Retail rents dynamics in two Chinese cities

Abstract

This paper examines the retail rent dynamics of two Chinese cities, Beijing and Shanghai. We use an error correction modelling (ECM) framework to estimate long-run equilibrium relationships and short-term dynamic corrections. The study period covers 1999-2012. We also run tests to examine the presence of structural breaks. The empirical results suggest that both supply and demand significantly affect retail rents for both cities in the long run. However, in the short term, the change of rent responds to change in income for Shanghai market. Both markets have a rapid speed of adjustment, especially Shanghai market that is more price and income elastic. The results shed some light on the behaviour of retail rent adjustment processes in one of the largest and fast growing emerging markets.

Key words: retail rent, error correction model, Shanghai, Beijing, China

Introduction

Since the implementation of its ‘‘open-door’’ policy in 1978, China has attracted the world’s attention because of its rapid economic growth and the potential of its enormous consumer market. In 1992, the central government of China adopted a policy of opening its retail market. This policy of liberalising the retail sector provided the impetus for more co-ordinated retail development and investment as well as broadening the channels for foreign retail investors to tap into China’s huge retail market with a population of 1.3 billion. In the last decade annual consumers’ expenditure and retail sales have shown double digit growth rates. As one of the biggest emerging markets, China has attracted many multinational retail corporations that created the demand for modern shopping centres and malls. Lately, China’s retail property sector has been among the top destinations for global capital, though it is still categorised as “a growth market” (JLL, 2012).

In addition to these traditional retail fundamentals, China has been experiencing a structural shift from an export-oriented economy to a consumption-driven economy. Since 2007, the Chinese government has embarked on a comprehensive series of consumption boosting measures such as wage increases, tax adjustments, strengthening the social safety net, job creation, promotion of urbanization and affordable housing, intensive investment in transport infrastructure, and improving the quality of retail supply, moving away from the department-store dominated centres to modern, full-scale shopping centres. These government measures are expected to propel its retail sector for many years to come.

The Chinese market presents a compelling opportunity for retailers and investors. China’s retail sector has long been firmly underpinned by solid demand fundamentals—massive population, rapid urbanization and an emerging consumer class. However, the study of retail rent in China is scant, due to the relatively short history of retail market and incomplete data.

This paper represents the first systematic attempt to examine the importance of economic factors in determination of retail property value in two Chinese cities, Beijing and Shanghai over the period from 1999 to 2012. We estimate a long run rent model and set up an error correction framework in which we test short run adjustment processes. The study was inspired by the conspicuous lack of research on the determinants of retail rents in Chinese retail property sector, given the increased

prevalence of international investors' strong interest in and increasing exposure to Chinese retail property sector. Furthermore, as the markets considered are each to some degree international retail centres attracting multinational retail occupiers and investors, the analysis provides a useful reference for the comparison of rental change between prime locations in the two largest Chinese retail markets.

The paper is organized as follows. The next section reviews relevant literature, followed by a discussion of the evolution of retail markets in China with the focus on Beijing and Shanghai. The research data and the theoretical model are discussed before the empirical results are presented. We then conclude the paper by considering the significance of the results presented and outline limitations of the study.

Literature review

The existing literature on retail rent determination follows broadly two approaches. One approach follows central place theory, agglomeration economies and demand-externalities to examine the impact of characteristics and location of retail property on rent. Most studies focus on developed western countries such as U.S and Australia (e.g. Sirmans and Guidry, 1993; Benjamin, et al., 1990 and 1992; Des Rosiers et al., 2005; Hanna, et al., 2007; Vernon, 2012). These studies find that location, size, age of the building, retail image, tenant mix and lease length affect retail rents. Sirmans and Guidry (1993), for instance, examine rental variations across shopping centres in the U.S, using customer drawing power variables such as size, age, and type of anchor tenants, architectural design, location and general economic conditions and find that the dependent variables considered explain about 85% of the variation in rent. Similar studies were conducted by Hui et al. (2007) for the Hong Kong retail market and Yuo et al. (2011) for retail rents in the U.K.

Another approach looks at the demand for and supply of retail property and their impact on retail property rent. The economic theory these studies are based upon is that the price is determined by the interaction of demand and supply. However, there is no direct measure of the demand for retail property. Demand in the retail property market is largely a function of the derived demand for retail space—that is, demand from the end user, the consumer. Retail sales and consumers' expenditure are often used to proxy this demand. The other variables representing demand include GDP, employment, and disposable income. The supply side is captured by such variables as the stock of retail space, vacancies, and new construction.

The prior research found that consumer expenditure, as a proxy for demand, affects retail space and rent. The evidence on the relationship between rents and the supply of space is not as clear. The impact of supply is consistently negative in the long run, though not always significant in the short run. These studies suggest that retail space supply is slow to adjust to changes in demand as measured by the level of retail sales or retail employment (e.g. Benjamin, et al. 1993; Benjamin, et. al. 1995; Eppli and Shilling, 1995). The long adjustment lags indicate a possible explanation for the prolonged cycles in the retail space market. Benjamin, et al. (1998) developed a simultaneous model of retail space demand and supply and linked the vacancy rate to retail rent. The results show price inelasticity of demand and supply for retail space. Gregory, et al. (2001) estimate the relation of retail rent per square foot to retail sales per square foot in a regional shopping centre with an econometric model. They find that average rents per square foot do not respond immediately to a change in the retail sales of the shopping centre. They attribute this to the fixed lease arrangement

and rent smoothing. However, they failed to consider the factors that affect retail sales. Hanna, et al. (2007) find that changes in employment, space absorbed and the vacancy rate have a significant impact on retail rent in Houston, U.S. More recently, Hendershott, et al. (2013) used an error correction modelling (ECM) approach to analyse the retail rents of 11 U.S. cities. They estimated a long run rent model and used error correction models for short run rent, vacancy and supply adjustment and found that in the short run, rent responds partially to changes in retail sales.

The empirical research on retail rent in the U.K (e.g. Key, et al. 1994; Tsolacos, 1995, Colwell and Jackson, 2003), the other European cities (D'Arcy, et al. 1997) employ single-equation models and find that demand side variables such as GDP and consumers' spending are significant factors in determining retail rental value. For example, Key, et al. (1994) developed national and regional models of retail rents for the U.K. A reduced form equation for rent determination is used which is designed to capture demand and supply conditions in the retail property market. Real consumer spending is found to be the principal demand side influence on rents. On the supply side, floor space and construction starts are also found to be significant in the national model. Tsolacos (1995) studied the importance of broad economic factors in retail property markets as determinants of retail rental value in the U.K. using a reduced form equation based upon a structural demand-supply model. The study finds that retail rental changes are explained by GDP and consumer expenditure, i.e. demand-side factors, whilst the supply side factor, proxied by the volume of retail building, was insignificant. Hendershott, et al. (2002) used error correction modelling (ECM) techniques to analyse long-run equilibrium relationships and short-term dynamic corrections of retail and office property in the U.K. They found both demand proxied by consumer expenditure and supply proxed by floor space and new orders had a significant impact on retail rents for most regions of the U.K.

Modern retail shopping centres and supermarkets did not exist in China until 1992 when the Chinese government opened its retailing market to foreign investors. However it restricted foreign investment to the six major cities and five special economic zones in the form of joint venture shopping centres. This restriction was lifted in 2004. So far existing research on Chinese retail focused on distribution reform, the competitive strategy for foreign retailers to enter the Chinese retail market and changes in Chinese consumer behaviour (e.g. Cui and Liu, 2001; Mai and Zhao, 2004). Some of these studies investigated the factors that affected a shopping centre's attractiveness, and its performance (e.g. Wong and Yu, 2003; Wu and Tian, 2009), but these studies did not relate the characteristics of shopping centres to retail rent. There is little literature devoted to the analysis of rental performance of retail property apart from one research paper by Liang and Wilhelmsson (2011) who studied the rent of 109 retail properties in Shanghai. They adopted central place theory, agglomeration economics and demand-externalities to examine the impact of characteristics and location of retail property on rent and found that building age, retail space area, the distance to the Jing An central business district were significant variables in explaining rental differences between retail properties. There are a few studies of Chinese commercial real estate markets that investigate office rents and their adjustment processes in Shanghai and Beijing (e. g., Ke and White, 2009 and 2013, Lecomte, 2013). To the best of our knowledge, there is no study investigating the determinants of rental change in the retail property sector in China, mainly due to the lack of quality data. The study aims to enhance the understanding of the retail property market and its performance in China's two largest commercial real estate markets – Beijing and Shanghai.

The development of the retail sector in China

In the pre-reform era, Chinese retail was comprised of state enterprises sharing a monopoly with collective enterprises. Government regulations and controls influenced the distribution channels through frequent or ongoing price controls, subsidizing products, and rationing. Private retailing was illegal and called the "black market". The department store was the backbone of the retail industry in Chinese cities. The higher end of the retail market in cities like Beijing and Shanghai was dominated by a few large, state-owned department stores located in the central areas of the city. The retail property was owner-occupied. There was no commercial retail property market in China.

In 1992, the central government decided to open its retail market in six large cities and five special economic zones to foreign retailers and investors as a strategy to accelerate the country's tertiary industry growth, and create more job opportunities (Lam, 1995; Shi and Yang, 1998). China permitted the investment of foreign funds into its retail industry. More specifically, foreign investment in retail developments were required to take the form of a joint venture with a Chinese company, and these joint ventures could only be developed in five special economic zones and six cities, namely, Beijing, Shanghai, Tianjin, Guangzhou, Dalian and Qingdao. As a result of the stringent regulation, only 18 joint venture retail enterprises were approved by the central government by the end of 1997, but more than 200 joint venture retail enterprises were established with the approval of the local authorities (Chang, 1998; Wang and Liu, 1998) with the attempt to boost their cities' profile.

Since 2004, to fulfil its World Trade Organization (WTO) obligations, China lifted all remaining restrictions. Foreign retailers are permitted to establish business operations, both retailing and wholesaling, anywhere in China; operate wholly owned retail enterprises and joint ventures and sell goods through other channels, including television, telephone, mail, internet, and vending machines. With the exception of wholly owned foreign enterprises, provincial governments delegated the authority to approve entrants in their respective jurisdictions (Han 2003).

Retail reform in China consists of several components: pricing reform, dismantling the state monopoly, and the reform of state retail enterprises. Price controls over most commodities had been removed by the late 1990s. Many restrictions on non-state retail development have been lifted. Like other industries, the retail sector experienced a shift from a state monopoly to a diversified structure of ownership (Wang and Chan, 2007). The rapid growth of non-state sectors, especially the entry of foreign retailers, has intensified competition, and greatly inspired retail innovations in a relatively monotonous market, and led to the emergence of many new retail formats and retail property market.

Rapid economic growth and increases in incomes in China has stimulated a huge and expanding demand for services and retail property. However, China is highly heterogeneous. Major differences exist in income, living standards, consumption patterns, the nature of the retail distribution and supply systems and local governments' approach towards retail modernization, between urban and rural areas, within regions, and among cities. Beijing and Shanghai are chosen for study because they are among the first cities to open up to foreign retailers; they are the largest cities in China, the most important economic and commercial centres; their retail systems are the most advanced with the largest number of shopping centres and foreign retailers, the biggest department stores and the largest diversified retail conglomerates in China. They have the largest commercial retail space and

are the most transparent real estate markets in China. What is more, the data in these cities are more readily available compared to other Chinese cities.

Beijing is the cultural and administrative capital of China. Large state-owned Chinese enterprises have offices or headquarters in Beijing, which are the largest employers in the city, many of the largest foreign firms also have a presence in Beijing. A strong presence of top enterprises and company headquarters suggests a fast accumulation of high-income executives and high net-worth individuals in Beijing, which back the creation of many new submarkets throughout the city. Shanghai has a long history as the commercial centre of China. In 2009, it was designated by the State Council to be developed into a global financial centre. In the span of two decades, the market has grown from only a few centrally located 'retail streets' into a large number of hubs to serve Shanghai's rapidly expanding urban area.

Shanghai and Beijing are the second and third most populous cities in China with populations of 14.3 million and 13 million respectively in 2013. They are the wealthiest cities in China, too. Since 2000, the retail sales of consumer goods in Beijing and Shanghai grew at double digit every year (see Figure 1).

Insert Figure 1 about here

The fast economic growth in China has increased household income. In the last decade, average income has increased greatly. For instance, in 2000, the average income was 9,371 Yuan and in 2012 it had increased to 47,593 yuan (China statistics Bureau). Beijing and Shanghai are the wealthiest cities in China and the average income in these two cities is significantly higher than the national level. For example, in 2012 the average income in Beijing and Shanghai was 85,306 Yuan and 80,191 Yuan respectively, which is 1.8 times and 1.7 times that of the national average income and experienced double digit growth (Figure 2).

Insert figure 2 about here

However, the average urban consumer expenditure accounted for circa 50% of the average income (see Figure 3). There is a massive amount of savings which are consistently higher than or approximately equal to GDP in these two cities. For example, by the end of 2012, the savings in Beijing were 1.2 times of its GDP; while the savings in Shanghai are about 97% of its GDP (China Statistics Bureau), implying the potential for enormous consumer expenditure.

Insert figure 3 about here

The two cities are often the first cities of choice for major international brands entering China. They are also the cities that can accommodate a large number of stores for each brand. Over 100 international fashion stores were already established in these cities, which increased the demand for retail space. From 1999 to 2012, the retail space completed totalled 27.31 million square meters, among which, 10.1 million square meters of space was sold in Beijing (see figure 4) . In Shanghai, the total retail space completed was 22.8 million square meter and 15.5 million square meter of the space was sold (see figure 5). The remaining space is owner occupied. By the end of 2012, Beijing had a gross floor area of shopping malls/centres of 6.3 million square meters and Shanghai had about 2 million square meters (DTZ, 2012). Furthermore, the quality of retail properties has been improving and is becoming an important investable asset.

Insert figures 4 and 5 about here

Relative real estate portfolio weightings are expected to move in favour of China in the future. Currently, investment is going to favour the major cities such as Beijing and Shanghai, because that is where the consumer demand is strongest and the infrastructure is most modern, the markets are most transparent. Investors, foreign and domestic, are lured by the vast potential of retail property as an investment asset. However, there is little research on retail property rent and its determinants. This study aims to shed some light on the performance of retail property sector in the two markets and contribute to the understanding of the retail rent movement, its determinants and adjustment processes.

Data and methodology

Data

We use semi-annual retail property rent for Beijing and Shanghai over the period 1999-2012. The retail property data are collected from DTZ market reports. The data are monthly average asking rent per square metre for the stores that are available to let in any given period in the prime commercial districts in the two cities and do not take in account rent free periods. In the similar studies of retail rents in the U.K and the U.S markets (e.g. Tsolacos, 1995, D'Arcy et al. 1997, Hendershott et al. 2013), asking rents were used in the models due to the unavailability to effective rents. The effective rent data are not available for this study, too. Retail space in Shanghai refers to department stores and shopping malls with a gross floor area of over 10,000 sqm. The Shanghai rent data comprise of shopping centres in five first tier commercial hubs: West Nanjing Road, East Nanjing Road, Huaihai Road, Xujiahui and Lujiazui. These are the investible grade retail properties. Unless otherwise specified, the retail rent variable is the average highest asking rent per square metre per month of the selected department stores or shopping malls in these prime commercial districts

Beijing data of retail space comprise the shopping malls in the following prime commercial districts: Asian Games Village, CBD, Chaowai, Lufthansa, Wangfujing/East Chang Ji Avenue, Wang Jing, Xidan. DTZ reports the highest and lowest retail rents in each of the districts. The rent used in the paper is the average highest asking rent per square metre per month in these districts. The highest rents are likely to be more sensitive to economic changes.

We collect a broad set of demand side and supply side variables; they are gross domestic product (GDP), average urban consumer expenditure (AUCE), retail sales (RS) and income per capita (INC); all the data are measured in nominal terms and then deflated for analysis purposes. The supply side variables include the total stock (TS) and retail property investment (INV). Not all of these data are included in the model due to high and significant correlation between many of them (see the correlation matrices in the appendix, all combinations of variables show statistically significant correlations at the 95% or 99% levels). These data were collected from China Statistics Year Book, Beijing Statistics Year Book and Shanghai Statistics Year Book.

Insert figure 6 about here

Figure 6 shows the pattern of real rents in each city from the second half of 1999 until the second half of 2012. Rents in Shanghai show a significant increase in 2003, rising then more gently until 2008 before falling slightly. In November 2001, China entered the World Trade Organization (WTO), which opened the Chinese market for more international trade and investment and opened up the world economy for Chinese exports. As an important trade and export hub in China, Shanghai benefited immediately from this event. From 2002 to 2007, the GDP growth rate in Shanghai was consistently over 12% per annum. The disposal income growth rate reached a peak in 2003 before falling, then rose continuously to 2008 (as displayed in Figure 2). However, the supply of completed retail space in 2002 remained more or less at the level of the later 1990s (as shown in Figure 5), all of these would cause the structure break point in 2003 in the Shanghai rental time series.

Rents in Beijing show a general decline until 2005 before increasing and then falling back before they display a brief peak in 2009, falling back again and then rising towards the end of the time period. Hence the patterns of rental movements are quite different in each location. It might be the case that there are structural breaks present in these markets. Before the Olympic games in Beijing, 2008, most resources were diverted to constructing sports facilities, so, there was limited increase in newly completed retail space from 2006-2009, especially in 2009, new starts and newly completed areas declined, which could have resulted in the severe shortage of supply and rising retail rents in 2009. Thus, in Shanghai there may be a break in 2003 while in Beijing rents seem to spike in 2009 and is notably different from the immediately preceding and subsequent periods in the data set.

Methodology

The retail rental model employed here is based upon the widely accepted approach that considers adjustment processes in real estate markets. Most of the recent research using this has done so in the context of office markets first and has then been extended to retail markets (Hendershott et al 2002 and Hendershot et al 2013), arguing that the retail markets often show similar patterns and amplitudes of volatility and hence it would seem appropriate to employ the same modelling framework.

Demand for retail space is a function of the cost of space and the revenue generated through sales.

$$D = I_0 R^{I_1} E^{I_2} \tag{1}$$

where *D* is demand, *R* is rent, *E* is an economic variable reflecting the retail market, $\lambda_1 < 0$ is the 'price' elasticity and $\lambda_2 > 0$ the 'income' elasticity. In equilibrium demand and supply equate at the market clearing rent and the vacancy rate is at its natural rate. Solving for rent and in logs we have:

$$\ln R = \gamma_0 \ln \lambda_0 + \gamma_1 \ln E + \gamma_2 \ln SU + \gamma_2 \ln(1-v) + u_t \tag{2}$$

where R is rent, E is economic activity, and SU is stock. We do not have vacancy rate data for the retail markets in Beijing or Shanghai. To account for the vacancies that would exist in equilibrium, following Hendershott et al. (2002) we add and subtract $\gamma_2 \ln(1\text{-}v^*)$ from the right hand side of (2) assuming v^* is constant. This gives the long run model:

$$\ln R = -\gamma_0 + \gamma_1 \ln E + \gamma_2 \ln SU + u \tag{3}$$

The impact of vacancies are captured in the error term. This formulation has also been employed by Hendershott et al. (2002) in their analysis of both office and retail markets in the U.K. The coefficients on γ1 and γ2 are expected to be positive and negative respectively. Price and income elasticities can also be retrieved. The residual from this relationship is the difference between actual rent and those values estimated by the model. Hence:

$$u_t = \ln R_t - \hat{\gamma}_0 - \hat{\gamma}_1 \ln E_t - \hat{\gamma}_2 \ln SU_t \quad (4)$$

Where u_t is the residual from the long run model. If (3) is a cointegrating relationship comprising individual variables that are integrated of order one, I(1), then the error term will be integrated of order zero, i.e., is stationary, I(0), and an error correction mechanism can be constructed using the lagged value of the residual from (1) in a short run dynamic model:

$$\Delta \ln R_t = \beta_0 + \beta_1 \Delta \ln E_t + \beta_2 \Delta \ln SU_t + \beta_3 u_{t-1} \quad (5)$$

In this model, the change in rents is a function of the change in demand and supply and is also related to the lagged difference between actual and long run rent reflecting market disequilibrium. The coefficient on the change in demand (E) is expected to be positive while that on supply change is expected to be negative. The coefficient on the lagged error term from (3) is expected to range between 0 and -1 where a 0 value implies no adjustment, -1 implies full adjustment and values within this range of 0 to -1 imply partial adjustment. A value smaller than -1 implies over-adjustment.

Given the patterns displayed in retail rents, we also consider whether there are structural breaks present. The graph of rental value may suggest that breaks exist in each city. For example, in Shanghai there may be a break around 2003 while in Beijing there may be some unobserved factors causing rents to spike in 2009. In the case of Shanghai the break may represent a structural change in the market and the upward jump in rents after 2003 does not adjust back to pre-2003 rents during the remainder of the time period covered by the dataset. In Beijing, it is unlikely that there is a structural break as rents seem to revert to a similar pattern of movement after the peak in the second half of 2009.

In practice we do not impose a break but instead empirically test whether there is empirical evidence of a break. However as it is possible that more than one break occurs we employ the multiple break point test of Chow and Bai and Perron (2003).

Results

As a preliminary step before estimation of time series models, unit root and stationarity tests are conducted on each of the variables. Tests including the Augmented Dickey-Fuller test, and those proposed by Phillips and Perron (1988), and Kwiatkowski, et al (1992) are conducted.

Insert table 1 about here

Table 1 presents results from unit root (ADF, PP) and stationarity (KPSS) tests on variables in the datasets for each city. There are four variables that capture demand side influences. These are gross domestic product (GDP), income per capita (INC), retail sales (RS), and average urban consumers' expenditure (AUCE). On the supply side, retail property investment (INV) and total stock (TS)

variables are used. While the PP tests frequently show that variables are I(1), ADF often suggests a higher order of integration. This has implications for the format in which variables may be entered in equations.

In addition, while there are a number of different demand side factors, in practice it is not possible to include each of them in the rental models due to highly significant correlations between them as seen in table A in the appendix. All pairs of variables have significant correlations and hence in estimation we choose the variable that contributes to the highest explanatory power in the models.

Next we test for the presence of structural breaks in the rental time series for each city. Using the Chow breakpoint test for each city, results can be found in table 2 below.

Insert table 2 about here

The results in table 2A for Beijing suggest that there is no break in the time series. None of the test statistics are significant at the 5% (or even 10%) significance levels and hence we cannot reject the null hypothesis of no break. In contrast, results for Shanghai in table 2B suggest that there is a break in the first half of 2003. Results are statistically significant at the 5% level. Following on from this, we enter a dummy variable in the long run model for Shanghai each time period from 2003Q1 onward taking the value of 1.

Insert table 3 about here

Table 3 presents the results of the long run models. All explanatory variables are statistically significant with the expected signs in the long run models for both markets. Demand is captured by income per head which is positively significant. Rent is negatively and significantly affected by stock, a supply side factor. The retail rents for Shanghai are positively affected by the structural changes that seemed to increase rents from 2003 onwards for this market. Around 44% of the variation in Beijing retail rent is explained by the model while almost 95% of the variation in Shanghai rent is explained. Table 4 presents Johansen cointegration tests for Beijing and Shanghai.

Insert table 4 about here

Both the trace and maximum eigenvalue tests are employed. Both tests indicate the presence of one cointegrating vector for Beijing and possibly two for Shanghai. Therefore we proceed to estimate the short run error correction model which is presented in table 5 below.

Insert table 5 about here

The change in income per capita is significant and correctly signed for Shanghai but is insignificant in Beijing at the 5% level. The supply variable captured by total stock is insignificant for both cities. The break point variable (only for Shanghai) is significant. The results suggest evidence of adjustment in rental values as the error correction term is statistically significant with the correct sign. The implied speed of adjustment is just over 40% in Beijing, suggesting that around 40% of any imbalance is corrected within one half-year in Beijing market. The speed of adjustment in Shanghai market is even faster than the Beijing market with 90% of any imbalance being corrected over one half-year. However the Shanghai model has a lower explanatory power and has some evidence of

autocorrelation. Adding the lagged dependent variable as an explanatory variable did not alter the overall findings presented above.

From the long run models estimated above, price and income elasticities are calculated and presented in table 6 below.

Insert table 6 about here

Results for both cities indicate an elastic responsiveness in retail rent, the effects being more sensitive in Shanghai than in Beijing. These are significantly higher than those found by Hendershott *et al*. (2002) who estimated elasticities for London retail. This may be a reflection of the significant changes experienced in the cities economies and retail markets but requires further research.

Conclusions

The economic growth, urbanization, large population and fast growing wealthy middle class group in China provides huge potential for retailers, retail property developers and investors. However, the study of the determinants of retail rents in Chinese cities is scant due to the short history of modern retail shopping centres and shopping malls in China and unavailability of quality data. This is the first paper that analyses the retail rents in China. The aim is to contribute to better understanding of retail property markets in China's two largest commercial real estate markets, Beijing and Shanghai.

This paper has applied an adjustment model to explain retail rental movements. The long run models show significant relationships between rent and key drivers on the demand and supply sides of the market. While there is a range of demand variables, the statistically significant correlations between them meant that one variable had to be adopted to capture demand influences. The income variable used is significant in each city. In the short run models, the error correction terms are significant and correctly signed a priori. The change of retail rents in Shanghai responded to demand; the supply side's effect is insignificant whilst the change in retail rents in Beijing is not significantly related to changes in demand and supply. The coefficients on the error correction terms imply that both of the cities show relatively rapid adjustment after exogenous change. Rents are price and income elastic, and the Shanghai market is notably more sensitive. This could be attributed to the institutional setting. In China, the lease term is relatively short, 1-3 years' lease term is the norm. The supply of retail space is less constrained, so the rent is more sensitive to the change in demand and the adjustment process is relatively rapid.

The short time series of retail rent and the quality of the rent is main constraint for this type of research, though we endeavour to run various tests so that the results can be as robust as possible. A longer time series would permit more advanced treatment for the break found in Shanghai rental patterns. However this will take a much longer time period to become available and would provide a logical step for future research in this field.

References:

Bai, J. & Perron, P. (2003). Computation and analysis of multiple structural change models. *Journal of Applied Econometrics,* 18, 1–22.

Benjamin, J. D., Boyle, G. W. & Sirmans, C. F. (1990). Retail leasing: the determinants of shopping centre rents. *Journal of the American Real Estate and Urban Economics Association,* 18, 302-312.

Benjamin, J. D., Boyle, G. W. & Sirmans, C. F. (1992). Price discrimination in shopping centre leases. *Journal of Urban Economics,* 32, 299-317.

Benjamin, J.D; Jud, G.D. & Okoruwa, A. (1993). Forecasting the stock of retail space using the koyck distribution lag model. *Journal of property research,* 10, 185-192.

Benjamin, J.D; Jud, G.D. & Winkler, D. T. (1995). An analysis of shopping centre investment. *Journal of Real Estate Finance and Economics,* 10 (2), 161-68.

Benjamin, J. Jud, G. D & Winkler, D. T. (1998). A simultaneous model and empirical test of the demand and supply of retail space. *Journal of Real Estate Research,* 16(1), 1-13.

Eppli, M. J. & Shilling, J. D. (1995). Speed of adjustment in commercial real estate markets, *Southern Economic Journal,* 61(4), 1127-1145.

Chang, C.F. (1998). Insights into the reform of state-owned commercial enterprises. *Commercial Research, 8,* 22–24.

Colwell, P. F. & Jackson, C. (2003). Modelling rental change across key retail investment markets in Britain: valuation and measurement considerations. *Journal of Property Investment and Finance,* 22 (5), 354 – 385.

Cui, G. & Liu, Q. (2001). Emerging market segments in a transitional economy: A study of urban consumers in China. *Journal of International Marketing,* 9(1), 84-106.

D'Arcy, E. McGough, T. & Tsolacos, S. (1997). An empirical investigation of retail rents in five European cities, *Journal of Property Valuation ad Investment,* 15 (4), 308-322.

Des Rosiers, F. D., Theriault, M. & Menetrier, L. (2005). Spatial versus non – spatial determinant of shopping centers rents: modelling location and neighbourhood – related factors. *Journal of Real Estate Research,* 27(3), 294 – 314.

DTZ, (2012): Property Times, available on www.dtz.com

Gregory, H.; Chun, M.; Eppli, J. & Shilling, J. (2001). A simulation analysis of the relationship between retail sales and shopping center rent. *Journal of Real Estate Research,* 21(3), 163-186.

Han, J. (2003). The reform of the distribution system in China. In The Internationalization of Retailing in Asia, ed. J. Dawson, M. Mukoyama, C. C. Sang, and R. Larke, London, Routledge.

Hanna, M. E., Caples, S. C., Smith, C. A. & Rollins, C. P. (2007). Factors impacting price for retail space in Houston. *Journal of Economics and Economic Education Research,* 10(2), 31-40.

Hendershott, P.; MacGregor, B. & White, M. (2002). Explaining real commercial rents using an error correction model with panel data. *The Journal of Real Estate Finance and Economics,* 24(1-2), 59-87.

Hendershott, P.; Jennen, M. & MacGregor, B. (2013). Modelling space market dynamics: an illustration using panel data for US retail. *The Journal of Real Estate Finance and Economics,* 47 (4), 659-687.

Hui, E.C.M., Yiu, C.Y. & Yau, Y. (2007). Retail properties in Hong Kong: a rental analysis. *Journal of Property Investment and Finance,* 25(2), 136-146.

Liang, J. & Wilhelmsson, M. (2011). The value of retail rents with regression models: a case study of shanghai. *Journal of Property Investment and Finance,* 29(6), 630-639.

JLL, (2012). China city profile: an overview of 20 retail locations. Available on www.jll.com

Ke, Q. & White, M. (2009). An econometric analysis of Shanghai office rents. *Journal of Property Investment and Finance,* 27(2),120 – 139.

Ke, Q. & White, M. (2013). A tale of two Chinese cities: the dynamics of Beijing and Shanghai office markets. *Journal of Real Estate Portfolio Management,* 19(1), 31-47.

Key, T., MacGregor, B.D., Nanthakumaran, N. & Zarkesh, F. (1994). Economic cycles and property cycles. Main report for understanding the property cycle, RICS, London.

Kwiatkowski, D., Phillips, P. C. B.; Schmidt, P. & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root: how sure are we that economic time series have a unit root? *Journal of econometrics,* 54(1/3),159–178.

Lam, A.C. 1995. Tapping the Retail Market in China. *China Business Review* 22(5): 23–28.

Lecomte, P. (2013). Tiptoe past the dragon: Replicating and hedging Chinese direct real estate. *Journal of Real Estate Portfolio Management,* 19(1), 49-72.

Mai, L. W. & Zhao, H. (2004). The characteristics of Supermarket Shoppers in Beijing. *International Journal of Retail & Distribution Management,* 32(1),56 – 62.

Phillips, P. C. B. & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika,* 75(2), 335-346.

Prystay, C., (1997). Reduced to clear. *Asian Business,* 33(2), 42–45.

Shi, S. & Yang, A. S. (1998). Retail roundabout. *China Business Review,* 25 (1), 43–49.

Sirmans, C. F. & Guidry, K. A. (1993). The determinants of shopping centre rent. *Journal of Real Estate Research,* 8(1), 107-115.

Tsolacos, S. (1995). An econometric model of retail rents in the United Kingdom. *The Journal of Real Estate Research,* 10(5), 519-529.

Yuo, T. S. T., Lizieri, C., McCann, P. & Crosby, N. (2011). Rental values in UK shopping malls. *Urban Studies,* 48(8), 1667-1679.

Vernon, P. (2012). Shopping towns in Australia. *The Journal of the Society of Architectural Historians*, 22(1), 102-121.

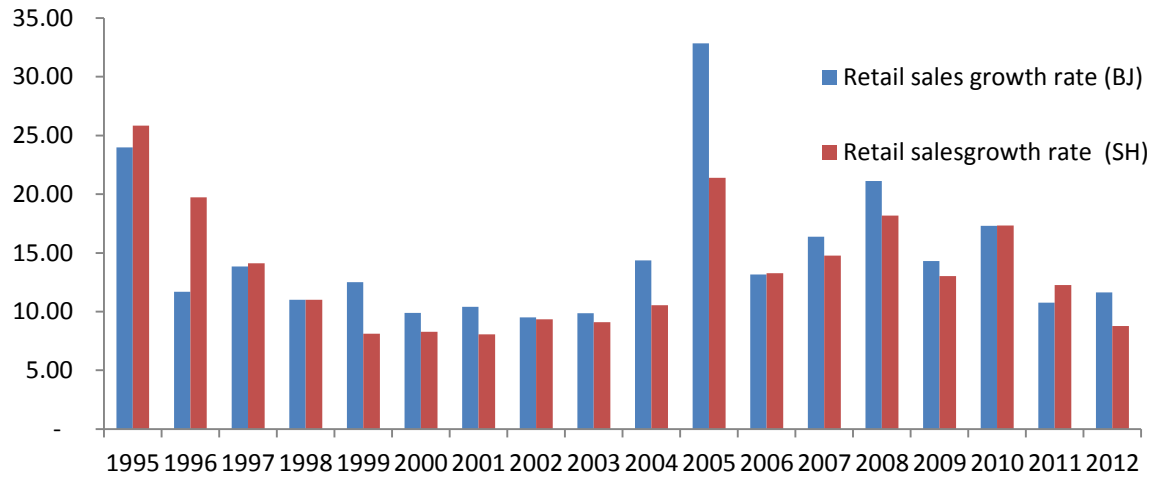
Wang, C. H. & Liu, X.H. (1998). Theories on foreign investment in China's retail market. *Journal of Beijing Institute of Business,* 82(4), 6–8.

Wang, E. (2011). Understanding the 'retail revolution' in urban China: a survey of retail formats in Beijing. *The Service Industries Journal,* 31(2),169-194.

Wong, K. M. & Yu, L. (2003). Consumers' perception of store image of joint venture shopping centres: first-tier versus second-tier cities in China. *Journal of Retailing and Consumer Services,* 10, 61–70.

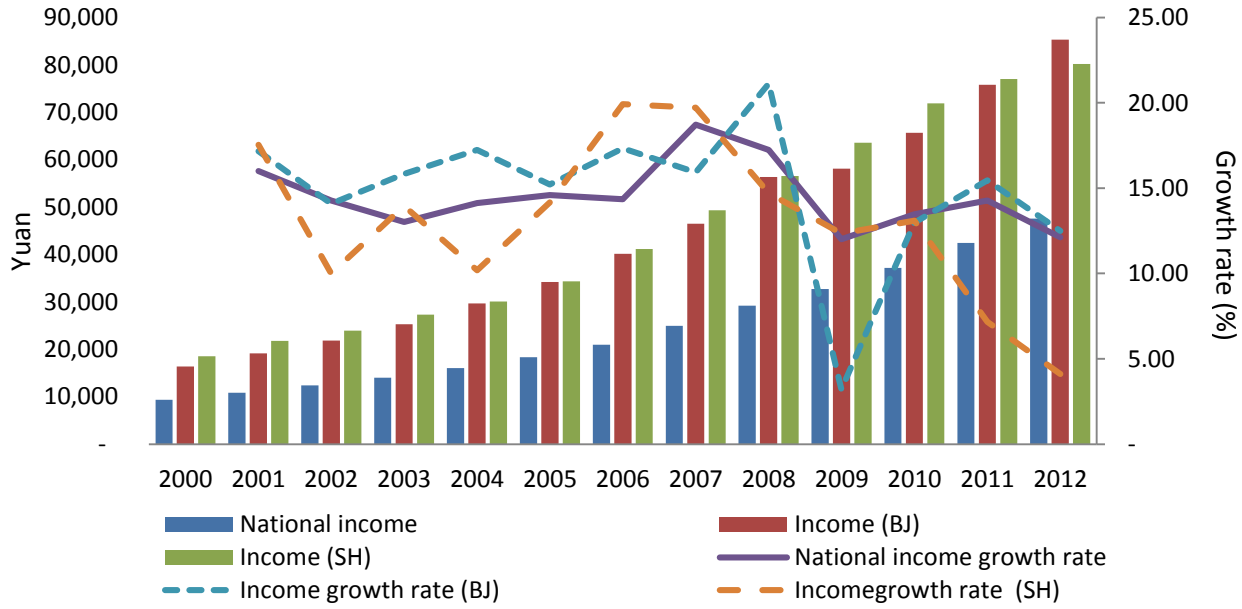
Wu, J. & Tian, Z. (2009). The impact of selected store image dimensions on retailer equity: evidence from 10 Chinese hypermarkets. *Journal of Retailing and Consumer Services,* 16(6), 486–494.

Figure 1: Retail sales growth rate



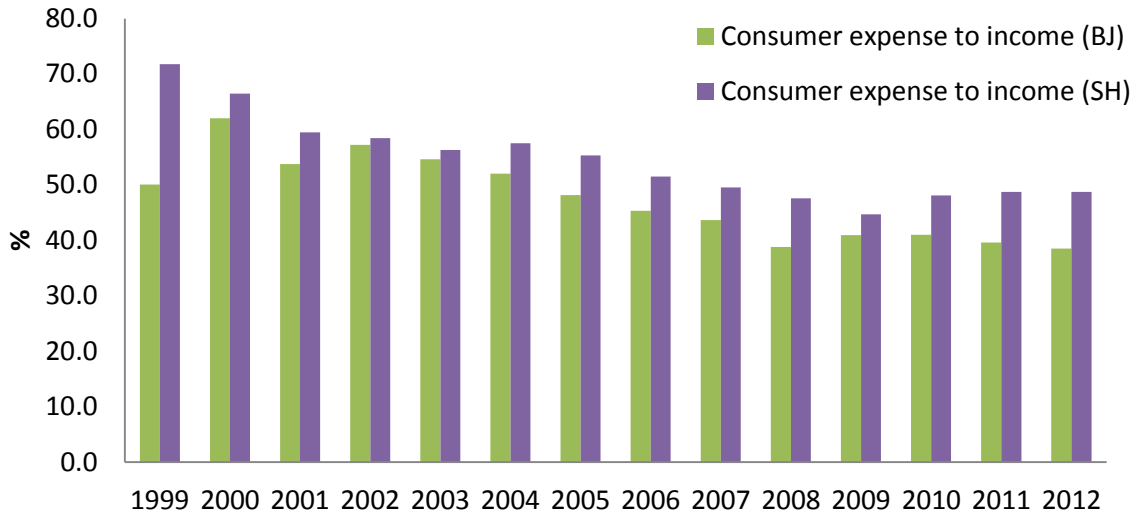
Source: China Statistics Bureau

Figure 2. Income and income growth rate



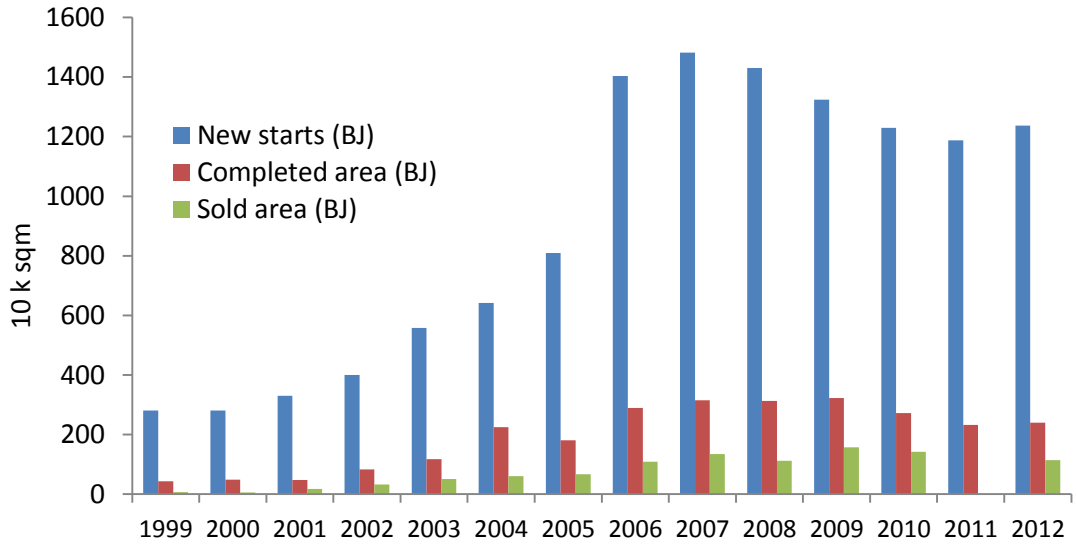
Source: China Statistics Bureau

Figure 3. Consumer expense to income ratio



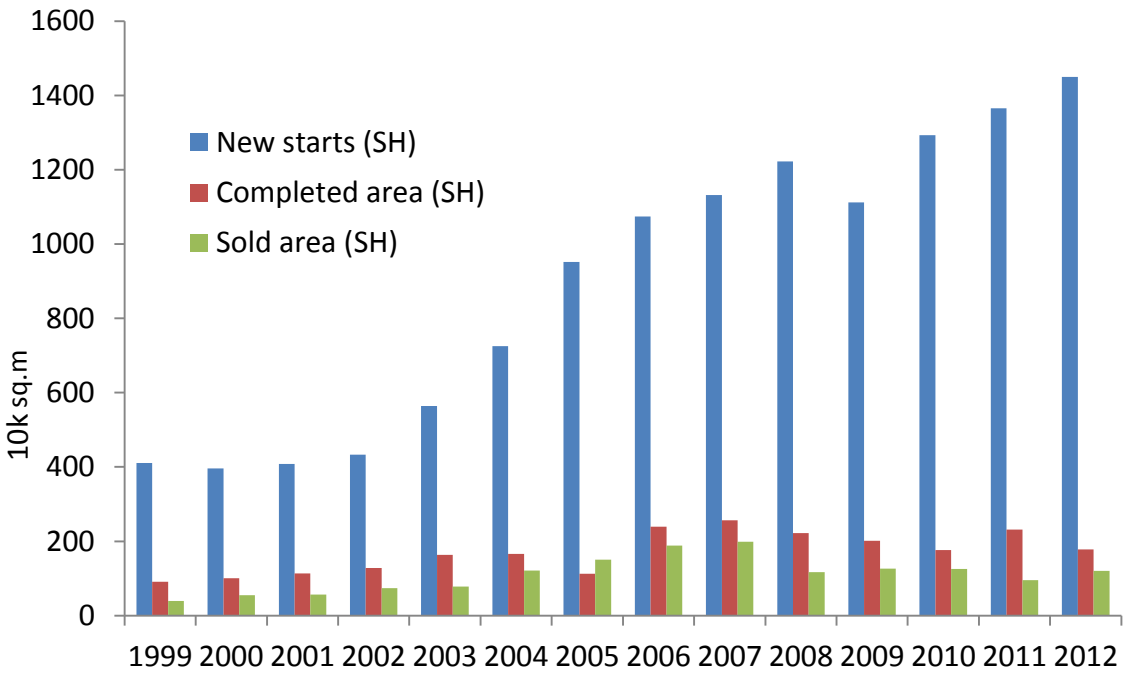
Source: China Statistics Bureau

Figure 4: Retail property new starts, area completed and sold (Beijing)



Source: China Statistics Bureau

Figure 5. Retail property new starts, area completed and sold (Shanghai)



Source: China Statistics Bureau

Figure 6: Real Retail Rents in Beijing and Shanghai

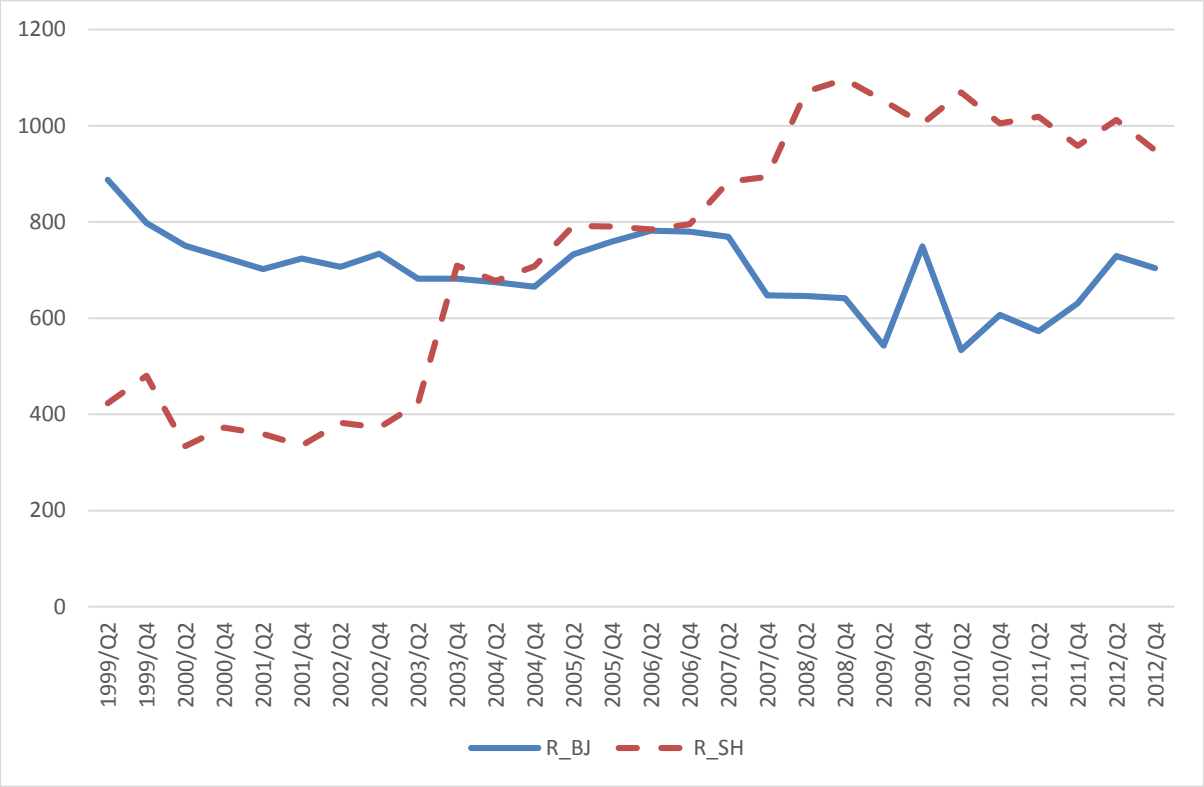


Table 1: Unit Root and Stationarity Tests[#]

	Beijing			Shanghai		
	ADF	PP	KPSS	ADF	PP	KPSS
INV	-5.543***	-5.541***	0.595**(0)	-6.056***	-6.074***	0.625**(0)
INC	-3.237**(0)	-11.982***	0.657**	-7.607***(2)	-8.973***	0.648**
GDP	-9.279***	-8.663***	0.656**	-7.219***(2)	-9.653***	0.518**(2)
RS	-8.555***	-9.318***	0.131*	-3.064*	-4.304**(0)	0.125*
AUCE	-7.866***	-11.747***	0.206**	-3.433*	-3.404*(0)	0.126*(0)
TS	-28.403***(2)	-10.370***	0.660**(0)	-3.299*	-9.268***(0)	0.191*
RENT	-6.079***	-6.039***	0.152*	-5.807***	-5.783	0.572**

Note: [#]All variables are I(1) unless stated otherwise in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively. INC is income per capita, INV is retail property investment, GDP is gross domestic product, RSCG is retail sales, AUCE is average urban consumer expenditure, TS is total stock of shopping centres, department store and shopping malls, RENT is real retail rent.

Table 2. Chow Breakpoint Test – Beijing and Shanghai

A. Beijing chow Breakpoint Test: 2009S2			
Null Hypothesis: No breaks at specified breakpoints			
Equation Sample: 1999S1 2012S2			
F-statistic	1.99	Prob. F(2,23)	0.16
Log likelihood ratio	4.47	Prob. Chi-Square(2)	0.11
Wald Statistic	3.98	Prob. Chi-Square(2)	0.14

B. Shanghai chow Breakpoint Test: 2003S1			
Null Hypothesis: No breaks at specified breakpoints			
Equation Sample: 1999S1 2012S2			
F-statistic	4.6	Prob. F(2,22)	0.02
Log likelihood ratio	9.79	Prob. Chi-Square(2)	0.01
Wald Statistic	9.21	Prob. Chi-Square(2)	0.01

Table 3: Long Run Model for Retail Rents of Beijing and Shanghai

Dependent variable =real rent		
	Beijing	Shanghai
Constant	-0.543	8.916
	(-0.272)	(12.272)***
Income per capita	0.943	1.105
	(3.450)***	(5.174)***
Total Stock	-0.259	-0.174
	(-2.838)***	(-2.727)**
Break Dummy		0.457
		(5.528)***
Adjusted R-squared	0.443	0.949
F-statistic	11.739	171.105
Prob(F-statistic)	0.000	0.000
DW	0.956	1.851

Notes: *** and ** stand for the significance levels at 1% and 5%. Dependent Variable is rent**.** Sample period is from 1999Q1 to 2012Q2. The dummy variable takes a value of 1 for Shanghai from 2003 H1 onwards until the end of the dataset.

Table 4A: Johansen Cointegration Tests: Beijing

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.58	33.76	29.79	0.01
At most 1	0.21	10.78	15.49	0.22
At most 2 *	0.16	4.63	3.84	0.03
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.58	22.98	21.13	0.03
At most 1	0.21	6.14	14.26	0.6
At most 2 *	0.16	4.63	3.84	0.03
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 4B: Johansen Cointegration Tests: Shanghai

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.75	57.25	29.79	0
At most 1 *	0.47	20.57	15.49	0.01
At most 2	0.12	3.6	3.84	0.05
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**

None *	0.76	36.68	21.13	0
At most 1 *	0.47	16.97	14.26	0.02
At most 2	0.12	3.6	3.84	0.05
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 5: Short Run Dynamic Adjustment Model – Beijing and Shanghai

Dependent variable =change in real rent		
	Beijing	Shanghai
Constant	0.020	-0.079
	(0.652)	(-0.787)
Δ Income per capita	0.423	0.309
	(1.889)	(2.15)**
Δ Total Stock	-0.231	-0.03
	(-1.576)	(-0.24)
Break Point		0.56
		(6.75)***
Error Correction Term	-0.413	-0.829
	(-2.535)*	(-2.844)***
Adjusted R-squared	0.229	0.159
F-statistic	3.588	5.341

Prob(F-statistic)	0.029	0.047
DW	1.992	1.736

Notes: *** and ** represent the 1% and 5% significance levels respectively. Δ refers to the 'change in' or first difference of the variable in question. .

Table 6: Price and Income Elasticities

	Beijing	Shanghai
Price Elasticity of Demand	-3.862	-5.747
Income Elasticity of Demand	3.643	6.344

Appendix

Table A: Correlations Tests

Panel A: Beijing	GDP_BJ	INV_BJ	RS_BJ	AUCE_BJ	PINC_BJ
GDP_BJ	1				
INV_BJ	.95**	1			
RS_BJ	.98**	.93**	1		
AUCE_BJ	.98**	.93**	.94**	1	
INC_BJ	1.00**	.92**	.98**	.98**	1

Panel B: Shanghai	GDP_SH	INV_SH	RS_SH	AUCE_SH	PINC_SH
GDP_SH	1				
INV_SH	.96**	1			
RS_SH	.98**	.97**	1		
AUCE_SH	.99**	.97**	.99**	1	
INC_SH	1.00**	.96**	.98**	.98**	1

Note: GDP is gross domestic product; INV is retail property investment; RS is retail sales; AUCE is average urban consumer expenditure; INC is income; BJ is Beijing; SH is Shanghai.