China Direct Real Estate-Where and What Do You Invest

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I. INTRODUCTION

China's real estate market is one of the biggest recipients of foreign direct investment in China (Fung, Huang, Liu and Shen, 2006). Wang & Wang (2012) study appreciation in housing prices in 10 major Chinese cities for the period 1999 through 2010. They find a median price appreciation rate per square meter for residential housing of 264% over the 12 year period. While they concede that they do not have China-wide data to prove the assertion, they believe that the price appreciation rate of housing in China is likely the highest in the world over this period. The high appreciation rate has generated concern about a possible bubble in the Chinese real estate market. Despite all the speculation and concern, although the Chinese real estate market has declined somewhat, the bubble really has not burst.

China's real estate market has unique characteristics. All real estate in China was owned and managed by the government under the central planning economic regime before 1988 (Fung, Huang, Liu, and Shen 2006). The 1988 Constitutional Amendments separated land ownership and land use right. One primary difference in the definition of real estate in China from what real estate means in other developed economies is that real estate in China refers only to land use rights plus the ownership of the improvements on the land. The state is the owner of the land. The lease terms of the land range from 50 to 70 years. Here we are only referring to mainland China. Hong Kong's real estate ownership system is similar to that of the United Kingdom.

According to "People's Republic of China state-owned urban land use right transfer Provisional Regulations" Article XII, for preexisting residential properties, the transferee's land use right lease term is the original user's lease term less the time the original user has used. Due to the special nature of China's real estate market, the preexisting residential property market might act differently compared with the new built market due to shortened periods of land use rights.

If we assume land is scarcer and more valuable in more populated areas, then population and population growth will drive up land lease prices and thus property prices. We are unsure how the increased competition of land use rights, affects potential buyers' attitudes toward preexisting properties with shortened land use rights. The interaction cannot be analyzed at this point since the exact real population and population growth at any given time is undeterminable for most cities.

For the reasons explained above, we believe regional property research which separates the preexisting and new residential markets will be more meaningful than general real estate research in China's special situation. Furthermore, the luxury homes market might be different from middle and/or bottom tier markets.

The purpose of this research is to analyze China's residential direct real estate market in order to improve decision making by potential buyers/investors. We analyze the market according to region, preexisting or new built, and by top, middle and bottom tier. We compare the returns of different direct real estate markets with average returns from Chinese stocks during the same time period. This comparison will further help potential investors' decision making.

II. LITERATURE REVIEW

Roberts (2014) reports that real estate prices fell by as much as 0.9 percent in September, 2014 for the fifth straight month in all but one of the 70 largest cities in China. Across China housing prices fell 11% for the first 9 months of 2014 even though many cities have loosened or eliminated home purchase restrictions. Fung (2014) points out that real estate transaction volume continues to fall, however more slowly than earlier in the year. A recent study by China Real Estate Index System showed that 17 Chinese cities have housing inventories that could take more than five years to digest, and that property developers are in need of financial help. Davis & Fung (2014) discuss whether there is a real estate bubble in China. They provide examples of oversupply of residential real estate, large reductions in selling prices for apartments, empty or near empty apartment complexes, and developers delaying planned developments. Stratfor Analysis (2014) reports that the Chinese government plans to use the slowdown in housing construction, which is expected to worsen in coming months, to push through long sought reforms. The main reform is the creation of a national property registry, which is expected to provide a tool to combat corruption, which often takes the form of collusion between property owners and local authorities. The registry will also help further a plan to initiate a property tax system to provide additional funds primarily for local governments and to provide incentive for those who own multiple properties to find productive uses for their properties, which often are treated as investments, but do not generate current income.

Fung, Huang, Liu & Shen (2006) give statistical support that China's residential real estate market is one of the most important driving forces behind national economic growth. Real estate development is a key factor in economic growth as real estate is an essential part of the manufacturing process of goods and services, and property rights are the foundation of a well-functioning market economy. The paper details the

development of the real estate industry in China. The China Real Estate Report (2015) focuses primarily on the office, retail and industrial real estate markets. It predicts a permanent end to China's double digit annual growth rate and a slowing, but still healthy economy. Four cities are highlighted for good potential for overall economic growth. Beijing, headquarters for many large Chinese companies, has high consumer spending and rental rates are expected to increase modestly. Shanghai, China's largest city and its "powerhouse", is home to many local and international firms and is also expected to do well. Shenzhen will benefit from its IT and technology sector and its proximity to Hong Kong. Wuhan's economy will improve over the next few years as more companies take advantage of its transportation hub location on the Yangtze River. Hui & Chan (2014) conclude that the most significant factors in China's foreign direct investment in real estate are the openness of China's market and China's strong economic growth. Foreign developers still invest mainly in coastal areas of China; however, the trend is to invest in the fast growing areas. The authors caution that the Chinese government should monitor the real estate market to stabilize house prices. Adams (2013) comments on primarily residential real estate and states that investment firms like investing in residential Tier 2 cities (cities of five to ten million people). Tier 2 cities and residential markets are considered safe when compared with luxury and mixed-use developments in larger cities. These investment firms believe that it is important to look at the real estate market as different markets depending on the demographics and type of development, as there are different risks associated with different real estate markets.

Chan & Chang (2014) analyze the stock, bond and real estate markets in China to see whether increasing lending rates has a dampening effect on the real estate market. They find that indeed increasing the lending rate does dampen the real estate market. They also find that: the stock, bond and real estate markets exhibit different patterns of volatility and return; prices in the stock and real estate markets have significant effects on the bond market; and prices in the stock market have significant effects on the real estate market. Zhang & Fung (2006) investigate reasons for the imbalance between the Chinese real estate and stock markets for the period 1997-2005 during which the real estate market was booming while the stock market was declining, especially during the last 4 years of the period. They find that the two markets are negatively related due to fund flows. The declining stock market can be explained in part by funds flowing into the booming stock market. They recognize that increasing interest rates can dampen the real estate market, but believe they will also hurt the stock market. They argue for policies that encourage the flow of funds from the housing market to the stock market, but they recommend caution so as not to overheat the stock market. Huang (2013) predicts that China's housing market will drop while the stock market will rise because of lack of an alternative investment channel after the housing market bubble bursts. He believes China's housing bubble has hindered China's economy since 80% of the funds are in the housing industry. He believes the housing market bubble must burst for China to grow.

Wang and Wang (2012) point out the significance of the differences in the Chinese political system, legal environment and culture when compared to the Western world. These differences make them wonder whether the current theories of economic growth can apply to all economies. Items unique to China include its extremely rapid growth during the last two decades and the rapid development of high-income groups, which could form a boom-and-bust price pattern. Also, the Chinese real estate market uses land auction and presale systems that make it difficult for developers to adjust supply of housing to fluctuating demand. While there has been a great boom in the real estate markets, Wang and Wang see signs in 2012 of a possible large correction in the housing market. Yan, Ge & Wu (2014) study the effects of more stringent constraints imposed since 2004 on the conversion of rural land to urban use in 16 major Chinese cities. They find that land supply is positively related to new housing supply. The government's intervention caused a decline in land supply that caused a decrease in the supply of new housing and a significant decline in housing supply elasticity. They also believe that there is a problem with the allocation of new urban land among different uses because much of the land allowed for new urban use has been designated for industrial use rather than residential use. Yan, Ge and Wu recommend that the Chinese government seeks ways to change the land supply system to allow adequate land to meet demand for residential use and that local governments consider allocating more new urban land to residential use.

In sum, many studies have been done regarding China direct housing market, including the future of the housing market, the relationship between stock and housing market, and the unique characteristics of the China housing market. However, no study to date has done in depth regional comparison across the country and takes into consideration the property size and whether it is new or existing construction.

III. METHODOLOGY

Monthly direct real estate price data is from the National Bureau of Statistics of China.[1] The data range from January 2011 to April, 2015. In this study, direct real estate includes both new and existing residential properties. The data are from 70 major cities in China.

We first plot direct real estate prices for the 70 major cities by month, year-to-year and as of April, 2015 compared to the 2010 base year. We do this separately for new and existing real estate.

We next divide the 70 cities into seven groups based on each city's price index as of April, 2015 compared to the 2010 base year. Group one has the highest price increase and group seven the lowest. We create graphs for each group's price changes month-over-month, year-over-year, and as of April, 2015 compared to the 2010 base year price indexes. We show the results for groups one and seven.

[1] http://data.stats.gov.cn/tablequery.htm?code=AA030O

China has two major stock market indexes: the Shanghai composite index and Shenzhen component index. The stock market index data is available through sohu.com.[2] The Shanghai composite index is calculated using all listed stocks and considering total shares outstanding. The biggest drawback of this method is that total shares outstanding includes state owned shares and legal person shares. These shares are not tradable. So using total shares outstanding, instead of tradable shares, distorts the real stock market performance. The Shenzhen stock market created a different index in 1995, the Shenzhen component index, which uses 40 listed companies and tradable stocks. It gained popularity compared with the old Shenzhen composite index, which is calculated the same as the Shanghai composite index. Currently, the most quoted indexes are the Shanghai composite index and the Shenzhen component index. We will use the Shanghai Composite Index to represent the change in the general stock market.

We compare the residential direct real estate returns for the entire 4 plus year period with general stock market return over the four plus year period.

Finally, we analyze direct real estate market regional correlation, new and existing construction correlation, and the correlation of the direct real estate market with the stock market.

IV. Results

We plot direct real estate prices for the 70 major cities. This analysis yields a pattern that is fairly consistent for the majority of cities, though the trend for any particular city is difficult to follow. Figures 1, 2 and 3 provide the overall graphs for new construction and Figures 4, 5 and 6 provide the overall graphs for existing buildings. Although most cities follow the indicated patterns, some cities, e.g., Beijing, Shanghai, Shenzhen and Guangzhou, are consistently near the top of the range in terms of returns, while other cities are consistently in the middle range and still others are near the bottom but still follow the same pattern over the period. The patterns are quite similar for new and existing construction, however, the existing construction is consistently at a lower level than the new construction. This can also be observed from the summary statistics in Table 1 and 2. The median price index for new construction is 108 in comparison to 102 for existing construction as of April 2015 compared with the 2010 base year.

Perhaps the most meaningful and easiest way to understand and view residential real estate price changes in China is to look at changes at the end of the period versus the prices in a base year, for which we use 2010. Figure 3 provides this information for new construction. Note that prices are very steady until about December 2012. Median prices then rise rapidly to a peak in March 2014. Then median prices decline to about 8% above the base year by April 2015, but there are wide variations. Prices for top performers are still about 27% above base year, but prices for some bottom performers are about 8% below base year prices, and prices for the worst performing city, Wenzhou, are over 24% below the base year. Figure 6 shows that prices for existing construction compared to the 2010 base year followed an almost identical pattern as for new construction except that median prices fell slightly from January 2011 until December 2012 when they started climbing. Prices reached a peak of about 7% over the base year prices by April 2014 and then declined to about 2% over the base year by April 2015.

We show the mean and median price changes since 2010 for small, medium, and large residences in Tables 1 and 2. It is clear that large residences have much lower price increases compared with small and medium residences. This is true for both new and existing constructions. Large new residences have a median of 5% price increase while small (medium) new residences have a median of 10% (8%) price increase since 2010. Large, existing residences have a median of 1% price drop while small (medium) existing residences have a median of 2% (1%) price increase since 2010. The market seems to prefer small to medium size residences over large residences.

Figures 7- 9 show graphs for new construction for both the top and bottom tier cities. Figures 10-12 show graphs for existing buildings for both the top and bottom tier cities. Seven cities are top performers for both new and existing construction. They are Shanghai, Beijing, Guangzhou, Shenzhen (the four tier one cities of China), Xiamen, Zhengzhou, and Urumqi. Seven cities are bottom performers for both new and existing construction. They are Wenzhou, Hangzhou, Ningbo, Haiko, Sanya, Jinhua, and Quanzhou. Wenzhou, Hangzhou, Ningbo, and Jinhua are in the same area, which is just south of Shanghai. Haiko and Sanya are both in Hainan province. Hainan province is an island located in the South China Sea. For new construction, again, the general trends are very consistent for all tiers, with one obvious outlier, the city of Wenzhou, which is the only city to show a consistent decline in property value over the entire period for both new and existing construction. Although their declines are not consistent over the period, several other cities show a price decline since the 2010 base year. Top tier cities' new construction median price index is 120 in comparison with bottom tier cities' median price index of 98 as of April 2015 with 2010 as the base year. For existing construction, we see a rather flat month over month and year over year movement for the bottom tier cities while the top tier cities fluctuate. For the April 2015 prices compared to the 2010 base year, the bottom tier cities exhibit a downward trend while the top tier cities have an upward trend. Top tier cities' existing construction median price index is 114 in comparison with bottom tier cities' 92 as of April 2015 with 2010 as the base year.

[2] http://q.stock.sohu.com/zs/000001/lshq.shtml

Figure 1: New construction Month-Over-Month Price Index

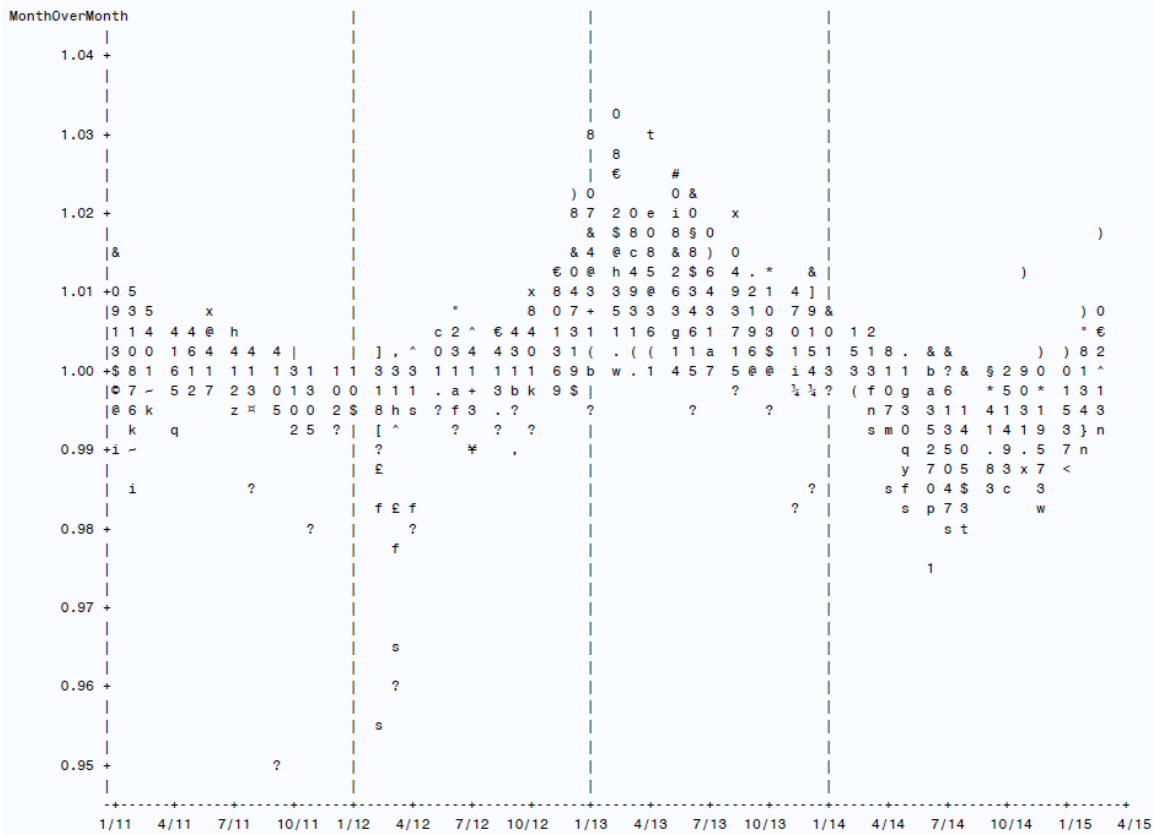


Figure 2: New construction Year-Over-Year Price index

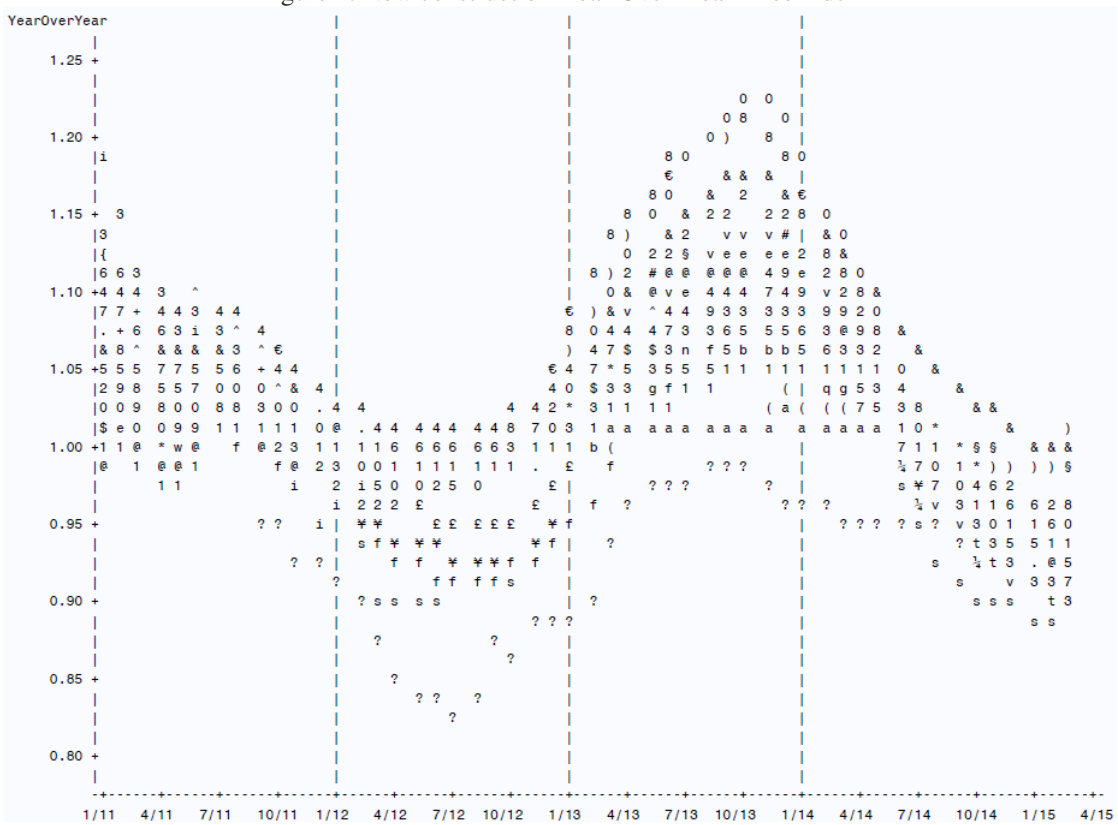


Figure 3: New Construction Price Index, Base Year 2010

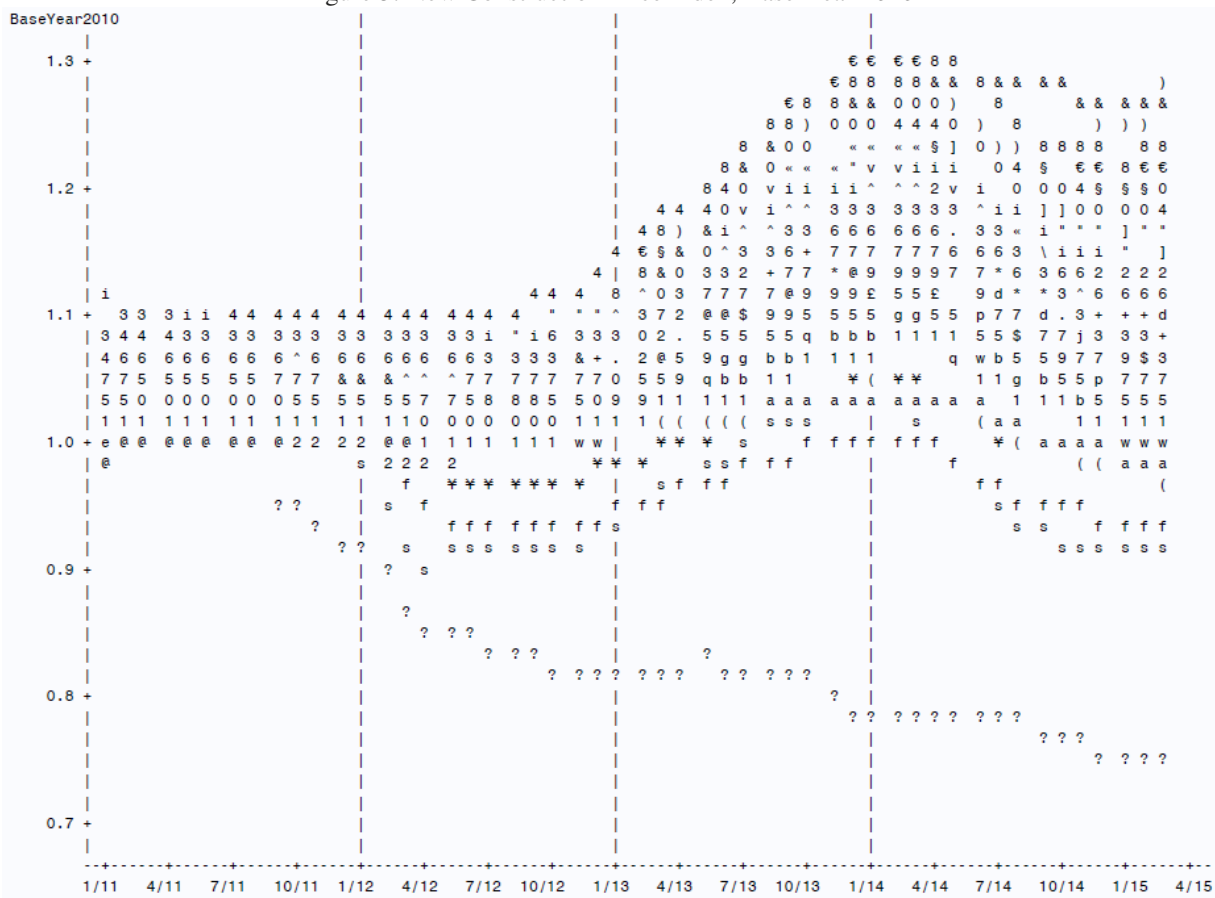


Figure 4: Existing Construction Month-Over-Month Price Index

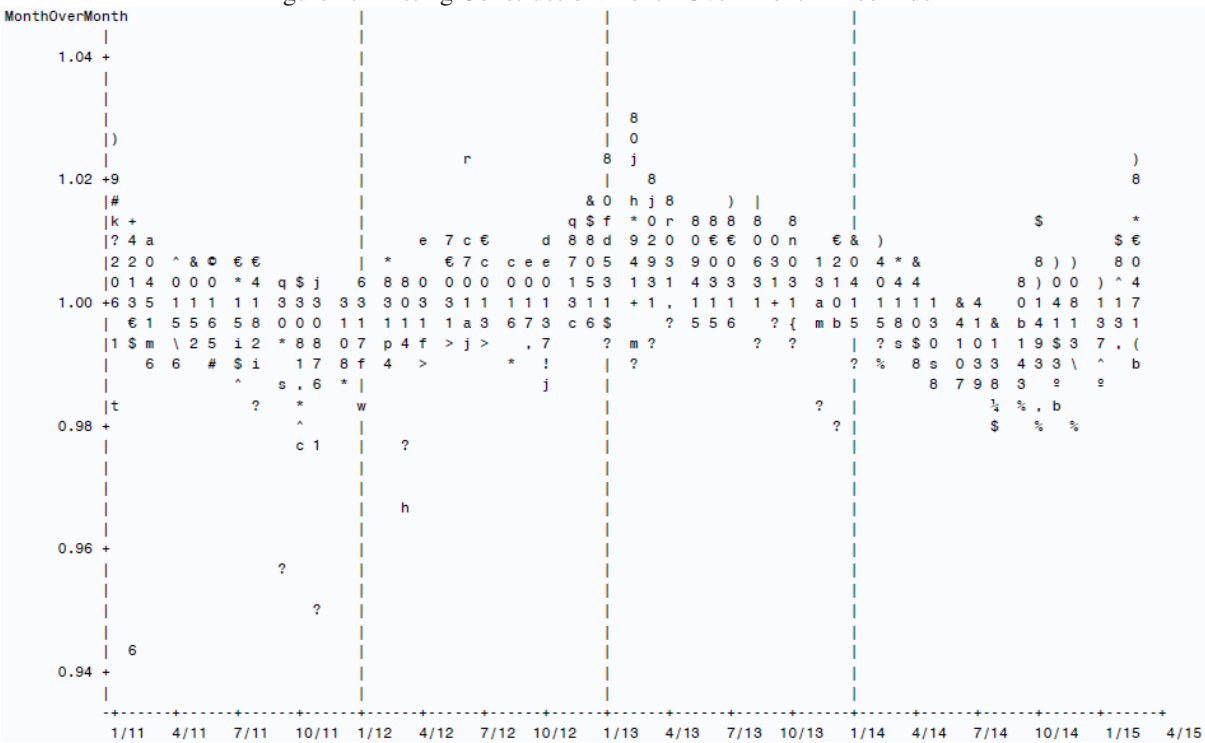


Figure 5: Existing Construction Year-Over-Year Price Index

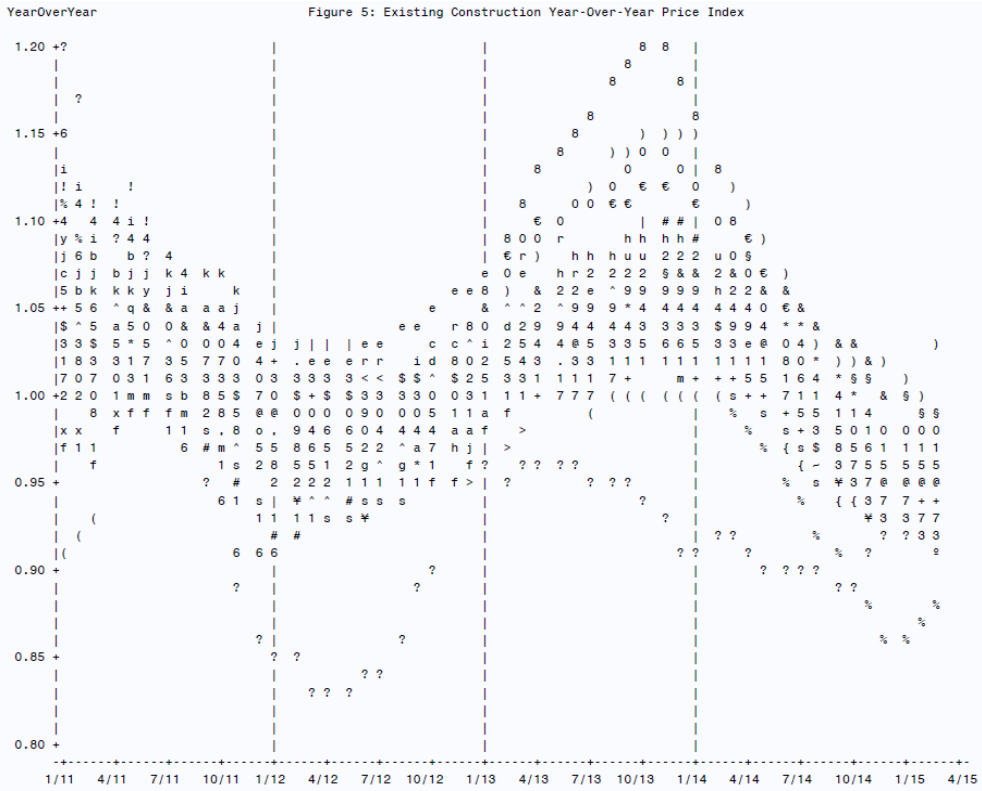
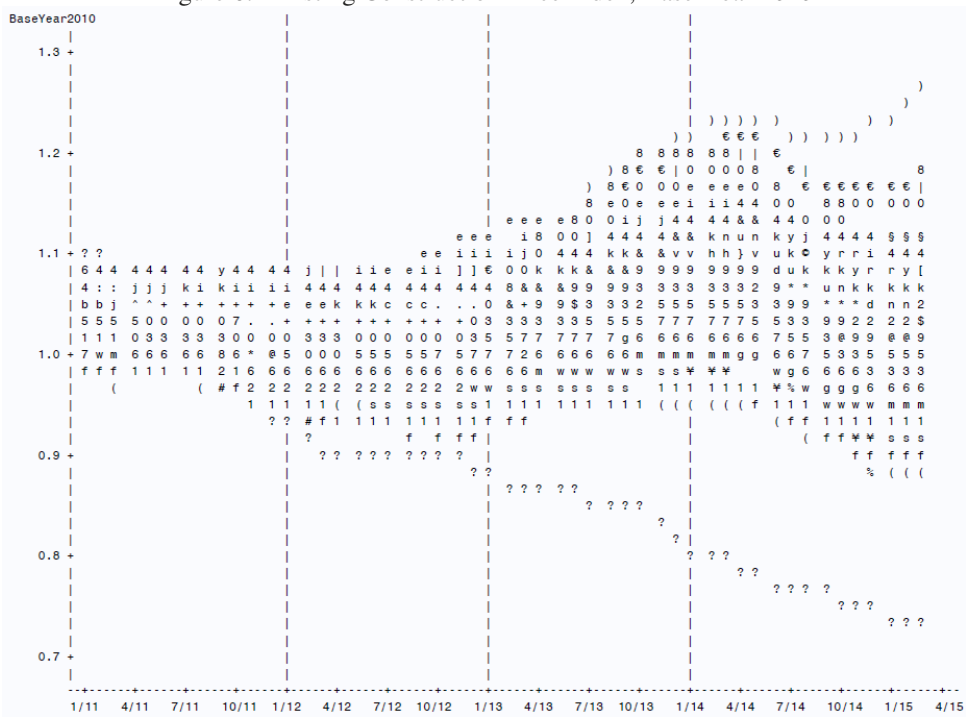


Figure 6: Existing Construction Price Index, Base Year 2010



0	Shanghai	7	Baotou	e	Taiyuan	m	Xuzhou	t	Guilin	?	Wenzhou	[	Xiangfan	:	Jining	|	Guiyang	§	Zhengzhou
1	Sanya	8	Beijing	f	Ningbo	n	Huizhou	u	Wuhan	.	Hohhot	]	Xining	+	Jilin	»	Changchun	&	Xiamen
2	Nanjing	9	Beihai	g	Anqing	o	Chengdu	v	Shenyang	#	Fuzhou	}	Bengbu	¼	Shaoguan	«	Changsha	^	Nanchang
3	Dandong	a	Tangshan	h	Yichang	p	Yangzhou	w	Quanzhou	,	Haerbin	{	Qinhuangdao	>	Yantai	¤	Chongqing	$	Nanning
4	Urumqi	b	Dali	i	Yueyang	q	Wuxi	x	Luzhou	"	Shijiazhuang	)	Shenzhen	<	Zhanjiang	°	Jinzhou	¥	Jinhua
5	Jiujiang	c	Dalian	j	Changde	r	Kunming	y	Luoyang	@	Nanchong	(	Haikou	*	Hefei	©	Yinchuan	€	Guangzhou
6	Lanzhou	d	Tianjin	k	Pingdingshan	s	Hangzhou	z	Jinan	~	Ganzhou	!	Zunyi	%	Mudanjiang	\	Xian	£	Qingdao

Table 1: New Construction Price Index Descriptive Statistics

	BaseYear2010	Year-Over-Year			Month-Over-Month		
City	PriceIndex-4/15	Mean	Std Dev	Median	Mean	Std Dev	Median
Wenzhou	0.756	0.942135	0.050729	0.9525	0.994673	0.009693	0.997
Hangzhou	0.913	0.987615	0.073039	0.9925	0.998558	0.011575	0.9995
Ningbo	0.938	0.990692	0.051558	0.9925	0.998519	0.00693	0.999
Haikou	0.972	1.000962	0.038705	1.0015	0.999096	0.003664	0.9995
Jinhua	0.981	1.0015	0.053016	1.0115	0.999173	0.008462	1
Tangshan	0.984	1.002077	0.020122	1.008	0.9995	0.003352	1
Quanzhou	0.994	1.00925	0.044772	1.005	1	0.006322	1
Bengbu	0.999	1.009827	0.037273	1.017	0.999635	0.005172	1
Qingdao	1.007	1.013673	0.057502	1.015	0.999577	0.007193	1
Sanya	1.009	1.008519	0.039354	1.003	1.000115	0.004914	1
Wuxi	1.015	1.009115	0.034119	1.0115	1.000019	0.005027	0.9995
Dali	1.021	1.012192	0.028258	1.0075	1.000289	0.004345	1
Anqing	1.025	1.012442	0.040719	1.013	0.999635	0.00461	0.9995
Shaoguan	1.031	1.017596	0.047994	1.027	1.00025	0.006471	1
Jiujiang	1.033	1.014981	0.039101	1.0195	1.000154	0.005356	1
Luzhou	1.043	1.019769	0.047108	1.0175	1.000731	0.007121	1.001
Baotou	1.047	1.020942	0.049576	1.0225	1.000135	0.006444	1.001
Nanchong	1.048	1.020231	0.052622	1.0035	1.000692	0.007081	1.0005
Yangzhou	1.049	1.018096	0.041546	1.025	1.000615	0.006043	1
Yantai	1.051	1.020154	0.04541	1.027	1.000519	0.005839	1
Huizhou	1.052	1.022558	0.043904	1.029	1.000596	0.005925	1.0005
Beihai	1.053	1.020154	0.044913	1.0165	1.000865	0.005881	1
Chongqing	1.064	1.023135	0.048939	1.025	1.000615	0.005925	1.0005
Changde	1.065	1.022096	0.038364	1.0295	1.000808	0.005467	1.0005
Chengdu	1.066	1.022692	0.046293	1.0235	1.000962	0.006126	1
Jinzhou	1.068	1.026462	0.051833	1.0265	1.000769	0.006656	1
Nanning	1.071	1.021289	0.045996	1.0205	1.001231	0.006461	1.0005
Hohhot	1.071	1.026404	0.048059	1.027	1.000808	0.006639	1
Dandong	1.072	1.027731	0.059771	1.0255	1.000173	0.006373	1
Xiangfan	1.075	1.0255	0.049797	1.028	1.000731	0.005895	1
Jinan	1.078	1.022904	0.043743	1.021	1.000981	0.005312	1.001
Ganzhou	1.08	1.023404	0.048303	1.0215	1.000481	0.006041	1
Changchun	1.08	1.025135	0.04164	1.0265	1.001058	0.005389	1.001
Qinhuangdao	1.081	1.028539	0.050725	1.03	1.0005	0.005806	1
Yichang	1.083	1.026	0.04593	1.0265	1.001154	0.005493	1.001
Guilin	1.083	1.03025	0.059716	1.033	1.001039	0.008675	1
Zunyi	1.084	1.026846	0.035773	1.039	1.001135	0.005217	1.001
Xuzhou	1.085	1.024077	0.045962	1.0325	1.001385	0.005902	1
Zhanjiang	1.085	1.031173	0.04679	1.0395	1.00125	0.006444	1.001
Jining	1.086	1.025192	0.038771	1.0285	1.001135	0.005126	1
Pingdingshan	1.087	1.026462	0.042538	1.031	1.001135	0.005831	1.001
Haerbin	1.088	1.026827	0.043862	1.023	1.000981	0.005765	1.001
Dalian	1.088	1.029789	0.04967	1.0345	1.001019	0.006455	1.0015
Jilin	1.091	1.027115	0.044741	1.029	1.000923	0.005573	1
Kunming	1.091	1.027942	0.040896	1.0315	1.001	0.005141	1.001
Mudanjiang	1.093	1.025846	0.037554	1.02	1.000692	0.004426	1
Luoyang	1.094	1.029192	0.045011	1.034	1.001385	0.006149	1.001
Yinchuan	1.094	1.029192	0.038761	1.028	1.001673	0.005505	1.002
Tianjin	1.096	1.025308	0.039746	1.032	1.001308	0.00536	1.0015
Shenyang	1.099	1.032769	0.065141	1.034	1.001135	0.007958	1.001
Guiyang	1.103	1.028192	0.031416	1.035	1.001462	0.00465	1.002
Taiyuan	1.107	1.028942	0.050576	1.013	1.001846	0.006279	1.001
Hefei	1.109	1.028327	0.041782	1.0195	1.001615	0.005077	1
Lanzhou	1.11	1.030519	0.043643	1.0255	1.001019	0.004621	1
Xian	1.111	1.032577	0.045697	1.0355	1.001846	0.005899	1.002

Nanchang		1.113	1.032481	0.05454	1.034	1.001346	0.006874	1.0015
Fuzhou		1.114	1.034173	0.058373	1.032	1.001923	0.007839	1
Wuhan		1.122	1.030539	0.047911	1.0335	1.001904	0.006153	1.002
Changsha		1.129	1.037712	0.060371	1.0495	1.00175	0.007404	1.002
Yueyang		1.135	1.034365	0.063543	1.0295	1.000769	0.007638	1
Nanjing		1.14	1.035019	0.063466	1.0145	1.002519	0.00731	1.002
Xining		1.158	1.041654	0.042278	1.0395	1.002	0.005351	1.002
Shijiazhuang		1.165	1.038481	0.046715	1.045	1.001885	0.005483	1.002
Urumqi		1.176	1.045942	0.048276	1.055	1.002442	0.006021	1.002
Shanghai		1.195	1.04775	0.082852	1.02	1.003442	0.009352	1.001
Zhengzhou		1.201	1.046154	0.047095	1.0455	1.002923	0.006167	1.0015
Guangzhou		1.224	1.055019	0.08041	1.0425	1.003731	0.009236	1.0025
Beijing		1.237	1.055365	0.078961	1.025	1.003731	0.008918	1.002
Xiamen		1.274	1.059885	0.057846	1.0585	1.004269	0.006979	1.002
Shenzhen		1.278	1.054673	0.073326	1.033	1.004692	0.008742	1.002
Overall	Mean:1.0789	Median:1.083	1.02445	0.0521	1.02	1.00097	0.00654	1
Below 90 sm	1.0977	1.0995	1.028416	0.05347	1.025	1.001239	0.00699	1.001
90-144 sm	1.0827	1.084	1.025466	0.05234	1.022	1.000992	0.00677	1
Above 144 sm	1.0516	1.0535	1.019829	0.0529	1.015	1.000422	0.00698	1

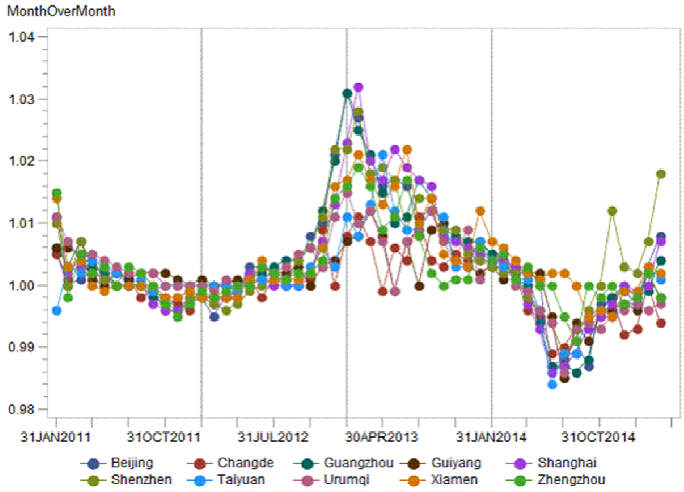
Table 2: Existing Construction Price Index Descriptive Statistics

	BaseYear2010	Year-Over-Year			Month-Over-Month		
City	PriceIndex- 4/15	Mean	Std Dev	Median	Mean	Std Dev	Median
Wenzhou	0.738	0.942019	0.087887	0.9175	0.993039	0.010553	0.995
Haikou	0.884	0.980647	0.024773	0.993	0.997745	0.003279	0.999
Mudanjiang	0.889	0.985692	0.059905	0.997	0.997365	0.008878	0.999
Ningbo	0.897	0.981404	0.032991	0.9805	0.998269	0.004703	0.9985
Jinhua	0.915	0.987308	0.040093	0.9975	0.998385	0.005895	0.999
Hangzhou	0.924	0.984962	0.037018	0.988	0.99825	0.005445	0.999
Sanya	0.933	0.989059	0.03727	0.989	0.998863	0.004414	1
Jinzhou	0.933	0.994846	0.028042	1	0.998635	0.004415	1
Quanzhou	0.943	0.992019	0.028851	0.997	0.998885	0.004605	1
Ganzhou	0.948	0.991615	0.024457	0.9965	0.998942	0.004085	1
Xuzhou	0.952	0.993769	0.023709	0.999	0.999039	0.004753	1
Anqing	0.959	0.995385	0.031469	1.0045	0.998846	0.004099	1
Baotou	0.962	0.998289	0.026764	1.004	0.99925	0.004878	1
Qinhuangdao	0.963	0.997154	0.031882	1.0025	0.998846	0.004041	0.999
Qingdao	0.969	0.999577	0.033471	1.004	0.998981	0.004027	1
Lanzhou	0.97	0.999216	0.046863	1.002	0.997706	0.008864	0.999
Yantai	0.97	1.001577	0.041088	1.0105	0.999058	0.005192	0.9985
Dali	0.972	1.003078	0.033928	0.998	0.998529	0.003957	1
Xi An	0.975	1.003843	0.035468	1.011	0.998941	0.004764	0.999
Haerbin	0.98	1.003365	0.029124	1.0085	0.999365	0.004798	1
Dandong	0.981	1.003846	0.029856	1.0105	0.999173	0.004157	1
Guilin	0.983	1.005431	0.031495	1.007	0.999235	0.005062	1
Jilin	0.988	1.003154	0.030121	1.005	0.999423	0.003816	1
Chengdu	0.988	1.002412	0.033527	1.009	0.999941	0.005562	1
Yangzhou	0.991	1.001442	0.028813	1.0055	0.999404	0.003225	0.999
Fuzhou	0.991	1.0035	0.053651	0.998	0.999808	0.006774	0.999
Shijiazhuang	0.993	1.000289	0.028397	1.0075	0.999558	0.00475	1.001
Changchun	0.998	1.006346	0.028897	1.011	0.999942	0.004304	1.001
Chongqing	1	1.004706	0.026196	1.006	0.999902	0.003817	1

Tangshan		1.002	1.005789	0.026518	1.0065	1.000058	0.00447	1
Jinan		1.003	1.006519	0.028079	1.009	0.999769	0.003562	1
Jiujiang		1.004	1.003846	0.029901	1.0075	0.999789	0.004667	0.9995
Bengbu		1.009	1.011673	0.031876	1.0145	0.999596	0.004754	1
Beihai		1.01	1.008706	0.036924	1.021	1.000235	0.005747	1
Nanchong		1.013	1.007294	0.028388	1.012	1.000157	0.004333	1
Luzhou		1.021	1.007	0.023788	1.009	1.000608	0.004186	1.001
Wuxi		1.023	1.010231	0.026942	1.015	1.000231	0.004332	1
Jining		1.023	1.011962	0.036853	1.01	0.999654	0.004325	0.9995
Nanning		1.025	1.007941	0.02603	1.008	1.000314	0.005812	1.001
Nanchang		1.025	1.009442	0.041137	1.025	1.000154	0.006086	1.0025
Hohhot		1.025	1.010154	0.025377	1.017	1.000173	0.003312	1
Shaoguan		1.026	1.011078	0.035489	1.02	1.000549	0.005707	1
Dalian		1.027	1.010442	0.033524	1.0155	0.999962	0.005629	1
Yichang		1.031	1.013154	0.044139	1.011	1.000346	0.006808	1
Changsha		1.042	1.014308	0.029018	1.011	1.000596	0.004253	1.0005
Tianjin		1.044	1.013212	0.03049	1.017	1.000558	0.005027	1.002
Zhanjiang		1.044	1.018333	0.033701	1.019	1.000137	0.003868	1.001
Nanjing		1.046	1.010962	0.039505	1.0005	1.000981	0.00529	1.002
Huizhou		1.046	1.018569	0.03686	1.022	1.000451	0.005569	1.001
Hefei		1.049	1.013539	0.037192	1.02	1.000539	0.00627	1.0015
Pingdingshan		1.059	1.019865	0.035522	1.0265	1.001115	0.005992	1.001
Yinchuan		1.062	1.020941	0.03761	1.024	1.001098	0.005182	1.002
Wujhan		1.064	1.0185	0.038429	1.015	1.000865	0.004707	1.001
Shenyang		1.066	1.018058	0.030914	1.0205	1.000712	0.004207	1.001
Kunming		1.069	1.025588	0.044848	1.031	1.00098	0.006866	1.001
Luoyang		1.073	1.023731	0.037635	1.0315	1.000827	0.005121	1.001
Xiangfan		1.091	1.026137	0.042057	1.025	1.00098	0.005187	1.001
Zunyi		1.092	1.024157	0.041147	1.017	1.000588	0.004206	1.001
Yueyang		1.097	1.027216	0.044974	1.029	1.000431	0.004627	1.001
Xining		1.097	1.024314	0.026903	1.023	1.001373	0.004152	1.001
Changde		1.1	1.026647	0.041965	1.032	1.001196	0.006347	1.001
Xiamen		1.102	1.027269	0.033797	1.0315	1.001904	0.005229	1.0025
Urumqi		1.107	1.026882	0.039945	1.028	1.000922	0.004218	1.002
Taiyuan		1.108	1.029058	0.031317	1.036	1.001577	0.004376	1.002
Zhengzhou		1.121	1.02825	0.034799	1.031	1.001481	0.004147	1.0015
Shanghai		1.157	1.034404	0.051359	1.0185	1.00275	0.006265	1.002
Guiyang		1.16	1.038451	0.036643	1.037	1.002118	0.00474	1.002
Guangzhou		1.178	1.039981	0.048475	1.0335	1.002904	0.006929	1.004
Beijing		1.182	1.037558	0.076713	1.013	1.003096	0.009149	1.002
Shenzhen		1.272	1.050294	0.053564	1.045	1.004569	0.007658	1.004
Overall	Mean:1.0198	Median: 1.017	1.009214	0.04102	1.01	0.999993	0.00551	1
Below 90 sm	1.0306	1.021	1.011583	0.04216	1.012	1.000183	0.00585	1
90-144 sm	1.0202	1.012	1.009194	0.04115	1.01	0.999981	0.00579	1
Above 144 sm	0.9913	0.9905	1.003588	0.04133	1.006	0.999391	0.00641	1

Figure 7: New Construction Month-Over-Month Price Index, Group 1 & 7

Group 1 (Top Performers)



Group 7 (Bottom Performers)

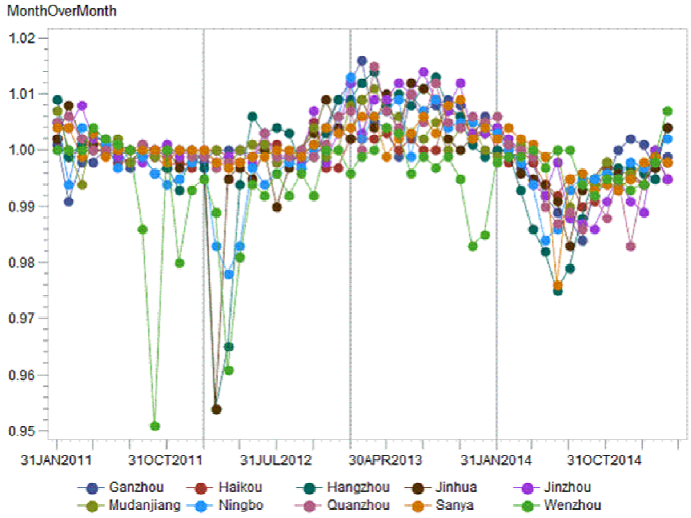
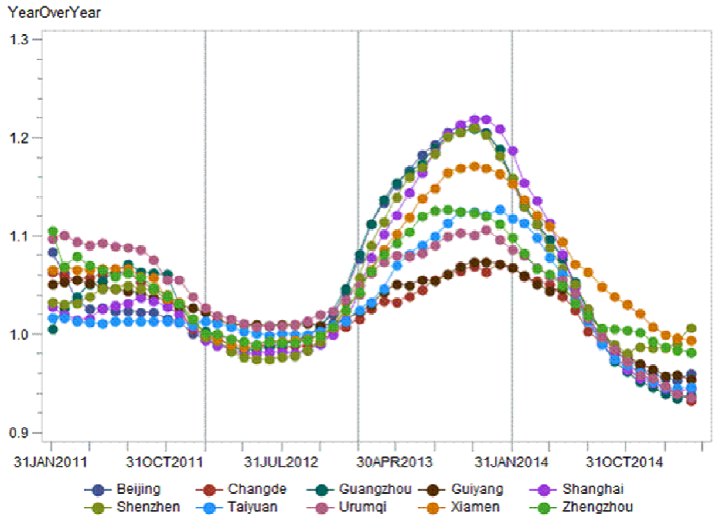


Figure 8: New Construction Year-Over-Year Price Index, Group 1 & 7

Group 1 (Top Performers)



Group 7 (Bottom Performers)

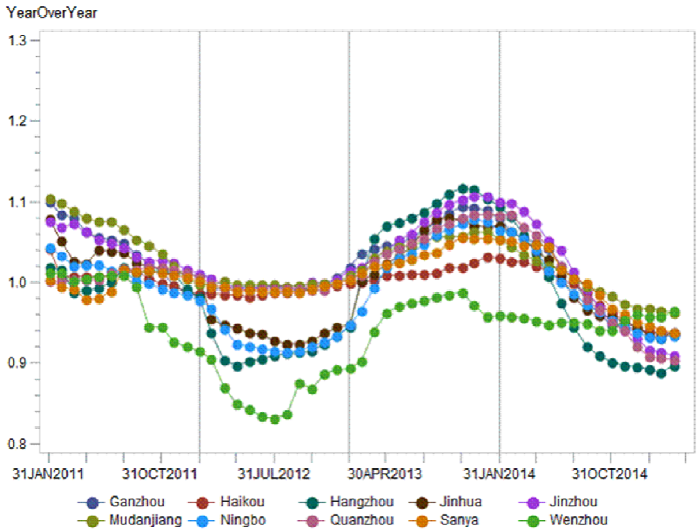
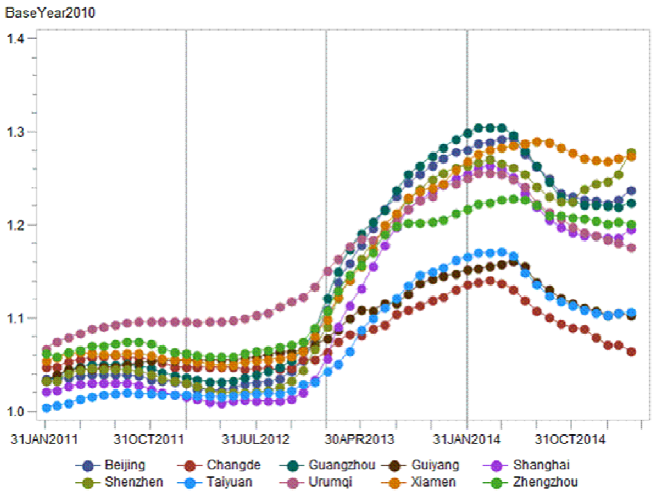


Figure 9: New Construction Price Index(Base Year 2010), Group 1 & 7

Group 1 (Top Performers)



Group 7 (Bottom Performers)

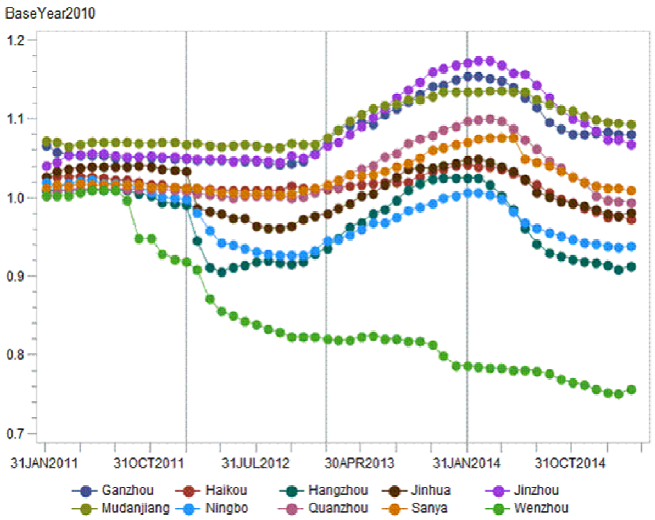
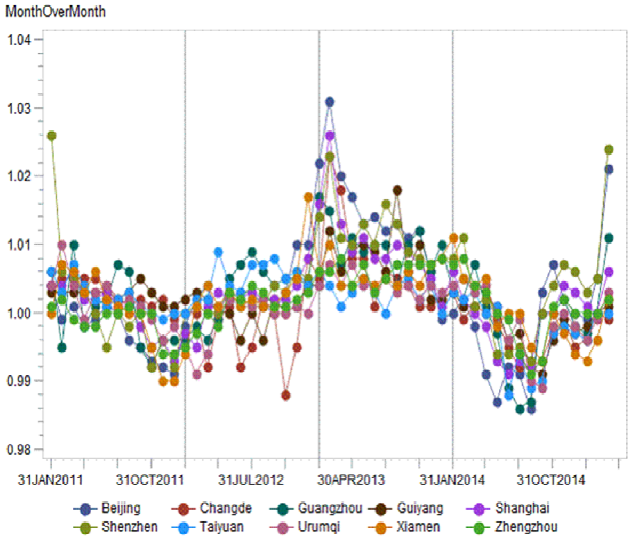


Figure 10: Existing Construction Month-Over-Month Price Index, Group 1 & 7

Group 1 (Top Performers)



Group 7 (Bottom Performers)

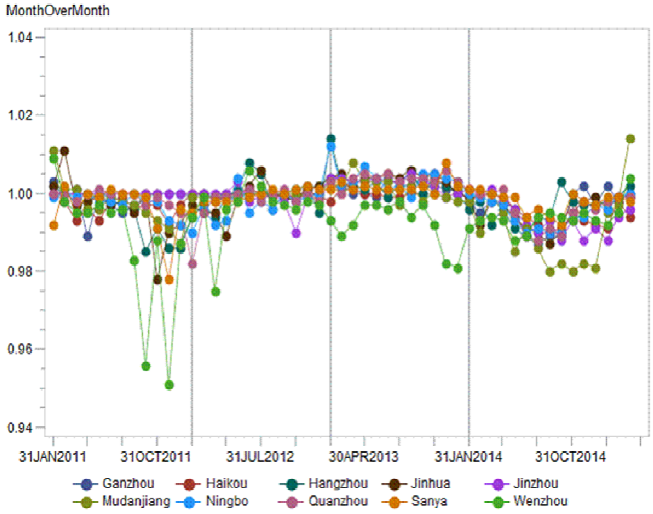
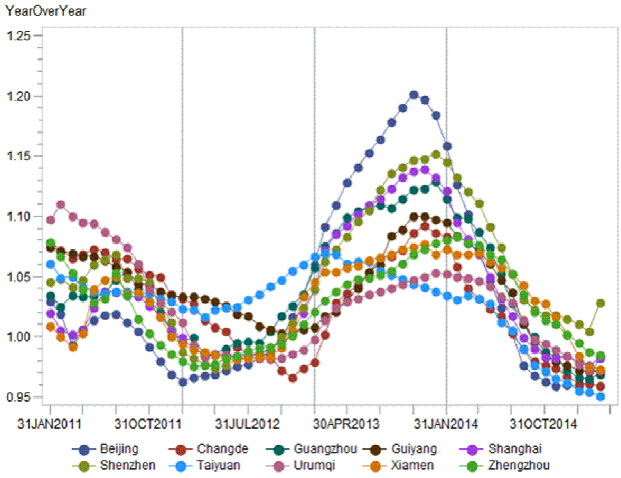


Figure 11: Existing Construction Year-Over-Year Price Index, Group 1& 7

Group 1 (Top Performers)



Group 7 (Bottom Performers)

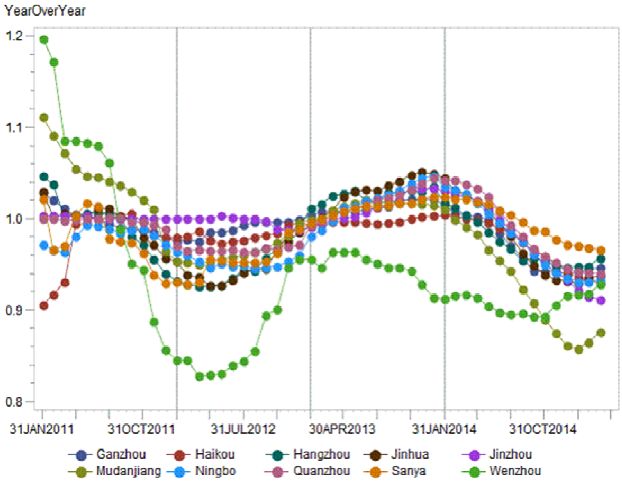
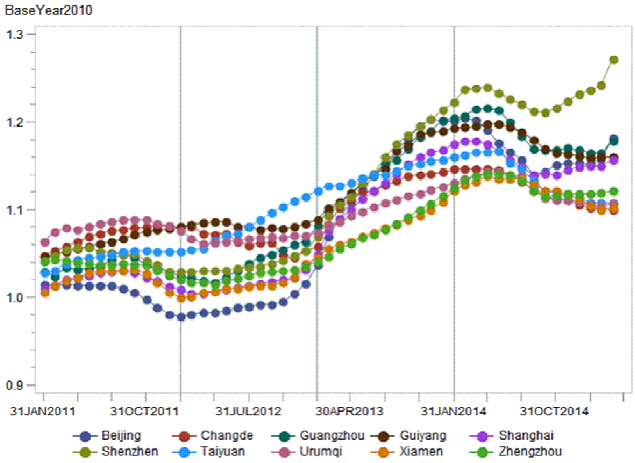
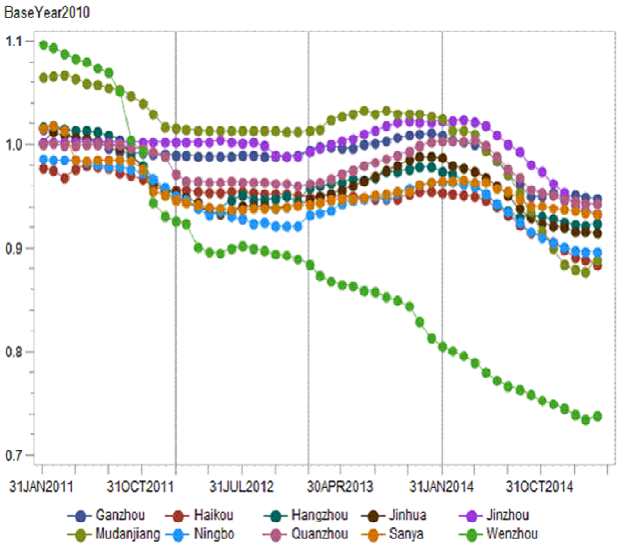


Figure 12: Existing Construction Price Index (Base Year 2010), Group 1 & 7

Group 1 (Top Performers)

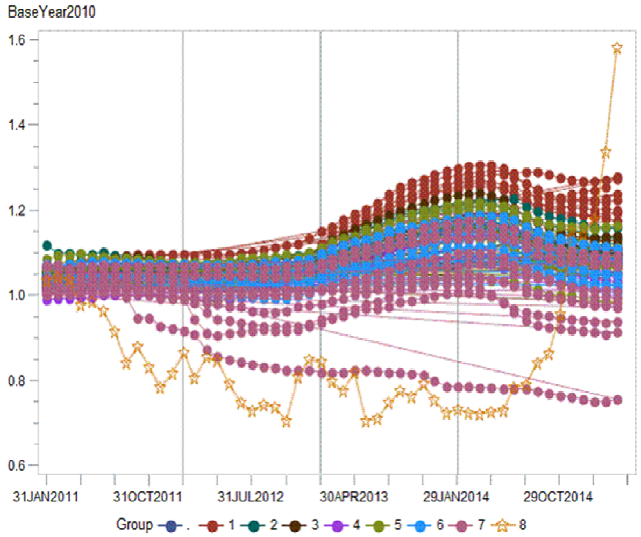


Group 7 (Bottom Performers)



We compare direct real estate overall returns for each city from 2011 to April 2015 with returns for the general stock market. Figure 13 shows that, over the period, the stock market rose by 58% while the average and median increases in real estate prices for new construction was only 8%. But the stock market consistently underperformed the direct real estate market until around July, 2014. The stock market started a dramatic climb from 27% below the 2010 base period in June 2014 to 58% above the base period in April 2015[3].

Figure 13: Stock Market Return Compared to Return of New Construction



-- Note: The golden star line represents the return for the general stock market as represented by the Shanghai Composite index. The dotted lines represent the real estate prices changes in each of the 70 Chinese cities. The comparison of the stock market returns to the price changes of existing buildings is very similar to that of new construction except that the price increase for existing construction is less than 2% on average versus the 8% increase for new construction.

It seems clear that new construction commands substantially higher prices than existing construction. However, the comparison is somewhat muddied because we do not have data that could show that we are comparing new and existing units of similar size and quality.

We further analyzed the data using Pearson correlation analysis. For month over month new construction data, all cities are correlated with each other at $p<0.05$ except Wenzhou. Wenzhou's monthly price index is correlated with only 6 cities, Nanjing, Xiamen, Ningbo, Hangzhou, Jinan, and Shenzhen at $p<0.05$. For year over year new construction data, all cities are correlated with each other at $p<0.05$ except Wenzhou. Wenzhou's annual price index is positively correlated with most cities at $p<0.05$ except Sanya, Nanchong, Quanzhou, and Luzhou. For price index with 2010 as the base year, again, most cities are correlated with each other at $p<0.05$. The exceptions are Tangshan, Ningbo, Hangzhou, Haikou, and Jinhua. These five cities are all from the bottom tier cities. Notice that Wenzhou's overall price index with 2010 as the base year is correlated with most cities except Tangshan, Bengbu, and Qingao at $p<0.05$. However, the correlation is negative with 62 cities and only positive with four cities (Ningbo, Hangzhou, Jinhua, Haiko). All the four cities that are positively correlated with Wenzhou are from the bottom tier cities. This seems to say that Wenzhou is getting more and more distressed as other cities rise. Investors are attracted away from Wenzhou when prices in other cities rise. In summary, with exceptions, the 70 cities' new construction month over month, year over year, and with 2010 as the base year price indexes are significantly correlated with each other. The exceptions came from the bottom tier cities.

For existing construction, Lanzhou and Wenzhou's monthly price patterns are in general not correlated with other cities with a few exceptions. All other cities' monthly prices seem to correlate with each other with a few exceptions at $p<0.05$. For annual price, Wenzhou is positively correlated with 53 cities and not correlated with 16 cities at $p<0.05$. Lanzhou are positively correlated with 66 cities and not correlated with only 3 cities at $p<0.05$. All other cities' annual prices correlate with each other at $p<0.05$ with exceptions. It is hard to discern a pattern when it comes to overall price index as of April 2015 compared to the 2010 as the base year. There are more correlated cities than uncorrelated cities. The bottom tier cities seem to have more uncorrelated situations than other cities. Wenzhou seems to be in general negatively correlated with other cities. In summary, with exceptions, the 70 cities' existing construction month over month and year over year price indexes are significantly correlated with each other. Although it is difficult to discern a pattern, for overall price index compared to the 2010 base year, there are more correlated cities than uncorrelated cities.

Regression analysis shows that price movements for existing and new construction are highly related to each other. New construction monthly price movement explains 46% of existing construction monthly price movement. New construction annual price movement explains 70% of existing construction annual price movement. New construction price index compared to the 2010 base year explains 55% of existing construction price compared to the 2010 base year. The results hold if we break the data into two groups, 2011-2012 and 2013-2015. The latter group shows a much higher correlation between the new and existing housing markets than the former. We hesitate to interpret this as the Chinese new and existing housing markets are becoming more in sync with each other over time without continuous data in the future to support this conclusion.

[3] Since the last data of data used in this study, the Shanghai stock index dropped from 4441 on 4/30/15 to 2737 by the end of January, 2016.

Table 3: Existing and New Construction Regression Analysis
Dependant Variable: Existing Construction Monthly Price Index
Overall Model: $p<0.0001$; Adjusted $R^2=0.4638$

Parameter Estimates				
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	42.8095	1.0193	42	<.0001
New construction monthly price index	0.5713	0.0102	56.11	<.0001

Dependant Variable: Existing Construction Annual Price Index
Overall Model: $p<0.0001$; Adjusted $R^2=0.7017$

Parameter Estimates				
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	33.4970	0.7297	45.91	<.0001
New construction annual price index	0.6582	0.0071	92.53	<.0001

Dependant Variable: Existing Construction Price Index, Base Year 2010
Overall Model: $p<0.0001$; Adjusted $R^2=0.5493$

Parameter Estimates				
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	38.1190	0.9828	38.79	<.0001
New construction price index, base year 2010	0.6061	0.0091	66.6	<.0001

Regression analysis shows that the stock market annual movement and the stock index compared to the 2010 base year are highly correlated with the existing construction housing market median annual movement and the price indexes compared to the 2010 base year. Existing housing market median annual price movement explains 28% of the stock market annual movement. The existing housing market median price index compared to the 2010 base year explains 15% of the stock market price index compared to the 2010 base year movement.

Many other researchers have studied the relationship between stock and real estate markets in various countries with varying results. Lin and Fuerst (2014) study nine Asian countries from 1980 – 2012. They find that the two markets were not related in six countries, including China, but were integrated in the most densely populated areas, including Taiwan, Singapore and Hong Kong. They believe areas with more frequent real estate transactions allow for better information and more transparency, which causes the two markets to move together. Lin and Lin (2011) also find no relationship between stock and real estate markets in China for the period March 1995 – June 2010. However Gao, Li and Gu (2012) conclude that the direct real estate market and stock market in China are integrated for the period 1999 – 2009. Chan and Chang (2014) study the Chinese markets for the period February 2003 to June 2011. They find that prices in the stock market have significant effects on the real estate market, but the reverse is not true. Zhang and Fung (2006) study the Chinese markets for the period 1997 – 2005 during which the real estate market was booming while the stock market was declining. They find that the two markets are negatively related to each other, and that the declining stock market was due in part to the large amount of funds flowing into the real estate market.

Still other researchers have studied the relationship between stock markets and real estate markets in countries other than China. Su (2011) finds evidence of a long-run equilibrium relationship between real estate and stock markets in Western European countries for the period 2000 – 2008. Casni and Vizek (2014) find varying degrees of codependence in the markets in all 30 developed and emerging economies they study for the period 1970 – 2012. The markets in countries with a market-based financial system and more developed economies tend to be more highly synchronized. Tsai, Lee and Chiang (2012), Heaney and Sriananthakumar (2012) and Hui and Ng (2012) find varying degrees of correlation between the stock and real estate markets they study in the U.S., Australia, and Hong Kong, respectively.

Studies of more developed economies tend to show a positive correlation between the stock and real estate markets, even though the relationship may be asymmetric in some cases.

If we use existing housing market mean annual and 2010 as the base year price indexes, instead of the medians, the results become insignificant. This helps explain the conflicting previous researches. The stock market and the existing housing market are correlated with each other using housing market medians, but not means. China's existing housing market extreme high and low performers makes the mean values less meaningful than the medians when trying to relate the real estate market to the stock market. The median existing housing price indexes are more representative of the housing market as a whole and are better interpreters of the stock market. Neither the mean nor the median monthly price movement of the existing housing market are correlated with the stock market monthly price movement.

Table 4: Stock Market and Existing Construction Regression Analysis

Dependant Variable: Shanghai Stock Market Monthly Price Index
Overall Model: p=0.0807; Adjusted R^2=0.041

Parameter Estimates				
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	560.8534	257.8668	2.17	0.0344
Existing housing market median monthly price index	-4.5977	2.5787	-1.78	0.0807

Dependant Variable: Shanghai Stock Market Annual Price Index
Overall Model: p<0.0001; Adjusted R^2=0.2761

Parameter Estimates				
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	628.9034	116.5041	5.4	<.0001
Existing housing market median annual price index	-5.2257	1.1556	-4.52	<.0001

Dependant Variable: Shanghai Stock Market Price Index, Base Year 2010
Overall Model: p=0.0027; Adjusted R^2=0.15

Parameter Estimates				
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	463.2407	119.1072	3.89	0.0003
Existing housing market median price index, base year 2010	-3.6498	1.1540	-3.16	0.0027

The stock market is correlated with the median new housing market's monthly and annual movement and also with the new housing market's mean annual movement. New housing market median monthly movement explains 6% of the stock market monthly movement. New housing market median annual movement explains 25% of the stock market annual movement. New housing market mean annual movement explains 23% of the stock market annual movement. The stock and housing market indexes compared to the 2010 base year are not correlated.

Table 5: Stock Market and New Construction Regression Analysis
Dependant variable: Shanghai Stock Market Monthly Price Index
Overall Model: p=0.0465; Adjusted R^2=0.0585

Parameter Estimates				
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	459.386	175.4922	2.62	0.0117
New housing market median monthly price index	-3.5790	1.7530	-2.04	0.0465

Dependant Variable: Shanghai Stock Market Annual Price Index
Overall Model: p<0.0001; Adjusted R^2=0.2497

Parameter Estimates				
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	431.4593	77.7272	5.55	<.0001
New housing market median annual price index	-3.2120	0.7577	-4.24	<.0001

Dependant Variable: Shanghai Stock Market Price Index, Base Year 2010
Overall Model: p=0.1144; Adjusted R^2=0.0301

Parameter Estimates				
Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	180.4115	58.4248	3.09	0.0033
New housing market median price index, base year 2010	-0.8680	0.5402	-1.61	0.1144

Sensitivity tests were performed by breaking the data into two groups, 2011-2012 and 2013-2015, to confirm the results. The existing housing market median annual movement and price index with 2010 as the base year are better indicators of the stock market than new construction data for both groups. However, for monthly movement, no significant correlation is found between existing housing and the stock market for both groups. For 2013-15 group, monthly new construction price movement is significantly correlated with the stock market monthly movement while the relationship is insignificant for the 2011-12 group.

Overall, the stock and housing markets are correlated with each other. Median values of the housing market movement are better interpreters of the stock market than the mean values in general. Existing housing market movements are better interpreters of the stock market in the long run. For short term movement, median new housing market monthly movement is a better interpreter of the stock market monthly movement. For brevity, this research reports the results using housing market medians, not mean values in

Tables 4 and 5.

V. Summary and Conclusion

China's direct housing regional markets are in general correlated with each other. However, this study indicates that there is a very large difference in potential return from investments in residential real estate depending on the city in which the investment is made. Over the period from January 2011 to April 2015, real estate price changes for new (existing) construction varied by city from a negative 24% (26%) to a positive 28% (27%). We especially caution investors about investing in south of Shanghai and in Hainan province. These are some of the most distressed areas in China.

The mean and median price increase is less than 2% over 4 plus years for existing construction, but about 8% for new construction. While location is something an investor can control, the investor cannot keep a residence new. Once a unit is purchased for the first time, it automatically falls into the existing building category. The only ones who can invest in new construction are the developers. Thus, the only way for the typical investor to invest in new construction is by investing in a development or construction company. Our comparison of new construction versus existing buildings in this paper is really a comparison of what a typical real estate investor can expect by investing in property that immediately becomes existing property when the purchase is made versus what a developer can expect from the initial sale of newly constructed units. From this point of view, it was the developers, not the actual property buyers that benefited most from the property market during our study period.

Small to medium size residences demand much higher price increases compared with the larger residences. This is true for both new and existing construction.

China's housing market is correlated with the stock market. The stock market has generally underperformed the real estate market until around July 2014 when the stock market started a remarkable climb from 27% below the 2010 base period in June 2014 to 58% above the base period in April 2015. The stock market seems to have the potential for high returns, but with a great potential for volatility.

Whether investing in the direct real estate market or the equity market will yield the best return depends on several factors including the location of the real estate, the size of the residence, as well as the correct timing of the investment. Our research provides an in depth analysis of these factors.

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