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Real Estate Outlook

China

2012
Economic Analysis

- **This report is our annual update of recent developments, policies, and prospects in the residential property sector.**
- **We estimate that national housing price levels are, on average, now broadly in line with underlying fundamentals** due to price moderation since early 2011, although pockets of overvaluation remain.
- **While government cooling measures remain in place, market activity and prices have picked up** since mid-2012 on easing credit policies and a firming economic outlook.
- **Consequently, the near-term outlook has improved,** although a sharp rebound is unlikely given the authorities' resolve to contain the market and prevent price bubbles.

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Publication date: 21 December, 2012

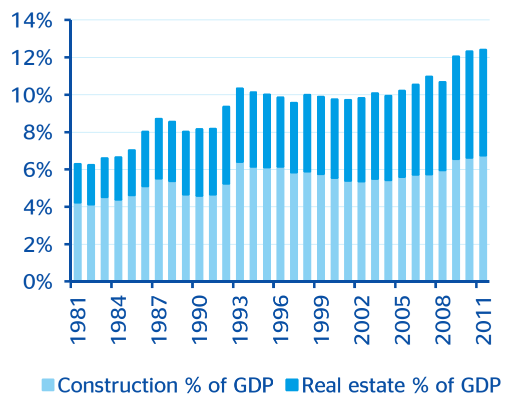
1. Introduction and Summary[1]

China's real estate sector remains the focus of intense interest given its large contribution to investment and growth (Chart 1), importance as an asset class for investors, and implications for social well-being. Since our last annual Real Estate Outlook published in 2011, market focus has shifted from worries of rapid price increases and risks of asset bubbles, to falling prices and weakening demand following measures by the central government in 2010-11 to cool down the market. For a time, the downturn exacerbated fears of a hard landing in the economy.

More recently, however, there are signs of a mutually reinforcing pickup in the real estate market and the economy. In particular, the decline in housing prices began to stabilize in mid-2012, and since then prices have been rising on a sequential basis, along with a pickup in sales transactions and investment. The upturn has occurred even as government cooling measures remain firmly in place.

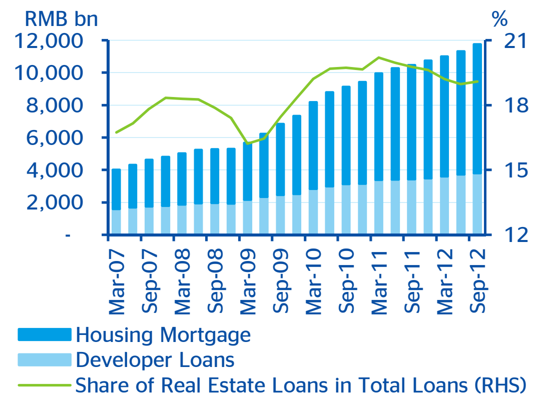
The turnaround is due to an increase in the availability of financing (Chart 2) and improved market sentiment. The latter has been influenced by subtle signals from China's new leadership that, while continuing to prevent speculative price increases through existing measures, it may no longer seek to introduce new cooling measures. Such signals could mean that the government may tolerate a pickup in the sector as long as price increases remain in line with underlying fundamentals. In the meantime, progress in the government's affordable housing program continues.

Chart 1
The real estate sector is an increasing share of China's economy



Source: NBS, CEIC and BBVA Research

Chart 2
Real estate loans and structure



Source: NBS, CEIC and BBVA Research

The remainder of the report is organized as follows. Section 2 updates recent policies in the housing market and assesses their implication for the near-term outlook. Using our econometric model of supply and demand in the housing market, Section 3 updates our estimates of the degree of price misalignments relative to underlying fundamentals. Section 4 extends the model over a medium-term horizon. Finally, Section 5 summarizes Latin America's experience with housing finance, and draws some conclusions for China.

For a second year in a row we find that the degree of housing price overvaluation has narrowed. While prices remain elevated in some of the larger cities, at a national level observed prices are now broadly in line with our estimates of equilibrium owing to the downward price adjustments of the past year as well as strong fundamentals that have continued to push up underlying equilibrium prices. This bodes well for a modest increase in prices in the near term. Over the longer term horizon, we maintain our view that China's strong economic fundamentals, including rapid projected income growth and urbanization should support higher housing prices.

1: The significant contributions of Zhigang Li, who was part of the BBVA Research team in Hong Kong during the preparation of much of this report, is gratefully acknowledged.

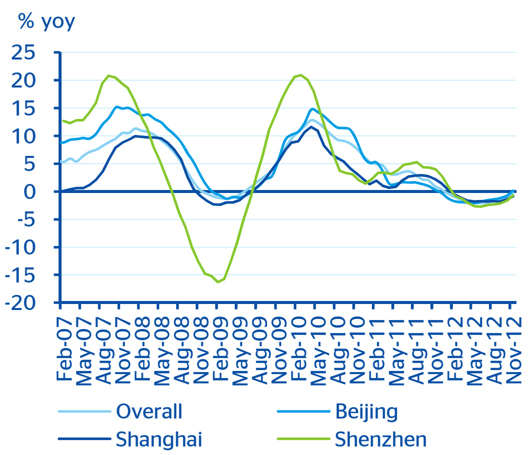
2. Recent Developments and Outlook for the Housing Market

China's housing market shows signs of rebounding after contracting for the year from mid-2011 due to the government's tightening measures. According to official and private sector data sources, there has been a pickup in both prices and sales volumes. The rebound is an important contributor to the current pickup in overall economic growth.

For the recent period, the pace of nation-wide housing price increases, measured in year-over-year terms, peaked in July 2011 at 3.6% y/y (Chart 3). Prices began falling in July 2011 in sequential terms, amounting to a cumulative decline of -1.8% (including both new and secondary housing) through May 2012 according to official NBS data covering 70 major cities.[2] Cities such as Wenzhou, which suffered from turmoil in the local private lending market last year, led the declines, followed by Hangzhou. Meanwhile, using a different source (NDRC), we see a similar trend, although the cumulative decline is somewhat larger. (See the appendix for a description of data sources.)

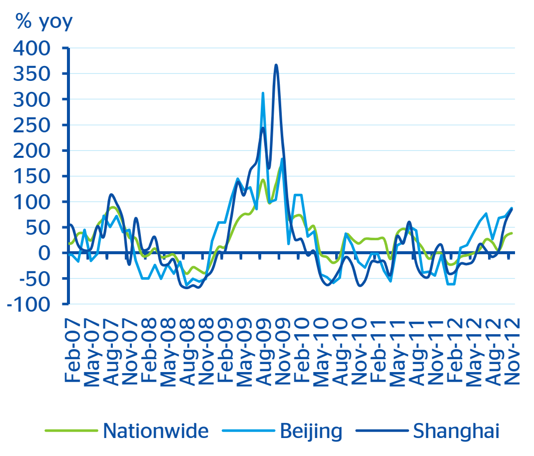
Subsequently, as credit conditions began to ease on the effects of government stimulus measures—with back-to-back interest rate cuts in June/July and a series of reductions in the RRR since November 2011—residential housing prices began to rebound in June 2012, and had risen by a cumulative 0.7% through November 2012, although they remain slightly negative in year-over-year terms (-0.2% y/y in November). At the same time, housing transactions have also rebounded (Chart 4).

Chart 3
Housing prices are beginning to turn up again



Source: NBS, CEIC and BBVA Research

Chart 4
Sales value growth has also started to pick up



Source: NBS, CEIC and BBVA Research

2.1 Measures to tame the market remain in place

The rebound in prices and sales transactions has occurred even as administrative restrictions remain in place (see Box 1). These measures reflect the government's determination to maintain housing affordability and prevent speculation, as reflected in repeated official statements, most notably in last year's Central Economic Work Conference (CEWC) held in December 2011 and during the National People's Congress (NPC) held in March 2012, when Premier Wen emphasized that "home prices are still far from returning to reasonable levels."

2: Beginning in January 2011, the NBS discontinued publishing an aggregate housing price index, and provided instead individual city-level data for new and existing home sales, respectively. We aggregated these data into a housing price index that maintains the continuity with the pre-2011 data series.

While tamping down speculative activities in the market, the authorities have also implemented fine tuning adjustments to protect first-time home purchasers. In this regard, in December 2011, the NDRC announced preferential policies for first-time purchasers, followed in March 2012 by the provision of preferential credit terms and interest rates for the first-time home buyers.

Working at odds with the tightening measures has been a progressive easing of the monetary stance over the past year, including cumulative cuts in the RRR of 150 bps between December 2011 and May 2012, and back-to-back interest cuts in June and July 2012, equivalent to 50bps in total. The easing of the monetary stance has resulted in declines in mortgage rates.

Meanwhile, in the midst of the economic slowdown during the first half of 2012, an increasing number of local governments began to adopt more "aggressive" fine-tuning measures to stimulate local housing sales, on which they rely heavily for fiscal revenues. Such efforts, however, were typically halted by the central government (see table 3 in the appendix).

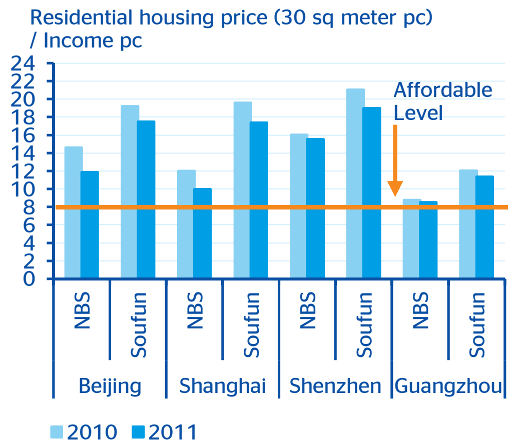
More generally, the authorities have been walking a fine line between seeking to prevent overheating of the property market on the one hand, while implementing supportive policies to spur economic growth. In this regard, they have refrained from further tightening measures (see below), preferring instead to maintain the existing ones in place. In the meantime, an expansion of the property tax pilot program is widely expected. At present, only Shanghai and Chongqing are included in the program, and the associated tax revenues are relatively limited given that the tax is levied only on new transactions and qualified high-end existing properties.

With incomes continuing to rise, these efforts, along with downward price developments, have led to some improvement in housing affordability ratios (Chart 5).

2.2 A bottoming out since mid-2012

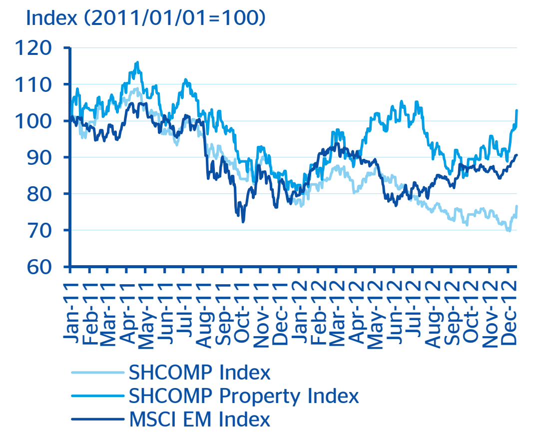
As noted above, the fall in housing prices appears to have bottomed out in June 2012, with a subsequent pickup due to monetary easing and a gradual improvement in market confidence (Chart 6). As such, the number of cities reporting price increases for new homes has risen sharply in recent months (Chart 7). The improvement in market confidence appears to have been boosted by expectations of an improving growth outlook, as well as signals by the new leadership—most recently in the December 2012 Central Economic Work Conference—that supportive economic policies will remain in place. Importantly, it appears that they may tolerate the trend of recent price increases by refraining from introducing new property tightening measures beyond those already in place.

Chart 5
Affordability ratios are still stretched, but show signs of improvement



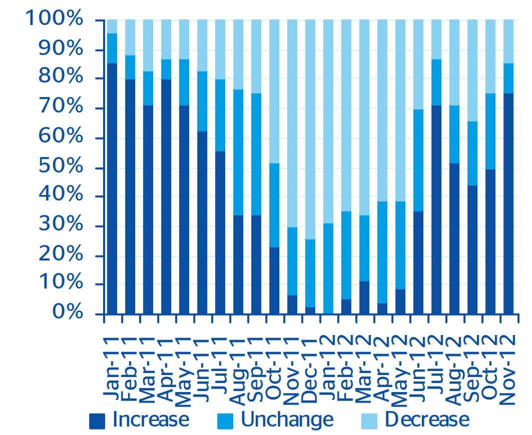
Source: NBS, Wind and BBVA Research

Chart 6
Property shares have driven the market up in late 2012



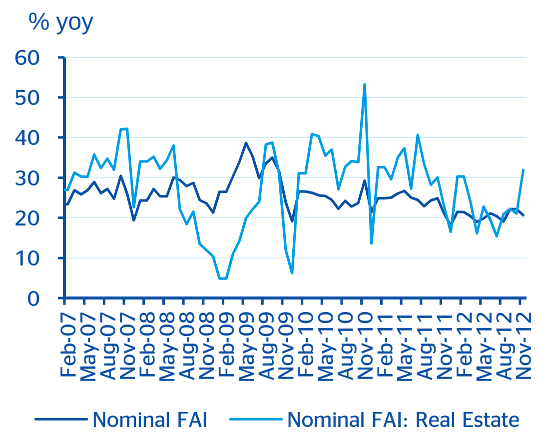
Source: Bloomberg and BBVA Research

Chart 7
New home price increases are spreading to more cities



Source: NBS and BBVA Research

Chart 8
Investment in the real estate sector is rising again

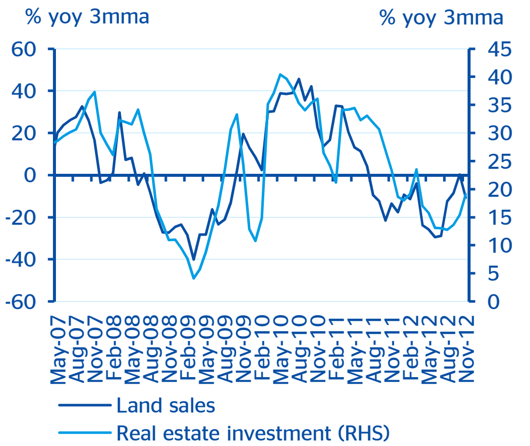


Source: NBS, CEIC and BBVA Research

Transactions volumes have picked up and housing inventories have declined…

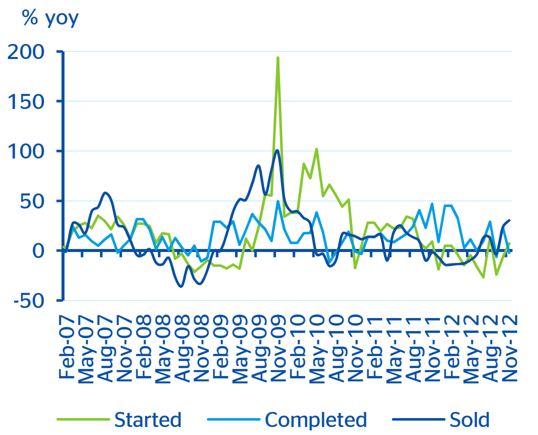
Real estate investment appears to be picking up after a slowdown through mid-2012 (Charts 8 and 9). The pickup is part of a broader acceleration in economic activity and investment, due in large part to government stimulus measures, including an easing of financing conditions. The PBoC's interest rate cuts of last June and July have led to a decline in mortgage rates, further boosting sales. However, with property cooling measures still in place, sales growth of floor space and new starts remain subdued, reflecting continued caution among developers in starting new construction (Chart 10).

Chart 9
Land sales (volume terms) and investment are picking up once again ...



Source: NBS, CEIC and BBVA Research

Chart 10
...although growth of floor space starts and completion remain subdued



Source: NBS, CEIC and BBVA Research

Box 1: Measures and policy stances on the property market

Table 1
Chronology of Real Estate Policy Measures and Stances, April 2010 – December 2012

Date	Policy Description
April 2010	Curbing unreasonable housing demand, more restrictive regulation of financing activities and land purchases by real estate developers
April 2010	Announcement of the possibility of introducing a property tax on a pilot basis in Shanghai, Beijing, Shenzhen and Chongqing. (The property tax is said to be 1.2 – 1.5% of 70% of the historical transaction value of each home.)
April 2010	The State Council decides to tighten mortgage rates and down payment requirements. Details include: 1) Second home buyers are required to pay 50% down payment instead of 40%. Mortgage rates are also raised to 1.1 times the benchmark mortgage rate of 5.94% vs previously 0.8-0.85 times the benchmark rate. 2) Banks are required to impose higher down payments for buyers of third or more homes, although it did not specific the percentage. 3) First-time home buyers of units larger than 90 sqm have to put down a 30% down payment, increased from 20%.
April 2010	Bank of China (BOC) becomes one of the first state banks to announce adjustments in existing customers' mortgage contract requirements upon expiry to current market standards. Existing mortgagees' will be required to follow terms of: 1) A minimum 30% down payment for first home buyers purchasing units less than 90 sqm, and 0.85 times the benchmark rate of 5.94%; 2) A minimum 50% down payment for second home buyers and 1.1 times the benchmark rate of 5.94%; 3) 1.2 times the benchmark rate (5.94%) for third or more homes. For third or above home buyers, BOC reserves the right to require a larger than 50% down payment or not approve the mortgage applications, if the applicants show a high-risk credit profile.
June 2010	MHURD, PBOC & BOC jointly issue a statement to enforce 2nd home buyer/mortgage definition. With immediate effect, the following will be counted as 2nd home purchases and extended with 2nd or above mortgage terms: 1) Buyers that own at least 1 property; 2) Ownership to be defined according to family as a unit, instead of number of persons; 3) Buyers even with paid-off mortgage liabilities will still be counted as second home purchasers; 4) Non- local buyers without at least one year of local tax records or social securities records will be considered as a second home buyer according to different banks.
October 2010	Mortgage loans for 3rd or more homes are banned nationwide; the minimum down payment ratio is raised to 50% and mortgage rates are set at 1.1 times the PBOC's benchmark lending rate; the minimum down payment ratio for first home purchase is set at 30%; loans to developers with a record of regulation violations are suspended.
October 2010	Adjustment of the deed tax rates and preferential personal income tax rates: 1) For purchases of single and ordinary homes, the deed tax rate is halved, and for the purchases of such homes smaller than 90 sq.m., the rate is reduced to 1.0%. 2) For those who sell their self-use homes and then purchase a new home within one year, the personal income tax is no longer exempted.
October 2010	The CBRC reduces the discount that banks are allowed to apply on mortgages for first-home purchases. The new discount is set at 15%, from 30% previously. (The 30% mortgage rate discount for first home purchases was launched in 2008 as part of China's stimulus package.)
November 2010	Restrictions announced on provident fund loans, with the interest rate for second houses raised by 10%. Second home purchases by provident fund loans apply only to ordinary housing to improve living conditions; first installment shall be no less than 50%, and interest rates cannot be lower than 1.1 times of the rate set for the first housing provident fund loan.
November 2010	Ministry of Housing and Urban-Rural Development and SAFE jointly announce restrictions on home purchases by non-residents. According to the measure, a foreigner can at most buy one house for personal residence under the condition that he or she can provide the proof of working in China for more than a year. For residents of Hong Kong, Macao and overseas Chinese, the measure still applies with minor relaxations.
January 2011	The State Council unveils 8 new measures to toughen curbs on the property market: 1) Require local governments to set housing price targets in line with local income levels for 2011; 2) Accelerate the construction of social security residential properties; 3) Business tax for housing sales within 5 years of purchase must be levied on total sales value; 4) The down payment ratio for second-home purchases must not be less than 60%, up from 50%, with interest rate at least 1.1 times of the benchmark rate; 5) Strengthen the management of land supply for housing; 6) Purchase restrictions imposed in all large- & medium-sized cities. Families already owning a property are restricted to buy only one more, while those already owning 2 or more properties are prohibited to purchase additional properties; 7) Strict implementation & accountability for local governments over the housing price control targets; 8) Improvements in guidance for media's housing market coverage.
January 2011	Shanghai and Chongqing announce the long-expected property tax on trial basis, to be imposed on new purchases.
January 2011	The State Council requires local governments to publish and meet their annual housing price targets (set in line with the income growth of their regions).
March 2011	The National People's Congress (NPC) passed the 12th five-year plan of 2011-2015, in which the central government targets to build up 36 million units of public housing in next five years (10 million units in 2011).
May 2011	NDRC begins to impose a "one house one price" policy, under which developers are required to enhance public information disclosure about the offering price and available supply volume when selling residential properties.
June 2011	NDRC permits the local government financing vehicles (LGFVs) to issue bonds to finance the public housing program.

Continued on next page

Table 1

Chronology of Real Estate Policy Measures and Stances, April 2010 - December 2012 (Cont.)

Date	Policy Description
July 2011	The State Council unveils 5 new measures: 1) Local governments should strictly implement the tightening policy on the property market. 2) Local governments should make efforts to meet the target and start 10 million units of social housing by the end of November. 3) Further curb speculative investment and expand home purchases restrictions to second and third tier cities where housing prices have observed excessive increases. 4) Implement the residential land supply as planed this year. 5) Prevent excessive increases in housing rents.
August 2011	The Ministry of Housing and Urban-Rural Development outlined five standards on decisions for implementing home purchases limits.
October 2011	The central government suspends Foshan city's plans to ease property purchases limits.
December 2011	During the Central Economic Work Conference, the government introduces a commitment of "bring housing prices back to reasonable levels" for the first time in official announcements
January 2012	Premier Wen reiterated the government will continue the curbs on property market speculations and bring housing prices back to a reasonable level in the State Council meeting.
February 2012	The central government called off policy fine-tuning in two cities (Contract tax subsidy in Wuhu and housing purchase restrictions easing in Shanghai).
March 2012	Premier Wen mentioned that "Home prices are still far from returning to reasonable levels" and insisted the strict regulations of real estate sector will continue during the 11th National People's Congress.
April 2012	Premier Wen said the government will further consolidate the effect of property market curbs and keep the restrictions in the State Council meeting.
May 2012	During the six provinces economic situation informal discussion held in Hubei, Premier Wen said to stabilize the property tightening measures and strictly implement the differentiated policies on mortgage, tax and purchase restrictions. "Put stabilizing economic growth in a more important position."
June 2012	Different central government agencies (MOHURD, NDRC, PBoC and CBRC etc) separately clarified rumors about easing curbs on the property market and reaffirmed the tightening measures will continue.
July 2012	During Premier Wen's field investigation in Jiangsu province, he vowed to curb real estate speculations and considers it as a long term task.
July 2012	The State Council sent eight inspection teams to investigate the implementations of ongoing property tightening measures with differential credit polices by local governments in 16 cities and provinces since July.
July 2012	In the Central Political Bureau meeting, the government has reaffirmed to prioritize stable economic growth and the ongoing measures to curb speculative demands will continue.
August 2012	During Premier Wen's field investigation for social housing projects in Tianjin, he reiterated the government should continue to resolutely curb real estate speculations which are still in the "critical period".
November 2012	The Housing and Urban-Rural Development Minister Jiang Weixin said that the government will continue the curbs on the property sector in the near future, during the 18th National Party Congress.
December 2012	In the Central Political Bureau meeting, the central government delivered messages that the property tightening policy will not be relaxed.
December 2012	During the Central Economic Working Conference, the authorities pledged to maintain the continuity and stability of current housing policies, but notably drops a reference from the previous year to, "bring housing prices back to reasonable levels".

Source: Media reports, press releases, and Government websites

Box 2: The role of the real estate sector in China's economy

Real estate has been a key driver of growth in China, ever since the market reforms of the sector in the late 1990s. By one measure—namely, home ownership rates, which reached up to 90% in 2011[3]—policies in the real estate sector have been a great success. However, growth of the market has been accompanied by rapid price increases that have resulted in declining affordability. The government's policy response has been to use macro prudential tools to cool speculation in the market, and to expand affordable housing through large scale projects, and outlined in the 12th Five Year Plan.

Real Estate Sector in GDP

The real estate sector (including associated construction), accounted for 12.4% of total output in 2011, roughly double the level of the early 1980s (see Chart 1, above). Moreover, since 2009 the share of real estate and construction output as a share of GDP has jumped by two percentage points, from an average of 10% during 2001-2008, to 12% 2009-2011, following the government's RMB 4 trillion stimulus package. Meanwhile, investment in real estate as a share of total fixed asset investment edged up to 24.2% during 2009-12, from 23.6% during 2001-08. It is noteworthy, however, that in the year through August 2012, investment in residential building slowed to 11% y/y from 37% y/y in the same period a year ago, contributing 4 percentage points less to growth of total fixed asset investment which, in turn, declined to 21% from last year's 28% in the respective periods.

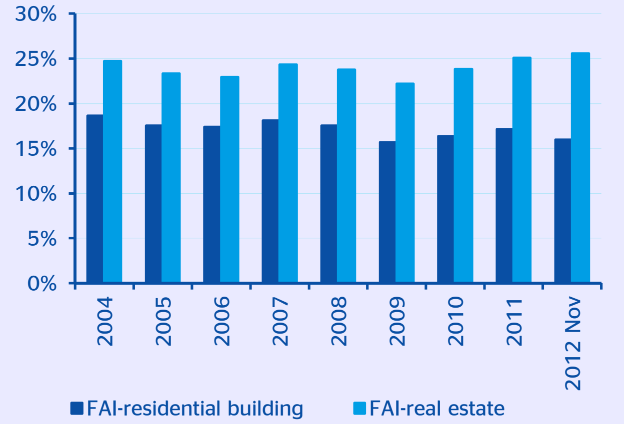
Employment in the Real Estate Sector

In 2011, the real estate construction sector employed around 12 percent of the 144.7 million total urban employees, with another two percent employed by the real estate management sector. These figures compare with a total of 9% in 2005. According to the city labor supply and demand survey compiled by the Ministry of Labor and Social Security, the construction and real estate sectors accounted for about 7% of new job creation in the past few years. As a consequence of the government's housing policy, urban employment in these two sectors declined by 560,000 from the end of 2011 to the second quarter of 2012.

Bank Credit to the Real Estate Sector

As of Q2 2012, total real estate loans (mortgages plus credit to developers) amounted to RMB 11.3 trillion, or 18% of total bank credit (63.3 trillion RMB), up from 13% in 2005. Of these real estate loans, about one-third was to real estate developers and the remainder for mortgages. Since the second half year of 2010, a deceleration of real estate loans has dragged down total bank loans (Chart 13). However, real estate loans began to stabilize in the third quarter as the transaction volumes and investment recover.

Chart 11
Real estate investment as % of total fixed asset investment

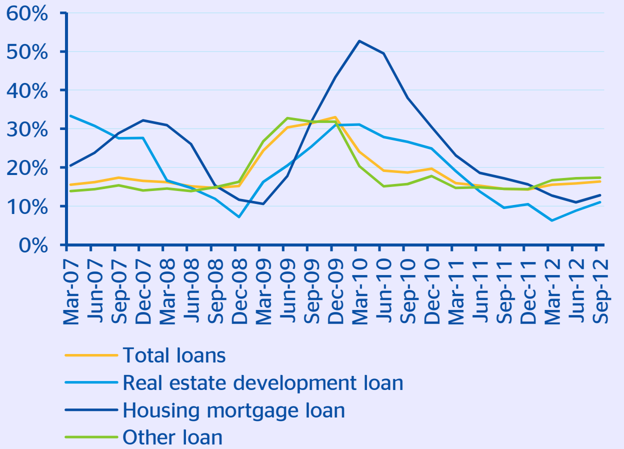


Source: NBS, CEIC and BBVA Research

Chart 12
Employment as a percent of total urban employment

Source: NBS, CEIC and BBVA Research

Chart 13
Real estate loans have dragged down total loan growth



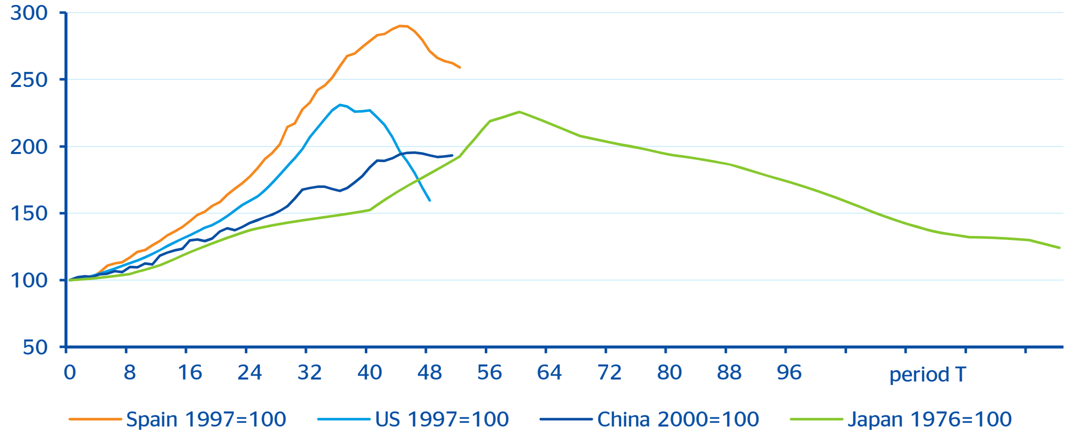
Source: NBS, CEIC and BBVA Research

[3] China Household Finance Survey (2012), conducted by China Southwestern University of Finance and Economics,

Housing price increases are looking less like a bubble

Chart 14 provides an update of our analysis of recent price developments in comparison to international experience with housing prices bubbles. As noted above, overall housing prices have moderated after peaking in July 2011. Thus, the pattern of price increases in China looks increasingly less like a bubble in comparison to the run-up in prices previously observed in Spain, the US and Japan. In particular, while the pace of price increases appeared similar to these bubble cases in the past, particularly to that of Japan, the more recent levelling off of prices makes the situation in China appear less similar. This provides evidence that the government's efforts to cool the market have worked to prevent the housing market from becoming a bubble.

Chart 14
International comparison of price bubbles

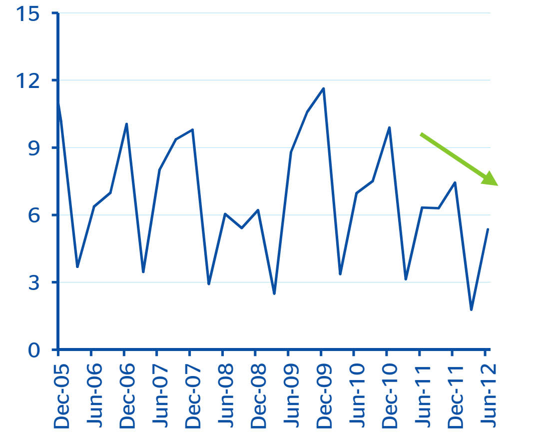


Source: NBS, CEIC and BBVA Research

After increasing in early 2012, financial tensions are now easing

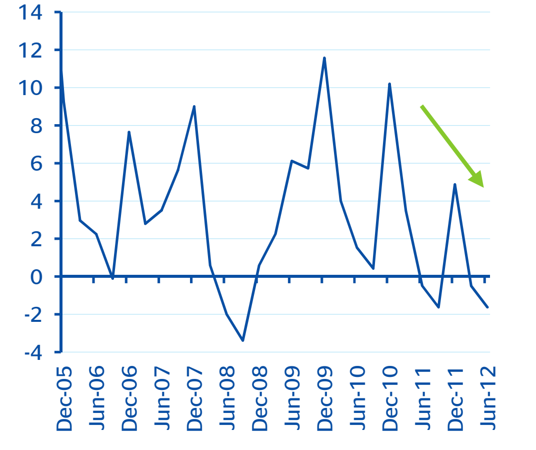
Given the deceleration of sales transactions during the first half of 2012, revenues of developers (a proxy for operating cash flow) have declined relative to the outstanding value of loans over the past year (Chart 15), suggesting a higher level of financial stress. Similarly, the interest coverage ratio (proxied by sales net of investment, divided by interest expenses) has also been on a declining trend (Chart 16). However, these trends are likely to reverse with the recent pickup in sales, which should help ease liquidity conditions and reduce any overhang of inventories. Moreover, the cuts in interest rates by the PBoC in June and July of this year should also help to reduce financing costs of highly leveraged developers. Moreover, anecdotal evidence suggests that some developers are accessing funds through the non-bank ("shadow banking") market.

Chart 15
Operating cash-flow ratio of real estate developers



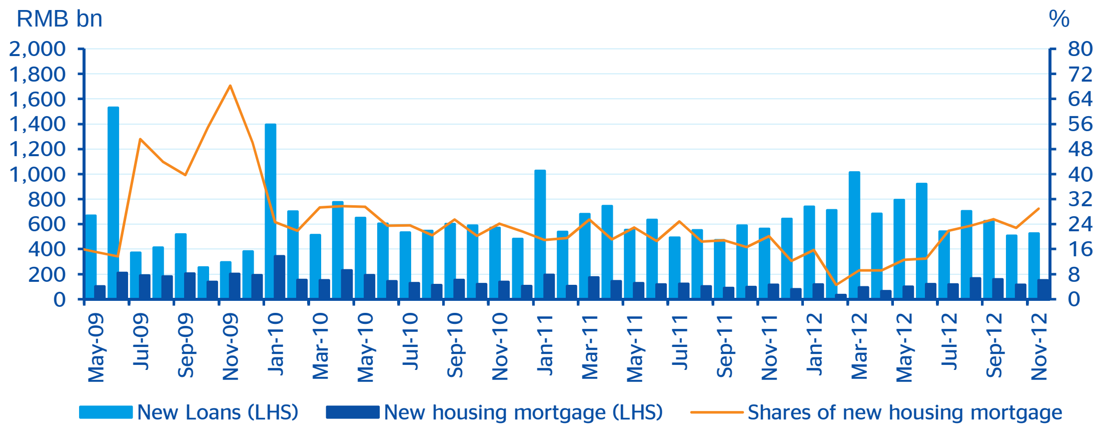
Source: NBS, CEIC and BBVA Research
Note: ratio is expressed as sales divided by outstanding loans. The former is based on NBS data, and the latter on PBoC data.

Chart 16
Interest coverage ratio of real estate developers



Source: NBS, CEIC and BBVA Research
Note: ratio is expressed as sales net of investment divided by interest due, which is computed by applying an assumed interest rate of 8% to the outstanding stock of credit to the real estate sector.

Chart 17
Mortgage loans have risen as a share of new credits



Source: PBoC, CEIC and BBVA Research

Box 3: Progress in social housing projects

One of the more ambitious targets in the latest 5-year Development Plan is the construction of 36 million units of public housing. The aim is to help ensure housing affordability. The program is also a key element of the government's fiscal stimulus measures to support growth.

Recent progress in meeting the targets has been encouraging, following concerns over the past year that the projects were behind schedule. Based on government reports (MOHURD)[3], both the full-year new housing starts and completion targets had been reached by the end of October[4] (Chart 18).

The government also set a target of 6 million units housing starts for 2013, lower than 2012, which should help reduce the fiscal burden on local governments. The less aggressive target reflects a shift in focus in progress of construction instead of merely kicking off projects.

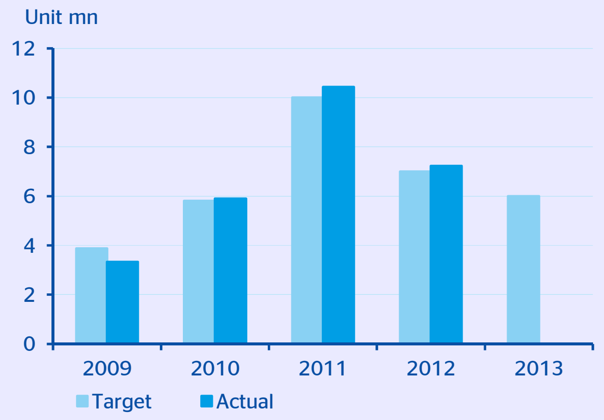
In 2011, actual spending by the central government on social housing was over RMB 172 billion, 33% higher than originally planned. For 2012, the central government further increased the budget by 23% (RMB 212 billion) and, based on historical experience, the realization will exceed that amount.

In addition to central government funding, other potential sources of financing for social housing include:

- Land sales: 10% of such sales by local governments are directed by the MOF and MOHURD for social housing projects.
- Local government bonds: the MOF increased the limit on local government bond issuance by 25% in 2012 (to RMB 250) with proceeds of the increase targeted for social housing projects; special private placement notes (PPNs) by municipal governments, issued by Beijing (2011) and more recently by the western province of Qinghai.
- Bank loans: the authorities are encouraging banks and other financial institutions to increase lending for social housing projects. Total outstanding loans for such projects were up by more than 60% yoy in the first three quarters of 2012, much faster than the overall growth of real estate development loans (11% yoy).
- Other potential funding sources include corporate bonds, housing provident fund (HPF) loans, and the channeling of social security and insurance funds.

According to the Ministry of Housing and Urban-Rural Development, over RMB 1 trillion was unvested in the social housing program in the first ten months of 2012, accounting for 18.7% of total real estate investment over that period.

Chart 18
Affordable housing starts have met full year target



Source: Wind and BBVA Research
Note: Data for 2012 has been updated until October

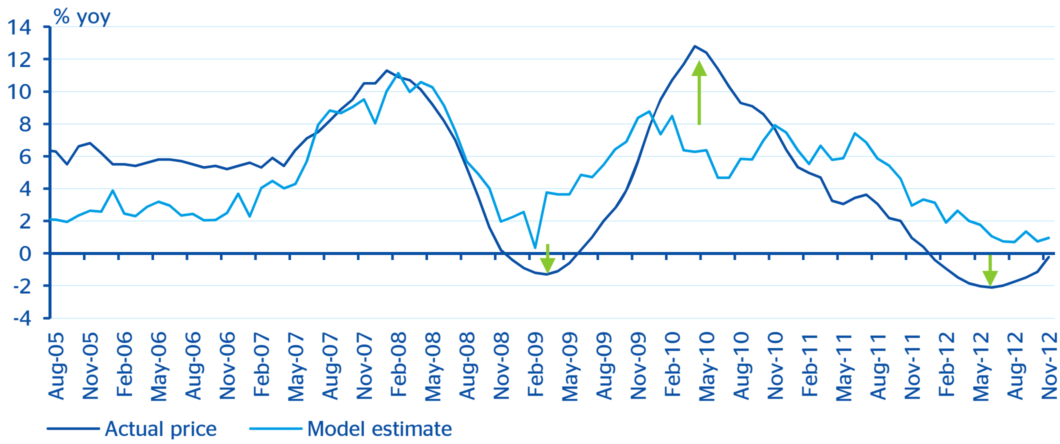
3:Ministry of Housing and Urban-Rural Development of the People's Republic of China.
4:Against a target of 7.0 million units 7.22 million units of affordable housing had been started by the end of October 2012, and against a completion target of 5.0 million units, 5.05 million had been completed.

2.3 Macroeconomic drivers of recent price dynamics

In this section we update our model of short-term price dynamics to determine the influence of monetary factors, in particular money supply and growth and inflation, on recent housing price developments. To do so, we update our time series model with data through November 2012 (see appendix for details on methodology).

Our findings confirm the role of these factors in determining recent price fluctuations. In particular, the restrictive housing policies in place since 2010, have led to a growth of housing prices below that predicted by our model. As seen in Chart 19, the restrictive housing policies may have suppressed price growth by more than 3 percentage points on average in 2012 (up to November). More recently, since mid-2012 the gap between actual and model-predicted price growth has narrowed, most likely due to the effects of government stimulus measures and an increase in market confidence in the growth outlook.

Chart 19
Actual and predicted housing price growth



Source: NBS, CEIC and BBVA Research

2.4 Perspectives from the ground

In order to gauge the effect of the authorities' policies in the housing market, we conducted a survey of market participants, including buyers, developers, banks, and brokers. The survey was undertaken in Shanghai in June 2012 in collaboration with MBA students of the China Europe International Business School (see Box 4 for details).

The responses from the surveys were generally consistent across the different types of participants, in particular regarding perceptions that the authorities' cooling measures were effective in reducing housing prices (by 5-20%) and transactions (by 20-60%). Developers reported that they had stopped acquiring land during that time, and that the perceived risks to the banks had increased. Nevertheless, despite the tightening measures, respondents indicated that underlying demand remained strong, especially from the needs for family life-improvements and marriage. In terms of the outlook, participants thought that the market was bottoming out, especially on expectations that tightening measures would be eased within the coming year. Indeed, since the when the survey was conducted, the market has been turning up, with signals that the authorities may ease their preoccupation with preventing modest price increases.

Box 4: Views from the ground based on surveys

In order to glean the perceptions of participants in the real estate market, we conducted market surveys in Shanghai during June 2012, in collaboration with student research teams from the CEIBS business school. The survey covered a total of 69 participants across five market segments, including real estate developers, banks, investment companies, brokers, and random purchasers (see appendix for details of the survey).

The major views from participants can be summarized as follows: (1) the authorities' efforts to reduce housing prices have been effective; (2) housing curbs have significantly affected business operations of developers, banks, and institutional investors; (3) the impact on the housing market has increased financial risks, although they were still manageable; (4) the underlying demand for housing remains strong, particularly due to the needs of family life-improvements and marriage; and (5) the market was bottoming out on expectations of easing policy restrictions

The responses by different market participants suggest that authorities' effort to reduce housing prices have been effective. According to brokers, the policies since mid-2010 has reduced the transaction price of second-hand properties by 5-20% and reduced the transaction volume by 20-60%. Moreover, the impact was perceived to be greater on premium residences and villas. More buyers in the selected sample believed that housing prices of house in Shanghai would increase (41.7%) than remain flat (20.8%) or decrease (20.8%) during the coming year. Overall, investors surveyed believe that the housing market price level would drop by about 5% in 2012.

Due to the falling prices relative to still high land costs, all of the real estate developers interviewed had stopped acquiring land over the past year. On the banks' side, they had raised lending rates to developers above the central bank's base lending rate to 110% - 130%, depending on the qualification of loan applicants. Due to the restrictions on the residential market, investors had shifted their investment focus from residential property to commercial property. In addition, investors were also moving towards indirect investment channels, the most popular of which were REITs, real estate stocks, bonds, and PE funds.

The large impact on the housing market was perceived to have increased financial risks, although they were judged to be manageable. Local banks surveyed indicated uncertainty over default rates in the near future if the government continued with its restrictive housing policies.

Despite the tightening measures of the past couple of years, potential demand for housing was still viewed as robust. In particular, according to real estate developers, young consumers have accounted for the largest share of housing purchase in recent years, largely due to marriage-related motivations. This finding is in line with the survey results from the buyers as well: some 24% of purchasers were motivated to buy houses as an investment, while 30% undertook purchases for marriage purposes. Another major demand for housing (41%), was reported to be to improve current living conditions,

In terms of the market outlook, the consensus was biased towards housing prices bottoming out as policies loosen in the future. Developers' views on property market dynamics remained upbeat despite some concerns over a temporary slowdown. They viewed a hard landing as unlikely, as housing prices would remain steady for a while before turning slowly upward again. The existing housing restrictions were expected to remain in place for another year. In the meantime, local governments were viewed as likely to improve the liquidity environment for property firms to avoid bankruptcies.

The surveyed also covered perceptions of affordable housing initiatives. According to the real estate developers, the existing policies did provide useful incentives to develop affordable housing projects. In particular, the incentives included favorable land prices, tax reductions and interest benefits.

3. An Update on the Narrowing of Housing Price Misalignment

One of the key outputs of our previous Real Estate Outlooks has been to assess the degree of residential housing price misalignments relative to fundamentals. In this section we update our assessment by applying our model of equilibrium housing prices to more recent data. For a second year in a row, we find that the degree of price misalignment has moderated, especially in first-tier cities, where the impact of stringent housing curbs has had the biggest effect. As such, we find that aggregate housing prices are now broadly in line with equilibrium values.

A model of equilibrium housing prices

Our empirical model of housing prices estimates the degree of misalignment between actual (nominal) and equilibrium housing prices based on a framework of supply and demand. The model incorporates panel data going back to 1995 and covers 35 major cities (see the Appendix for details). The underlying factors in the model include current income growth, population density, and construction costs. These factors determine the equilibrium prices by affecting housing demand and supply. In general, higher income growth and higher population density will increase housing demand and result in higher equilibrium prices, all else equal. On the other hand, higher construction costs and higher interest rates on real estate loans will reduce housing supply, also driving up equilibrium prices.

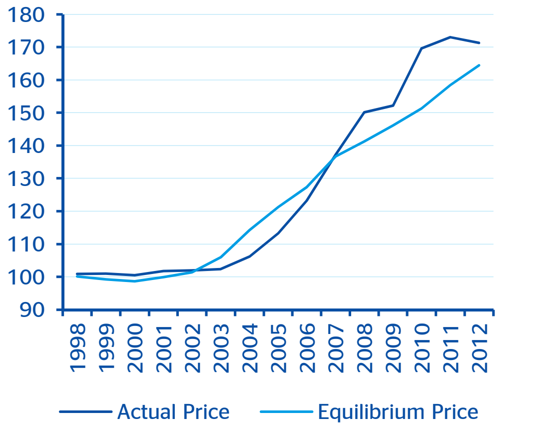
As with any modelling exercise, there are limitations. And with uncertain data quality, the results are intended only to be suggestive, rather than as a prediction of near-term price levels.

Price misalignments have narrowed further

For a second year in a row, we find that the moderation in housing price increases has led to a narrowing of the degree of housing price overvaluation relative to fundamentals. In particular, we find that the degree of misalignment has declined to just 1-2% in 2012, much smaller than the 7% misaligned we estimated for 2011. The narrowing of the degree of misalignment is due both to an increase in underlying equilibrium prices and the decline in observed prices over the past year.

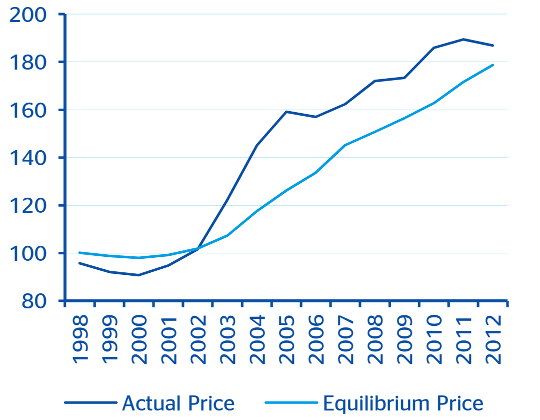
In 2012, housing prices have moderated in all six of the largest metropolitan areas (Beijing, Shanghai, Shenzhen, Guangzhou, Chongqing, and Tianjin) (Charts 20-25 and Table 2). For Beijing, the degree of price overvaluation has narrowed to 4% (from 13% estimated in early 2011), while for Shanghai and Chongqing, the overvaluation gap has narrowed to 4½% and 3% respectively in 2012. In Tianjin and Shenzhen, where the observed property prices have not strayed far from the estimated equilibrium prices for most of the sample period, the misalignments have almost been eliminated (to 1.3% and 0.1% respectively). Guangzhou remains an outlier, with our estimates showing an undervalued property market, with a doubling of the gap to -6% since early 2011.

Chart 20
Beijing



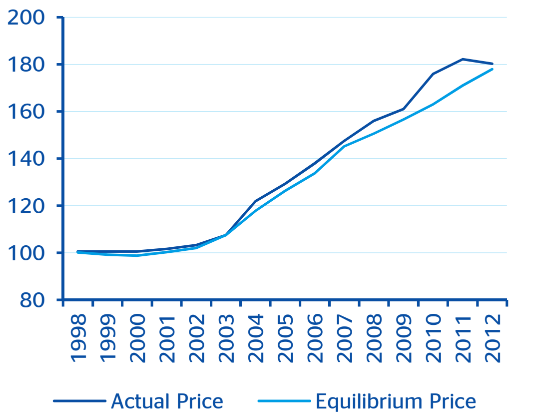
Source: NBS, CEIC and BBVA Research

Chart 21
Shanghai



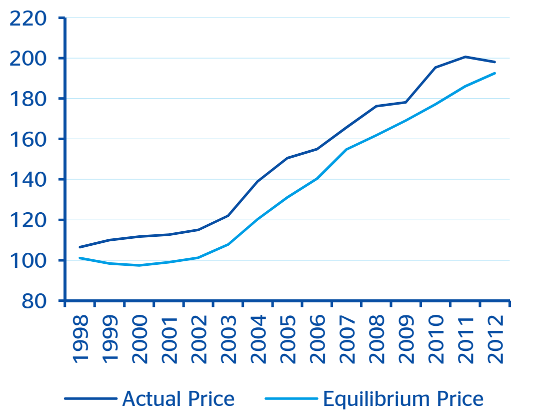
Source: NBS, CEIC and BBVA Research

Chart 22
Tianjin



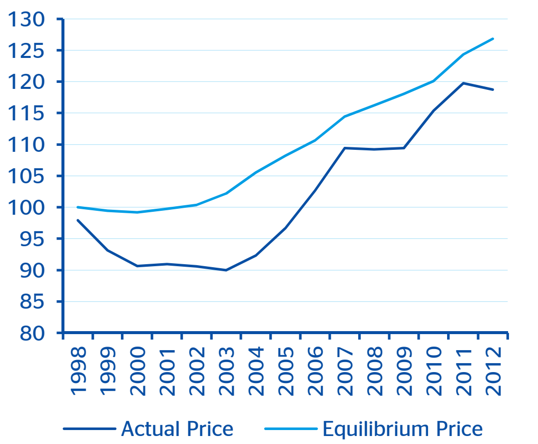
Source: NBS, CEIC and BBVA Research

Chart 23
Chongqing



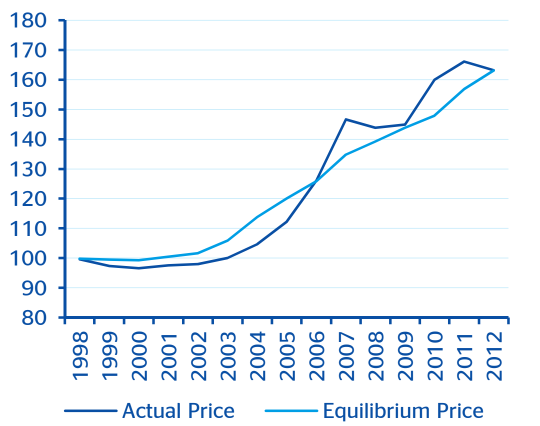
Source: NBS, CEIC and BBVA Research

Chart 24
Guangzhou



Source: NBS, CEIC and BBVA Research

Chart 25
Shenzhen



Source: NBS, CEIC and BBVA Research

With respect to the other 29 cities in our sample, we find that the housing markets in the Yangtze River Delta region still show significant overvaluation despite a sharp downward correction in prices, including in Nanjing, Hangzhou, and Ningbo. Most of the remaining second-tier cities show either aligned or under-valued housing prices. Notably, a number of cities with strong growth potential have seen housing prices lagging behind estimated equilibrium values, including in the Northeast (Changchun and Harbin in particular) and Southwest regions (including Kunming and Nanning). Our model suggests that these latter markets may present the most promising investment opportunities

In conclusion, the relatively small degree of overvaluation at present suggests that, at an aggregate level, housing price bubbles are not currently a wide-spread problem, although they may still be a concern in certain segments of the market or in certain cities. We emphasize that these estimates are suggestive only, given limitations to the model. Overvaluation of property prices in these cities can be eliminated gradually as housing price increases stay moderate, making a hard landing scenario unlikely. Another caveat is that the narrowed misalignment is largely attributed to the government's housing policies, and any policy easing, as currently seems in prospect at the margin, could lead to a more significant rebound in housing prices. In this regard, the authorities' intention to maintain curbs on housing purchases appears appropriate.

Table 2
Housing Fundamentals and Price Levels by City

	Average growth, 1999-2011					Estimated Over-valuation (2012)
%	Real income	Construction costs	Population density	Actual prices	Equil. prices	
Beijing	10.3	0.4	3.0	5.4	4.6	+4.1
Shanghai	10.4	0.3	2.6	8.1	5.7	+4.5
Shenzhen	3.8	0.6	9.8	5.4	4.4	+0.1
Guangzhou	8.0	1.2	2.8	2.2	1.9	-6.3
Chongqing	9.8	1.4	-0.5	6.3	6.9	+2.8
Tianjin	9.5	2.1	1.7	6.2	5.6	+1.3
Average	**8.6**	**1.0**	**3.3**	**5.6**	**4.9**	**+1.1**

Source: BBVA Research

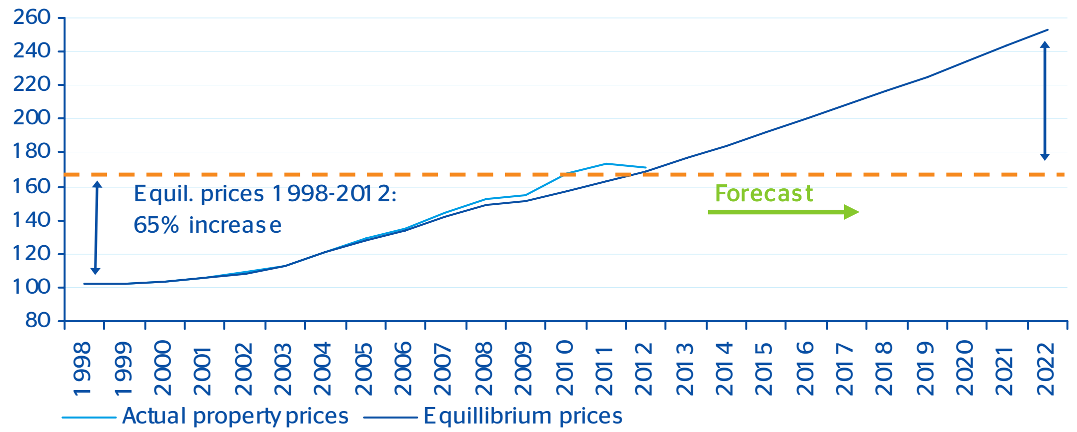
4. Medium-term Outlook

Our medium-term outlook for China's real estate sector remains upbeat on expectations of continued strong underlying growth. This is based on our projection of continued strong trends in real income growth, urbanization, and construction spending.

We update our supply and demand framework to project nominal equilibrium housing values over the medium term (Chart 26). As in our previous Outlooks, our baseline projection, through 2022, assumes real income growth of 10% per year, urbanization (measured as the growth in urban population) of 2% per year, and increase in housing supply of 7% per year. The projections also assume an average future inflation rate of 3-4%. The resulting projections are for an increase in nominal housing prices of 50% through 2022, equivalent to an increase of 15% in real terms. However, these results should be taken as suggestive, given the model's remaining limitations and the usual uncertainties surrounding projections of this nature.

As noted in Section 3 above, current housing prices are broadly in line with fundamentals (only 1-2% above equilibrium according to our model). As such, the authorities have largely succeeded in preventing the run-up in prices from deviating too far and for too long from equilibrium. While there are disparities across individual markets, overall, from this point forward we would expect prices to rise in line with the underlying upward trend.

Chart 26
Actual and equilibrium housing prices



Note: Average residential housing prices in China's 35 big and middle-size cities.
Source: NBS, CEIC and BBVA Research

Medium-term policy challenges

Over the medium term the government will continue to face challenges in fostering a healthy real estate market. Although we estimate price misalignments to be quite modest at present, going forward affordability will remain a pressing social issue.

Additionally, to prevent distortions and speculation in the real estate market, sound financial incentives and tax policies, including the broader introduction of property tax, would be helpful. Meanwhile, local government fiscal reforms would help to remove incentives of local officials to use land sales as a main source of revenue, which would inevitably push up land prices and housing prices. One factor not adequately accounted for in our medium-term outlook is the potential market impact of the authorities' investment program in social housing. The 12th 5-year plan incorporates an ambitious target for the construction of 36 million units, and such a large increase in supply of such housing could affect the real estate market and housing prices.

5. Housing Finance and Lessons from International Experience

Accessibility to finance can be an important element for governments in ensuring housing affordability and increasing home ownership. In this regard, country authorities across the world have adopted various approaches to nurture the development of housing finance. In this section, we describe the status of housing finance in China, and draw comparisons with Latin America, whose economies share a similar level of development, with the aim of drawing possible lessons for policies in China.

Housing finance in China is relatively well developed

Commercial banks in China dominate the primary mortgage market. The Housing Provident Fund (HPF), established in 1990, also provides important financing support, accounting for about 10% of outstanding mortgage loans. The HPF scheme, similar to one in Singapore, requires contributions from employers and employees. The former are entitled to the use their HPF contributions along with housing loans at preferential interest rates when purchasing, building, renovating, and repairing homes for self habitation.

Overall, China's bank mortgage loans amounted to 7.24 trillion yuan at end 2011, accounting for about 13% of total bank loans and over 15% of GDP (Chart 27). This compares, respectively, to over 35% and 50% in OECD countries, about 15% for both ratios in the East Asia and Pacific region, and about 20% and 10% in Latam. China's housing finance, therefore, compares favorably with the ratios in other regions, and may be a factor for the high housing ownership rate of 90% (Chart 28).

Compared to Latam countries with similar development levels, China's bank mortgage loans as a ratio to GDP just lagged behind Chile and led other major Latam countries as of 2011 (Chart 28), although the ratio to total bank loans is relatively smaller to Latam countries due to China's much larger total bank loans.

Housing finance in Latin America

Latin American countries have achieved relatively high rates of home ownership, with relatively less well-developed mortgage loan markets. They have achieved this through efforts to boost housing financing via a number of methods (see Appendix for details).

The first of these is the establishment of government institutions or programs to facilitate housing finance, to fill a void of banks in markets associated with macroeconomic instability, inflation, or currency risks. In some cases, these institutions have become the main providers of housing finance as, for example, in Mexico where two public institutions (INFONAVIT and FOVISSSTE) account for 80% of total mortgages.

Second, are policies to boost finance from both the demand and supply sides, including interest rate subsidies, grants, cash vouchers, tax breaks for buyers and builders, and credit guarantees. In Colombia, for example, the government provided interest rate subsidies for mortgages loans for new homes in 2009 to counter the effects of the 2008-09 global financial crisis. And in Chile, the government provides subsidies for low and middle income families, and tax benefits to encourage the construction and purchase of new homes.

Third is reliance on various sources of funding to channel loans to the housing sector. In Mexico, employers are required by law to contribute 5% of their wage bill to INFONAVIT, which collects mandatory fees from employers, issues new mortgage loans, and collects repayments from employees.

A number of programs have also been established for low income families. Using the example of Mexico once again, CONAVI and FONHAPO are programs that provide subsidies or grants for home purchases or upgrades to low income workers and families respectively. In Chile, the government provides vouchers for low and middle income families which can be used as down payments or can even cover the entire value of the home.

Lessons for China

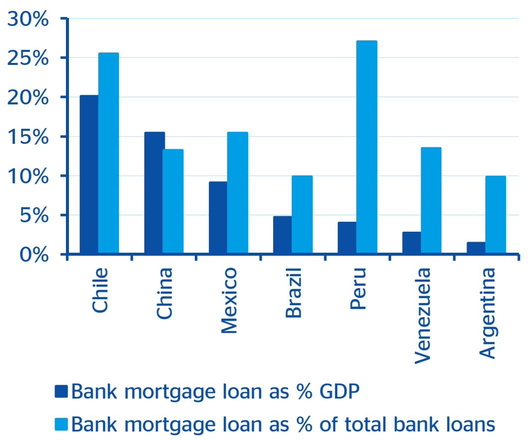
Latin American countries have strong traditions of homeownership, shared as well by China, even though the quality of such housing is uneven. China has built a large commercial banking system, one that leads Latin America in providing housing finance. That said, China faces a number of challenges in its housing market, including the tendency for surging prices and low rates of affordability.

To address affordability issues, China may draw on Latin America's experience, as we noted in last year's Real Estate Outlook on the role of financing and land use in the provision of social housing. The authorities may also wish to assess the use of various funding sources, including the government budget, employers/employee contribution schemes, with a view to broadening funding sources and achieving cost efficiency. Similarly, there may be ways to facilitate housing finance along the lines of Latin American countries, with the use of subsidies, grants, vouchers, and tax breaks. Such measures should be used in ways that maximize benefits, while minimizing distortions.

Efforts have been undertaken in Latin America to channel housing loans to low and middle income families. This could be relevant for China in ensuring housing affordability for lower income segments of the population, as a complement for the government's public housing program.

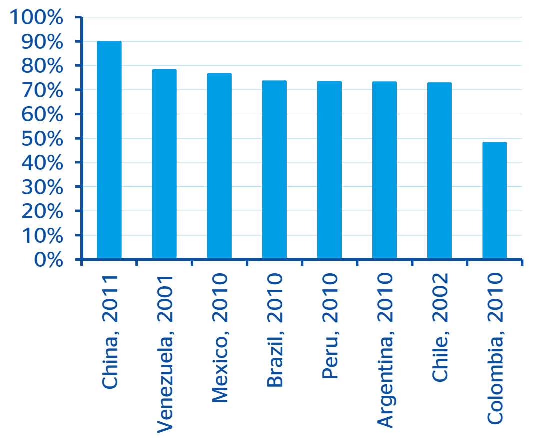
Finally, China's plans for financial liberalization to alleviate financial repression and spur economic development may enhance the efficiency and volume of bank lending to the housing sector. The development of domestic capital markets may also help. In all of these areas, China can draw on the experience in Latin America (see Banking Watch).

Chart 27
Mortgage loans relative to economic sizes in Latin American countries (2011)



Source: BBVA Research collected from bank statistics in the countries

Chart 28
Home ownership across Latin American countries



Notes: Venezuela for 2011, Chile for 2002
Source: BBVA Research collected from various country census

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7. Appendix

Table 3
Local government policy fine-tuning since 2012

Date	Local Government		Policy	Detail
2012 Jan	Xiamen	Sub-provincial city	Adjust the standards for private ordinary housing	The ordinary housing standard per unit is changed from area size (below 144 m² and 1.44 times of average commodity housing price) to unit price only (below RMB 2.5 mn in the island and RMB 1.8 mn outside the island.)
			Ease the Housing Provident Fund rules	The limit of the HPF loan is raised to RMB 0.8 mn from RMB 0.6 mn.
2012 Jan	Zhongshan	Prefecture-level city	Raise the housing price cap	The housing price ceiling has been raised to RMB 6590 / m² from RMB 5800 / m².
2012 Jan	Chongqing	Municipality	Raise the threshold for property tax	The threshold value of property tax has been raised to RMB 12,152 / m² from 9,941 / m² in the city center.
2012 Feb	Shenyang	Sub-provincial city	Ease the Housing Provident Fund rules	The limit of the HPF loan for each qualified couple is raised to RMB 0.5 mn from RMB 0.4 mn.
2012 Feb	Tianjin	Municipality	Adjust the standards for private ordinary housing	The threshold value per m² of ordinary housing standard is raised by more than 30% on average. (by 35.2%, 33.6% and 33.5% for central zone, Four districts around and Binhai New area respectively)
2012 Feb	Wuhu ***	Prefecture-level city	Tax credit or subsidy	The deed tax on property transaction is waived. Offer purchase subsidy of RMB 50 / m² - 150 / m² to housing below 90m². Offer more subsidy to home buyers meet with required professional qualifications.
2012 Feb	Shanghai ***	Municipality	Ease the housing purchase restrictions	The purchase restriction for the second house is eased to residence permit holders who have lived in Shanghai for three years.
2012 Mar	Shanghai	Municipality	Adjust the standards for private ordinary housing	The threshold value of ordinary housing is raised to RMB 3.3 mn, 1.6 mn and 2.0 mn for those locate within the inner ring, out of the outer ring and in between the both rings respectively.
2012 Apr	Binzhou	Prefecture-level city	Ease the housing mortgage rules	The limit of the housing mortgage loans is raised to RMB 0.3 mn and 20 years from RMB 0.25 mn and 15 years.
2012 Apr	Nanchang	Prefecture-level city	Ease the Housing Provident Fund rules and housing mortgage rules	The limit of the HPF loan is raised by RMB 0.1 mn. The limit of the mortgage loan for each qualified couple is raised by RMB 0.1 mn in the downtown and RMB 0.05 mn in the other five areas.
2012 Apr	Karamay	Prefecture-level city	Ease the Housing Provident Fund rules	The limit of the HPF loan for individuals is raised to RMB 0.7 mn from 0.5 mn, with an easing restrictions for the application.
2012 Apr	Bengbu	Prefecture-level city	Ease the Housing Provident Fund rules	The limit of the HPF loan for each qualified couple is raised to RMB 0.35 mn from RMB 0.3 mn for new housing in the downtown and to RMB 0.3 mn from RMB 0.25 mn for new housing in the other areas or secondary housing in the downtown.
2012 Apr	Beijing	Municipality	Tax credit or subsidy	The sales tax for the five years or above individual homeowner is waived. The deed tax on first home purchase is waived by 50%.
2012 Apr	Xinyang	Prefecture-level city	Ease the Housing Provident Fund rules	The limit of the HPF loan for individuals is raised to RMB 0.26 mn from 0.16 mn. The limit of the HPF loan for each qualified couple is raised to RMB 0.38 mn from 0.28 mn.
2012 Apr	Hohhot	Prefecture-level city	Ease the Housing Provident Fund rules	The limit of the HPF loan for individuals is raised to RMB 0.4 mn from 0.3 mn. The limit of the HPF loan for each qualified couple is raised to RMB 0.5 mn from 0.4 mn.
2012 Apr	Zhengzhou	Prefecture-level city	Ease the Housing Provident Fund rules	The limit of the HPF loan for individuals is raised to RMB 0.35 mn from 0.3 mn. The limit of the HPF loan for each qualified couple is raised to RMB 0.45 mn from 0.4 mn.

Continued on next page

Table 3
Local government policy fine-tuning since 2012 (Cont.)

Date	Local Government		Policy	Detail
2012 Apr	Zhengzhou	Prefecture-level city	Ease the Housing Provident Fund rules	The limit of the HPF loan for individuals is raised to RMB 0.35 mn from 0.3 mn. The limit of the HPF loan for each qualified couple is raised to RMB 0.45 mn from 0.4 mn.
2012 Apr	Wuhan	Sub-provincial city	Ease the Housing Provident Fund rules	The limit of the HPF loan (RMB 0.6 mn) for each qualified couple with housing below 90 m² is now applicable to individuals as well. The required down payment is reduced to 20%.
2012 May	Chongqing	Municipality	Ease the Housing Provident Fund rules	The limit of the HPF loan are raised to RMB 0.4 mn from 0.2 mn for each person, to RMB 0.8 mn from 0.4 mn for each family.
2012 May	Hunan	Province	Tax credit or subsidy	The down payment for the first home buyer is decreased with preferential interest rates and tax credit.
2012 Jun	Shijiazhuang ***	Prefecture-level city	Ease the housing purchase restrictions	The purchase restriction for the third house is eased to family with average house size per capita below 30.6 m²
2012 Jun	Henan ***	Province	Ease the housing purchase restrictions	The definition of the first home buyer is expanded to require for household with no registered property, but no longer require for proof of no bank loans. Preferential interest rates (up to 30% discount of benchmark mortgage rates) is offered to qualified first home buyer.
2012 Jun	Yangzhou	Prefecture-level city	Tax credit or subsidy	Subsidy rewards are offered to home buyers of fully decorated house below 144 m² up to 0.6% of the purchase price.
2012 Jun	Xi'an	Sub-provincial city	Ease the Housing Provident Fund rules	The limit of the HPF loan for individuals is raised to RMB 0.6 mn from 0.5 mn. The limit could be further expanded to RMB 0.7 mn under special approval.
2012 Jul	Zhuhai ***	Prefecture-level city	Ease the housing purchase restrictions	The regulations on the housing purchase restrictions and the housing price cap (RMB 11,285 / m²) implemented since Nov 2011 are relaxed
2012 Aug	Ningbo	Sub-provincial city	Ease the Housing Provident Fund rules	The limit of the HPF loan for each qualified household is raised to RMB 0.8 mn from 0.6 mn.
2012 Aug	Nanchong	Prefecture-level city	Ease the Housing Provident Fund rules	The limit of the HPF loan for individuals is raised to RMB 0.28 mn from 0.18 mn. The limit of the HPF loan for each qualified couple is raised to RMB 0.35 mn from RMB 0.25 mn. The limit for the loan term is expanded to 30 years from 25 years. The required down payment is reduced to 20% from 30%.
2012 Sep	Chengdu	Sub-provincial city	Ease the Housing Provident Fund rules	The HPF loan start to cover the complete house purchase with limit of RMB 0.4 mn and 30 years. The required down payment should be no less than 30%.
2012 Sep	Guiyang	Prefecture-level city	Tax credit or subsidy	Permanent resident treatments are offered to non-local first home buyers of the residential or commercial properties.
2012 Oct	Shanghai	Municipality	Ease the economic housing purchase restrictions	The purchase restrictions for qualified two-person households on the economic housing with two bedrooms are eased.
2012 Oct	Wuhan	Sub-provincial city	Ease the Housing Provident Fund rules	The limit of the HPF loan for secondary housing is raised to RMB 0.6 mn from 0.4 mn. Qualified local residents can use HPF loan to buy house in other cities.
2012 Nov	Zhuzhou	Prefecture-level city	Ease the Housing Provident Fund rules	The limit of the HPF loan for individuals is raised to RMB 0.45 mn from 0.4 mn.

Source: Media reports and BBVA Research
Note: *** means the fine-tuning policy has been withdrawal in the end.

Housing price data in China

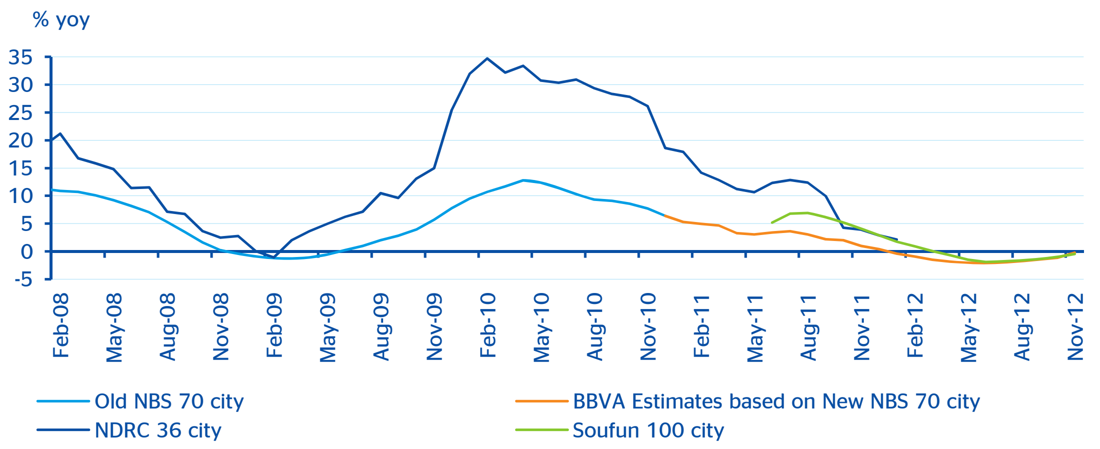
There are three major housing price data in China. The NBS 70 city housing price is the official statistics, the methodology of which has been reformed and improved since Jan 2011. The new series is considered more reliable compared to the previous one ended in 2010. The NDRC 36 city housing price is another official source provided by different government agency. The Soufun 100 city housing price is provided by the China Index Academy, a recognized private property research agency in China. More details about the different housing prices in China are listed below (Table 4). Since the NBS no longer provide a nationwide housing price data in the new 70 city series, we estimate the growth changes based on the individual city housing prices (Chart 29). Although these housing prices usually have differences in value terms due to the different sample sources and data collection methodology, their general growth trends are similar especially more recently.

Table 4
Different housing prices data in China

	Time series	Source	Release date	Sample collection methods
Old NBS 70 city	2005.07 - 2010.12	National Bureau of Statistics	the 10th day of the following month	Data are collected from real estate developers and sellers through sampling survey.
New NBS 70 city	2011.01 - Present	National Bureau of Statistics	the 18th day of the following month	New home sales data are collected based on network transactions records from city-level housing departments.
NDRC 36 city	2007.01 - 2012.01	National Development and Reform Commission		Data of transaction price are collected through sampling survey.
Soufun 100 city	2010.06 - Present	China Index Academy	the 1st working day of the following month	Data are collected from field survey, real estate developers, sellers and agents, government information disclosure.

Source: NBS, Media reports and BBVA Research

Chart 29
China housing prices from different sources



Source: CEIC, Wind and BBVA Research

Data

Below we summarize data used in this report. All data are expressed as year-on-year changes, and were retrieved from the CEIC database and compiled by BBVA research.

Table 5
Summary of Data

Variables	Sample and frequency	Notes	Sources
Aggregate housing price index	Monthly, 2005.7-2012.11	Data after 2011 compiled from disaggregate price index	NBS, CEIC, and BBVA calculation
City housing price index	Quarterly, 1998.1-2012.11, 70 cities.	Data after 2011 compiled from disaggregate price index	NBS, CEIC, and BBVA calculation
M2	Quarterly, 1998.1-2012.11		CEIC
Inflation	Quarterly, 1998.1-2012.11		CEIC
Income per capita	Yearly, 1998-2011		CEIC
Lending rate	Quarterly, 1998.1-2012.11	Five-year lending rate	CEIC
Urbanization	Yearly, 1998-2011	Population/area	CEIC

Source: NBS, CEIC and BBVA Research

In January 2011 the NBS discontinued the publication of an aggregate housing price index at the national and city level. To make the data consistent with historical series, we have reconstructed an aggregate price index for 2011 and the following from city-level new-construction and second-hand price indices (which are still published by NBS). The weights used to construct the aggregate price index are estimated using price data prior to 2010 by regressing aggregate price index on their components.

Description of empirical model for estimating equilibrium prices

To estimate the equilibrium property prices, we use a demand-supply framework of fundamental property prices[6]. Under this framework, if the housing market adjusted to shocks instantaneously, then the model could be closed at the equilibrium:

$$p_{it}^{d*} = p_{it}^{s*} = p_{it}^{*} \qquad \text{(A2.1)}$$

Note that our prices and determinants are at the city-level, with index *i* indicating cities. In the long-run demand equation, the determinants include housing stocks (s), current and expected per capita household income (y), real user cost of residential capital (measured in real interest rate; rr) and population density (dens). To obtain the long-run demand price pd*, we use an inverted housing demand function as follows:

$$p_{it}^{d*} = \alpha_1 s_{it} + \alpha_2 y_{it} + \alpha_3 y_{i,t+1} + \alpha_4 y_{i,t+2} + + \alpha_5 rr_t + \alpha_6 dens_{it} + \alpha_t \qquad \text{(A2.2)}$$

The coefficients of income and population density should be positive (α_2, α_3, α_4, α_6>0), while housing stock and user cost are expected to be negative (α_1, α_5<0). Here the time-specific fixed-effect α_t controls for the common impact of macroeconomic fluctuations, such as changing money supply, on the housing prices in different cities.

On the supply side, it is assumed that market entry and exit ensure that property developers make zero profits in the long run. Therefore, given the construction cost (c), the long-run supply price, ps*, induces a sufficiently high investment rate to cover depreciation and expected housing stock growth. This relationship can be expressed as follows.

$$p_{it}^{s*} = \alpha_5 \left(i/s \right)_t + \alpha_6 c_t \qquad \text{(A2.3)}$$

6: See McCarthy and Peach (2004), "Are home prices the next 'bubble'?" *Economic Policy Review*, Federal Reserve Bank of New York. In addition see Leung, Chow, and Han (2008), "Long-term and short-term determinants of property prices in Hong Kong, " Hong Kong Monetary Authority, for an application of the similar approach that applies to the Hong Kong property market.

where i/s is the investment rate; i, the real residential investment, is proxied by fixed asset investment (FAI) for real estate adjusting by FAI deflator and c is the real construction cost. Since higher prices encourage investment, the coefficient of the investment rate is expected to be positive (α_5>0). Property prices are expected to respond to construction cost positively (α_6>0).

In practice, we combine equations (A2.2) an (A2.3) to estimate its reduced-form version using panel-data estimator in Eviews. The deviation between the actual prices and the prices predicted by the model will give us an indication of housing price mis-alignment.

In addition to the fundamental-based model above, we also estimate a time-series model on the growth rates of national aggregate price index:

$$\Delta p_t = \beta_1 \Delta M_t + \beta_2 \Delta Inf_t + \beta_3 \Delta i_t + \beta_4 \Delta Y_t + \varepsilon_t \quad \text{(A2.4)}$$

In this model the year-on-year change of monthly national price index (*p*) is influenced by the changes of monetary supply (M), inflation (Inf), interest rates (*i*), and economic output (*Y*). Incorporating the monetary and macroeconomic conditions explicitly allows us to investigate the underlying forces of housing price fluctuations and mis-alignment. Use standard package in Eviews, we confirm that the year-on-year price growth is an I(1) process and estimate the model within a standard cointegration framework. After the model is estimated, we use the predicted price growth to compare with the actual price growth. We also project the price growth up to 2005.

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This report has been produced by the Asia Unit of the Emerging Markets team in collaboration with CITIC Bank

Chief Economist of Emerging Economies
Alicia Garcia-Herrero
alicia.garcia-herrero@bbva.com.hk

Chief Economist for Asia
Stephen Schwartz
stephen.schwartz@bbva.com.hk

Fielding Chen
Fielding.chen@bbva.com.hk

Le Xia
xia.le@bbva.com.hk

George Xu
George.xu@bbva.com.hk

With the contribution of
China CITIC Bank
Yifeng Tu
tuyifeng@citicbank.com

BBVA Research

Group Chief Economist
Jorge Sicilia

Emerging Markets:
Alicia García-Herrero
alicia.garcia-herrero@bbva.com.hk

Cross-Country Emerging Markets Analysis
Álvaro Ortiz Vidal-Abarca
alvaro.ortiz@bbva.com

Asia
Stephen Schwartz
stephen.schwartz@bbva.com.hk

Latam Coordination
Juan Ruiz
juan.ruiz@bbva.com

Argentina
Gloria Sorensen
gsorensen@bbva.com

Chile
Alejandro Puente
apuente@bbva.com

Colombia
Juana Téllez
juana.tellez@bbva.com.

Peru
Hugo Perea
hperea@bbva.com

Venezuela
Oswaldo López
oswaldo_lopez@bbva.com

Mexico
Adolfo Albo
a.albo@bbva.bancomer.com

Macroeconomic Analysis Mexico
Julián Cubero
juan.cubero@bbva.bancomer.com

Developed Economies:
Rafael Doménech
r.domenech@bbva.com

Spain
Miguel Cardoso
miguel.cardoso@bbva.com

Europe
Miguel Jiménez
mjimenezg@bbva.com

United States
Nathaniel Karp
nathaniel.karp@bbvacompass.com

Financial Systems & Regulation:
Santiago Fernández de Lis
sfernandezdelis@grupobbva.com

Financial Systems
Ana Rubio
arubiog@bbva.com

Pensions
David Tuesta
david.tuesta@bbva.com

Regulatin and Public Policy
María Abascal
maria.abascal@bbva.com

Global Areas:

Fianacial Scenarios
Sonsoles Castillo
s.castillo@bbva.com

Economic Scenarios
Julián Cubero
juan.cubero@bbva.com

Innovation & Processes
Clara Barrabés
clara.barrabes@bbva.com

Market & Client Strategy:
Antonio Pulido
ant.pulido@grupobbva.com

Equity Global
Ana Munera
ana.munera@grupobbva.com

Global Credit
Javier Serna
Javier.Serna@bbvauk.com

Global Interest Rates, FX and Commodities
Luis Enrique Rodríguez
luisen.rodriguez@grupobbva.com

Contact details

BBVA Research
10/F, Two International Finance Centre
8 Finance Street
Central, Hong Kong
Tel. + 852-2582-3111; Fax. +852-2587-9717
research.emergingmarkets@bbva.com.hk

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