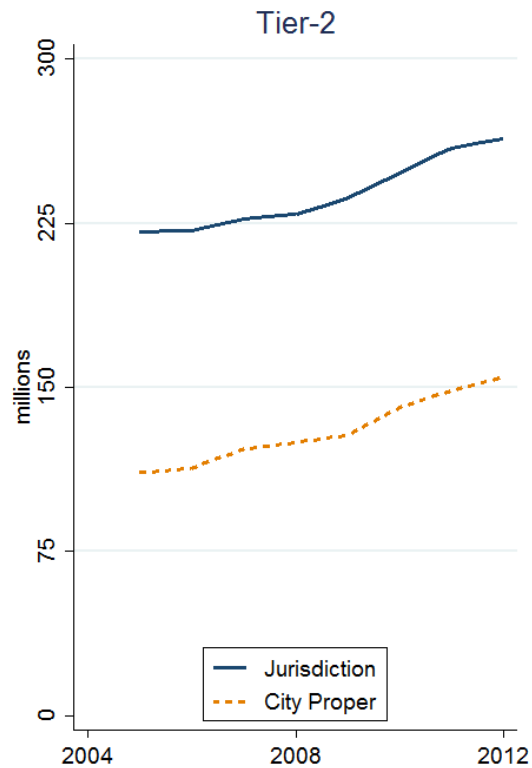
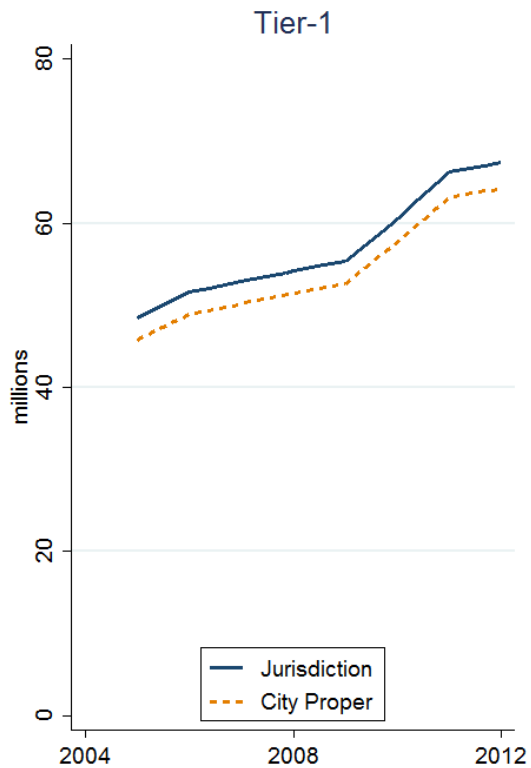
ROAD MAP

- Background information
- Construct a housing index to characterize the housing market boom
 - 2003-2013 for 120 cities
- Analyze mortgage borrowers to understand the demand side
- Some discussion

LIST OF CITIES

- First tier: Beijing, Shanghai, Guangzhou, and Shenzhen
- Second tier (35 cities): 2 autonomous municipalities, capital cities of 24 provinces, and 9 vital industrial and commercial centers
 - Our sample covers 31 of them
- Third tier: regional industrial or commercial centers
 - 85 in our sample

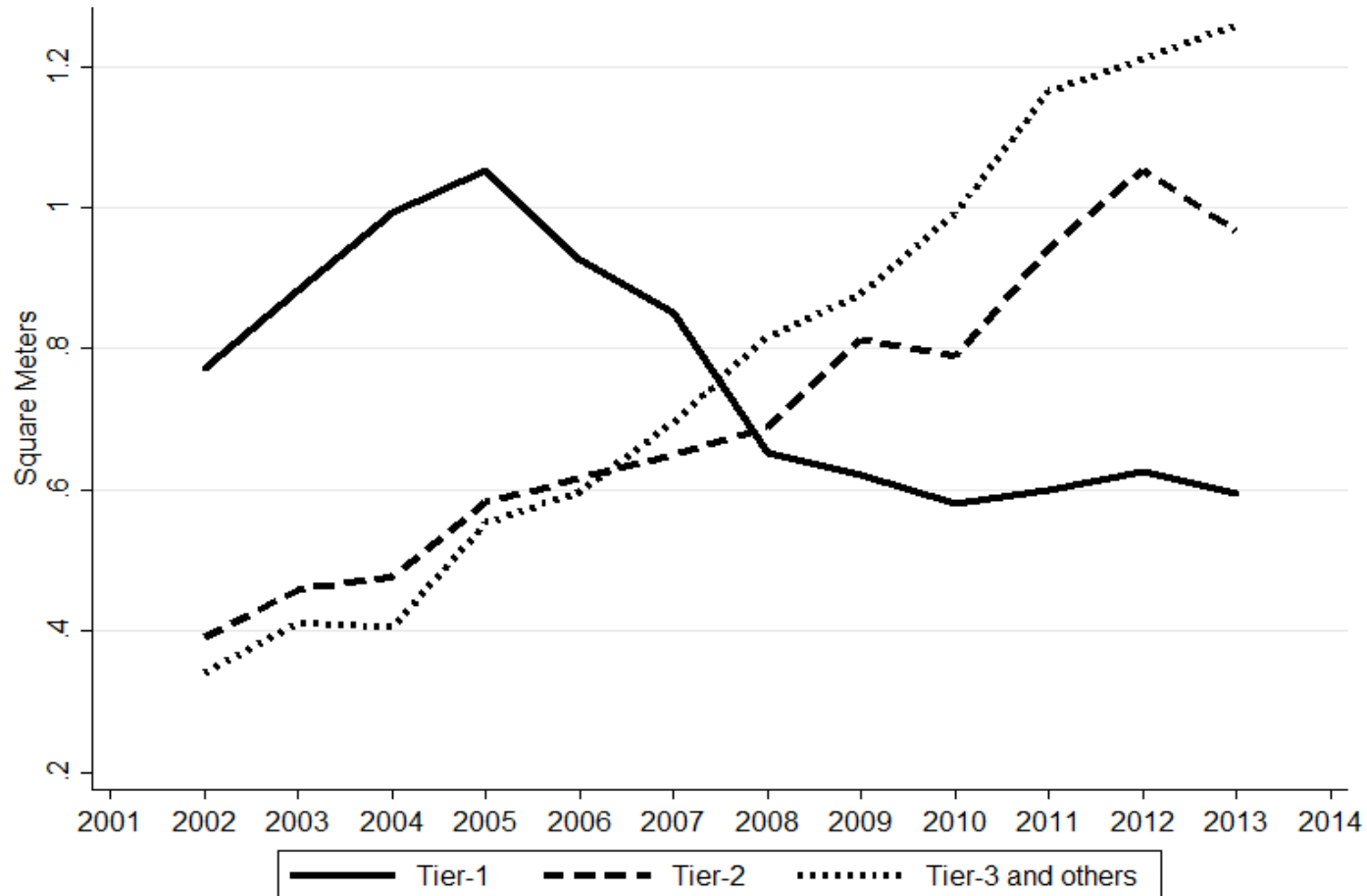
POPULATION GROWTH IN CITIES



INSTITUTIONAL BACKGROUND

- Housing market emerged only after late 1990s
 - Various reforms in 1990s
 - legalizing property rights to housing
 - abolishing housing allocation as in-kind benefit
 - PBC outlined procedures for residential mortgage loans at subsidized interest rates in 1998
 - By 2005, China has the largest residential mortgage market in Asia
 - In 2012, 8.1 trillion RMB in mortgage loans, accounting for 16% of all bank loans

SUPPLY OF NEW HOMES



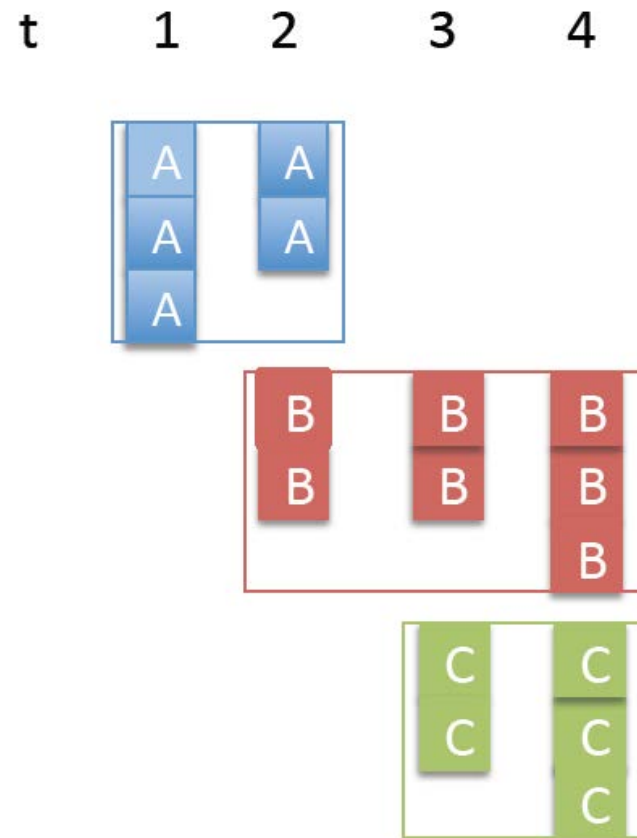
CONSTRUCTING HOUSING PRICE INDEX

Two standard approaches

- Hedonic price regressions, e.g., Kain and Quigley (1970)
 - Unobserved characteristics may lead to biased estimates
 - Rapid expansion of Chinese cities makes it especially hard to fully capture all characteristics
- Repeated sales approach, e.g., Baily, Muth and Nourse (1963) and Case and Shiller (1987)
 - Does not require measurement of quality; but repeated sales may not be representative of the general population of homes
 - Not so many repeated sales in the nascent Chinese housing markets

A HYBRID APPROACH

- A large number of new home sales in each city
 - Typically apartments in development projects
 - Within a development complex, the unobserved apartment characteristics are similar
 - It takes 1-2 years to sell all units in one complex



A HYBRID APPROACH

- A panel regression *for each city*:

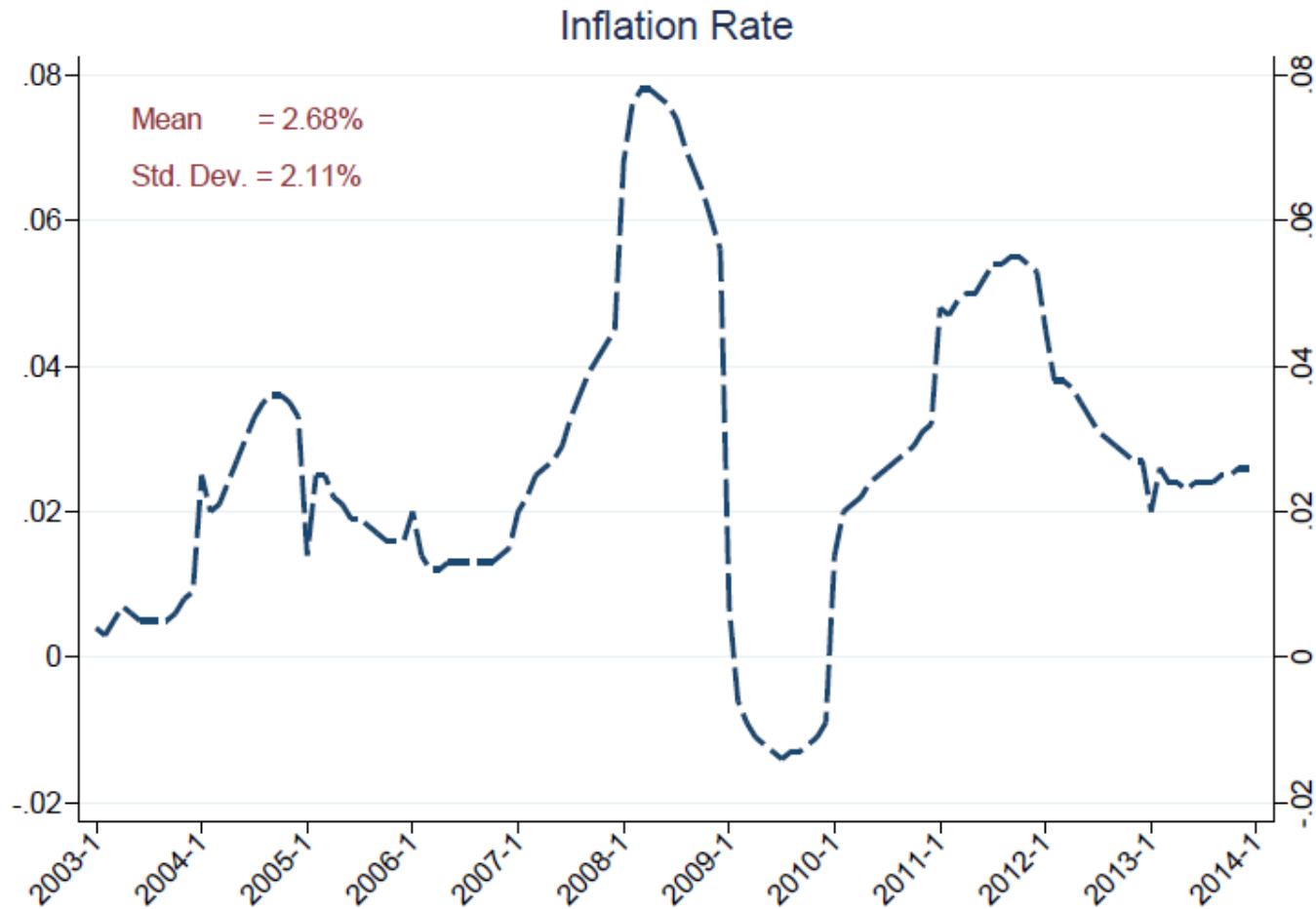
$$\ln P_{i,j,c,t} = \beta_{c,0} + \sum_{s=1}^T \beta_{c,s} \cdot 1\{s=t\} + \theta_c \mathbf{X}_i + DP_j + \varepsilon_{it},$$

$$PI_{c,t} = \begin{cases} 1 & \text{if } t = 0 \\ \exp(\beta_{c,t}) & \text{for } t = 1, 2, \dots \end{cases}$$

DATA

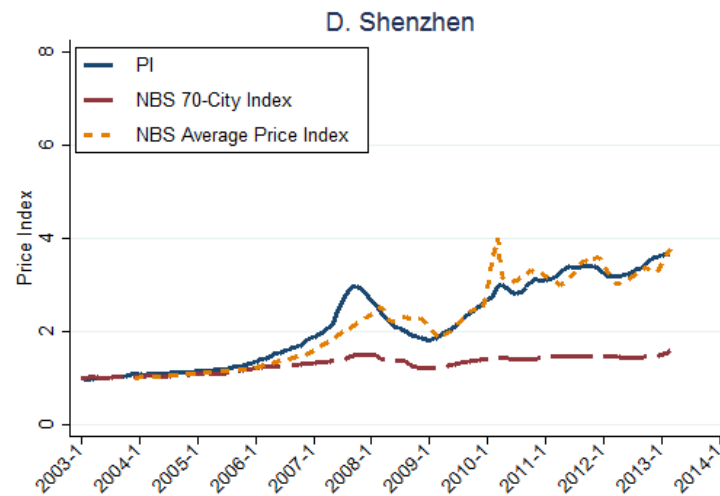
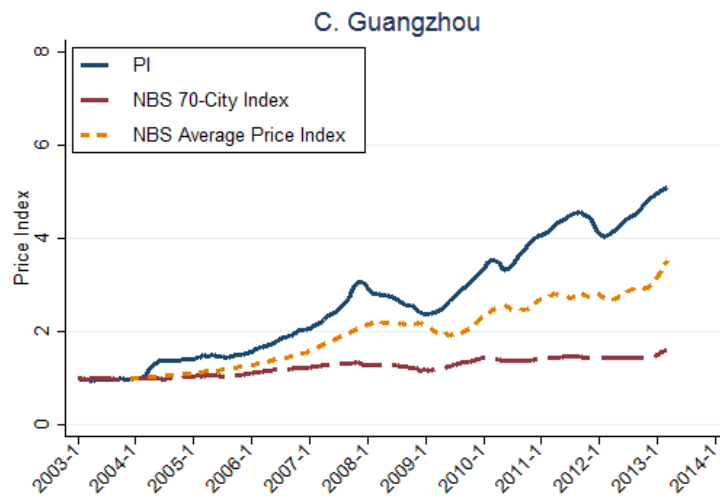
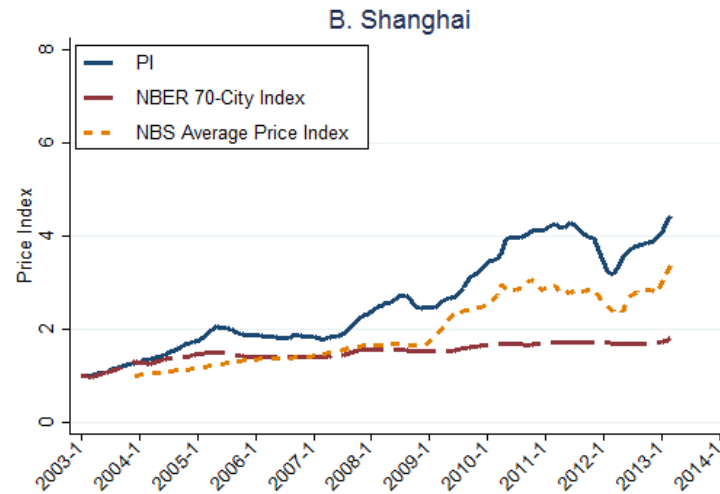
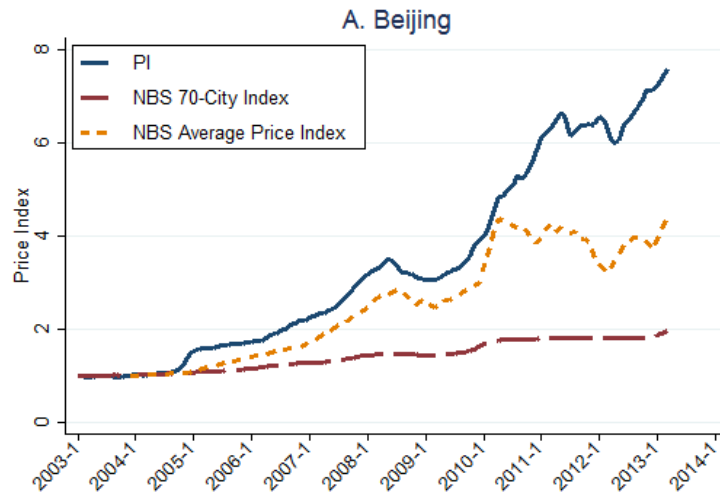
- A detailed mortgage data set for 120 major cities
 - a large commercial bank with 15% market share
 - one million mortgage loans, on new residential properties, from the first quarter of 2003 to the first quarter of 2013
- A typical mortgage contract contains information on
 - personal characteristics of home buyers (e.g., age, gender, marital status, income, work unit, education, occupation, and region and address of residence)
 - housing price and size, apartment-level characteristics (e.g., complex location, floor level, and room number)
 - loan-level characteristics (e.g., maturity, loan to value ratio, and down-payment)

INFLATION RATE



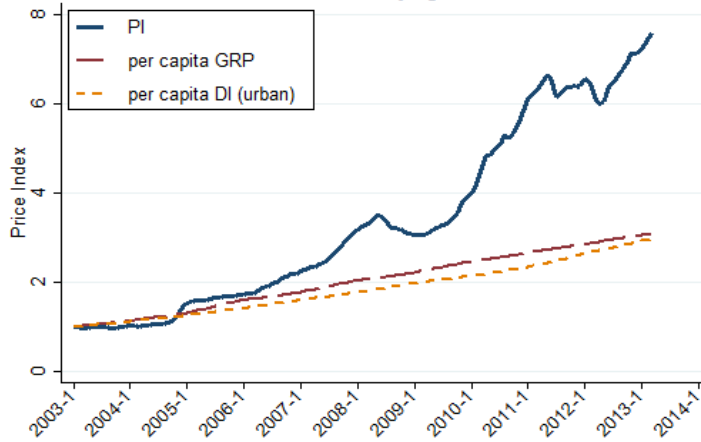
Source: National urban consumer price index, NBS.

PRICE INDICES FOR FIRST-TIER CITIES

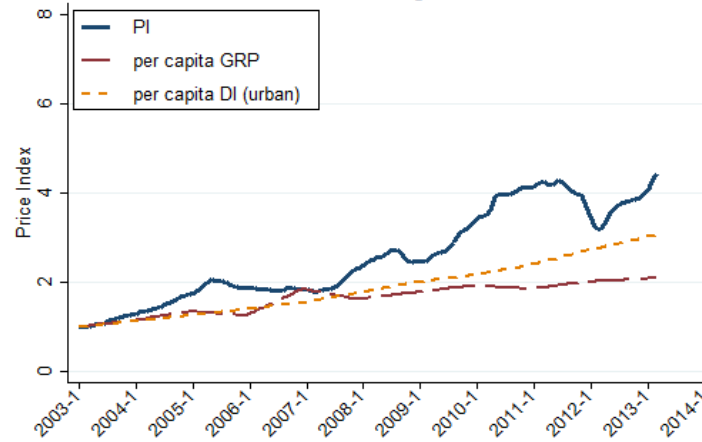


FIRST-TIER CITIES

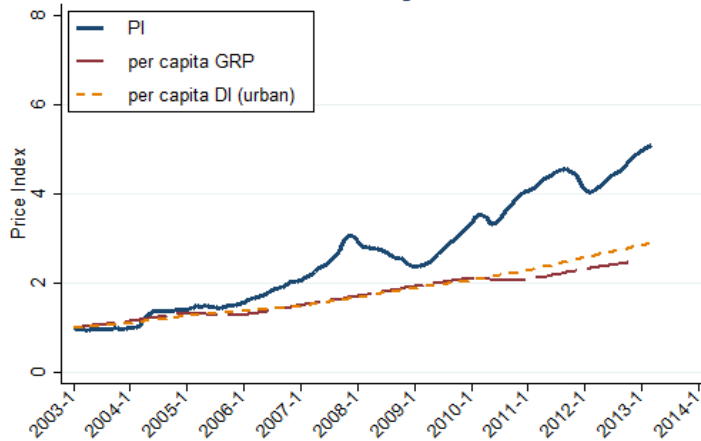
A. Beijing



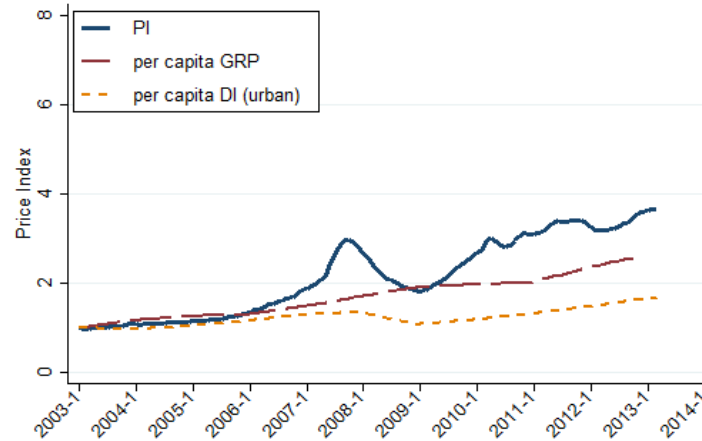
B. Shanghai



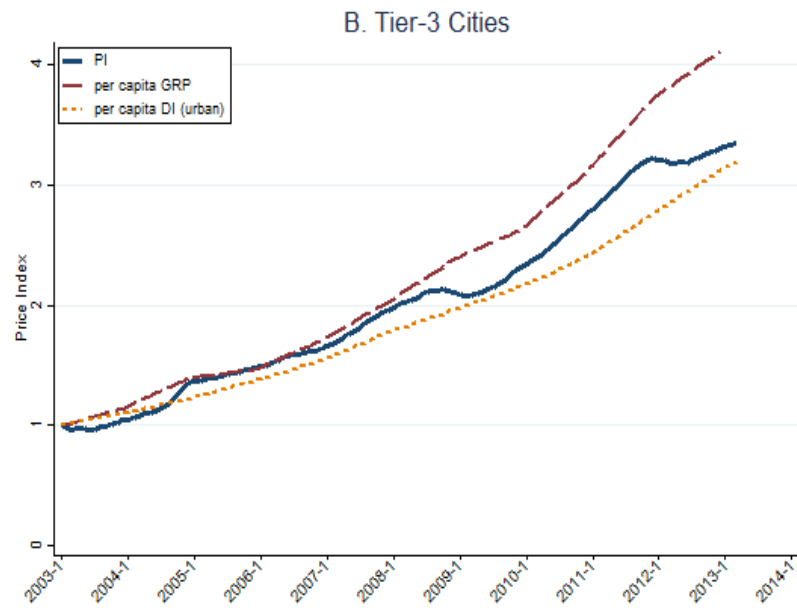
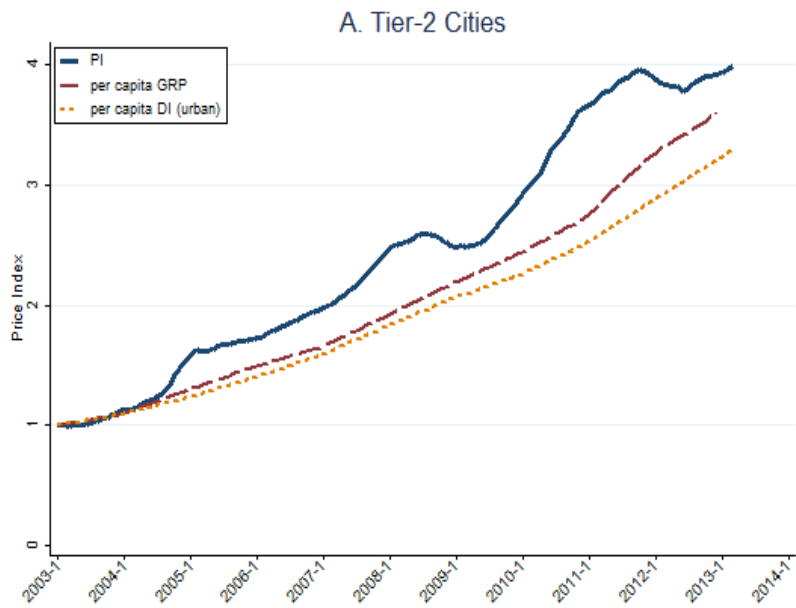
C. Guangzhou



D. Shenzhen



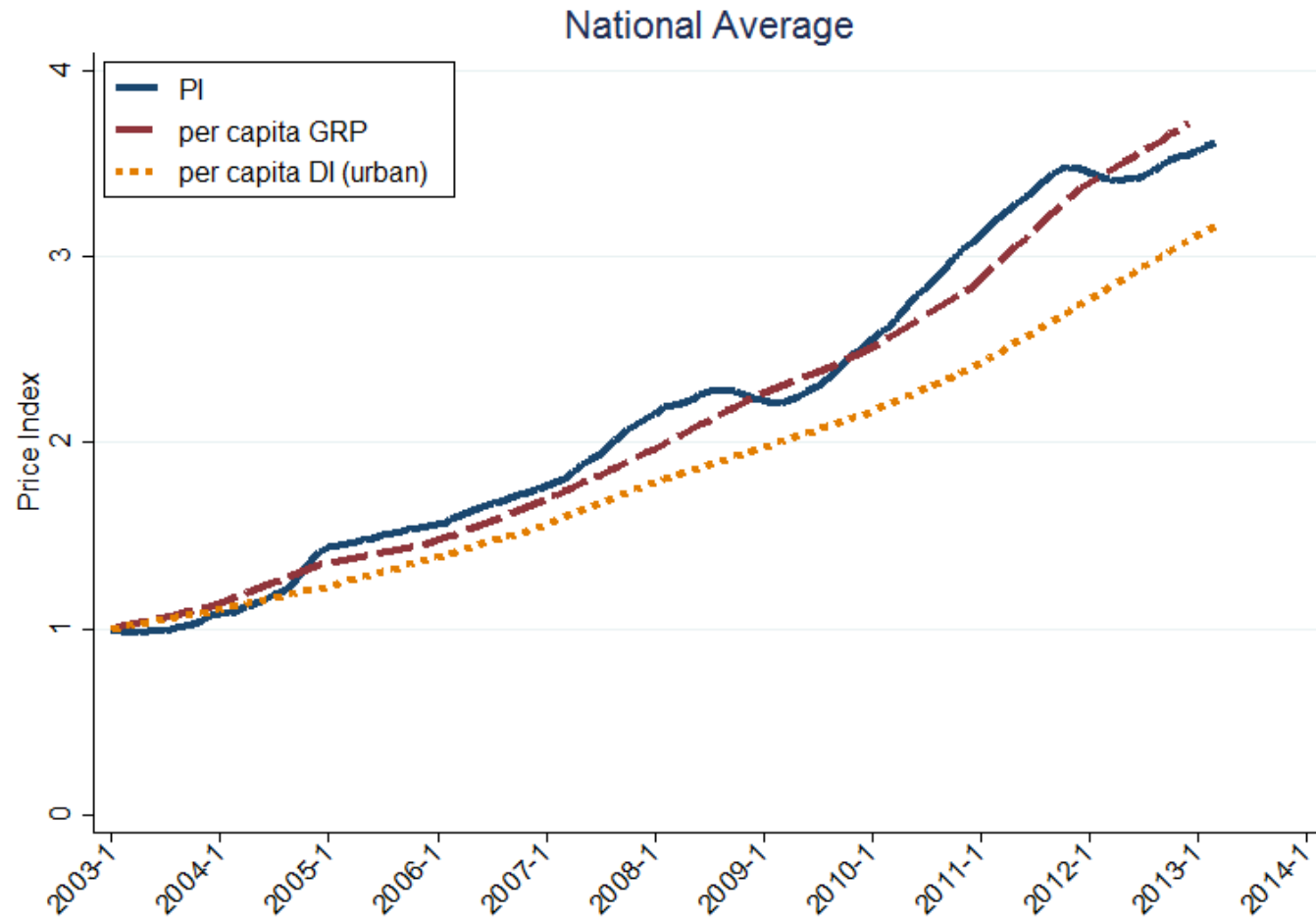
SECOND- AND THIRD-TIER CITIES



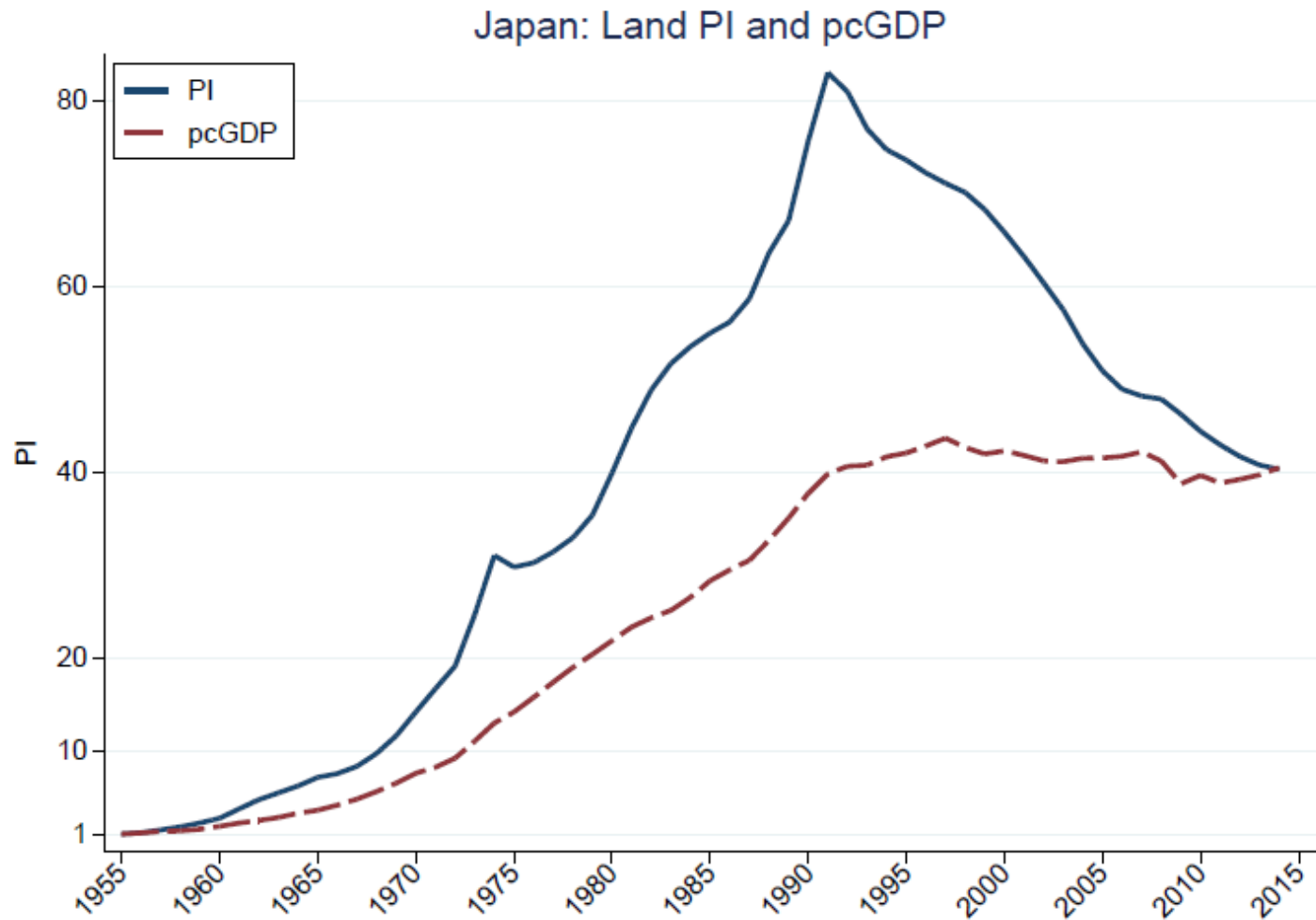
SUMMARY STATISTICS (NOMINAL)

		January 2003 - March 2013				
Nominal Growth		Obs	Mean	Std. Dev.	Min	Max
Tier-1 Cities						
Housing Price Index		4	0.159	0.031	0.128	0.2
Per capita GRP index		4	0.094	0.016	0.074	0.112
Per capita DI index (urban)		4	0.093	0.028	0.051	0.11
Tier-2 Cities						
Housing Price Index		31	0.132	0.022	0.082	0.189
Per capita GRP index		30	0.134	0.033	0.042	0.189
Per capita DI index (urban)		30	0.117	0.015	0.078	0.152
Tier-3 Cities						
Housing Price Index		85	0.106	0.036	0.007	0.178
Per capita GRP index		85	0.15	0.032	0.03	0.231
Per capita DI index (urban)		74	0.117	0.012	0.079	0.154

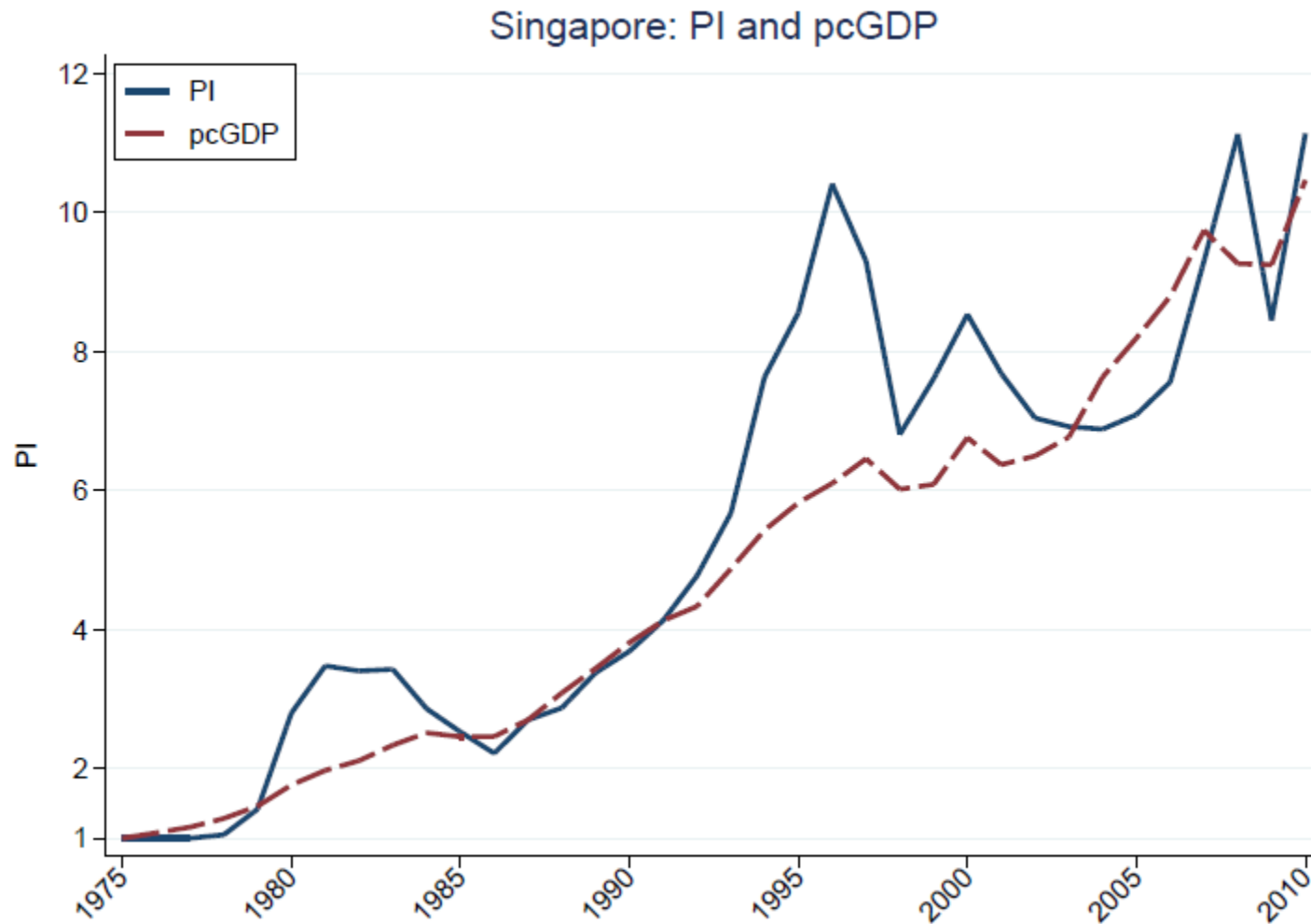
NATIONAL AVERAGE



LAND PRICE AND GDP GROWTH IN JAPAN



HOUSING PRICE AND GDP GROWTH IN SINGAPORE



SUPPLY AND DEMAND SIDES

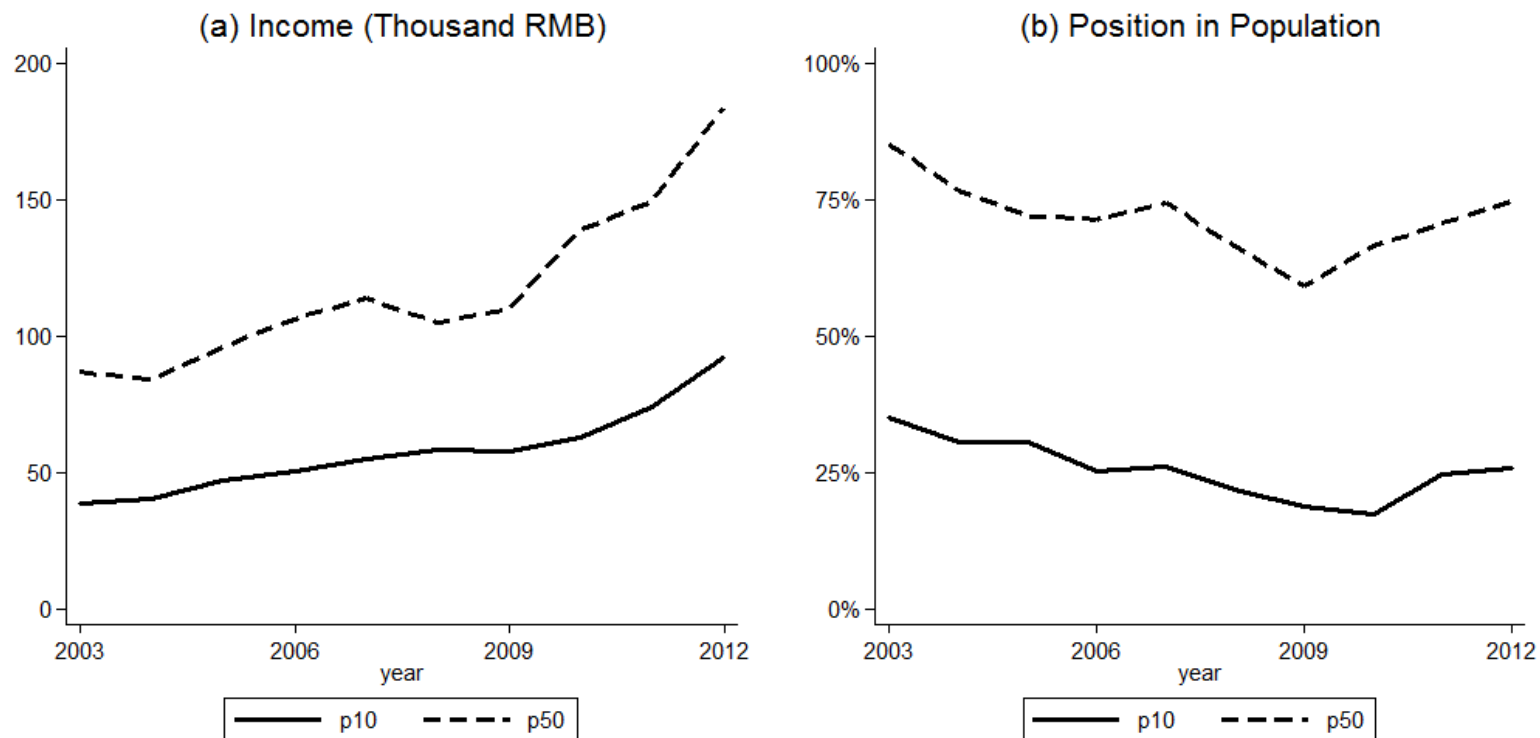
- Housing supply is ultimately determined by the local government
 - A monopolist of land supply, whose fiscal budget heavily relies on land sales
- Housing demand is determined by household income, expectations, and investment need
 - Has housing been out of reach of typical households?

MORTGAGE BORROWERS

- We focus on two groups of mortgage borrowers
 - Bottom-income group with household income in bottom 10% of borrowers in a city during a year
 - Middle-income group with household income in range [45%, 55%]
- p10 denotes the borrower with income at the 10 percentile and p50 denotes the borrower at the median

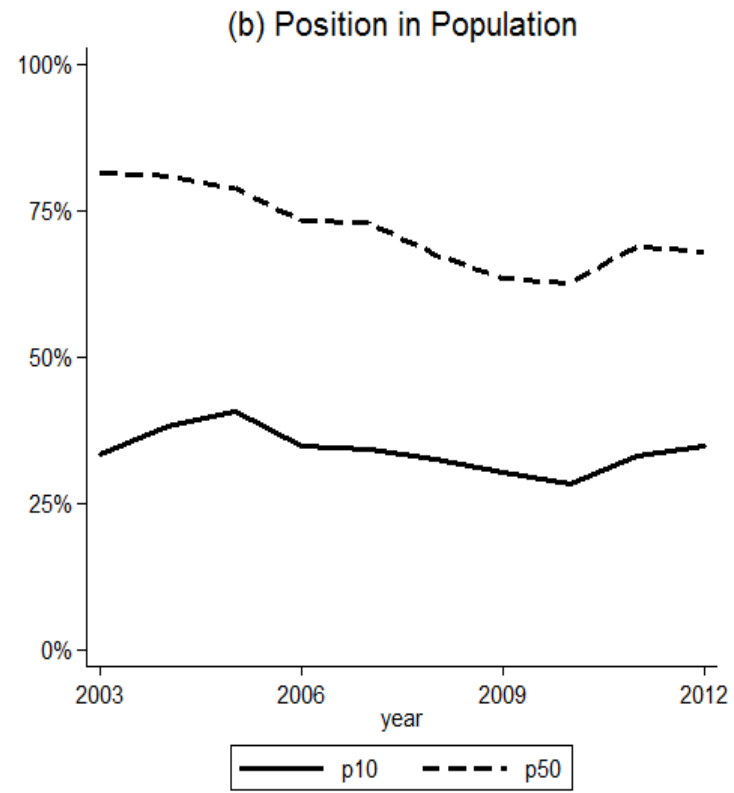
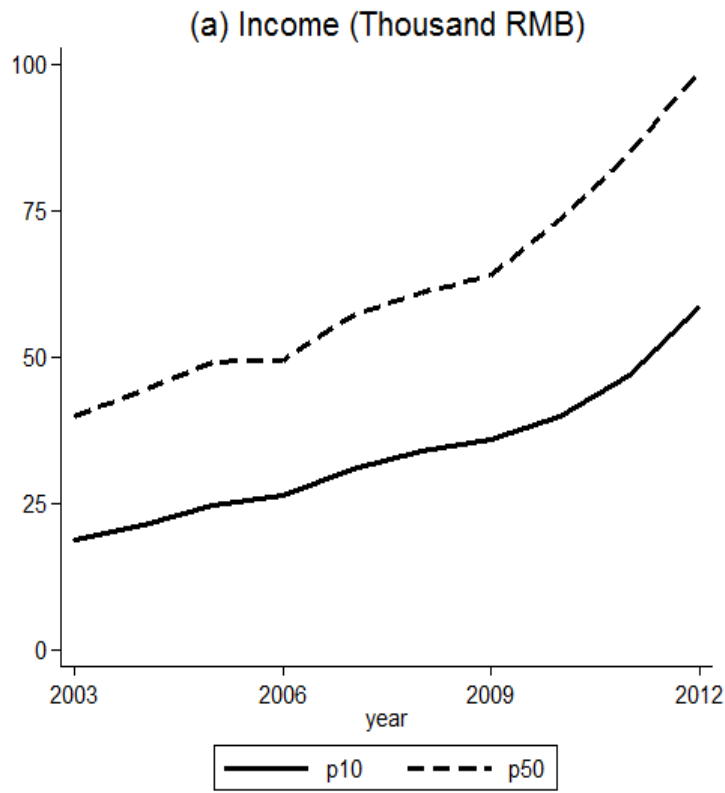
INCOME OF MORTGAGE BORROWERS FIRST-TIER CITIES

A. Income of Bottom and Median Mortgage Borrowers in Tier-1 Cities



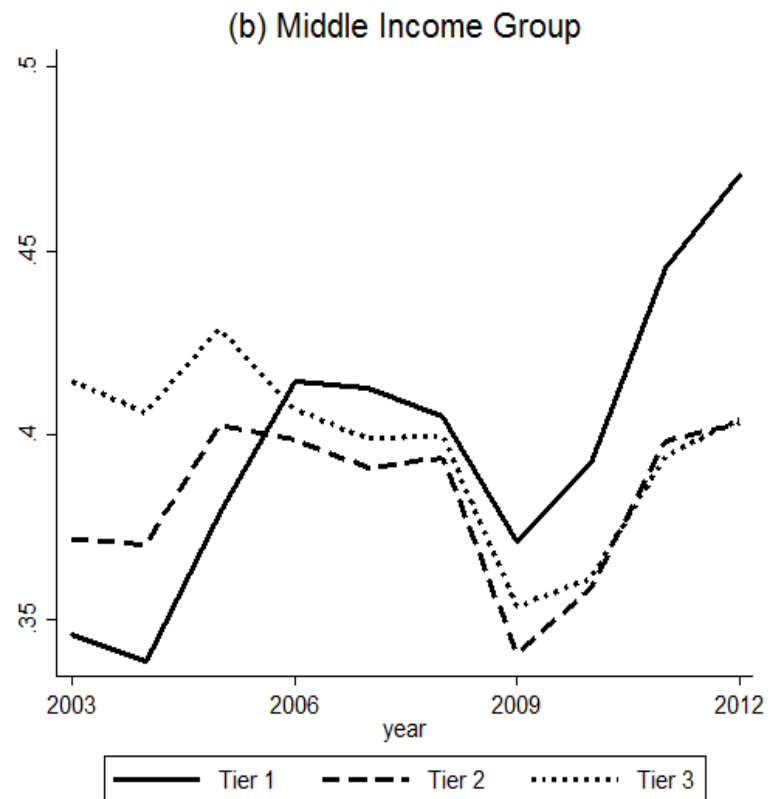
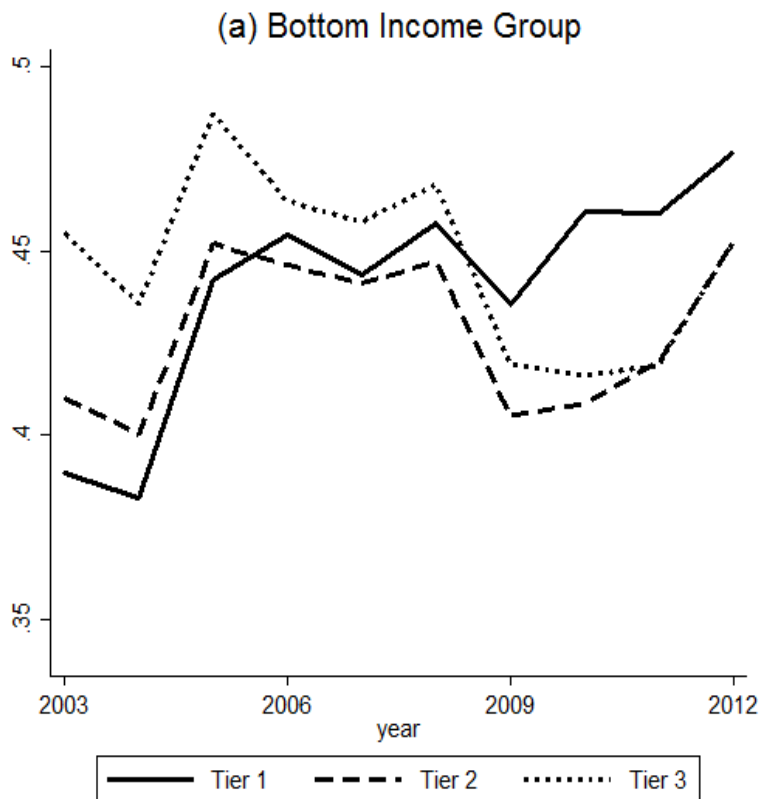
INCOME OF MORTGAGE BORROWERS SECOND-TIER CITIES

B. Income of Bottom and Median Mortgage Borrowers in Tier-2 Cities



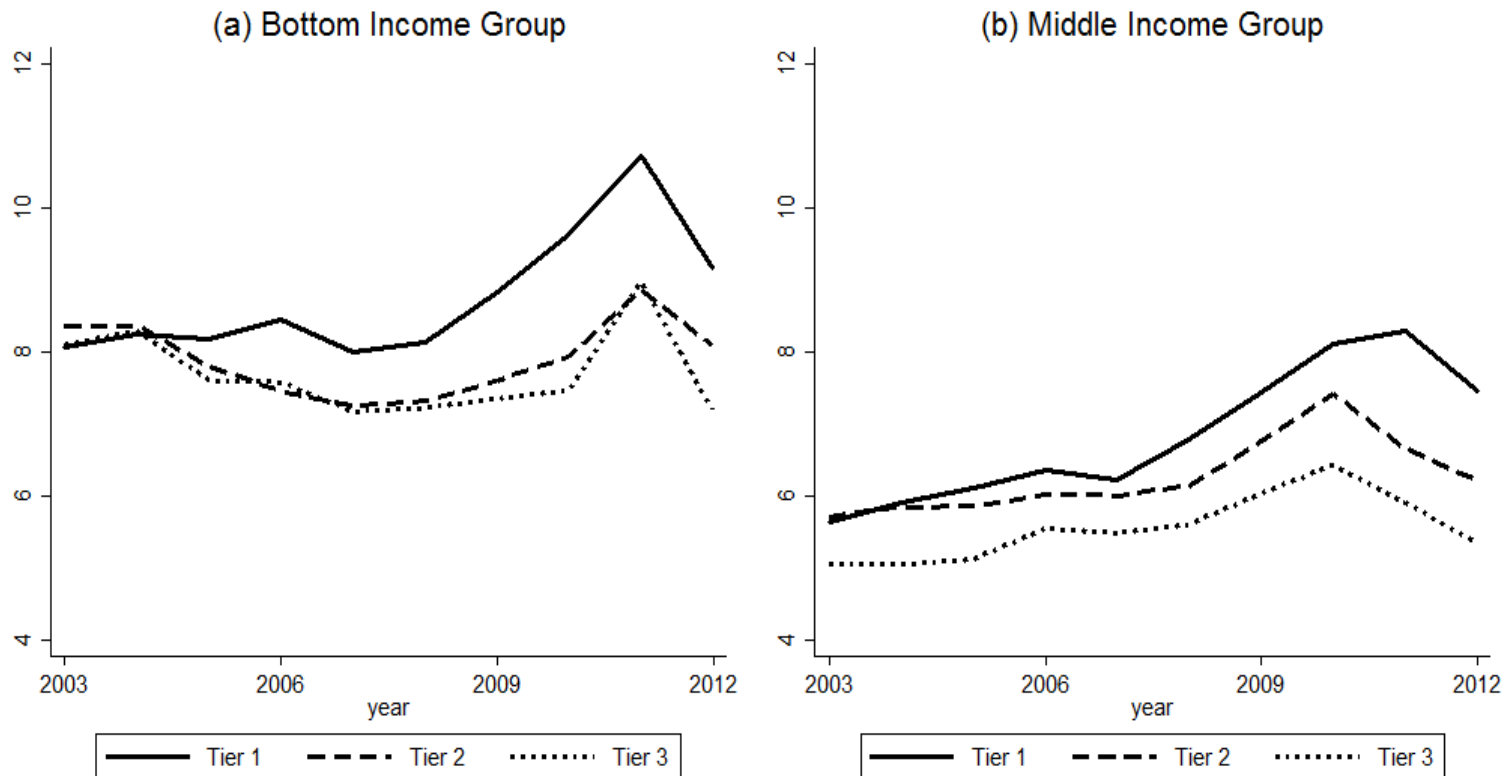
MORTGAGE DOWN PAYMENT

Ratio of Down Payment



PRICE-TO-INCOME RATIO OF MORTGAGE BORROWERS

A. Price-to-Income Ratio in Full Sample



FINANCIAL BURDEN

- Consider a price-to-income ratio of 8
 - 40% down payment implies a saving of 3.2 years of household income
 - Young people typically rely on parents or other family members to pay the down payment
 - A mortgage loan at 4.8 times of annual income
 - 6% mortgage rate implies ~29% of income to pay mortgage interest
 - With a maximum 30 year mortgage maturity, $4.8/30=16\%$ income to pay down mortgage (linear amortization)

FINANCIAL BURDEN AND EXPECTATION

- Why would (bottom-income) borrowers endure such financial burden?
- Suppose an income growth rate of 10%
 - Such expectation is irresistible based on observations of the past 30 years
 - Income will grow to 1.6 times in 5 years
 - A price-to-income ratio of 8 will be only 5 in 5 years
- Is the expectation of 10% income growth rate sustainable?
 - Pritchett and Summers (2014): regression to the mean may come soon
 - Then, the price-to-income multiple will crash with the households' expectation

UNDERSTANDING THE HIGH PRICE-TO-INCOME MULTIPLE

- Housing is commonly used as an investment vehicle
- Housing is widely regarded as too important to fall

HOUSING AS AN INVESTMENT VEHICLE

- High savings rate in China
 - 35% of GDP in 1980s, 41% in 1990s, and over 50% in 2000s
- Limited savings vehicles due to stringent capital controls
 - Bank deposit ~100 trillion RMB in 2013
 - Zero real deposit rate
 - Stocks ~ 20 trillion RMB in 2013
 - Government and corporate bonds
 - Housing

SHANGHAI STOCK MARKET INDEX

Figure I: Shanghai A-Share Index, 2003-2013

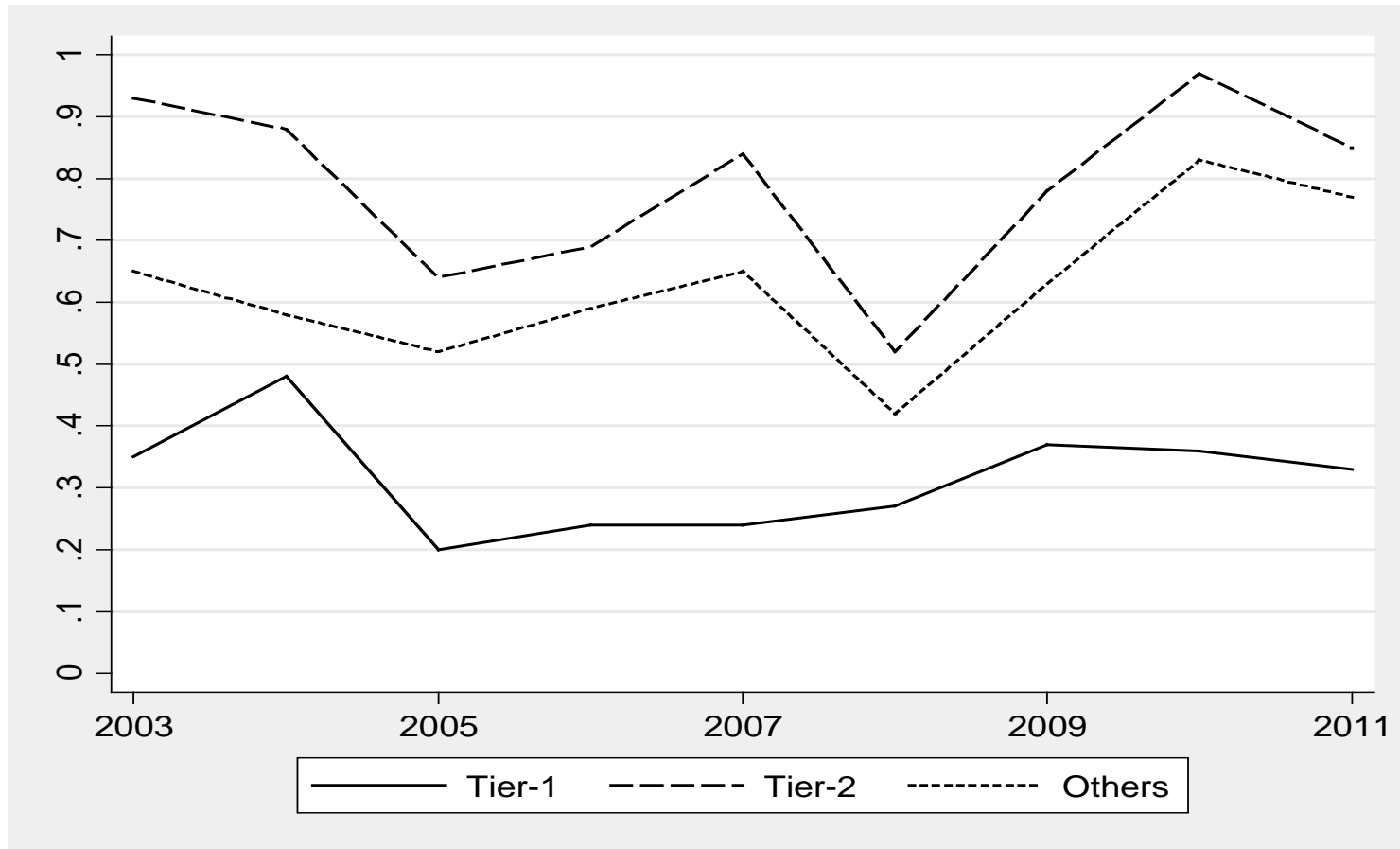


	Mean	Std. Dev.	Skewness
2003-2013	.073	.515	-.153
2003-2008	.0898	.662	-.337
2009-2013	.053	.339	1.182

THE ROLES OF GOVERNMENT

- Housing market is widely perceived to be too important to fail
 - Helps explain the robust expectations about housing prices
- The central government frequently intervened in housing market
 - Tightened down payment requirement and increased mortgage rates when the market was considered too hot, and reversed these measures when the market faltered
- Local government controls land supply
 - Land sales are a key source of fiscal revenue for local municipalities

SHARE OF LAND REVENUE IN CITY BUDGET



SUMMARY

- Enormous housing price appreciation across Chinese cities
 - Comparable household income growth, except in the first-tier cities
 - Steady participation by low-income households
- Household leverage is not a particular concern
- Housing market is unlikely a trigger for a financial crisis in China
 - It may crash with an economic downturn and amplify the downturn

CONCEPTUAL ISSUES

- Is it reasonable to have housing prices rising with household incomes?
 - Not the experience in the U.S. and many other European countries
 - Not unusual in Asian countries
- Important to understand strategic behavior of the supply side