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محددات أسعار المساكن في جنوب أفريقيا: تأثير فيروس كورونا

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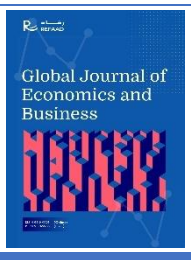

Determinants of Housing Prices in South Africa: The Impact of Covid-19

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Abstract:

Objectives: The present study aims to determine the relationship between selected macroeconomic and market variables, and South African housing prices, and the influence that Covid-19 had on South African housing prices, after holding for the effect of the change in selected macroeconomic, and market variables on housing prices.

Method: Housing prices were determined via the macroeconomic and market variables of economic growth, unemployment, inflation, household debt-to-income, interest rates, foreign exchange rates, stock market returns, and Covid-19. Data collected were analysed using correlation and hierarchical multiple regression tests.

Results: The findings indicated that pre-existing relationships between housing prices and traditional determinants of unemployment and household debt-to-income have changed. The results also indicated that housing prices increased during Covid-19 over-and-above the expected increase attributed to changes in the other selected predictor variables.

Conclusion: These results provide an updated collection of housing price predictors for practitioners to utilise post-pandemic.

Keywords: *housing prices; Covid-19; macro-economic determinants; micro-economic determinants.*

الملخص:

الأهداف: تهدف الدراسة الحالية إلى تحديد العلاقة بين متغيرات الاقتصاد الكلي ومتغيرات السوق المختارة، وأسعار المساكن في جنوب إفريقيا، وتأثير فايروس كورونا على أسعار المساكن في جنوب أفريقيا بعد التمسك بتأثير التغير في متغيرات الاقتصاد الكلي والسوق المختارة على أسعار المساكن.

المنهجية: وتم تحديد أسعار المساكن من خلال متغيرات الاقتصاد الكلي والسوق مثل النمو الاقتصادي، والبطالة، والتضخم، وديون الأسر إلى الدخل، وأسعار الفائدة، وأسعار صرف العملات الأجنبية، وعوائد سوق الأوراق المالية، فايروس كورونا. وقد تم تحليل البيانات التي تم جمعها باستخدام اختبارات الارتباط والانحدار المتعدد الهرمي.

النتائج: أشارت النتائج إلى أن العلاقات الموجودة مسبقًا بين أسعار المساكن والمحددات التقليدية للبطالة وديون الأسر المعيشية إلى الدخل قد تغيرت. كما أشارت النتائج إلى أن أسعار المساكن ارتفعت خلال فترة كوفيد-19 فوق الزيادة المتوقعة التي تعزى إلى التغيرات في المتغيرات التنبؤية الأخرى المختارة.

الخلاصة: توفر هذه النتائج مجموعة محدثة من تنبؤات أسعار المساكن للممارسين لاستخدامها في مرحلة ما بعد الوباء.

الكلمات المفتاحية: *أسعار السكن؛ كوفيد-19؛ المحددات الماكرو اقتصادية؛ المحددات الميكرو اقتصادية.*

Introduction:

Housing prices have typically been easy to predict and understand (Wu & Brynjolfsson, 2015) because of long-standing relationships between housing prices and housing price determinants, underpinned by theories that have invariably corroborated with observations of housing market dynamics (Bah et al., 2018). The significance of these relationships has been reinforced during periods of economic shock, whereby continuity of the relationships between housing prices and determinants was exhibited during periods of significant volatility (Wu & Brynjolfsson, 2015).

Economic conditions generally associated with a downturn in housing prices, such as low economic growth and increasing interest rates, have coincided with record-high housing prices throughout the country (Francis, 2020). This observation directly contradicts the pre-established relationships between housing prices and several macroeconomic and market determinants, resulting in insinuations that these relationships have been altered due to the pandemic (Sucheran, 2022). However, South African housing prices have not adjusted to these pre-defined relationships in response to Covid-19 (Sucheran, 2022). Subsequently, the lack of continuity between housing prices and housing price determinants from before the pandemic to after the onset compromises the validity of the application of previous research in the field to the current climate of Covid-19 affected housing prices. As a result, practitioners cannot confidently predict housing prices by the relationships of price determinants of old.

Considering these mitigating circumstances above, the present study seeks to contribute to the current literature by examining the relationship between relevant variables under the circumstances of Covid-19. The present study seeks to establish the extent to which Covid-19 has impaired the relationships between traditional market determinants and housing prices and the impact that Covid-19 has had on South Africa.

Literature Review:

This section draws from the relevant literature to provide insight into the fundamentals and dynamics of the housing market. A nuanced overview of the relationships between macroeconomic and market factors and housing prices will provide a theoretical background from which relevant literature can. This analysis culminates with an overview of academic insight into the impact that Covid-19 has had on housing prices, from which the research objectives of the present study will follow.

The Housing Market:

The "housing market" refers to tangible, resident-demarcated land, and related property, unmovable and (largely) exhaustive (Olsen, 2017). The land is finite; thus, changes in supply are mainly dependent on expansions of real estate zoning and the repurposing of single-unit homes into multi-unit residences (Bramley, 2013). Nonetheless, these alterations are costly and time-intensive, resulting in an intrinsically supply-lagging market (Al-Masum & Lee, 2019). Consequentially, determination within the housing market lies with the demand side of the supply-demand function (Olsen, 2017).

The law of supply and demand is an economic principle that details a resource's price and quantity determinants in a competitive market by explaining the interaction between its demand and supply (Gale, 1955). Changes in price and quantity react to changes in supply and demand until an equilibrium is reached. Applying this law to the housing market, where supply is lagging, an increase in demand results in a price bubble (an increase in price above intrinsic value) for the duration of efforts to increase supply (Fingleton, 2008). Based on the law of supply and demand, the research necessitated the focus on demand-altering factors present throughout housing-related literature, which will guide the objectives of the present study.

The fixed nature of housing ensures that housing demand is tied to the attractiveness of its location (Bramley, 2013). Scaling this notion, the demand for a country's housing market depends on the country's attractiveness which is primarily determined by many economic and market variables (Al-Masum & Lee, 2019). Thus, a theoretical and literary review of housing prices' important macroeconomic and market determinants is presented below.

Macroeconomic and Market Determinants of the Housing Market:

This section explains the determinants of housing prices by exploring the theoretical and literary workings of scholars who have studied significant macroeconomic and market variables' impacts on housing prices.

Economic Growth:

Economic growth measures the annual growth in a country's production, including annual growth in spending - which speaks to the extent to which real income has grown (Klarl, 2016). When economic growth increases, the ratio between individual income and the cost of goods and services increases, rendering goods and services more affordable - increasing consumer spending power (Valadez, 2011). Therefore, increasing economic growth and enhancing consumer spending power make housing more affordable, increasing housing demand and market prices (Klarl, 2016).

Yıldırım and İvrendi (2017) found that economic growth in the form of industrial production has a statistically significant impact on determining the demand for housing in Turkey, corroborated by the markets of the United States (Garriga et al., 2019) and throughout the European Union (Filotto et al., 2018). Importantly, Apergis et al. (2014) determined a robust and positive correlation between South African housing prices and economic growth, deducing shocks in economic growth to have profoundly impacted housing prices.

Unemployment:

Francis (2020) asserts a significant connection between unemployment and the housing market. Unemployment rates are related to disposable income figures and consumer spending (Agnew & Lyons, 2018). As unemployment decreases, average disposable income increases and consumer spending rises, rendering homeownership affordable for more consumers and increasing housing demand (Francis, 2020). It also results in more consumers meeting the required mortgage bond criteria, further increasing demand and increasing housing prices (Andre et al., 2019). Many observations of a significant relationship between unemployment and housing prices have been documented throughout global markets (Rupert & Wasmer, 2012); however, recent studies within South Africa have not found significant relationships (Akinsomi et al., 2018).

Debt-to-Income Ratio:

The household debt to income ratio is calculated as the ratio of household debts that arise from loans to the total income earned by households (Scott & Pressman, 2013). Thus, it measures the ability of households to settle their principal debts, whereby a high ratio indicates a high risk of default (Scott & Pressman, 2013).

The empirical literature suggests that an increase in the ratio promotes growth in housing prices due to the excess loans circulating the market, allowing for the purchasing of more housing (Lowe, 2017). However, the ratio also impacts consumer savings; the more significant the debt-to-income ratio, the less income households can save. This affects their ability to invest in an asset with the income and savings requirements that housing necessitates, funneling consumers towards the less capital-intensive option of renting (Lowe, 2017). Thus, the relationship between household indebtedness and housing prices is not always positive, as the market's appetite for savings confounds it.

Sibanda and Mhlanga (2013) found a positive relationship between housing prices and debt-to-income in South Africa. Nomatye and Phiri (2017) study also supported these findings, suggesting that the household debt-to-income ratio primarily influences changes in housing prices and concluding on the significant effect that excess loans have on increasing housing prices.

Inflation:

Inflation measures the rate of change in prices of goods and services in an economy (Hay, 2009). When inflation rises, the money supply increases, and prices of limited goods, such as housing, adjust to meet the influx of excess money (Hay, 2009). Thus, a strong, positive relationship exists between inflation and housing prices.

Inglesi-Lotz and Gupta (2011) investigated the relationship between inflation and South African housing prices, noting a high positive correlation between the two variables. This strong correlation has rendered housing a solid hedge against inflation in South Africa. Taderera and Akinsomi (2020) supported this finding by confirming the strong inflation-hedging qualities of housing in both the short and long run.

Interest Rates:

Interest rates are the cost of borrowing money and are the percentage of the principle of a loan that a lender charges a borrower for using money (Hott & Jokipii, 2012). Repo interest rates (the interest rate charged by the central bank to borrowing banks) serve as the basis for interest rates. The repurchase rate is dependent on

balancing the desire to stimulate borrowing and spending and encourage economic growth by setting low interest rates, with the need to maintain a level of interest rate that keeps inflation controllable (Kuttner, 2014).

Interest rates affect housing prices as they determine the cost of mortgages, which affects housing affordability (Bhutta & Keys, 2016). Housing prices adjust to the cost of financing a purchase, as cheaper mortgages increase mortgage demand, which increases housing demand and prices (Kuttner, 2014). Thus, an inverse relationship exists, whereby a decrease in interest rates will be balanced out by an increase in housing prices and vice versa. This was tested by Kwangware (2008), who confirmed the existence of a negative correlation between interest rates and South African housing prices.

Foreign Exchange Rate:

The foreign exchange rate is defined as the price of the domestic currency for another currency (Taylor, 1995). Suppose foreign exchange rates depreciate and the foreign currency grows relative to the local currency. In that case, residential real estate becomes cheaper for foreign investors who earn in their stronger currency. This increases foreign investor purchasing power, which increases foreign demand for housing and contributes to higher housing prices (Ma & Zhang, 2019).

However, this effect is often surpassed by the income effect of the foreign exchange rate (Bahmani-Oskooee & Wu, 2018). This is the case in South Africa, a net importer that relies heavily on imported goods such as oil, machinery, and consumption (Ma & Zhang, 2019). When the Rand appreciates relative to the foreign currency (a decrease in the foreign exchange rate), imported goods become cheaper and general prices decrease. This decreases inflation and increases disposable income, rendering housing more affordable. The decrease in inflation also allows the government to decrease interest rates, increasing demand for mortgages and housing (Bahmani-Oskooee & Wu, 2018). This increases the price of housing, implying an inverse relationship between foreign exchange rates and housing prices.

Stock Market Return:

A further market metric with bearings of significance to the housing market is the returns of stock markets. The short-term impact of stock market returns on the price of housing is a positive one. As the stock market returns increase, invested funds increase (Antonakakis et al., 2016), which can be reinvested into the economy, which the housing market forms a part of. Therefore, an increase in the stock market returns results in a ripple effect of increasing housing demand and, thus, increasing housing prices (Antonakakis et al., 2016).

However, many investors view housing and the stock market as substitutes. Economic theory dictates that when the relative attractiveness of a substitute increases, the demand and price of the asset in question decrease (Campbell, 1985). Thus, an increase in stock market returns results in more investors funneling their investments towards the stock market instead of the housing market. This decreases housing demand and prices, implying an inverse relationship between the two variables (Choi, 2021).

The net effect of increasing stock market returns on housing prices depends on whether increasing disposable income outweighs decreasing investor appetite for housing (Choi, 2021). Evidence from the literature suggests that in most markets, the effects on income outweigh those of investor appetite, increasing housing prices (Antonakakis et al., 2016).

Covid-19 impact on the Housing Market:

Analyzing the relationships between major macroeconomic and market variables and housing prices provides a foundation for a review of the impact that Covid-19 has had on housing prices.

The introduction of a pandemic of the scope and consequence of Covid-19 could inevitably lead to altering housing determinants such as unemployment, disposable income, and economic growth. Previous periods of high unemployment and low disposable income have diminished housing demand, stifling housing prices (Hott & Jokipii, 2012). Thus, an initial period of slow market growth was experienced during the first few months of the pandemic as fear and uncertainty disrupted housing demand and supply. Intuition, in combination with fundamental economic principles, resulted in predictions of Covid-19 collapsing the housing market just as the market collapsed in the wake of the 2007 financial crisis (Liu & Su, 2021).

However, the circumstances surrounding Covid-19 differed vastly from those of the 2007 financial crisis. Unlike in 2007, homeowners were not overleveraged, and lending standards were not too loose; thus, there was

no frenzy to liquidate real estate and saturate the housing market (Liu & Su, 2021). Instead, the market rebounded and experienced unparalleled growth (Jones et al., 2021).

The growth in the housing market was attributed to the monetary policies implemented by the government. Interest rates were lowered to a record low of 3.5% in July 2020, encouraging borrowing and investment and easing concerns about impending economic decline (D'Lima et al., 2022). This also significantly lowered mortgage rates, which increased housing demand (Subaşı & Baycan, 2022). The government provided grants and stimulus packages to ensure that household incomes did not collapse when unemployment inevitably rose. These policies increased housing prices to record-high levels nationwide (Marcus, 2022).

However, the economic environment observed towards the latter half of 2021 did not support the trend of a growing housing market. Inflation had risen steadily due to increasing fuel and electricity costs. This subsequently leads to the Reserve Bank increasing interest rates, diminishing disposable income, and limiting the volume of mortgages. Furthermore, households had more outstanding debt than before the pandemic, reflected by a higher debt-to-income ratio (Srivastava et al., 2022). This increase in consumer indebtedness does not reflect increased mortgage activity, but rather it indicates a decreased ability for consumers to take on more debt, resulting in fewer mortgages. Despite the increase in interest rates and the decrease in consumers' ability to take on more debt, housing prices continued to rise.

Speculators have argued that the continued growth in housing prices can be attributed to the changing dynamics of post-covid lifestyles and the pandemic increased demand for housing as more people started working from home. This increased the relative prices of larger suburban homes (Jones et al., 2021). Single-family housing also increased in price relative to multifamily construction as the demand for housing away from dense urban areas increased due to the declining need for accessibility to economic hubs (Jones et al., 2021).

Increasing housing demand was also aided by the influence of price expectations (Subaşı & Baycan, 2022). Price expectations are known to shape current housing prices significantly. This has been influential since the onset of the pandemic, as consumers raised their expectations of future housing appreciation based on the current appreciation. Consumers during this time preferred to pay inflated prices rather than wait for the possibility of lower prices to unveil themselves at a much later date (D'Lima et al., 2022).

In summary, theories and literature have explored the relationships between selected macroeconomic and market factors in the South African housing market. Covid-19's detrimental impact on the country's economic and market well-being, along with observations of a consistently ascending housing market in South Africa, have starkly contradicted the pre-established relationships that housing prices were found to have had with the explored macroeconomic and market factors of economic growth, unemployment, debt-to-income, inflation, interest rates, foreign exchange rates, and stock market returns. This has led to speculation surrounding the impact of changing lifestyle dynamics on the market, leading one to wonder if Covid-19 has altered the relationships between the market and the mentioned macroeconomic and market factors (Jones et al., 2021). Academic contributions towards these changed dynamics in South Africa are scarce.

This study explores the extent to which previously established relationships between the housing market and macroeconomic and market variables of economic growth, unemployment, debt-to-income, inflation, interest rates, foreign exchange rates, and stock market returns still hold. This study also seeks to identify how Covid-19 has changed the relationships between the selected macroeconomic and market variables with housing prices. Therefore, the research objectives of the present study are to determine:

- The relationship between selected macroeconomic and market variables and South African housing prices, and
- The influence that Covid-19 had on South African housing prices, after holding for the effect of the change in selected macroeconomic and market variables on housing prices.

Research Methodology:

This section details the dataset used in the analysis, outlining the variables and methodologies utilised in exploring the study's objectives.

Data:

The study uses quarterly observations for the chosen variables from 01 January 2002 to 30 June 2022 to form a time series of 82 observations, the last 10 of which occurred post the introduction of Covid-19 pandemic. The recording and reporting norms of the economic variables necessitated quarterly data. A quarterly data sampling

aligns with most studies explored in the literature review. A sample period of over 20 years is deemed long enough to infer generalizability.

Variables:

This study's variables of housing prices, macroeconomic and market variables, and Covid-19 are outlined below.

Housing Prices:

Housing prices were measured via the South Africa Nominal Residential Property Price Index (RPPI). This index measures the change in the average prices paid by households for all residential properties in South Africa. The index is the most comprehensive housing metric available, factoring in the sale prices of new and resale residential housing (Els, 2010). Thus, the index allows for comparing the country's total housing price levels. The bank reports the RPPI for International Settlements every quarter.

Macroeconomic Variables:

The economic growth of South Africa was measured using the country's gross domestic product (GDP). This metric measures the total market value of all the finished goods and services produced within South Africa, serving as the most popular indicator of economic growth throughout literature and in practice (Valadez, 2011). The South African Reserve Bank (SARB) releases GDP data every quarter.

Unemployment is measured using the Quarterly Labour Force Survey (QLFS). The QLFS is a household-based survey that covers total employment and unemployment in all industries and sectors. This data is published quarterly by the SARB and serves as the country's most widely cited unemployment metric (Yu, 2009).

The South African household debt-to-income ratio calculates the ratio of the combined debts of South African households to the combined monthly income of South African households. This ratio is recorded and published every quarter by the SARB.

Inflation is proxied by the South African Consumer Price Index (CPI). CPI measures the overall change in consumer prices based on a representative basket of goods and services and is widely regarded as the best metric for measuring inflation (Cavallo, 2020). Stats SA publishes quarterly CPI data.

Market Variables:

In line with prior literature, interest rates are proxied by the repurchase rate (REPO). The REPO is the rate at which financial institutions borrow from the reserve bank. It subsequently informs the prime rate at which private banks lend to individuals, reported every quarter.

The South African nominal effective exchange rate proxies the foreign exchange rate. This is the weighted average exchange rate of the Rand based on trade and consumption of manufactured goods between South Africa and its most important trading partners. The weighted average exchange rate of the Rand is calculated against twenty currencies at varying weights according to their level of trade with South Africa.

Stock market returns for South Africa are proxied by using the South African FTSE/JSE Africa All Shares Index. Companies in this index comprise the top 99% of the market capitalisation of all listed companies on the Johannesburg Stock Exchange, rendering it the most comprehensive index for gauging market returns. Bloomberg provides quarterly returns figures.

Covid-19:

The presence of Covid-19 acts as a dummy variable in the study, denoted as '1' in model calculations when present in the time series (from March 2020 onwards) and as '0' otherwise.

Data Analysis:

The collected data were analysed using IBM SPSS version 28. This software has been used industrywide and is considered robust in its correlation and hierarchical regression tests (Rahman & Muktadir, 2021). As some variables were index valued, a two-step approach for transforming continuous variables was employed to transform the variables into normally distributed variables. Descriptive statistics were used to test for normality, homoscedasticity, and linearity assumptions. Variance inflation factor tests were also run to test for potential issues of multicollinearity present amongst the set of regression variables. No unit tests were conducted, as data

analysis was carried out in line with the methodology employed by a host of articles referenced throughout (Garriga & Peralta-Alva, 2019; Sibanda & Mhlanga, 2013; Yildirim A& İvrendi, 2017).

For research objective one, correlation and hierarchical multiple regression tests were carried out to determine (i) the relationship between selected macroeconomic and financial variables and South African housing prices. Pearson correlation coefficients determine the size, direction, and significance of correlations between the dependent variable of housing prices, whilst regression results indicate the proportion of change in housing prices that a change in the variable predicts and whether this change is statistically significant or not.

For research objective two, a hierarchical multiple regression allows for a second model that includes the independent dummy variable of Covid-19 to be compared to the first regression model comprising just the economic and market variables. This allows for the analysis of the influence that Covid-19 had on South African housing prices after adjusting these prices for the changes imparted by the selected macroeconomic and market variables explored in the first regression.

Results and Discussion:

This section compares the outcomes of the results to prior literature. Detailed below are the results of the correlation and regression tests employed to address the study's research objectives. These results are supplemented with a discussion of the results' relevant implications on the research objectives.

Assumption Testing:

Tests of normality were run using the Shapiro-Wilk test. Results were non-significant for all variables, ranging from 0.182 to 0.994. As these values did not fall below the threshold of .005, the samples can be considered normally distributed. The scatterplots of standardised predicted values against standardised residuals between the dependent and independent variables indicated that linear relationships existed. Scatterplots also indicated variance consistency for differing values of the variables; thus, homoscedasticity could be assumed.

Analysis of Results:

Below Table (1) is a Pearson correlation matrix of housing prices with the selected macroeconomic, market, and Covid-19 variables. Correlation results infer the direction and size of the relationship between two variables. This is followed by Model 1 Table (2) of a hierarchical multiple regression of housing prices with the selected macroeconomic and market variables. Regression results dictate whether variation in independent variables has resulted in material variation in housing prices and if this affected variation is significant to variation affected by other variables.

Table (1): Pearson Correlation Matrix of Housing Prices with Macroeconomic, Market, and Covid-19 Variables

		Economic growth	Unemployment	Inflation	Debt-to-Income	Interest Rates	Foreign Exchange Rate	Stock Market Returns	Covid-19
Housing Prices	Pearson Correlation	.987**	.206	.992**	.187	-.751**	-.842**	.969**	.579**
	Significance	<.001	.072	<.001	<.003	<.001	<.001	<.001	<.001

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

Table (2): Hierarchical Multiple Regression of Housing Prices with Macroeconomic, Market, and Covid-19 Variables: Model 1

Model		Beta	Significance	R^2	Sig. F Change
1	(Constant)	-654.853	.699	.989	<.001
	Economic Growth	.001	.527		
	Unemployment	16.015	.612		
	Inflation	13.201	<.001		
	Debt-to-Income	9.359	.415		
	Interest Rate	-.133	.662		
	Exchange Rate	.003	.917		
	Stock Market Returns	.000	<.001		

Macro-economic and Market Variables:

Economic Growth:

The present study's results reinforce the abovementioned study's findings and extend them to the present day. Results indicate that housing prices are most severely positively correlated with economic growth (r (78) = .987, p < .001). This suggests that a change in economic growth coincides with a change in the same direction and of a similar quantity in housing prices. This relationship is consistent with Apergis et al. (2014), who found the same relationship in South Africa from 1994 to 2014.

However, regression results indicate that a change in economic growth does not predict a significant change in housing prices relative to the change effected by other variables in the regression (B = .001, p = .527). Thus, it is suggested that economic growth is not a significant predictor of South African housing prices, which does not align with the findings of Apergis et al. (2014), who indicated that shocks in economic growth have resulted in profound impacts on South African housing prices; explained by the small-scale GDP volatility during Covid-19, controlled for by government intervention. Therefore, mitigating an economic growth shock has likely caused housing prices to react to predictors that have exhibited greater volatility during Covid-19, such as inflation or stock market returns.

Unemployment:

The weak, positive correlation between unemployment and housing prices (r (77) = .206, p = .072) indicates an insignificant relationship, whereby a change in unemployment coincides with a small change in the same direction in housing prices. This finding does not align with generalised economic theory, as holding all other variables constant, unemployment and housing prices are expected to have an inverse relationship (Agnew & Lyons, 2018). Furthermore, regression results indicate that change in unemployment does not predict a significant change in housing prices relative to change effected by other variables in the regression (B = 16.015, p = .612). Thus, it is suggested that unemployment is not a significant predictor of South African housing prices.

Akinsomi et al. (2018) contextualised the insignificant relationship between unemployment and South African housing prices by highlighting the country's inequality, resulting in a housing market dominated by a few high-income participants. Thus, findings may indicate that changes in unemployment on housing prices, which affect a few housing market participants, are less impactful than changes in variables that impact most housing market participants.

Inflation:

The significant positive correlation between inflation and housing prices (r (78) = .992, p < .001) suggests that a change in inflation coincides with a change in the same direction and of a similar quantity in housing prices. This relationship is aligned with theories proposed in economic literature, positing that as the money supply increases, the prices of assets with constrained supply, such as housing, will increase. Thus, this finding confirms the inflation-hedging properties of South African housing (Inglesi-Lotz & Gupta, 2011).

Furthermore, regression results indicate that change in inflation predicts a significant change in housing prices relative to change effected by other variables included in the regression (B = 13.201, p < .001). This aligns with prior South African literature noting the ability of inflation to affect housing prices (Taderera & Akinsomi, 2020). Thus, it is suggested that inflation significantly predicts South African housing prices.

Debt-to-Income:

The weak, positive correlation between household debt-to-income and housing prices (r (77) = .187, p = .103) indicates an insignificant relationship, whereby a change in household debt-to-income coincides with a small change in the same direction in housing prices. Moreover, regression results indicate that a change in the ratio does not predict a significant change in housing prices relative to the change effected by other variables in the regression (B = 9.359, p = .415). Thus, it is suggested that household debt-to-income is not a significant predictor of South African housing prices.

Lowe (2017) has attributed the insignificance between household debt-to-income and housing prices towards the conflicting theologies behind how a change in the ratio may impact a consumer's ability to purchase housing. He noted that whilst a higher ratio may indicate more mortgage loans, it also indicates fewer savings, which would have an adverse effect on housing affordability. Results of the present study suggest that the counter-acting positive

and negative effects of a changing debt-to-income ratio on housing prices have resulted in a net effect of insignificance between the two variables.

Interest Rates:

The significant negative correlation between interest rates and housing prices (r (78) = -.751, p < .001) suggests that a change in interest rates coincides with a change in housing prices of a similar magnitude but in the opposite direction. However, regression results indicate that a change in interest rates does not predict a significant change in housing prices relative to the change effected by other variables in the regression (B = -.133, p = .662). Therefore, whilst there is a defined relationship between interest rates and housing prices, one cannot conclude that a change in interest rates has resulted in a material change in housing prices.

An explanation for the lack of material effect of interest rates on housing prices in South Africa was outlined by Kwangware (2008), who noted the staggered nature of housing prices in adapting to interest rate changes. A further explanation has been highlighted by Camilleri et al. (2019), who noted that price expectations could override the ability of interest rate changes to affect housing prices.

Exchange Rates:

The significant negative correlation between foreign exchange rates and housing prices (r (76) = -.842, p < .001) suggests that a change in foreign exchange rates results in a change in housing prices of a similar magnitude but in the opposite direction. This finding is aligned with the notion that a rand appreciation results in higher housing prices due to decreased inflation, increased disposable income, and increased spending power. However, regression results indicate that a change in foreign exchange rates does not predict a significant change in housing prices relative to the change effected by other variables in the regression (B = .003, p = .917). Therefore, whilst there is a defined relationship between foreign exchange rates and housing prices, one cannot conclude that a change in interest rates has resulted in a material change in housing prices.

Whilst this finding does not align with the expectation of a net exporter to exhibit a significant relationship between foreign exchange rates and housing prices, an explanation has been offered by Kwangware (2008), who suggests that housing markets tend to respond to other variables such as inflation and interest rates before the impact of change in foreign exchange rates materialises.

Stock Market Returns:

The significant positive correlation between stock market returns and housing prices (r (78) = .969, p < .001) suggests that a change in stock market returns coincides with a change in the same direction and of a similar quantity in housing prices. This relationship supports the findings of Antonakakis et al. (2016), who attribute a positive correlation between stock market returns and housing prices to the excess capital that strong market returns afford consumers to spend on housing.

Furthermore, regression results indicate that change in stock market returns predicts a significant change in housing prices relative to change effected by other variables in the regression (B = .001, p < .001). Thus, it is suggested that stock market returns significantly predict South African housing prices, concurring with the theory suggesting that the effect of increasing market returns on increasing disposable income outweighs the effect of decreasing investor appetite for housing in South Africa, resulting in higher housing prices (Choi, 2021).

The present study's findings allow for a conclusion to the first research objective of determining the relationship between selected macroeconomic and market variables and South African housing prices. Correlational relationships between housing prices and economic growth, inflation, interest rates, foreign exchange rates, and stock market returns are congruent with prior research findings. However, correlation results reveal that unemployment and household debt-to-income were not significantly correlated with housing prices for the study. Furthermore, of all the variables included in the regression, only inflation and stock market returns could predict significant variations in housing prices. These findings speak to the first research question of the study, allowing one to conclude that inflation and stock market returns as significant determinants of housing prices in South Africa.

These findings have major implications for practitioners and scholars alike, providing an updated profile of the relationship between housing prices and the macroeconomic and market variables in the present study. This allows for a greater understanding of South African housing market dynamics, more informed predictions of

future housing prices, and a greater ability to control housing prices via control of significant determinants such as inflation.

Covid-19:

Below is Model 2 Table (3) of the hierarchical multiple regression of housing prices with the selected macroeconomic, market, and Covid-19 variables. Regression results dictate whether variation in independent variables has resulted in material variation in housing prices and if this affected variation is significant to variation affected by other variables.

The results follow the multiple hierarchical regression model summary of housing prices with the selected macroeconomic, market, and Covid-19 variables. Model summary results indicate the level of variance in housing prices after accounting for the effect in housing price variance of the other tested variables in the model.

Table (3): Multiple Hierarchical Regression of Housing Prices with Macroeconomic, Market, and Covid-19 Variables: Model 2

Model		Beta	Significance	R^2	Sig. F Change
2	(Constant)	1652.868	.339	.991	.001
	Economic Growth	.001	.227		
	Unemployment	-56.373	.126		
	Inflation	12.378	<.001		
	Debt-to-Income	-9.332	.440		
	Interest Rate	.232	.447		
	Exchange Rate	.033	.193		
	Stock Market Returns	.000	<.001		
	Covid-19	780.540	.001		
				R^2 change	
				.002	

Multiple Hierarchical Regression Model Summary of Housing Prices with Macroeconomic, Market, and Covid Variables

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.994[a]	.989	.988	375.03907	.989	855.577	7	67	<.001
2	.995[b]	.991	.989	349.48310	.002	11.157	1	66	.001

a. Predictors: (Constant), Stock Market Return, Debt-to-Income, Interest Rate, Exchange Rate, Unemployment, Inflation, Economic Growth

b. Predictors: (Constant), Stock Market Return, Debt-to-Income, Interest Rate, Exchange Rate, Unemployment, Inflation, Economic Growth, Covid

c. Dependent Variable: Housing Prices

The results of the second model of the regression test indicate that housing prices significantly increased during Covid-19 (B = 780.540, p = .001). This result also indicates that Covid-19 predicted significant variation in housing prices after the effect of the other tested variables was accounted for, reflected by a significant F-change value (F-change (1,66) = 11.157, p = .001). Thus, it can be concluded that Covid-19 increased housing prices over and above the increase in housing prices that is attributed to the pandemic-induced changes in the chosen macroeconomic and market variables included in the regression.

The increase in housing prices, over and above that predicted by the changes in explanatory variables included in the regression, indicates that additional, Covid-related forces have increased housing prices. This finding aligns with the notion provided by D'Lima et al. (2022), who attested to a bubble-like increase in housing prices during Covid-19.

This aligns with the idea that the introduction of the pandemic has changed the dynamics of the housing market to a degree whereby properties are valued differently than before (Subasi et al., 2022). This supports the idea that there is an increased demand for housing due to the shift in working norms allowing more employees to work from home (Jones et al., 2021). It also lends more support to the notion brought forward by Subaşı and Baycan (2022) and D'Lima et al. (2022), who noted the impact that price expectations have had in increasing housing demand and housing prices, stating that housing consumers during the pandemic preferred to pay inflated prices now than to wait for the possibility of lower prices in the future.

The present study's findings allow for a conclusion concerning the second research objective of determining the influence that Covid-19 had on South African housing prices after holding for the selected macroeconomic and market variables of model 1. Regression results indicate that after holding for the effect of the included

macroeconomic and market variables of model 1 on housing prices, Covid-19 significantly increased housing prices.

Findings of a significant, tangible impact of Covid-19 on housing prices should add the factor of Covid-19 to the collection of housing price determinants used by scholars and practitioners. This factor should be accounted for when evaluating and predicting housing prices in the future.

Limitations:

The findings of this study need to be viewed and interpreted in light of some limitations. These limitations can be categorised into two broad categories: limitations regarding the sample used and limitations regarding the variables used.

The recent Covid-19 pandemic restricted the study to 10 quarterly Covid-19-affected samples. One must be cognitive of this sample size when attempting to generalise the findings of the study post-pandemic. It is important to preface long-term predictions regarding the findings of this study with the caveat of limited Covid-19 samples.

Proxies were used when testing most variables, including the dependent variable. Whilst the best estimates of variables were used as proxies, they do not account for the entirety of the factors in question; thus, a degree of error is warranted.

Moreover, while literature necessitated including a host of housing price predictors, some exhibited multicollinearity. Variables used to proxy economic growth and inflation exhibited a significant correlation which may skew or undermine the effect that one or both variables may have on predicting housing prices and must be noted when interpreting the results of this study.

Finally, given the correlational nature of this study, one cannot explicitly conclude causality. However, results still provide an estimate of an association between variables, which is of immense value to scholars and practitioners interested in the relationships between housing prices and the given independent variables. Furthermore, it has been well established in the literature that housing prices are reactant to changes in the economy and the market, thus whilst causation cannot be explicitly concluded, interpretation of causation is feasible when results are analysed through the prism of prior literature (D'Lima et al., 2022).

Recommendations for Further Research:

The present study's findings extend the knowledge of relevant research conducted before Covid-19. However, the study's limitations hinder the present study's results. Thus, for these results to be recognised as conclusive, limitations regarding the sample size and methodology should be addressed in future research.

It is recommended that future research replicate the present study after an elapsed period whereby post-Covid observations comprise a greater proportion of the overall sample. This would allow for the results of the impact of Covid-19 on housing prices to be inferred with greater confidence. It would reinforce and update the present study's findings, allowing for a greater understanding of housing price determinants and better modelling and speculation of future housing prices.

It is also recommended that this study be replicated in other countries, as it would be a valuable addition to the literature to identify whether the effect of Covid-19 on housing prices is global if it can be blanketly applied across different regions, and to determine what national characteristics may confound observed effects.

Conclusion:

The key findings of the present study are two-fold in nature. Contrary to the findings of prior literature, the present study identified only inflation and stock market returns as significant predictors of South African housing prices. The second of the key findings found that Covid-19 increased housing prices over and above the increase attributed to variations in the chosen macroeconomic and market variables.

The present study's findings contribute to prior literature by exploring the dynamics of a housing market in the aftermath of a watershed period in history, allowing practitioners to act with more meaningful information regarding present market dynamics. The lack of synergy between the results of the present study and those of studies conducted before Covid-19 pandemic underly the significant contribution the present study provides. It emphasised the changing dynamics within the market that the present research has explored.

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