Analysing Historical Real Estate Price Trends and Economic Indicators from 2004 to 2023: A Study of Office Properties at CBD Belapur, Navi Mumbai

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Abstract

This study investigates real estate price trends for office properties in CBD Belapur, Navi Mumbai, from 2004-2023, and how these changes relate to macroeconomic variables including interest rates, GDP growth, unemployment, and inflation. In order to account for major economic events, the COVID-19 epidemic, the 2008 financial crisis, and India's demonetization in 2016, the analysis is divided into two periods: 2004-2013 and 2014-2023. The findings indicate, nominal prices have increased significantly over time, and real prices accounting for inflation show considerable fluctuation, after 2016. GDP growth and real estate prices are found to have a significant negative correlation, while interest rates had a positive effect on real estate prices from 2004-2013. However, from 2014-2023, none of these factors had a significant impact on price stability. The post-pandemic trend toward remote work further reduced demand for office space, which slowed the rise in prices. This study offers information to help policymakers and investors make wise choices in an evolving socioeconomic context.

Keywords: Real Estate Price Trends; Macroeconomic Indicators; Real Estate Price Index; Economic Growth and Real Estates

Introduction

Urban economic dynamics are greatly influenced by Central Business Districts (CBDs), as office real estate values are directly correlated with macroeconomic variables including Gross Domestic Product (GDP) growth, inflation, unemployment, and interest rates. Although global research is conducted on the relation between economic cycles and real estate prices, less is known about developing markets such as India. Rapid urbanization and corporate demand have led to significant price growth in CBDs like Belapur in Navi Mumbai, yet the implications of macroeconomic shifts are still little understood. This research is split into two main periods: 2004–2013 and 2014–2023, and looks at the price trends of office properties in CBD Belapur. The objective is to evaluate the impact of events, such as changes in workplace needs following the pandemic, and macroeconomic issues on real estate prices.

The objective of the study

The primary objective of the paper was to examine the trends for office building real estate prices in the CBD. Belapur from 2004-2023 to macroeconomic variables viz. GDP growth rate, unemployment rate, inflation rate, and interest rates. The study hypothesizes that real estate prices of the CBD Belapur decline as related to the growth rate of GDP, but interest rates and inflation have varying effects on prices across different periods. The study also attempts to analyse how the events, of the global recession, India's demonetization, and the post-COVID movement towards working from home affect office real estate demand and price. It sheds light on macro-economic factors through the lens of these dynamics, influencing the real estate market.

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Literature Review

This section provides a literature review on the trends of real estate prices of CBDs and their relationship with several macroeconomic indicators. Features of clustering, due to the strategic importance of its location, translate into price premiums in the cases of CBDs, as has been demonstrated by Clapp et al. (2005) and Rosenthal and Strange (2008) and are evident for Belapur's office real estate market.The role of corporate demand and infrastructure accessibility was highlighted by Hendershott et al. (2005) and McDonald (2007) as driving prices in their studies. In Belapur, proximity to the suburban railway network has played an important role in maintaining demands.

Davis and Heathcote, 2007; Wheaton and Torto, 2006, mentioned that prices, particularly in the CBDs, respond positively to economic expansions since the growing business activity raises demand. Dragana (2022) concluded that selected macroeconomic factors significantly influenced prices in Bosnia and Herzegovina from 2007 to 2019. In India, Ball et al. (2009) and Das and Roy (2017) observed that rapid GDP growth from 2004 to 2008 substantially supported the increase in the values of office property. Since companies looked for the best locations during the economic boom, prices soared, substantiating the global experiences of CBD reflecting the GDP growth rate.

While Clayton et al. 2007 and Hendershott 2008, Vasileiou, E.2024 considered real estate's role as a guard during inflation, high inflation raises financing costs and hence would lower demand for commercial properties. Mukherjee and Bhaduri, 2012, ascertained inflation as one of the causes of disturbance in the real estate markets. The relation is still complex; hence, these works infer that inflation may lead both to long-term price appreciation and also introduce short-term fluctuations in prices.

Capozza et al. (2004) and McDonald and Stokes (2006) noticed that higher interest rates dampen the prices of real estate due to increased borrowing costs. Mishra and Biswas (2014) observed that this is the case in India also, especially during the period after 2008, when increasing interest rates decelerated demand for office spaces in CBDs. With the stabilizing interest rates, however, demand again started to surge for office spaces in line with global trends as reported by Ling and Naranjo (2009).

Gyourko and Keim (2006) and Wheaton (2009) documented the volatility of the real estate market during periods of economic recession. In 2019, Jerome and Etienne concluded that while the office market in France is experiencing high prices due to constrained supply and low interest rates, it is only slightly overvalued. The financial crisis in 2008, according to Tsolacos et al. (2010), resulted in the decline of office real estate price growth in most parts of the world. These studies highlight the extreme complexity of office real estate prices to economic recessions.

Jonathan et.al (2020) concluded that investors in the African context should closely monitor specific macroeconomic indicators, as these factors significantly influence property price movements. In 2022, Elmar et.al concluded that rent and vacancies, are the primary determinants of office prices in European cities, with significant variations in the impact of macroeconomic impacts across different crises, highlighting the characteristics of the German and Swiss office markets during turbulent times.

The increase in the price of real estate in a CBD is seen from much of the literature; however, Belapur further provides an increase in understanding by portraying the special characteristics an Indian CBD takes during a rapidly urbanizing economy. This study shall bring fresh insight into how the office real estate market in Belapur has responded to the variations of the macroeconomic environment between 2004 and 2023.

Methods

The methodology adopted involved the collection of real estate transaction values from 2004-2023 of office properties in CBD Belapur and macroeconomic indicators for India. The data collected was acquired through the Index II document available from the Department of Registration and Stamps,

Government of Maharashtra. The transactions spanned throughout the year, thus average annual real estate prices per square meter were computed which were considered for further study. A real estate price index was constructed based on transaction values to cater for inconsistencies and to track changes in property values over time. The true transaction prices termed nominal prices were converted into real prices to account for inflation, using the appropriate Consumer Price Index (CPI-Base year 2012). This ensured that changes in property values reflect real purchasing power. The macroeconomic indicators data viz. GDP growth rates, inflation rates, and interest rates have been considered for the purpose of correlation with real estate prices. The unemployment rates were excluded because they didn't have as direct impact on office real estate prices as the chosen variables and including them could have led to redundancy. Also, to test the hypothesis stated in the objective, the study also assumes a null hypothesis that, there is no significant relationship between real estate prices and GDP growth, interest rates, or inflation. The null hypothesis was tested through statistical analysis. The study employed the Shapiro-Wilk Test for Normality, and Pearson correlation analysis to explore relationships between variables, followed by multiple linear regression to assess the impact of GDP growth, inflation, and interest rates on real estate prices. The graphical representation was indicated by plotting the real prices over time to visualize trends and co-relation.

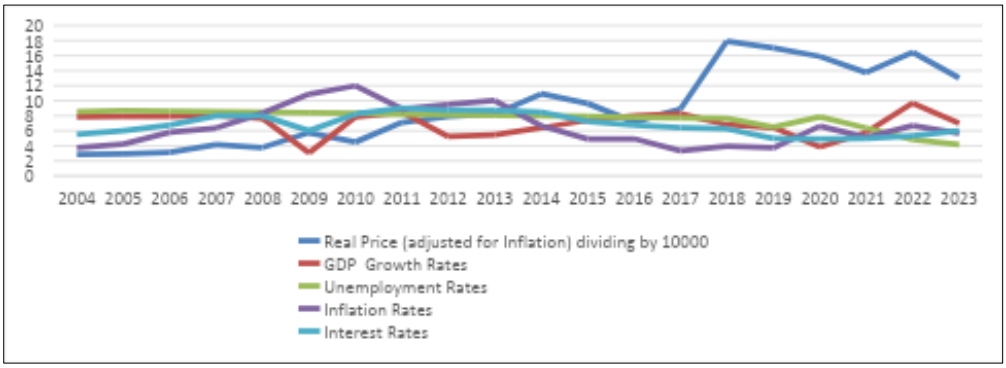
Results and Discussion

Figure 01: Nominal and Real Prices of Office Properties in CBD Belapur (2004-2023) with Key Macroeconomic Indicators

Year	Average Price per sqm in Rs. (Nominal Price)	Real Price in Rs. (adjusted for Inflation)	Price Index of each year	GDP Growth Rates	Unemployment Rates	Inflation Rates	Interest Rates
2004	15045	28313	36	7.86	8.55	3.76	5.5
2005	16084	29038	37	7.92	8.69	4.24	6
2006	18522	31603	40	7.92	8.61	5.79	6.75
2007	26047	41783	53	8.06	8.53	6.37	8
2008	25439	37666	48	7.66	8.48	8.34	8
2009	43102	57554	73	3.09	8.40	10.88	6
2010	37722	44977	57	7.86	8.31	11.98	8.25
2011	65035	71194	90	8.5	8.22	8.91	9
2012	79241	79241	100	5.24	8.15	9.47	8.75
2013	90679	82421	105	5.46	8.08	10.01	8.75
2014	127983	109052	138	6.39	7.99	6.66	8.5
2015	118657	96383	122	7.41	7.89	4.90	7.25
2016	92647	71703	91	8	7.8	4.94	6.75
2017	118641	88864	113	8.26	7.72	3.32	6.4
2018	248851	179340	227	6.8	7.652	3.93	6.25
2019	245009	170217	215	6.45	6.51	3.72	5
2020	243923	158939	201	3.87	7.859	6.62	4.9
2021	221850	137497	174	5.78	6.38	5.13	5
2022	283249	164527	208	9.69	4.822	6.69	5.3
2023	236558	130063	165	6.99	4.172	5.64	6

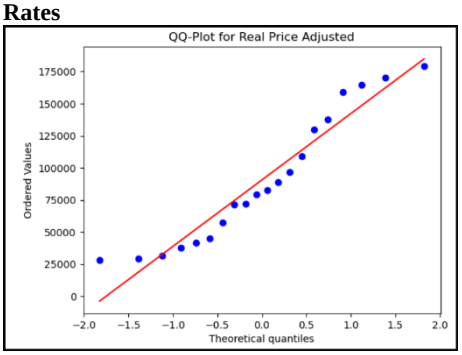
Source: Prepared by Author, 2024

Figure 02: Graph comparing Real Prices of Office Properties in CBD Belapur (2004-2023) with Key Macroeconomic Indicators



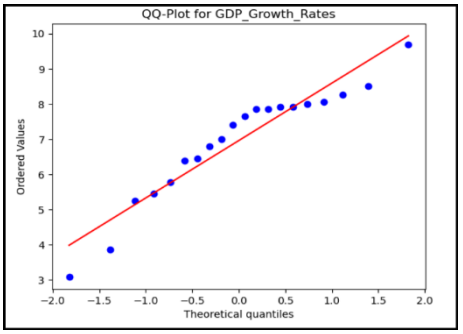
Source: Prepared by Author, 2024

Figure 03: Quantile-Quantile Plot for Real Price Rates



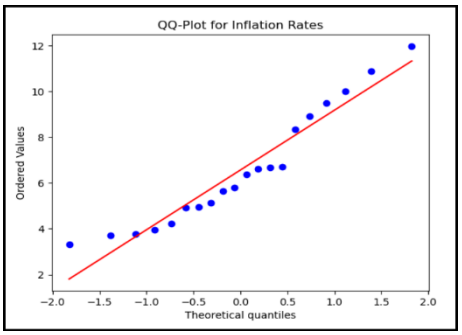
Source: Shapiro-Wilk Test, 2024

Figure 04: Quantile-Quantile Plot for GDP Growth



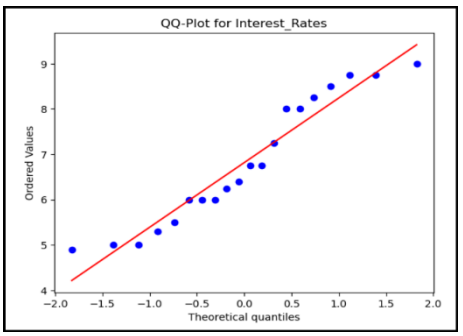
Source: Shapiro-Wilk Test, 2024

Figure 05: Quantile-Quantile Plot for Inflation Rates



Source: Shapiro-Wilk Test, 2024

Figure 06: Quantile-Quantile Plot for Interest Rates

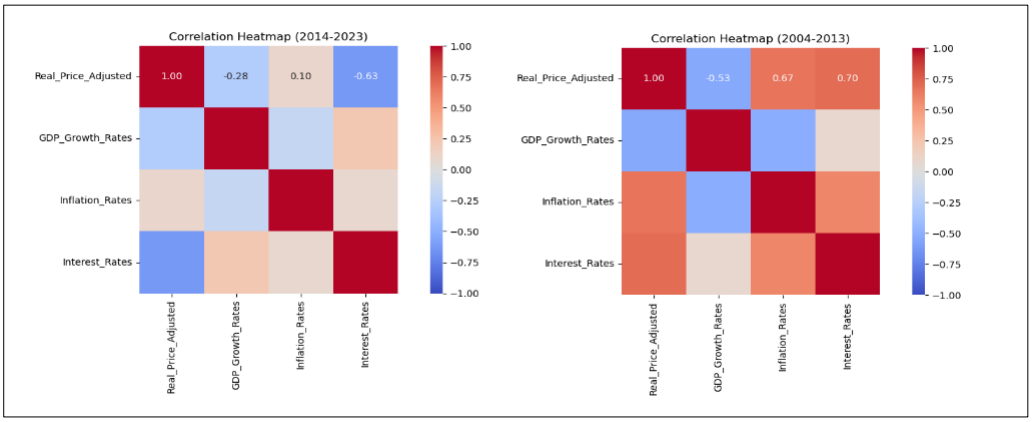


Source: Shapiro-Wilk Test, 2024

The Shapiro-Wilk Test revealed that the data was normally distributed in both periods, indicating that the regression analysis was valid. From 2004 to 2013, the regression analysis revealed a significant negative correlation between GDP growth and real estate prices (p-value = 0.015) and a positive influence of interest rates (p-value = 0.008), with an R-squared value of 0.86.

However, from 2014 to 2023, the R-squared dropped to 0.43, and no variable had a statistically significant influence, indicating changed market dynamics after 2014. The heatmap visualization helped to reinforce the findings from correlation analysis, providing a clear overview of how these variables interacted.

Figure 07: A heatmap to visualize the correlation matrix between variables.



Source: Prepared by Author, 2024

Figure 08: Interpretation of the results and the conclusions drawn from the correlation analysis for both periods.

Variable Comparison	2004-2013 (Correlation)	Interpretation (2004-2013)	2014-2023 (Correlation)	Interpretation (2014-2023)	Conclusion
Real Price vs. Interest Rates	+0.70 (Strong Positive)	As **interest rates increased**, **real estate prices** also increased, indicating high demand despite rising borrowing costs.	-0.63 (Strong Negative)	As **interest rates increased**, **real estate prices** decreased significantly, indicating that borrowing costs dampened demand.	The impact of **interest rates** shifted dramatically. In 2004-2013, demand outpaced borrowing costs, but in 2014-2023, higher rates suppressed prices.
Real Price vs. Inflation Rates	+0.67 (Strong Positive)	**Inflation** was a major driver of **real estate prices**. Higher inflation led to higher property prices.	+0.10 (Very Weak Positive)	**Inflation** had almost no influence on **real estate prices**.	**Inflation** played a crucial role in 2004-2013 but became far less significant in 2014-2023, likely due to other market dynamics post-COVID.
Real Price vs. GDP Growth	-0.53 (Moderate Negative)	Higher **GDP growth** was associated with lower **real estate prices**, possibly due to market dynamics or external factors.	-0.28 (Weak Negative)	**GDP growth** had a weaker, negative impact on **real estate prices**, reflecting limited influence post-COVID.	The negative impact of **GDP growth** weakened over time, reflecting a shift away from economic growth as the main driver of prices.

Source: Prepared by Author, 2024

The study's findings reveal that macroeconomic variables affected the market for office property in CBD Belapur from 2004 to 2023, but in diverse ways throughout time. Between 2004 and 2013, GDP growth had a considerable negative influence on real estate prices, defying the assumption that economic growth stimulates demand for office space. During this time, rising interest rates surprisingly raised real estate values, indicating high demand for office space. However, from the year 2014 onwards, interest rates had a negative effect and allowed prices to fall due to increased costs of borrowing. Inflation had uneven consequences, and real estate values did not always rise in either period. The market adjusted further after 2016; with interest rates and inflation increasing, inducing price variations. Following COVID-19, the shift towards working from home resulted in the reduction of demand for large office spaces to a standstill, leading prices to stagnate. Overall, the null hypothesis is rejected for GDP growth, confirming its negative impact on real estate prices, while mixed effects of interest rates and inflation lead to partial rejection. The results indicate that it is indeed the real prices that are sensitive to interest rates and other economic variables in times of uncertainty even if the nominal prices might be rising during inflation. This explains the complexity of the real estate market and the need to consider multiple factors that interact with its components.

Conclusion

An analysis of the office real estate market in CBD Belapur unfolds significant changes in how macroeconomic factors affect prices. Contrary to an ideal scenario, GDP growth had a negative influence on real estate values, especially between 2004-2013. During this time, rising interest rates unexpectedly increased prices, but the inflationary impact was not noticed. Since 2014, interest rates began to limit real estate values, particularly as borrowing costs increased, adding to price decreases. Considering the COVID-19 epidemic, the transition to remote work reduced demand for office spaces, resulting in stagnating prices beyond 2020. The data indicates that macroeconomic factors such as GDP growth, inflation, and interest rates impact real estate values, but their effects change over time.

Another factor contributing to this since 2014, is the influx of office space supply through the development of a state-of-art office real estate market in nearby nodes. Understanding these tendencies is critical for making sound judgements in emerging markets.

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References

Ball, M., Lizieri, C., & MacGregor, B. D. (2009). The Economics of Commercial Property Markets. Routledge.

Benedetto, Manganelli., Francesco, Tajani. (2015). Macroeconomic Variables and Real Estate in Italy and in the USA. 31-48. Doi: 10.3280/SCRE2015-003002

Capozza, D. R., Hendershott, P. H., & Mack, C. A. (2004). An anatomy of price dynamics in illiquid markets: Analysis of a real estate market. Real Estate Economics, 32(1), 1-32.

Case, K. E., & Quigley, J. M. (2008). How housing booms unwind: Income effects, price effects and feedback through financial markets. Journal of Housing Economics, 17(2), 190-202.

Clapp, J. M., Nanda, A., & Ross, S. L. (2005). Which school attributes matter? The influence of school district performance and demographic composition on property values. Journal of Urban Economics, 57(3), 458-486.

Clayton, J., Ling, D. C., & Naranjo, A. (2007). Commercial real estate valuation: Fundamentals versus investor sentiment. Journal of Real Estate Finance and Economics, 35(3), 457-479.

Das, K. R., & Roy, S. (2017). Urban planning in the context of rapid urbanization: A study of Navi Mumbai. Urban Studies Journal, 54(6), 1295-1309.

Davis, M. A., & Heathcote, J. (2007). The price and quantity of residential land in the United States. Journal of Monetary Economics, 54(8), 2595-2620.

Dragana, Nikić, Stanković. (2022). Analysis of the impact of macroeconomic factors on real estate prices in Bosnia and Herzegovina. Economics (Bijeljina), 10(2):147-160. Doi: 10.2478/eoik-2022-0015

Elmar, Lang., Ferdinand, Mager., Kerstin, Hennig. (2022). Office Property Pricing and Macroeconomic Shocks: European Regions through the Real Estate Cycle. International real estate review, 25(2):217-236. Doi: 10.53383/100341

Fingleton, B. (2009). Increasing returns and economic growth: An empirical application to real estate markets. Real Estate Economics, 28(1), 117-145.

GDP Growth Rate of India (Constant Prices) during 2001-02 to 2013-14. (n.d.). Open Government Data (OGD) Community. https://community.data.gov.in/gdp-growth-rate-of-india-constant-prices-during-2001-02-to-2013-

14/?_gl=1*15g28ia*_ga*MTY3MDc1OTYxMi4xNzI2MDAxMjA2*_ga_2NLK0N9J6V*MTcyNjAwMTIwNS4xLjEuMTcyNjAwMTM1OS41Mi4wLjA.

Graham, J. R., Harvey, C. R., & Rajgopal, S. (2010). The economic implications of corporate financial reporting. Journal of Accounting and Economics, 40(1), 3-73.

Gyourko, J., & Keim, D. B. (2006). What drives real estate returns? Journal of Real Estate Finance and Economics, 32(2), 67-88.

Hendershott, P. H. (2008). Office markets and business cycles. Journal of Real Estate Finance and Economics, 36(2), 137-160.

Hendershott, P. H., & Hendershott, R. J. (2005). Real estate and inflation. Journal of Real Estate Finance and Economics, 30(2), 123-140.

Home - RBI. (n.d.). RBI. https://website.rbi.org.in/web/rbi. Handbook of Statistics on Indian Economy

Jérôme, Coffinet., Etienne, Kintzler. (2019). International Real Estate Review. International Real Estate Review, 22(2):275-306. doi: 10.53383/100282

Jonathan, Oladeji., Joseph, Awoamim, Yacim., Kevin, Wall., Benita, Zulch. (2020). Macroeconomic leading indicators of listed property price movements in Nigeria and South Africa. 27(2):93-119. Doi: 10.18820/24150487/AS27I2.4

Ling, D. C., & Naranjo, A. (2009). The integration of commercial real estate markets and stock markets. Real Estate Economics, 37(3), 383-417.

McDonald, J. F. (2007). Economic analysis of an urban housing market. Urban Studies, 44(6), 1129-1147.

Mishra, S., & Biswas, S. (2014). Office space demand dynamics in Indian metros. Journal of Urban Economics, 45(3), 298-314.

Mukherjee, P., & Bhaduri, A. (2012). Real estate as an investment asset in India: A critical review. International Journal of Housing Markets and Analysis, 5(2), 118-134.

Rao, R., Kumar, S., & Choudhary, M. (2014). CBD development in India: The case of Navi Mumbai. International Journal of Urban Planning, 8(2), 115-130.

Reddy, K. S., & Mehta, R. (2016). Real estate trends in CBD markets: Evidence from India. Journal of Property Investment & Finance, 34(4), 413-431.

Department of Registration and Stamps Government of Maharashtra. (n.d.). https://igrmaharashtra.gov.in/

Rosenthal, S. S., & Strange, W. C. (2008). The attenuation of human capital spillovers. Journal of Urban Economics, 64(2), 373-389.

Vasileiou, E., Hadad, E. and Melekos, G. (2024), "What drives the real estate market? Could behavioural indicators be useful in-house pricing models?", EconomiA, Vol. 25 No. 1, pp. 157-174. https://doi.org/10.1108/ECON-10-2023-0166

Visualization Engine v3.0. (n.d.). https://visualize.data.gov.in/

Wheaton, W. C., & Torto, R. G. (2006). Vacancy rates and the future of office rents. Journal of Urban Economics, 39(2), 181-205.

World Bank Open Data. (n.d.). World Bank Open Data. World Bank Open Data. (n.d.-b). World Bank Open Data. https://data.worldbank.org/ https://data.worldbank.org/indicator/FR.INR.DPST?end=2023&locations=IN&start=2000&view=chart&year=2000.