



Condominium price dynamics in Sri Lanka: correlation with inflation and periods of concern

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ABSTRACT

This study conducted in Sri Lanka's commercial capital – Colombo, investigated temporal variation of condominium prices from 1998 to 2018, to identify price – inflation relationships and periods of concern. The price increased non-linearly with time without abnormal trends. Unit root, cointegration and vector error correction method tests showed inflation can explain temporal variation of semi-luxury condominium's price appreciation, and it showed a statistically significant ($P < 0.01$) positive impact in the long run. Price appreciation and inflation showed a weak negative, yet statistically significant impact for luxury condominiums. The impact of inflation on price appreciation in the short run was mostly a negative correlation and as per explanatory powers the impact was minor. It seemed that Sri Lankan condominium market would mostly be without any periods of concern considering the increasing presales and the decreasing price to rental ratios. However, there is a continuous increment of the ratio between the price and household annual income, and it was about 5.25 as at 2018 (price bubbles occurred when this ratio is over six). More studies are recommended specially on future periods of concern and studies that incorporate ultra-luxury apartments being developed by international developers.

ARTICLE HISTORY

Received 9 July 2019
Accepted 21 October 2020

KEYWORDS

Condominiums; household income; inflation; presales; price; Sri Lanka; VECM

1. Introduction

In response to the rising land prices, developers tend to raise the height of buildings, and multi-story condominium units become a solution (Xu, 2019). Condominiums include separately owned units as well as common areas and facilities that are jointly owned; as the ownership is sellable, condominiums are considered as real estate (Findlaw, 2018). A condominium is a property comprising land with building or buildings of more than one unit of residential and/or non-residential accommodation with shared common areas (Valenzuela, 2018).

Sri Lanka's condominiums initially were government schemes which had started in 1970 and was under the Condominium Property Act No. 12 of 1970 (Ministry of Housing and Construction, 2019). Later it was replaced by the Apartment Ownership Law number 11 of 1973. The first private condominium was registered only in 1979 (Prathapasinghe, Perera, & Ariyawansa, 2018). The exact history of condominium type

properties elsewhere is not clear and could date around 1100s in Germany; and France recognized horizontal properties in 1804 (Natelson, 1987). The condominiums in the present context in many developed countries were not dissimilar Sri Lanka, and surprisingly the legalization of condominiums even in many developed countries were in the mid-20th century. As an example, condominiums first appeared in 1968 in British Columbia, Canada, with the introduction of the Strata Title Act (1966) (Ouyang, 2019). About a decade further on US territory Puerto Rico adopted similar legalization in 1958 (Weesep, 1987). Many European countries had adopted with Belgium being the first in 1924 (Glock, 2005).

In an early condominium market, the demand for the condominiums is high due to limited supply, and the developers can get a good (high) price. However, after sometime, there will be an inverse relationship between the demand and the supply. Over supply at this stage would result in a drastic reduction of prices (Lind & Lindqvist, 2005). Price bubbles of the condominiums can utterly trouble the investment and economic decisions of isolated economic agents, and can have a huge impact on the economy of a country (Cadil, 2009). One way of getting an insight to periods of concern such as price bubbles is via investigation of price dynamics (Stevenson, 2008).

A common observation of metro and urban areas is the increased demand for houses (Malpezzi & Mayo, 1987; Lee, 2014), and Colombo, the commercial capital of Sri Lanka is no exception (Jayalath, 2016). The main four types of buyers of condominiums in Sri Lanka are existing landowners, Sri Lankans working in foreign countries (repatriates), expatriates and the investors (Senaratne, Zainudeen, & Weddikara, 2010; Silva & Fernando, 2016). Even though rules and regulations were relaxed, within an Asian context, countries like Malaysia, Singapore and Thailand received greater preference by foreign buyers (Kirchenbauer, 2019).

Understanding the spatiotemporal price dynamics of various segments of the housing market would provide useful insights for the stakeholders including the potential buyers, financial institutions, and policymakers (Apergis & Payne, 2019). Also, price inflation has rendered the structure of affordability more inequitable and requires a careful examination of the representation and conditions of local markets (Goix, Giraud, Cura, Corre, & Migozzi, 2019). Therefore, we consider such analysis in Sri Lanka would fill an important research gap. Also, there is a speculation in Sri Lanka on price bubbles, and similar speculation is there in many other countries and regions (Al-Masum & Lee, 2019; Goix et al., 2019). Arguments for a possible price bubble is primarily based on the rapid price hike (e.g. Al-Masum & Lee, 2019) and the price variation being unable to be explained with market fundamentals (Stevenson, 2008). The over pricing of condominiums or whether the price hike is rapid to have a bubble is subjected to similar for and against arguments (see: Al-Masum & Lee, 2019 on Sydney housing price bubbles). The main concern is that only a limited amount of research has been conducted in this regard, which is particularly the case in countries like Sri Lanka with emerging economies.

The authors were able to find very few studies that dealt with real estate price dynamics in emerging markets such as the study conducted by Lee (2014) in Malaysia. Therefore, the findings based on a data set from a developing condominium market could be used by similar economies in their decision marking and would fill an important research gap. Furthermore, even the already published studies were mainly done at an

aggregated country level and not at a city level (Al-Masum & Lee, 2019), and this is another research gap this study aimed to fill.

One of the objectives of this study was to investigate the past, present and future nexus of condominium prices and its derivatives and to model them with inflation. In this regard we hypothesized that inflation rate does impact the condominium price appreciation. Condominium price appreciation and inflation could be related if homeowners buy an apartment unit as a long-term investment (Stevenson, 2008). Also, housing is a good hedge against inflation (Lee, 2014). Therefore, identifying a long-term relationship with price and inflation can be valuable. The other objective was to investigate whether the prices are in line with the market fundamentals with reference to the condominium price to household income ratio as well as the condominium price to rental ratio, therein to identify periods of concern.

There are a few condominium-related studies done in Sri Lanka; however, most of those were (e.g. Anthonisz et al., 2015; Ariyawansa, 2007) management and/or sociological studies with a qualitative or semi quantitative research methodology. Comprehensive quantitative studies that were done to test marketing and economic principals are rather unfound. Therefore, as per our knowledge, this is the first study to deal with condominium economics with a comprehensive quantitative approach. Even though the study deals with data from Sri Lanka, the findings will be applicable to other countries as well and can be used to test condominium data models elsewhere.

2. Literature review

Real estate plays a significant role in the household assets in many countries (Al-Masum & Lee, 2019). As per Australian Bureau of Statistics (2017) the contribution of it was almost 70% in Australia.

Buyers consider factors such as location, water supply, electricity, presales, price, and quality of the construction when buying a condominium (Ariyawanasa, 2007). Moreover, certain community factors such as the distance to railway stations, bus stations, temples, schools, recreational facilities, social organizations, and quality of neighbourhood (e.g. crime rate) would be influential on the decision (Bello, 2007; Peng, Chen, & Chen, 2016). Even though there can be several factors that govern the demand for a condominium, the most important factor is price (Chu, Chang, & Sing, 2012; Fesselmeyer & Liu, 2013). It is obvious, that much of the literature focuses on the role of supply and demand (many cases confined either to supply side or demand side factors) on prices (Kohler & Van Der Merwe, 2015).

In addition to supply and/or demand side factors on price, several other factors may affect the price, such as demographics, government policies, interest rates, inflation, and the economy itself (Kim, 2004; Mathews 2018). Even though some past works had incorporated multivariable studies (e.g. Al-Masum & Lee, 2019), it should be noted due to practical as well as theoretical constraints it is difficult to screen out the pure contribution of a single factor as many factors are interrelated. As an example, growth in population and government policies such as subsidizing and tax reductions would increase the demand and reduce the price (Kohler & Van Der Merwe, 2015). Another complication in studying real estate prices is certain factors are difficult to be quantified, such as the speculation of buyers (Scheinkman & Xiong, 2003)

Even though many studies advocate the importance of studying the relationships between price and macroeconomic variables, most of the past studies are confined to a short period of time (Goix et al., 2019). Also, the findings of past studies were not similar and some cases opposite, an indication that many issues surrounding housing price and market fundamentals or market determinant variables have not been fully understood (Al-Masum & Lee, 2019). One such determinant is inflation (Kearl, 1979; Taderera & Akinsomi, 2020). Kohler and Merwe (2015) observed in Australia in 1980s the price to follow general inflation in the economy, but after the financial deregulation in mid 1980s and disinflation in early 1990 to be governed also by other factors such as population growth, household size and quality of apartments. Real estate investment is expected to provide hedging against inflation (Taderera & Akinsomi, 2020). However, past studies prove this may not necessarily be the case. In 1970s the boom in house prices and increased inflation in USA was positively correlated, as increased inflation had resulted in reduction in relative cost of home ownership due to reduced relative cost of mortgage, therein by increasing the demand for houses which resulted in increased prices (Manchester, 1987). Onder (2000) referring to several suburbs in Turkey that were characterized by a high inflationary environment (over 50% since 1986) showed no hedging against inflation. Even though studies are not rare on role of real estate against inflation, studies that directly relate price and inflation on a cointegration platform (i.e. treating variables as time series), and identification of depth and direction of inflation on price or price appreciation is rare.

Studying price dynamics would aid identification of periods of concern such as price bubbles (Stevenson, 2008), and identification and/or prediction of such troubling times have been done in different ways via different input variables. Hui and Yue (2006) found a price bubble in Shanghai condominium market, but not in Beijing via a model based on household income and the expenses, stock index price and gross domestic product (GDP). Three estimation processes (long-term equilibrium approach, fundamental market value, and the ratio between the price and the annual income) were used by Chung and Kwon (2011) to verify price bubbles in Korea. Himmelberg, Mayer, and Sinai (2005) and Bourassa, Hoesli, and Oikarinen (2019) identified the ratio between the housing prices to rent as the best way to identify the price bubbles. According to a study in Taiwan by Chang and Chen (2011), the price bubbles were found out by via a state space model, which represented the input and output variables in the first-order differential equations.

Even though Sri Lanka did not observe price bubbles for any type of real estate in the past, there is a speculation of a possible bubble soon. Even though no study had been done in this regard, this is a subject matter discussed in national news outlets (e.g. The Sunday Times Sri Lanka, 2018).

3. Materials and methods

3.1. Study area

The study was carried out in Colombo Municipal Council (CMC) and some of its suburbs (Figure 1). The CMC is about 37 km² with a permanent residential population of about half a million and with a similar floating population. The contribution of the

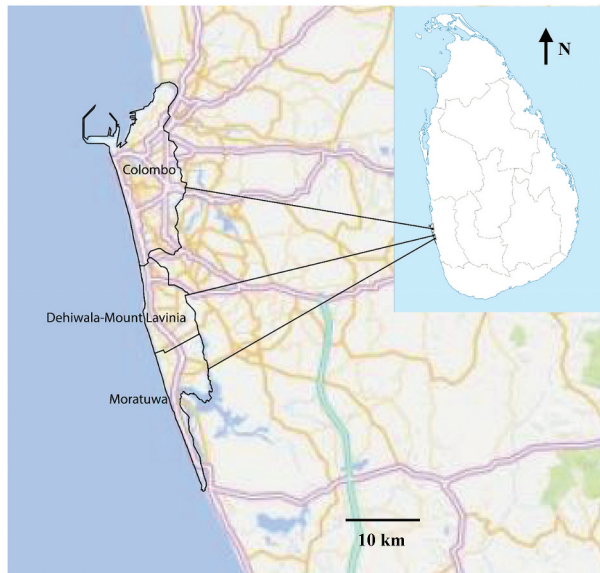


Figure 1. The study area.

GDP of Sri Lanka from Colombo is around 30% and the city plays a major role in the country's administrative, economic, and social aspects (Department of Census and Statistics, Sri Lanka, 2018). There are not many condominiums in other districts or at their commercial and/or city centres other than government condominiums that are not traded in public market. In that regard, perhaps, CMC is the only administrative jurisdiction in Sri Lanka that can be used for a condominium price dynamics study. Private condominiums in Sri Lanka are classified as luxury, semi luxury and super luxury based on the facilities it possesses (Table 1) (Senaratne et al., 2010).

3.2. Variables and data collection

Average selling price and rent of the condominiums were collected from property developers and third-party marketing managers (in general rent details could be obtained were less). Data on household annual income was collected primarily through online longitudinal (responder anonymous) type surveys. It was done to ensure the reliability of data as face-to-face interviews may result in people giving false information ((Sturges and

Table 1. Classification of condominiums in Sri Lanka (Senaratne et al., 2010).

| Type of Condominium | Facilities |
|---------------------|--|
| Semi luxury | 24-hour security, CCTV Cameras, elevators, garbage disposal system, Children's play area, private balconies |
| Luxury | Air-conditioned rooms, Swimming pool, gymnasium, laundry, restaurant and bar, central gas supply system |
| Super luxury | Salon, squash court, video Centre, three-tier security system, stand by generator, walking track, convenience stores, games rooms. |

Hanrahan, 2004). Data on presales were collected via online and through third-party marketing managers of the condominiums.

3.3. Data analysis

3.3.1. Appreciation rates, weighted average prices, presales percentage and household annual income

Condominium price appreciation rate per year (hereinafter price appreciation) or the increment of value of a property was found out by Equation (1) for each year. F, P, r and n stand for future price, initial price, appreciation rate and the number of years, respectively. Equation (1) has been used widely to determine the appreciation rate in real estate (e.g.: Montreal's residential and commercial markets, Shupilov (2017)).

$$F = P(1 + r)^n \quad (1)$$

The weighted average price of condominiums was determined by Equation (2). p_i is the price of the i^{th} condominium and n is number of condominium units.

$$\text{Weighted Average price} = \frac{\sum_{i=1}^n (p_i n_i)}{\sum_{i=1}^n n_i} \quad (2)$$

Housing speculation can be related to condominium price to household income ratio (Chung and Kwon, 2016) and could be used to identify the difficulty of affordability and purchase. This ratio was found out using Equation (3). Y_i is the price of the i^{th} condominium, I_i is the household annual income of i^{th} condominium unit and n is number of samples for each selected year.

$$\text{Housing Price/Household annual income} = \frac{\sum_{i=1}^n (Y_i/I_i)}{\sum_{i=1}^n n_i} \quad (3)$$

The average presales value was arrived by Equation (4). Where X_i is the percentage of presales for the considered i^{th} condominium unit and n is number of condominium units.

$$\text{Average presales value} = \frac{\sum_{i=1}^n (X_i)}{\sum_{i=1}^n n_i} \quad (4)$$

3.3.2. Unit root, cointegration and Vector error correction method (VECM) tests

Three different unit root tests namely Phillips Perron (PP), Kwiatkowski Phillips Schmidt Shin (KPSS) and Augmented Dickey Fuller (ADF) were performed for the inflation and appreciation rates (Lee, 2014). These tests were done primarily to check the stability of the variables at the first difference.

Cointegration test can be used to find positive or negative correlation between variables within a specific interval of time (Bangura & Lee, 2019). Two types of cointegration tests namely Trace, and Max Eigen were performed to check whether the inflation and appreciation rates were cointegrated or not in the long run with a 5% significant level of the critical value (CV). After cointegration test, VECM test was done to identify depth and direction of

inflation and appreciation rates. Unit root, cointegration and VECM tests were performed using EViews version 11 (IHS Global Inc., USA).

3.3.3. Pearson correlation, significance difference between samples and statistical power

Pearson correlation was used to quantify the strength of correlation. The significance was decided at $P < 0.05$ or $P < 0.01$. Difference between different groups were assessed via one-way anova. Pearson correlation and one-way ANOVA was done using IBM SPSS version 21. Statistical power (related to Type II error) of samples was found by keeping the effect size as 0.3 and the error probability as 0.05 using G* Power software by Heinrich Heine University Dusseldorf.

4. Results and discussion

4.1. Statistical power of samples

For the collected sample size of 92 for the luxury condominiums and 112 of semi luxury condominiums as of 2018, the statistical powers were 92% and 95%, respectively. The lowest statistical powers were 26% and 28% for luxury and semi luxury condominiums, respectively as at 1999. Even though the statistical powers were only about 30% for early study periods, it was more than 50% after 2005 and was over 75% from 2010 and after. However, for the super luxury condominiums (sample size of 10), the statistical power at best was 23%, therefore, was not considered in this study. Also, data pertaining to variables such as presales, household income and rental price were relatively less, such that separation as luxury and semi luxury was not possible due to low statistical power under those domains.

4.2. Temporal variation of price

Figures 2 and 3 show the temporal variation of prices of semi luxury and luxury condominiums of CMC, Dehiwela-Mount Lavinia and Moratuwa. Always, the price of condominiums was significantly higher than the other two suburbs and was statistically significant since 2000 (one way anova; $P < 0.05$). Price of both types of condominiums in general showed a non-linear increase with time. Nevertheless, the semi luxury condominiums were more linear than the luxury, based on correlation coefficient as well as Pearson correlation (data not shown). Also, the prices of condominiums reduced with the distance from CMC. It is common to observe that house prices always rise with time due to illiquidity of the asset and owner's unwillingness to sell at low prices (Stevenson, 2008). Past studies too have observed linear as well as nonlinear temporal variations of housing prices. Hong Kong housing prices from 2013 to 2018 increased linearly (Hong Kong House Price Index, 2019). Whereas, in UK the variation of prices was exponential from 1993 to 2007 and almost flat thereafter until 2013 (UK Inflation and price indices, 2019). The temporal variation of price in CMC, Dehiwela-Mount Lavinia and Moratuwa looked similar. However, the number of samples obtained was three to four times less in Dehiwela-Mount Lavinia and Moratuwa compared to CMC. Therefore, in subsequent analyses only the condominiums in CMC were considered.

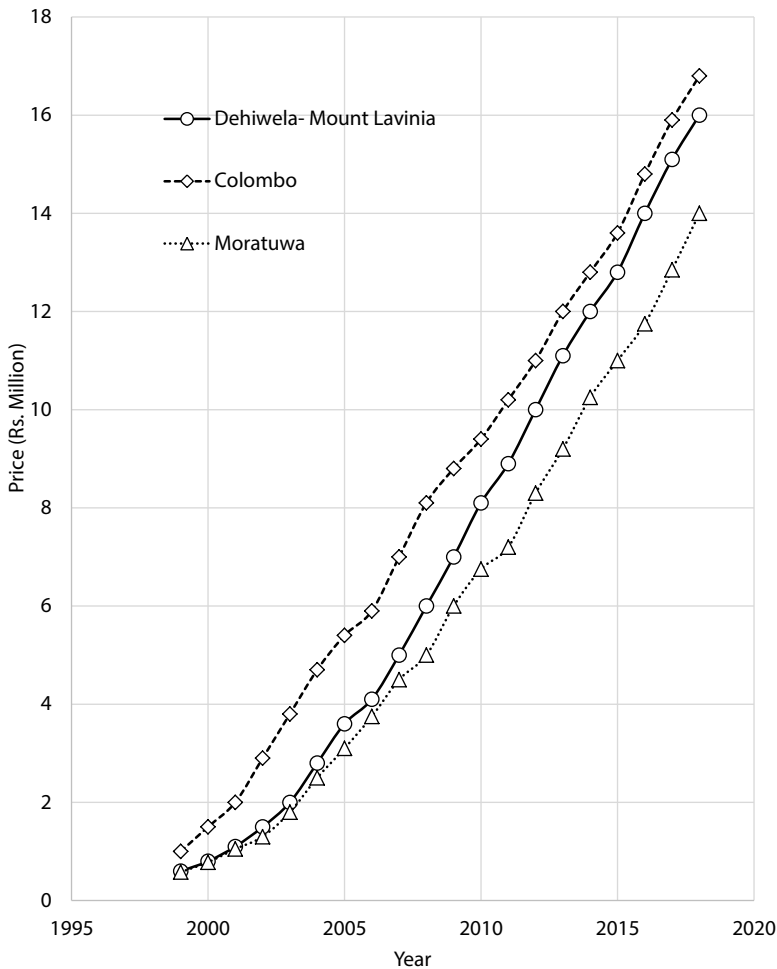


Figure 2. Temporal variation of price of semi luxury condominiums.

4.3. Evidence of stationarity of variables

Inflation rate and appreciation rate were stationary at the first level difference with a significant level of 5% as per unit root test results (Table 2). Therefore, cointegration test was performed on both variables.

4.4. Cointegration, direction and depth between variables

Tables 3 and 4 show the cointegration test results for inflation and appreciation rates of semi luxury and luxury condominiums, respectively. As per Trace and Max Eigen tests, the trace statistics were less than the respective critical value at 5% significant level. Therefore, it was clear that there could be one cointegrating relationship between the variables in the long run. This also suggested that the appreciation rates of semi luxury and luxury move together with the inflation rate in the long run.

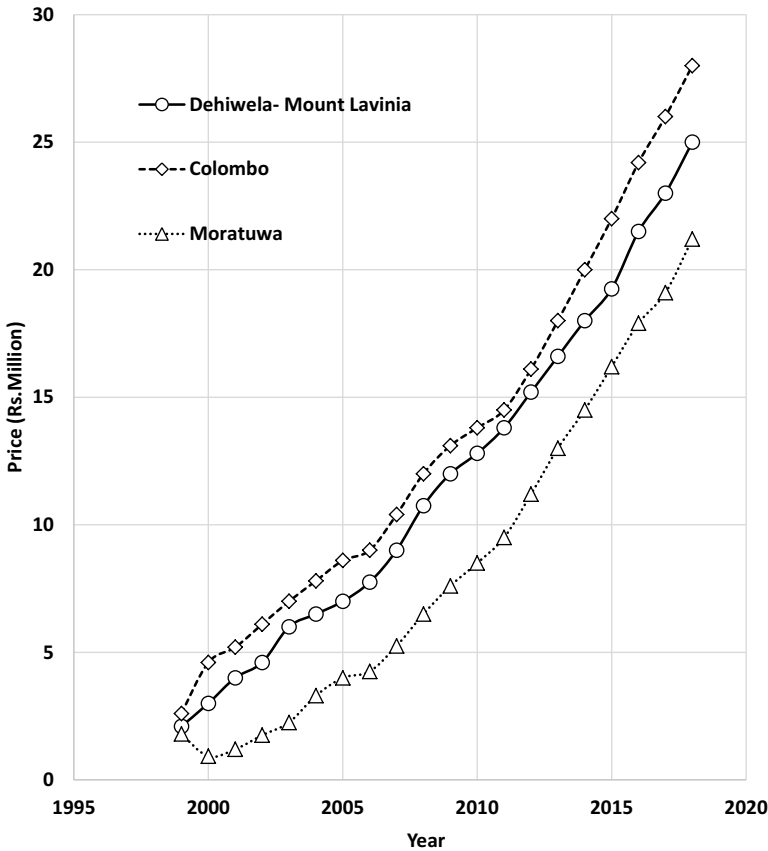


Figure 3. Temporal variation of price of luxury condominiums.

Table 2. Results of Augmented Dickey Fuller (ADF), Phillips Perron (PP), and Kwiatkowski Phillips Schmidt Shin (KPSS) Unit root tests (*, ** and *** indicates 10%, 5%, and 1% significant levels, respectively).

| Variables | Level series | | | Differenced series | | |
|---|--------------|-------|-------|--------------------|----------|-------|
| | ADF | PP | KPSS | ADF | PP | KPSS |
| Inflation rate | -0.73 | -1.00 | 0.12* | -4.37** | -2.33*** | 0.058 |
| Appreciation rate of semi luxury condominiums | -3.32 | -3.76 | 0.48* | -2.98** | -2.98** | 0.115 |
| Appreciation rate of luxury condominiums | -1.77 | -3.08 | 0.17* | -6.01** | -7.19** | 0.131 |

Table 3. Results of Cointegration test for semi luxury condominiums (CV: critical value at 5% significance level).

| Hypothesized (No. of CE(s)) | Cointegration | | | |
|-----------------------------|---------------|---------|----------------|---------|
| | Trace Test | 0.05 CV | Max-Eigen Test | 0.05 CV |
| None | 27.30 | 12.32 | 24.11 | 11.224 |
| At most 1 | 3.19 | 4.13 | 3.19 | 4.13 |

Tables 5 and 6 indicate the direction and depth of the relationship between the inflation rate and the price appreciation of condominiums by vector error correction method in the long and short runs, respectively. It was observed that the impact of inflation on the price appreciation of semi luxury condominiums and

Table 4. Results of Cointegration test for luxury condominiums (CV: critical value at 5% significance level).

| Hypothesized (No. of CE(s)) | Cointegration between inflation rate and appreciation rate | | | |
|-----------------------------|--|---------|----------------|---------|
| | Trace Test | 0.05 CV | Max-Eigen Test | 0.05 CV |
| None | 12.9249 | 12.3209 | 10.4007 | 11.2248 |
| At most 1 | 2.5242 | 4.13 | 2.5242 | 4.13 |

Table 5. Results of vector error correction method (VECM) tests in long run for the appreciation rate of different types of condominiums.

| | Semi luxury | Luxury |
|--------------------|-------------|--------|
| Coefficient | 2.47 | -0.94 |
| T-Statistic | 1.51 | -5.14 |
| Standard Error | -1.64 | -0.18 |
| R-squared | 0.09 | 0.76 |
| Adjusted R-squared | -0.05 | 0.57 |

Table 6. Results vector error correction method (VECM) tests in short run for the appreciation rate of different types of condominiums (all values were not significant at 1% significance level).

| | Semi luxury | | Luxury | |
|-------------|-------------|-------|--------|-------|
| | Lag 2 | Lag 3 | Lag 2 | Lag 3 |
| Coefficient | -0.16 | -0.41 | -0.08 | -0.09 |
| T-Statistic | -1.23 | -1.94 | 0.27 | -0.27 |

luxury condominiums had a positive and negative impacts, respectively, in the long run with a significance of $P < 0.01$. According to the coefficient obtained for the longer run, it can be understood that one unit of increment in the inflation rate leads to 2.47 units of increment in the price appreciation of semi luxury condominiums, while 0.94 units of decrement (as it is close to 1 could be taken as almost proportional to inflation) in the appreciation rate of luxury condominiums. This partly validated our hypothesis that price is related with inflation. Also, it is conspicuous that there is an influence from facilities or quality of the apartment in defining the relationship with inflation, that is why only one type of condominiums showed a strong relationship. In addition, appreciation rates of semi luxury and luxury condominiums had T- statistics of 1.51 and - 5.14, respectively. These were clear indications that the inflation rates have a certain impact on the appreciation rate of condominiums in the long run.

In the short run with a lag of 2 and 3, coefficients of the price appreciation of luxury and semi luxury showed negative values. Hence, with the increment of one unit of inflation rate, the price appreciation of semi luxury and luxury condominiums decreased by 0.16 and 0.08 units, respectively for a lag of 2. However, no short-term relationship was significant at $P < 0.01$, yet based on the T- statistics the relationships involving the semi luxury condominiums can be certified with more confidence.

4.5. Temporal variations of condominium price appreciation and inflation, and periods of concern

Prima facie observation of temporal variation of prices was not showing anything extraordinary compared to some other markets (e.g. see Stevenson, 2008 for the price variation in Ireland, where over 300% increase was observed within a decade). Therefore, the first impression was nothing to be worried in terms of an unstable economic condition such as a price bubble.

The price appreciation of semi luxury and luxury condominiums are shown in Figures 4 and 5, respectively with the annual average inflation rate. Increasing inflation can raise the price of almost all the goods and services from the economic point of view (Upper, 2016). Positive as well as negative impacts can be imposed on the housing prices due to inflation (Hartzell, Hekman, & Miles, 1987). With the increase of inflation rate, the cost of materials and construction increase and eventually results in the increase of house prices. Also, the rise of inflation leads to the increment of bank interest rates as well (Kearl, 1979; Onder, 2000). With a higher interest rate, people would not buy condominiums, as they may think it is not rational of investing in condominiums at high-interest rates If condominiums

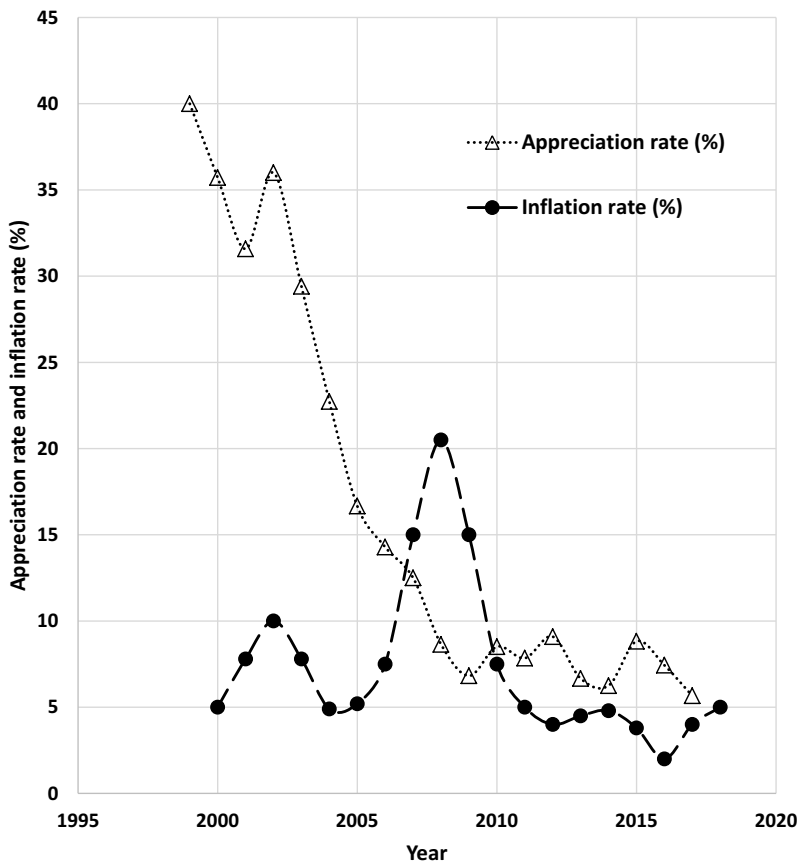


Figure 4. Temporal variation of inflation rate and the appreciation rate of semi luxury condominiums.

continued to be supplied even under these circumstances a price bubble is possible (Kearl, 1979).

It was clear that during the periods from 2000 to 2006 and from 2010 to 2017 the price appreciation for the semi luxury condominiums had been more than that of the inflation rate (Figure 4). This insinuate the relatively high demand for the semi luxury condominiums among the condominium buyers during that period. From 2007 to 2009, the inflation rate had been higher than that of the price appreciation of the semi luxury condominiums. Hence, there could have been a drop in the buying of condominiums (i.e. drop in demand) with the supply being the same. Therefore, from 2007 to 2009 must have been a period of concern (e.g. price bubble or similar), but, it was not the case (Ratnasingham, 2017). However, from 2019 to 2020 the predicted inflation rate will be once again higher than that of the extrapolated appreciation rate of semi luxury condominiums. As per the VECM test for the short run, it was already found out that there is a negative coefficient between inflation and price appreciation in semi luxury condominiums with a relatively high T test value (thus we could be more confident on the relationship) (Table 6). For semi luxury condominiums, a significant relationship was found between inflation and price appreciation, and a positive coefficient value of 2.47 (Table 5) in the long run. This meant the appreciation rate will be increased by 2.47 units for a unit change of inflation. Therefore, appreciation rate and inflation rate of semi luxury apartment behaved somewhat like USA housing market in mid 1970s (Onder, 2000).

From 2000 to 2005 and from 2010 to 2018, the price appreciation of the condominiums had been more than that of the inflation rate (Figure 5). Therefore, it indicated that the demand for the semi luxury condominiums was high during those periods and probably were no chances of price bubbles, as price could not increase with high elasticity as theoretically its priced would get capped by the prices of luxury apartments. However, from 2006 to 2007, the price appreciation matched with the inflation rate mainly due to the fact that price appreciation of luxury condominiums was low. With the increase of inflation, the cost of building materials and the construction increases (Nguyen, 2019). This resulted in the increase of the condominium prices, but it should be reflected in both semi and luxury. Therefore, what could have happened was a drop in luxury condominium sales and potential luxury condominium buyers going for low priced semi luxury condominiums instead.

From the analysis of VECM for the long run of luxury condominiums, a negative coefficient was observed proving the fact that in future if inflation continues to increase, the appreciation rates would further decrease. At the same time, a large T-statistic value of 5.14 clearly depicted that there is a significant relationship between the appreciation rate and inflation in the long run. Even though, a negative co-efficient was obtained in the short run for luxury condominiums, the T- statistic values were very low (0.07 and 0.09 for a lag of 2 and 3, respectively). Therefore, the relationship had to be considered insignificant, therefore no period of concern should be expected in the shorter run for luxury condominiums. In general, low inflation is an indication that economy was without extreme economic occurrences such as bubbles (Andolfatto & Williamson, 2015). Low inflation leads banks providing low interest loans and would result in greater purchasing power and could lead to price hikes. As inflation is an overall representation of the economy, it is prudent to discuss other factors in tandem to inflation on price variations and particularly on periods of concern.

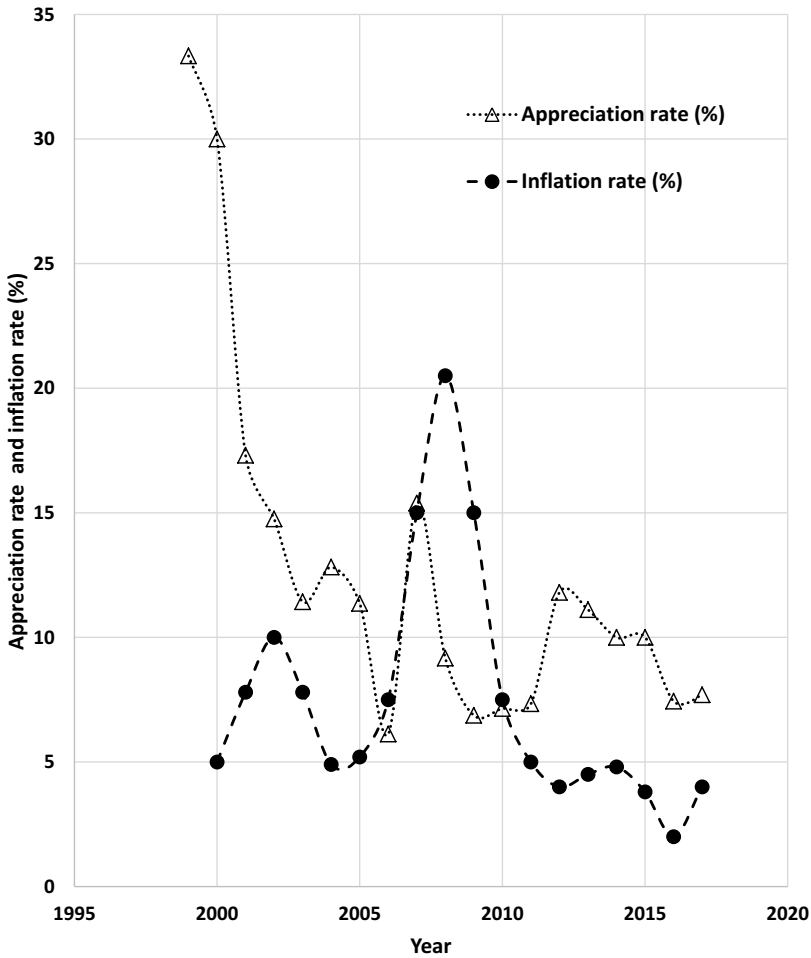


Figure 5. Temporal variation of inflation rate and the appreciation rate of luxury condominiums.

4.6. Temporal variation of the ratio between housing price and household annual income, and the presales

The ratio between housing price and household annual income increased with time (Figure 6; reliable data were available only from 2012). This ratio showed a positive correlation with the selling price of condominiums (Pearson $r > 0.7$; $P < 0.05$). The ratio was 4.25 and 5.25 in 2012 and 2018, respectively. Some areas like Boston, USA where price bubbles occurred had a ratio close to six (Bio, 2018). Hence, this ratio an indication that there are or there could be issues in Sri Lanka. If the price of condominiums is higher than that of the household annual income, there will be purchasing and affordability difficulties (Chung & Kwong, 2016).

Presales also play a pivotal role in condominium real estate market, especially in many Asian countries (Edelstein, Liu, & Wu, 2011). Figure 7 shows the temporal variation of percentage of presales for the condominiums (reliable data were available only from 2012). There was an increment of the selling price as well as the percentage of presales of

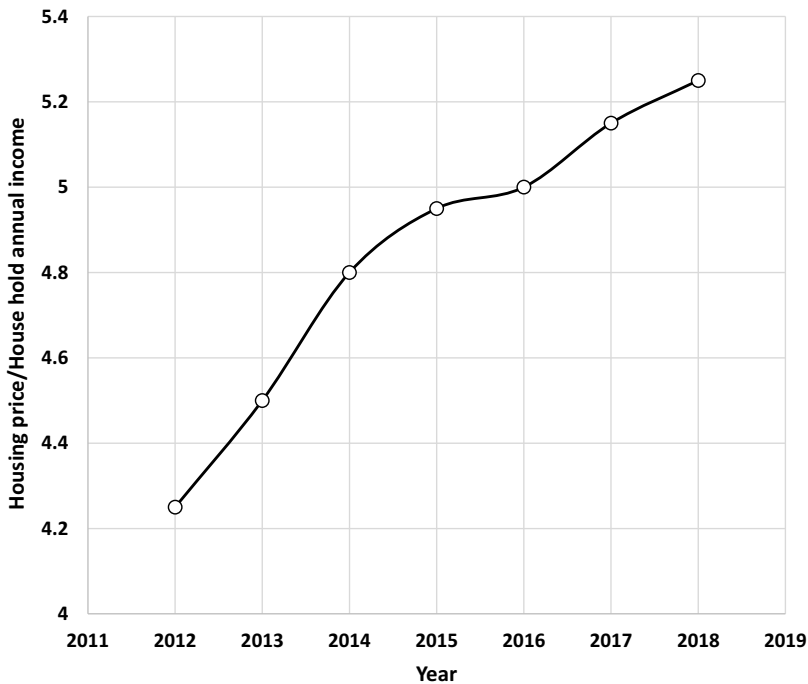


Figure 6. Temporal variation of housing price to household annual income.

the condominiums (Pearson $r > 0.7$; $P < 0.05$); therefore, the relationship insinuated that there is nothing serious to be concerned with.

4.7. Should Sri Lanka be worried?

Considering the small sample size, which we do not have a control, the discussion on periods of concern in Sri Lankan condominium market would be somewhat qualitative and speculative. Many studies from different regions and countries (e.g. Hejlova, Hlavacek, & Komarek, 2017; Okina, Shirakawa, & Shiratsuka, 2000) clearly indicated the strong threat that the condominium price bubbles have on the financial stability of a country or a region. Variable housing mortgage systems and national rules and regulations need to be imposed by countries since housing market differs from country to country (Duca, Muellbauer, & Murphy, 2010), and should be the case for Sri Lanka. Creating awareness among the public regarding the price inflations and bursts, building up a safe monetary policy in lending money from banks, decrease the number of qualifiers for obtaining loans are some of the precautionary methods (Crowe, Dell’Ariccia, Igan, & Rabanal, 2013; Fletcher, 2019).

Even though as per our results, possibilities exist/existed for price bubbles based on the relative variation of inflation and price appreciation of condominiums, we can also argue that there is ample evidence against the possibility for a price bubble to occur. Firstly, Sri Lankan buyers as well as developers are conservative in their decision making. As an example, general practice in Sri Lanka is not to start construction of a condominium project unless 40% of the presales have already taken place. Also, the banks strictly check the financial status quo of the buyer as well as the

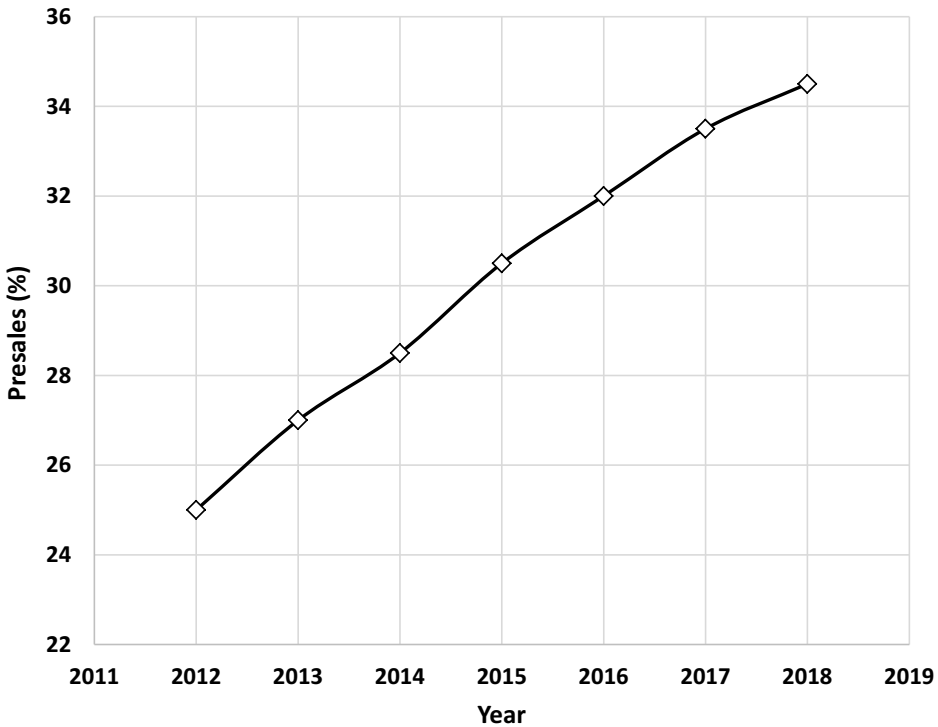


Figure 7. Temporal variation of percentage of presales.

seller to be certain on repaying ability and completion of the project, respectively. Such conservativeness meant supply and demand for most of the condominiums (semi and luxury) should be at equilibrium. Furthermore, when looking at the ratio between the price and rental of a condominium (Figure 8), it was evident that it decreased and stabilized after some time. This meant the owners were able to rent at a rate proportionately more than the rate at which price (selling or buying) of a condominium got increased. Therefore, condominiums are not overly priced, and chances of price bubbles are less.

5. Conclusion

The variations of the price of the semi luxury and luxury condominiums for the past 20 years were studied in CMC and in two of its suburbs. In all areas, the prices of the condominiums showed nonlinear growth, but without any abnormal trends (e.g. unprecedented price hike within a short time). Results of condominiums in CMC revealed price appreciation and inflation are cointegrated at first level and need to be treated as time series. In partial agreement with our hypothesis semi-luxury condominiums showed a correlation

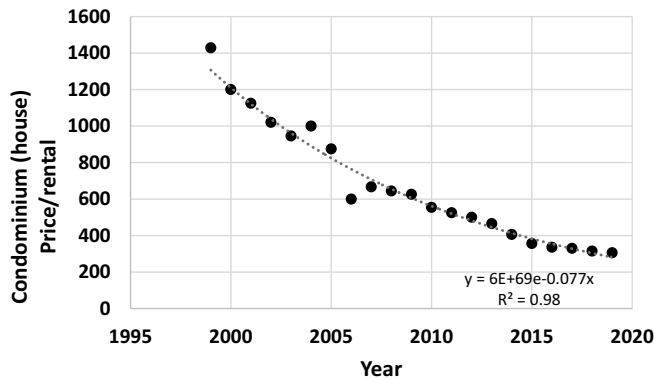


Figure 8. Temporal variation of condominium price to rental ratio.

with inflation such that price would appreciate by almost 2.5 times for a unit increase in inflation. However, luxury apartments showed a weak negative correlation, where decrease of prices for a given increase in inflation was close to one (0.94). Neither temporal variation of prices nor the correlation between price appreciation and inflation gave direct evidence on periods of concern such as price bubbles. Yet, referring the increasing housing price to household income ratio, a bubble is a possibility. Nevertheless, temporal increase of presales may give some relief as it indicated a stable status quo of the condominium market. Also, reduction of the ratio between price to rental of condominiums too suggested that a near price bubble is mostly unlikely. Another relief in this regard is the conservativeness of buyers and banks. Nevertheless, it is necessary government should intervene more to study and moderate the real estate market.

This study had to conduct under certain limitations, and some are due to the nature of the study area. As an example, being an emerging market, our data availability was limited, also due to practical (reluctant of the respondents) issues we could not obtain some more data. This was particularly the case when obtaining rent and household income data, thus studying price bubbles had to be done under these limitations. Therefore, it is recommended to adopt strategies to get more data and to cover super luxury and ultra-luxury condominiums. It should be noted international condominium developers (e.g. Shangri-La Hotels and Resorts, Zhong Tian Ding Hui (Pvt.) Limited, Krrish Group etc.) have started several projects with ultra-luxury condominiums. The port city project (on reclaimed land of 660 acres off CMC) would supply more condominiums. Therefore, studies targeting such developments could be vital not only to the local readership, but also international.

Acknowledgments

Authors would like to convey thanks for those who helped us giving necessary information. This research is partially funded by National research council, Sri Lanka (Grant number NRC 17-066).

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the National Research Council Sri Lanka [NRC 17-066].

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