From Sentiment to Sale: The Impact of Macroeconomic Indicators on Multi-Family Real Estate Investments in Canada

Michael Spina

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By: Michael Spina

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Signed by the final Examining Committee:

_____ Chair
Dr. David Newton

_____ Examiner
Dr. Erkan Yönder

_____ Examiner
Dr. David Newton

_____ Supervisor
Dr. Thomas Walker

Approved by _____
Dr. Erkan Yönder, Chair of Department

April 1, 2024 _____
Dr. Anne-Marie Croteau, Dean of Faculty

Abstract

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This paper explores the investment appetite for multi-family dwellings in the greater metropolitan areas of Vancouver, Edmonton, Calgary, Toronto, and Montréal from 2015 to 2023. The study uses macroeconomic variables and a sentiment index built from Google Trends to analyze sale volumes of developers, individuals, institutional investors, and private corporations. The results of the study indicate that both developers and institutional investors are susceptible to the economic conditions and market sentiment when making decisions to securitize their investments. Conversely, individuals and private corporations respond inversely to periods of high or low volatility, with higher or lower transaction volumes, respectively, possibly with the strategic intent of purchasing properties at a discount. Additionally, the analysis reveals that increasing the money supply in Canada consistently correlates with increased investment volumes across all investor types. In contrast, periods of negative sentiment are consistently associated with lower investments.

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Chapter 1. Introduction

Since the COVID-19 pandemic, there has been a growing interest in Canada's multi-family real estate market. Policy makers and investors have raised concern regarding the dramatic increase in housing prices, which many believe has the potential to lead to a nationwide crisis. Despite the significant surge in market valuations, Canadian investors continue to purchase properties in great numbers, highlighting a need to study the relationship between the investment tendencies of multi-family investors, the economy, and market sentiment.

While some there is existing scholarship on Canadian multi-family sector (August, 2021; & Kettani et al., 2015), few if any of these studies employ empirical work to investigate the investment appetite of buyers. Drawing on two strands of research, this study aims to understand the macroeconomic and behavioural variables impacting the sales of multi-family properties.

What we know about the relationship between the economy and multi-family assets is primarily based on quantitative studies that investigate how macroeconomic factors influence property performance. Earlier research established that employment levels are positively linked to real estate returns (Liang & McIntosh, 1998; Schätz & Sebastian, 2009). More recent studies also identified the exchange rate as an indicator of property returns (Bjørnland & Jacobsen, 2010). A large and growing body of literature also investigated the impact of immigration on rental affordability. The findings of Saiz (2007) and Ayano (2020) state that periods of high immigration are associated with an increase in rental rates, which can increase a building's vacancy, making it less desirable. Other studies link market indices to commercial real estate (CRE) performance, suggesting that these indices act as a proxy for the economy's health (Quan & Titman, 1999; Xu & Chen, 2012). There is a consensus among academics that money supply has a positive relationship with real estate returns (Quan & Titman, 1999; Hoesli et al., 2008; Schätz & Sebastian, 2009; Xu & Chen, 2012), while unexpected inflation, defined as the anticipated inflation levels minus the actual inflation measure, shows a negative relationship (Ling & Naranjo, 1997; Bjørnland & Jacobsen, 2010). Findings regarding interest rates create more division in the relevant literature. One branch suggests that a rise in interest rates is associated with decreased CRE performance (Xu & Chen, 2012), while another argues a positive relationship between these variables (Kola & Kodongo, 2017). A growing body of literature also investigated the role of investor optimism and pessimism on CRE returns. Clayton, Ling, and Naranjo (2008) find a negative relationship between consumer sentiment and CRE prices. Lin, Rahman, and Yung (2008) find similar results where when investors are optimistic (pessimistic), CRE returns are positive (negative).

The main challenge that multi-family literature faces is the scarcity of transactional data. Consequently, much of the published research focuses on publicly traded Real Estate Investment Trusts (REITs) or appraisal-based indices as a proxy for property performance. There are two main issues with utilizing these variables. First, the focus on REITs, which are large institutional investors, fails to consider a substantial portion of the private market. Second, appraisal-based indices rely on the assumptions of an appraiser, which may be biased. The present study addresses these issues by incorporating the actual transactional prices from four categories of investors: developers, individuals, institutional investors, and private corporations.

Menkhoff et al., 2010 states that large investors tend to possess a higher level of sophistication. Contrarily, smaller investors often rely on sentiment when making investment decisions. Since there is an oversaturation of studies on public institutions in real estate, the conclusions may falsely assume that all investment decisions are made with the highest level of diligence. This study contributes to the literature by introducing a sentiment factor, utilizing Google Trends, to account for the diverse range of investor sizes. The motivation behind this approach stems from the diverse sample of small entities, which have been shown to rely heavily on sentiment to make investment decisions (Heinig et al., 2020).

This thesis analyzes the influence of macroeconomic indicators with a contributed sentiment variable in the shifting sales volumes of multi-family investors in the greater metropolitan areas of Vancouver, Edmonton, Calgary, Toronto, and Montréal. This paper differs from previous studies in several ways. Firstly, it uses actual transactions obtained from CoStar spanning eight years. This approach allows to expand the observation window of previous studies. Secondly, this study classifies different investor types into four distinct categories. The benefit of this method is a clear distinction between investor types, which previous studies fail to address. Thirdly, the paper introduces four separate lag periods per investor type to account for the timely process of purchasing a multi-family property, resulting in a clear understanding of the time effects of multi-family sales. Fourth, the study acknowledges that various factors impact investors differently across distinct time periods. To optimize the model and determine the ideal lag for each variable, the study incorporates a Granger Causality Test to address the investor responsiveness. Lastly, this thesis suggests a sentiment index, constructed using a principal component analysis (PCA) while incorporating negatively correlated search terms. By analyzing market sentiment via internet search trends, we now have the capability to obtain a deeper and more precise insight into the behaviors of a diverse array of investors. This approach is a significant improvement over the traditional method of relying on economic variables.

The findings of this research reveal key similarities between investors. Firstly, a rise in Canada's money supply has a consistently positive relationship with investment volumes across all investor types. This finding highlights the benefits of inflationary environments on multi-family assets. Secondly, the study finds a consistently negative relationship between market sentiment and investment volumes. This finding underscores the importance investors attribute to the confidence of the overall population, which is vital for the success of their investments.

The study also highlights fundamental differences between investors. For example, rising employment and interest rates positively influence developers, whereas they are negatively influenced in response to increases in immigration. Individuals positively respond to unexpected inflation and work started while sharing a negative view on employment and immigration. Institutional investors react positively to employment, the market index and work started while reacting negatively to immigration, interest rates, and unexpected inflation. Lastly, this study finds a strong similarity between individuals and private corporations in a positive relationship between unexpected inflation and a negative reaction to immigration; this last finding confirms that both can leverage economic downturns by investing during periods volatility, allowing both individuals and private corporations to acquire multi-family properties at reduced prices.

The remainder of this paper proceeds as follows. Chapter 2 reviews the related literature. Chapter 3 introduces the selected data, the model framework, and the adjustment of selected variables. Chapter 4 provides the empirical evidence. Chapter 5 provides an in-depth discussion of the findings. The final section presents conclusions.

Chapter 2. Literature Review

There exists a considerable amount of literature on investor responsiveness to the economy. However, relatively few of these studies focus on relationships in real estate, especially in Canada. The research, to date, tended to focus on publicly traded corporations, which comprises valuable information, but pertains to a relatively small portion of the market. Our knowledge to date is that institutional investors are highly responsive to their country's economy. Building off this knowledge, we need to question whether smaller investors in the multi-family sector, respond in a similar manner to their more experienced counterparts or whether they rely more heavily on sentiment.

Ekholm and Pasternack (2007) suggest that larger investors react more positively (negatively) to good (bad) news than smaller investors. More recent evidence maintain that individual investors tend towards overconfidence, especially when they have lower capital (Tekçe & Yilmaz, 2015). Detailed examinations of trading behaviour identifies that institutional investors trade more after good past performance (Puetz & Ruenzi, 2011).

The Macroeconomy and Real Estate

Bouchouicha and Ftiti (2012) investigate the impacts of the macroeconomy on the real estate sectors of the United States and the United Kingdom. The authors find that interest rates, inflation, and employment growth have a statistically negative significant impact in both countries. Conversely, while analysing 46 metropolitan areas of the U.S. market, Liang and McIntosh (1998) find contradicting results. The authors show that employment growth is directly linked to real estate returns in the short-term (i.e., within one year). This finding is consistent with the work of Schätz and Sebastian (2009), who find that employment rates statistically significantly reinforce this relationship. The similarities between both countries continue with respect to inflation measure and the ten-year government bond yield, each demonstrating a statistically significant and positive influence on returns. These results hold true while analysing the Greek, French, Polish, and Norwegian markets, Grum and Govekar (2016) demonstrate.

While there is a plethora of literature on institutional real estate investors, studies pertaining to private investors are lacking. Hoesli, Lizieri, and MacGregor (2007) begin to fill this gap by investigating the influence of the economy on property returns for public REITs and private investors in the U.S. The authors find that inflation has a positive and statistically significant impact on returns. However, unexpected inflation, defined as the difference between the expected and the actual rate, is negative and statistically significant. The U.S. private market shows similar results. Inflation is positive and statistically significant, whereas unexpected inflation is negative and significant.

Ling and Naranjo (1997) nuance the abundance of material on institutional investors by building three real estate portfolios; this approach provides a more comprehensive insight into the U.S. commercial real estate market. The first portfolio is a combination of REITs trading on an American Stock Exchange. The second portfolio is the National Council of Real Estate Investment

Fiduciaries (NCREIF) property index, which includes a portfolio of commercial real estate reported at appraisal values. The third portfolio estimates property incomes and gathers comparable capitalization rates from the American Council of Life Insurers (ACLI). The study shows that across the three portfolios, the interest rates and inflation demonstrate a positive and significant effect on real estate returns. A comparative study by Kola and Kodongo (2017) also finds both measures to be positive and statistically significant.

Academic research regularly uses the NCREIF index as a proxy for commercial real estate performance, owing to the scarcity of transactional sale data. Known for incorporating appraisal-based properties, the index faces criticism by scholars due to the potential bias in the evaluative judgement of appraisers who depend on a set of assumptions for the calculation of value. Nonetheless, studies that incorporate the index, such as Gyourko and Keim (1992), have an impact on CRE literature through their identifying of the importance of lagged variables. These studies provide evidence of significance between lagged Equity REIT returns and the appraisal-based index returns, which implies that the human process of valuing marketable goods is not instantaneous, but rather involves a discernible delay. Similarly, Quan and Titman (1999) collect office transactional data across 17 countries and find that lagged inflation is positively related to real estate price movement across North America, Europe, Asia, and Oceania. Furthermore, the study also finds that those market indexes that capture the overall health of a country's economy show positive statistical significance regarding CRE returns.

Other studies consider the addition of monetary policy when analyzing CRE returns. For example, Baffoe-Bonnie (1998) analyzes the influence of the macroeconomy in four different regions of the United-States: the Northeast, Midwest, South, and West. The results are comparable across all regions. Money supply, interest rates, and employment growth demonstrate a positive and significant effect on prices. Furthermore, in assessing the effects of monetary policy in the Chinese market, Xu and Chen (2012) find that interest rates reach negative significance, while stock index returns and inflation achieve positive statistical relevance. Bjørnland and Jacobsen (2010) support this view in their study on Norway, Sweden, and the U.K. They measure monetary policy through the inflation rate, the three-month domestic interest rate, and nominal exchange rates. The authors utilise four lag periods to accommodate for varying response durations to information dissemination. Across all economies, the housing sector reacts simultaneously to monetary shocks, most notably, sudden, and unexpected changes in interest rates have a negative and significant effect on prices.

Behavioural Finance and Real Estate

Effectively measuring sentiments and quantifying their impacts on asset prices is an important research question (Baker & Wurgler, 2007). Prior studies often use a direct approach (for example, see Gallimore & Gray, 2002; Clayton, Ling, & Naranjo, 2008), such as surveys, or an indirect approach (for example, see Ling & Naranjo, 2003; Heinin et al. 2020; and Ke & Sieracki 2019), through the use, for example, of economic indicators to measure market sentiment. Given the complexity of conducting surveys, most literature focuses on the indirect approach. For example, Ling and Naranjo (2003) study the impact of capital flow on the U.S. REIT sector and find that they demonstrate a positive and statistically significant impact on returns. The authors further investigate the flow of capital in REIT indexes and find that higher flows of capital correspond to positive index returns. Subsequently, Fisher, Ling, and Naranjo (2009) investigate

the short-term and long-run dynamics of capital flows and returns in private real estate. The findings suggest that lagged private returns are positively linked to increases in capital flows. In other words, high (low) periods of capital flow reflect optimistic (pessimistic) sentiment and will result in an increase (decrease) in price. Lin, Rahman, and Yung (2008) also explore the relationship between REIT returns and investor sentiment. The authors find that when investors are optimistic, CRE returns are positive and statistically significant. Similar results are attained in the European market. For example, Heinig et al. (2020) incorporate a European sentiment index, and regress macroeconomic variables against CRE returns. The findings show that the sentiment index has a positive relationship with European CRE returns.

Per the body of empirical work, various investors tend to have different patterns of investments. In addressing the issue, Ke and Sieracki (2019) investigate the trading behaviour of four investor types within the London office market: institutional investors, REITs, private investors, and oversea investors. The authors measure investor sentiment based on the buy and sell imbalance, indicating whether there is a net demand for properties. The study outlines the diverse behavioural patterns in different investors, for which prior studies often fail to account. The authors find that private investors herd against institutional and REIT investors, such that when publicly listed companies were optimistic, private investors were pessimistic.

Limitations of the Existing Literature

The literature on publicly traded companies is abundant in CRE, yet, there is considerable neglect of private firms. The scarcity of information, regulatory reporting, and the ease of analysis of public firms are likely causes. The lack of studies on the private sector poses a significant burden on real estate literature, given their substantial portion of the market share. The difficulty associated to obtaining suitable private data is noticeable across real estate research, given the abundance of studies on public REITs, leaving other asset classes, such as multi-family properties, underrepresented. The need for more analyses on specific asset classes is clear, given the contradiction in various CRE studies' findings. The variability in period of study across studies, coupled with public companies altering the type of assets held in their portfolios, may explain these differences. Distinct findings emphasize the need for a market-specific and asset-specific study to limit the variability of results. Another issue is researchers' reliance on appraisal-based indices, which are influenced by human biases. Lastly, an aspect of behavioral finance that warrants attention is the dependence on economic variables as a means of measuring sentiment, which may have the unintended effect of excluding smaller investors. This shortcoming is worth consideration, as it could potentially limit the overall effectiveness of such an approach.

Hypotheses

To contribute to closing the above-identified gaps in the literature, this study investigates the following hypotheses:

The risks associated with development projects always warrant particular attention to the state of the economy. Additionally, given that the viability of developments is closely tied to the rentability of a building, I expect developers to monitor the market sentiment of the population closely.

H1: DEVELOPERS ARE HIGHLY REACTIVE TO THE STATE OF THE ECONOMY AND MARKET SENTIMENT TO SECURITIZE THEIR INVESTMENTS.

Given the costly capital requirements associated with purchasing multi-family properties, I expect individuals to make informed decisions while benefitting from economic downturns to purchase dwellings at a discount.

H2: INDIVIDUALS INVEST PREDOMINANTLY ON SENTIMENT, BUT ALSO BENEFIT FROM ECONOMIC DOWNTURNS, WHICH IS REFLECTED BY COUNTERINTUITIVE COEFFICIENT ESTIMATES.

Several extant studies underline the information advantage of institutional investors. Moreover, scholarships finds that these investors consistently invest rationally without undertaking substantial risk. Additionally, given that properties' performance depends on the income collected from tenants, I expect institutional investors to pay close attention to market sentiment.

H3: INSTITUTIONAL INVESTORS CLOSELY MONITOR THE MARKET SENTIMENT, AND ARE RATIONAL, RISK-AVERSE, AND HIGHLY REACTIVE TO THE ECONOMY.

Individuals often establish private corporations to secure tax advantages, primarily managing these entities themselves. I anticipate that they will invest in a manner similar to individual investors.

H4: PRIVATE CORPORATIONS REACT TO THE ECONOMY AND MARKET SENTIMENT SIMILARLY TO INDIVIDUALS DUE TO THE OWNERSHIP STRUCTURE OF THESE ENTITIES.

Chapter 3. Methodology

This study explores macroeconomic and sentimental impacts of multi-family real estate sales on developers, individuals, institutions, and private corporations in the greater metropolitan areas of Vancouver, Edmonton, Calgary, Toronto, and Montréal. Many researchers use economic variables to measure the shifting sales volume of real estate; however, the research to date focuses on the public sector. Such approaches fail to address the various types of investors and their responsiveness to the economy. Therefore, few scholars draw on any systematic research into multi-family real estate, especially within the Canadian context. This study aims to contribute to literature on multi-family real estate by establishing an explanatory relationship between distinct investor types, the economy, and sentiment.

Research Design

This thesis employs a quantitative research design using the statistical software Python to test the developed hypotheses using a series of lagged Ordinary Least Square (OLS) regressions. Given the lengthy process of purchasing a multi-family unit, the research design incorporates one-month, three-month, six-month, and twelve-month lag periods. The approach uses macroeconomic variables *Employment, Exchange Rate, Immigration, Index, Money Supply,* and *Work Started* per secondary data from government websites; *Unexpected Inflation*, *Sentiment*, and the *Yield* also comprise variables selected using secondary data.

Data Collection

Multi-Family Real Estate Sales

CoStar, an information provider of commercial real estate information in the United States, Canada, and parts of Europe, provides this study with transactional multi-family data. I filter the sales for the greater metropolitan areas of Vancouver, Edmonton, Calgary, Toronto, and Montréal from January 2015 to December 2023. The selection of these cities is explained by CoStar failing to monitor sales in smaller markets. Figure 1 presents the metropolitan areas of each city. The initial sample consisted of 16,670 transactions, many of which had missing sale prices and purchaser details. I remove any observations with these missing values.

Once the sample was adjusted for missing observations, it was necessary to exclude duplexes, triplexes, and quadruplexes from the data due to their nature of purchase. In particular, the inclusion of smaller properties was problematic because they are predominantly used for personal use rather than investments. Furthermore, smaller properties benefit from different financing privileges than their larger counterparts. For the purpose of the analysis, this study retains

buildings adhering to the Canadian Mortgage Housing Corporation (CMHC) commercial financing guidelines[1].

It is notable that a significant majority of properties, approximately 80% of the total observations, are priced below $5 million dollars. These properties are primarily purchased by individuals residing in the Greater Metropolitan Area of Montréal (GMA). However, it is imperative to mention that the accuracy of the data for these properties can, at times, be compromised due to the sheer volume of transactions. As a result, to ensure precision, I have excluded any properties that fall below the $5 million dollar threshold.

Lastly, to control for investor bias, this method removes transactions involving multiple purchasers. The benefit of this approach is the straightforward classification of investor types.

The final sample comprises 1,680 transactions from January 2015 to December 2023. I retain this sample period because transactional data prior to 2015 is limited. There were 25 investor types which I subdivide into four categories: developers, individuals, institutional investors, and private corporations. Table 1 showcases the transformed investor types. Following the classification of each group, I compute the total monthly sales volume. Figure 2 provides a detailed summary of the sales volume in each metropolitan city. Table 2 shares a detailed breakdown of the average prices and specific features of properties across the regions, offering a clearer understanding of the distinctions between each market.

Macroeconomic Variables

The selection criteria for macroeconomic factors is grounded in findings from previous studies, with an effort to maintain the independence of each variable. To avoid multicollinearity issues, correlation analysis tests the variables. Appendix A defines each variable.

As a proxy for economic health, I extract the *Employment* rate from Statistics Canada (for example, see Baffoe-Bonnie, 1998; Liang and McIntosh, 1998; Schätz & Sebastian, 2009). I obtain Canada's nominal *Exchange Rate* monthly from the Bank of Canada to measure the country's economic performance relative to its major trading partners. I obtain *Immigration* figures monthly from Statistics Canada as an indicator of housing affordability (see Akbari & Aydede, 2012; Saiz, 2007). I extract the Toronto Real Estate Capped Index (TTRE) daily from *the Globe and Mail* to measure the performance of the Canadian real estate sector. Subsequently, I convert the index prices to monthly averages to fit the sample period. Appendix B outlines all portfolio holdings of the *Index*. I obtain the variable *Money Supply* from the Bank of Canada to measure the liquidity of Canada's economy and account for inflationary periods (Xu & Chen, 2012). Finally, I extract *Work Started* monthly from the Federal Reserve Bank of St. Louis to measure Canada's housing supply.

Interest Rates

[1] Any property under five residential units does not qualify for multi-residential financing at the CMHC. Furthermore, properties with retail spaces must be at most thirty percent of the gross floor area of the entire building.

Next, I extract the 10-year bond yield and three-month Treasury bill from the Bank of Canada daily to capture the effects of interest rates on multi-family sales. Subsequently, I convert both yields to monthly averages to fit the sample period. The purpose of the 10-year bond is to capture long-term interest rates, whereas the three-month Treasury bill provides insight on short-term rates. Next, I adjust the model to capture the *Yield* spread as a proxy for market interest rate expectations, where:

$$\mathrm{Y_t} = \overline{\mathrm{B}}_{\mathrm{10Y,t}} - \overline{\mathrm{T}}_{\mathrm{3M,t}} \tag{1}$$

$\overline{\mathrm{B}}_{\mathrm{10Y,t}}$ represents the average yield of the 10-year bond for the month at time t and $\overline{\mathrm{T}}_{\mathrm{3M,t}}$ represents the average yield of the three-month Treasury bill for the same month.

Unexpected Inflation

This study follows Ahimud's (1996) methodology, which involves using Consumer Price Index (CPI)-linked bonds structured to modify coupon payments in response to inflation volatility.

In the Canadian context, Real Return Bonds (RRBs), real yield to maturity and real cash flows are known in advance; however, nominal yields depend on the inflation throughout the term of the Bonds. The following equation calculates the inflation compensation:

$$\mathrm{IC_t} = \frac{\pi_\mathrm{t}}{\pi_{\mathrm{t-1}}} \tag{2}$$

Where IC_t represents the inflationary compensations at time t, π_t represents the unadjusted CPI at time t, and π_{t-1} is the base measure of the CPI established by the Bank of Canada.

Given that the bonds expiring in December 2026 had an annual coupon rate of 4.25%, the following equation calculates nominal interest as:

$$\mathrm{i_{nom,t}} = \frac{4.25\%}{2} \times \mathrm{IC_t} \tag{3}$$

Where $i_{nom,t}$ is the nominal interest rate of RRBs for a given month. Therefore, the following equation calculates expected levels of inflation as:

$$\mathrm{E_{[\pi_t]}} = \left[\frac{1 + \mathrm{i_{nom,t}}}{1 + \mathrm{r_{real,t-1}}}\right]^2 - 1 \tag{4}$$

Where $E_{[\pi_t]}$ is the expected level of inflation at time t, $i_{nom,t}$ is the nominal interest rate at time t, and $r_{real,t-1}$ is the yield of Real Return Bonds at $t-1$ (i.e. 4.25%).

Lastly, the following equation calculates unexpected inflation as:

$$\pi_t^u = \pi_t - E_{[\pi_t]} \quad (5)$$

Where π_t^u is the unexpected level of inflation at time t.

Sentiment Index

This paper uses Google Trends to create a sentiment index to determine whether sentiment plays a crucial role in investment decisions. Only negative searches were considered to minimize interpretation bias. Table 3 outlines the full list of real estate-related search terms obtained monthly from Google Trends in Canada and their average normalized popularity during the sample period.

To address multicollinearity issues, I employ a Principal Component Analysis (PCA) to reduce the dimensionality of the data where the original dataset is represented as matrix X of size $n \times m$, where n is the number of months, and m is the number of search terms.

Subsequently, the following equation calculates the mean of each search term in column j as:

$$u_j = \frac{1}{n}\sum_{i-1}^{n} X_{ij} \quad (6)$$

Where $u_j$is the average of the search term j, n is the total number of observations for the sample period, and X_{ij} denotes the element of matrix X located in $i-th$ row and $j-th$ column.

Next, the following equation calculates the covariance matrix C of size $m \times m$ as:

$$C = \frac{1}{n-1} X^T X \quad (7)$$

Where X^T is the transpose of the mean-centered data matrix and X is the mean-centered data matrix as a result of subtracting the mean of $j-th$ column from the $i-th$ row of the original data matrix X.

Next, the following equation calculates eigenvalue decomposition on the covariance matrix C, to find its eigenvalues λi and eigenvectors V, as:

$$CV = VD \quad (8)$$

Where D is the diagonal matrix with eigen values λi and V is a matrix where columns are eigenvectors.

Next, I sort the results by their correspondent eigenvalues λi in descending order. The eigenvectors with the largest eigen values explain the most variance in the data, therefore, I retain them as principal components.

Lastly, I project the original mean-centered data X onto the selected k principal components to obtain the transformed data Y where:

$$\mathrm{Y} = \mathrm{XV_k} \tag{9}$$

Where V_k consists of the first k column of V. Figure 3 presents a line chart of the sentimental index.

Table 4 outlines the descriptive statistics for each variable.

Chapter 4. Results

I estimate the *Sales Volume* for different types of investors through a comprehensive analysis of various economic variables and a sentiment index, as Appendix A specifies.

Furthermore, I estimate the following regression equation for each investor type where:

$$\begin{aligned}\text{Sales Volumes}_{T} = {} & \alpha + \beta_1 \text{Employment}_{T-x} + \beta_2 \text{Exchange Rate}_{T-x} + \beta_3 \text{Immigration}_{T-x} \\ & + \beta_4 \text{Index}_{T-x} + \beta_5 \text{Money Supply}_{T-x} + \beta_6 \text{Unexpected Inflation}_{T-x} \\ & + \beta_7 \text{Sentiment}_{T-x} + \beta_8 \text{Work Started}_{T-x} + \beta_9 \text{Yield}_{T-x} + \varepsilon_i \end{aligned} \quad (10)$$

Sales Volume, the dependent variable, is the monthly sum of transactions per investor. To account for the timely process of purchasing a multi-family property, I lag the independent variables at one month, three months, six months, and twelve months, respectively.

Developers

Given the high risk associated with development projects, which often require substantial capital and are built on the speculation that properties will rent once the work is complete, this paper hypothesizes that developers are well-informed and rationally reactive to economic indicators as a pre-emptive measure to securitize their investments.

As such, I expect the variables *Employment*, *Index,* and *Money Supply,* health indicators of the Canadian economy, to be positive and statistically significant. On the contrary, given that a rise in the Canadian nominal interest rate is a potential indication of a weakened economic situation, I expect the *Exchange Rate* to be negative and significant.

Saiz (2007) finds a strong correlation between an upsurge in rental prices and *Immigration.* Nonetheless, limited evidence supports the notion of lower housing demand despite the rental increases (Green & Lee, 2016). Therefore, I expect Developers to undertake more projects to meet these increasing demands, resulting in an anticipated positive and significant relationship.

Unexpected Inflation, measured as the difference between the expected level of inflation and the CPI, may indicate future uncertainty in the market. Given the risky nature of development projects, this study expects a negative and statistically significant coefficient. On the other hand, the variable *Work Started* may suggest a heightened demand for housing and diminish the demand for development projects. Therefore, this study also anticipates a negative and significant coefficient.

As for the *Yield,* developers often use bridge loans[2] to finance their projects, and given their short-term nature, the interest rates are less important. Therefore, this study predicts a positive and statistically significant coefficient.

According to Heinig et al. (2020), companies are unlikely to rely on search engines to make investment decisions. However, the authors argue that the demand for housing is driven by the sentiment of consumers, which ultimately influence the viability of projects. Consequently, this study projects a negative and significant *Sentiment* coefficient.

Results for Developers

Table 5 shows the results of the regression analysis.

A closer inspection of these results shows that, for an average developer, in an average month, an increase in *Employment* translates to an increase of $53.35 million in *Sales Volume*, significant at the 5% level for the one-month lag period. The three-month and six-month lag periods have a positive coefficient estimate but are insignificant. Contrarily, the 12-month lag period has a negative coefficient but is not statistically significant.

The findings suggest that for an increase in *Immigration*, in an average month, the *Sales Volume* decrease by $43.30 million at the 12-month lag period, significant at the 5% level. The one-month lag period has a negative coefficient, whereas the three-month and six-month lag periods have positive coefficients, but none are statistically significant.

Likewise, an increase in the *Money Supply* is associated with an increase in *Sales Volume* of $75.10 million at the three-month lag period and $75.01 million at the six-month lag period, both significant at the 1% level. The one-month and 12-month lag periods have a positive coefficient but are not statistically significant.

For an average increase in *Unexpected Inflation*, *Sales Volume* decrease by $29.91 million in an average month at the 12-month lag period, which is significant at the 5% level. Both one-month and six-month lag periods have a negative coefficient, whereas the three-month lag period has a positive coefficient, but none are statistically significant.

Subsequently, for an increase in *Yield,* in an average month, the one-month, three-month, and six-month lag periods translate to an increase in *Sales Volume* by $62.12 million, $49.87 million, and $50.29 million, respectively. They are all significant at the 1% level. For the 12-month lag, the *Yield* increase is associated with an increase in *Sales Volume* of $34.67 million, which is significant at the 5% level.

Contrary to expectations, this study did not find the *Exchange Rate* and *Work Started* to have any statistical significance across all lag periods.

[2] Refers to a short-term loan that covers interest payments when a property is not generating rental income. These loans require developers to pay a lump sum at the beginning of the loan term, which covers all interest payments. Once a project is completed, the bridge loan is replaced by a conventional mortgage.

This study finds that for an average developer, in an average month, an increase in *Sentiment* is associated with a decrease in *Sales Volume* of $41.15 million at the six-month lag period. All other lag periods have a negative coefficient but are not statistically significant.

Individuals

Schnatterly et al. (2007) suggest that individuals have access to less information than institutional investors when making investment decisions. This paper hypothesizes that individuals invest predominantly on *Sentiment* while taking advantage of economic downturns to purchase properties at a discount. However, considering the sample minimum purchase price of $5 million, individuals are likely experienced investors who follow general macroeconomic trends.

Because increases in economic variables may indicate overpriced properties, I expect the variables *Employment, Money Supply,* and *Index* to be negative and statistically significant. Increases in these economic variables likely increase the *Sentiment* of individuals, and real estate may be overpriced. Similarly, I anticipate the *Exchange Rate* to be positive and significant.

Due to the lesser quality of buildings typically purchased by individuals per Table 2, the pool of reliable tenants may be smaller. Therefore, I anticipate the increased rents associated with periods of *Immigration*, as seen in Saiz (2007), to decrease the demand for inferior-quality units, resulting in diminishing investment opportunities. Therefore, I expect the variable *Immigration* to be negative and significant.

I expect the measure of *Unexpected Inflation*, an indicator of economic volatility, to be positive and statistically significant. The coefficient expectation is closely tied to the hypothesis that individuals purchase undervalued units in volatile markets.

Moreover, I anticipate the measure of *Work Started* to be positive and significant. Individuals do not traditionally undertake construction projects; therefore, I expect an opposite sign of what one may expect from developers.

In addition, I expect that the variable *Yield* will be negative and statistically significant. Based on the building characteristics that Table 2 presents, it is apparent that individuals tend to buy properties at a lower cost than other investors. This suggests that they have lower capital to invest. As a result, they are more likely to be influenced by the interest rate environment when making purchase decisions, as they have limited capital available to service their debt.

As discussed, several lines of evidence suggest that *Sentiment* is a primary driver for individual investment decisions (P.H. & Uchil, 2019). Given that the index was built around negative search terms, the anticipated coefficient estimate is to be negative and highly significant.

Results for Individuals

Table 6 shows the results of the regression analysis.

The difference in the coefficient sign of *Employment*, which suggests that for an average individual, in an average month, an increase in *Employment* is associated with a decrease in *Sales Volume* by $12.41 million, is noteworthy and significant at the 5% level for the six-month lag period. Surprisingly, all other coefficient estimates are negative but not statistically significant.

As expected, the variable *Immigration* is associated with a decrease in *Sales Volume* of $9.96 million for the 12-month lag period, significant at the 1% level. The one-month and six-month lag periods had positive estimates, whereas the three-month had a negative estimate, but none were significant.

Strong evidence of *Money Supply*'s impact was found across all lag periods. The one-month, three-month, six-month, and 12-month lag periods are associated with an increase of $28.79, $28.50, $24.78, and 18.62 million, respectively, all significant at the 1% level.

As anticipated, an increase in *Unexpected Inflation*, in an average month, translates to an increase in *Sales Volume* by $6.27 million for the one-month lag period, significant at the 10% level. The three-month lag was negative, and the six-month and 12-month lag were positive, but not statistically significant.

A closer inspection of the table's contents shows that an increase in *Work Started*, in an average month, is associated with an increase in *Sales Volume* by $8.18 million at the six-month lag period. All other lag periods were positive, but not statistically significant.

This study is unable to demonstrate any significance of the *Exchange Rate, Index,* and *Yield* regarding individual investors. These findings are surprising, given that other studies find a strong correlation between these variables and real estate (Bjørnland & Jacobsen, 2010; Xu & Chen, 2012).

The most interesting finding was the negative and statistically significant relationship between *Sentiment* and *Sales Volume* for the three-month and six-month lag periods, which correspond to a decrease in sales of $8.59 million and $7.13 million, significant at the 5% level and 10% level, respectively. The one-month lag was negative, whereas the 12-month lag was positive, but neither was significant, suggesting that sentiment factors gradually dissipate over time.

Institutional Investors

It is generally agreed in finance literature that institutional investors employ sophisticated investment strategies (Menkhoff et al., 2010). However, Heinig et al. (2016) state that institutions in commercial real estate rely on industry experts due to the diverse business environment in

which they operate. Because of the magnitude of the investments, which involve several stakeholders, this paper hypothesizes that institutional investors are rational, risk-averse, and highly reactive to the economy across all lag periods.

Accordingly, I expect the variables of *Employment, Index, Money Supply* to be positive and statistically significant. In contrast, I anticipate the *Exchange Rate* to be negative and significant.

Referring to Table 2, the average purchase price of *Institutional Investors* is significantly greater than other investors. Equally important, in all markets aside from Calgary, the average building age is lower than other dwellings, suggesting higher building qualities. As seen in Saiz (2007), periods of immigration push rental rates up,; Ayano (2021) supports and nuances this claim by stating that the average immigrant cannot afford rent. Higher rental cost is likely followed by periods of lower housing demand; as such, I expect the coefficient estimate to be negative and significant.

Following the hypothesis that *Institutional Investors* are rational and risk-averse, I expect *Unexpected Inflation* to be negative and significant. On the other hand, I anticipate *Work Started* to be positive and significant. Given the interest rate risks associated with large financings, I predict the *Yield* to be negative and significant.

Despite the literature outlining the high sophistication of institutions, the viability of multi-unit investments depends heavily on the rental income collected from tenants. Accordingly, I expect the *Sentiment* of tenants to influence the purchase decisions of institutions. As a result, I anticipate a negative and statistically significant coefficient estimate.

Results for Institutional Investors

Table 7 presents the results of the regression analysis.

For an average *Institutional Investors*, in an average month, the variable E*mployment* is associated with an increase of $102.78 million in *Sales Volume* for the 12-month lag period, significant at the 1% level. The three-month and six-month lag periods have negative coefficients but are not statistically significant. Contrarily, the one-month lag period has a positive coefficient but is not statistically significant.

As expected, the variable *Immigration* is associated with a decrease in *Sales Volume* of $50.5 million for the one-month lag and $62.25 million for the 12-month lag, significant at the 10% and 5% levels, respectively. The three-month lag period had a positive coefficient, whereas the six-month lag had a negative coefficient but were not significant.

As expected, the paper finds a significant relationship between *Sales Volume* and the *Index* across all lag periods. The one-month lag period (significant at the one percent level), the three-month lag period (significant at the 5% level), and the six-month lag period (significant at the 5% level) are associated with an increase in *Sales Volume* of $86.29 million, $81.71

million, and $75.14 million, respectively. On the other hand, the 12-month lag period is associated with a decrease in sales of $65.52 million, which is significant at the 10% level.

I find the variable *Money Supply* to increase *Sales Volume* by $108.92 million, which is significant at the 5% level for the 12-month lag period. The one-month and six-month both have positive coefficients but are not significant, whereas the three-month lag period has a negative coefficient but is also not significant.

According to the analysis, *Unexpected Inflation* has a negative and significant coefficient estimate at the 10% level. This suggests that an average increase in *Unexpected Inflation* leads to a decrease in *Sales Volume* of $43.94 million. While all the other coefficients were also negative, they were not statistically significant.

The variable *Work Started* had a positive relationship with the dependent variable, suggesting that an increase in new property starts is associated with an increase in *Sales Volume* of $64.59 million, significant at the 5% level. The one-month and 12-month lag periods have negative coefficients but were not statistically significant. The three-month lag, contrarily, has a positive coefficient but was insignificant.

Surprisingly, this study finds no significant relationship between the *Exchange Rate* and *Yield* concerning *Sales Volume*.

This study finds an inverse relationship between *Sentiment* and *Sales Volume.* Specifically, a rise in *Sentiment* is associated with a decrease of $84.95 million in *Sales Volume.* The decrease is statistically significant at the 1% level for a lag period of 12 months. All other coefficients are negative but are not significant.

Private Corporations

A noteworthy challenge of this research was developing the hypothesis for *Private Corporations.* The reason is that CoStar identifies large and small companies under the same investor type. However, an overwhelming percentage of the *Private Corporations* sample are companies registered to one individual, which is often done for tax purposes. Consequently, this paper hypothesizes that *Private Corporations* and *Individuals* respond similarly to economic and sentimental variables.

As such, I expect the variables *Employment, Money Supply,* and *Index* to be negative and statistically significant. Likewise, I expect the *Exchange Rate* to be negative and significant.

For the same reasons outlined for *Individuals*, I anticipate *Immigration* to be negative and statistically significant. Likewise, I expect *Unexpected Inflation* and *Work Started* to be positive and significant.

Regarding *Yield*, since private corporations have lower purchasing power, interest rates are more likely to influence their purchase decisions. Therefore, I predict a negative and statistically significant relationship.

Like *Individuals*, I expect *Sentiment* to have a negative and significant impact, as sole individuals overwhelmingly operate private corporations.

Results for Private Corporations

Table 8 presents the results for the regression analysis.

The study finds that for an average increase in *Immigration*, *Sales Volume* decrease by $18.93 million in an average month, significant at the 5% level for the 12-month lag period. Contrarily, the six-month lag suggests an increase in *Sales Volume* of $17.02 million, significant at the 5% level. The one-month and three-month lags have negative coefficients but are not statistically significant.

I find that Money Supply has a positive significant relationship at the three-month lag period, suggesting an increase in *Sales Volume* of $25.64 million, significant at the 5% level. The six-month lag period increases *Sales Volume* by $48.59 million, which is significant at the 1% level. The one-month and 12-month lag periods have positive coefficients but are not statistically significant.

Unexpected Inflation, as expected, has a positive coefficient for the three-month lag period, suggesting that for an average increase in *Unexpected Inflation,* in an average month, results in an increase in *Sales Volume* of $11.94 million, significant at the 10% level.

Surprisingly, the variables *Employment*, *Exchange Rate*, *Index*, *Work Started*, and *Yield* had no statistical significance across all lag periods.

Lastly, at the six-month lag period, an average increase in *Sentiment* is associated with a decrease in *Sales Volume* of $18.64 million, significant at the 5% level. All other coefficients are negative but not statistically significant.

Robustness Tests

So far, this thesis lags the introduced variables at four different intervals to acknowledge the lengthy process of purchasing a multi-family property. However, the findings visibly show that some variables are significant in the short term (i.e., one month or three months) and others in the long term (i.e., six months or 12 months), underlining the diverse responsiveness of investors. This section of the study aims to optimize the lag period of each variable and adjust Equation 10 for each optimal lag:

$$\mathrm{Y_t} = \alpha + \sum_{\mathrm{i=1}}^{\mathrm{lag}} \beta_\mathrm{i}\, \mathrm{Y_{t-i}} + \sum_{\mathrm{i=1}}^{\mathrm{lag}} \gamma_\mathrm{i} \mathrm{X_{t-i}} + \varepsilon_\mathrm{i} \qquad (11)$$

Where Y_t is the *Sales Volume* of each investor type, β_i is the coefficient of the lagged dependent variable, Y_{t-i} is the lagged values of the dependent variable Y, γ_i is the coefficients of

the lagged independent variables, and X_{t-i} is the lagged values of the independent variable X which I test to see if they have any predictive power over Y_t.

Table 9 presents the optimal lag periods of each variable, per investor type. Table 10 subsequently relays the regression results. Table 11 shows variables as percentage changes instead of absolute values to analyze how changes in these variables affect investment volume over time, adjusted for optional lag periods.

Developers

The findings of *Employment* and *Yield* are consistent with the previous results. For an average *Developers*, in an average month, an increase in *Employment* translates to an increase in *Sales Volume* of $54.83 million, significant at the 5% level. Similarly, an increase in *Yield* is associated with an increase in *Sales Volume* of $61 million, which is significant at the 1% level. Unlike the previous findings, the optimized model found no significant results regarding *Immigration, Money Supply, Unexpected Inflation,* and *Sentiment.*

Individuals

Regarding *Individuals,* an increase in the *Money Supply* translates to an increase of *Sales Volume* of $25.70 million, which is significant at the 1% level. This study did not find any significant results regarding other variables.

Institutional Investors

Consistent with previous results, an increase in *Index* is associated with an increase in *Sales Volume* of $68.49 million, which is significant at the 5% level. The model supports the previous negative and significant relationship of *Sentiment,* suggesting that for an average *Institutional Investors,* in an average month, an increase in *Sentiment* translates to a decrease in *Sales Volume* of $73.04 million, significant at the 5% level. The optimized model also finds a negative and significant relationship between *Yield,* suggesting that a *Yield* increase is associated with a decrease in *Sales Volume* of $56.02 million, significant at the 5% level.

Private Corporations

The optimized model could not draw any conclusions on the introduced variables and *Sales Volume.*

Chapter 5. Discussion

This study aims to determine how macroeconomic and sentimental factors impact the multi-family purchases of different investors in the Canadian market, as there is very little information available.

This thesis reveals that developers, *Employment, Money Supply,* and *Yield* have a statistically significant impact on *Sales Volume*, supporting the hypothesis that developers rely heavily on the state of the economy to make purchase decisions. Schätz and Sebastian (2009) and Baffoe-Bonnie (1998) support these findings through their identification of similar coefficient estimates for the stated variables. One unanticipated finding was the *negative* and statistically significant influence of *Immigration* on developers' *Sales Volume.* This result further supports the correlation between price appreciation and *Immigration*, which makes investments less attractive (Larkin et al., 2019). As expected, the measure of *Unexpected Inflation* had a negative and statistically significant relationship with *Sales Volume,* supporting the hypothesis that developers are wary of uncertainty due to the heightened risk associated with their investments. I find supporting evicende of *Employment* and *Yield* in the optimized model, where both variables had a positive and statistically significant relationship.

Contrary to expectations, this study did not find a significant difference between *Exchange Rate*, *Index*, and *Work Started* variables. The fact that developers often market the properties once the construction is complete, thus minimizing the impact of long-term real estate factors, may explain these findings. Perhaps the most striking finding is the strong relationship between *Sentiment* and *Sales Volume*. Despite developers being large investors, which have been proven to hold an information advantage, this study found a negative and statistically significant decrease in volume followed by periods of negative *Sentiment*. The influence of overall population on investment viability may assist in explicating this finding.

The paper hypothesizes that individuals with significant capital advantage over average investors can leverage economic downturns by investing during periods of negative sentiment. The negative and statistically significant relationship between *Employment* and *Sales Volume*, as well as Bouchouicha and Ftiti's (2012) findings, support this hypothesis. Moreover, the variable *Money Supply* is positive and statistically significant for all lag periods. I did not anticipate these results, however, it is not surprising given the set price floor of $5 million dollars, further supporting the idea that high net-worth individuals have an advantage in inflationary periods. Another important finding is that *Unexpected Inflation* had a positive and statistically significant impact, further supporting the idea that individual investors have tendencies to be overly optimistic (Aşikoğlu & Böyükaslan; 2016). The variable *Work Started*, an indirect measure of housing demand, has a positive and statistically significant impact on individuals, confirming the association between real estate demand and investor appetite. The weak association of the *Exchange Rate* and *Index* is interesting but not surprising given that both are measures of the broader economy and are not solely linked to multi-family real estate. One unexpected finding was the extent to which the *Yield* had no statistical significance across all lag periods. The fact that higher rates are not linked to a decreased demand for housing but rather an increase in rental

rates may explain this result (Van Order & Dougherty, 1991). Unlike larger corporations with a reputation to maintain, these results may reflect the unchanged appetite for multi-family investments during higher interest rate periods because there exist immoral[3] measures to cover the loan payments. I find supporting evidence when optimizing the lag periods, which show a highly positive and statistically significant relationship with *Yield* and *Sales Volume*. Lastly, this study assesses *Sentiment*'s importance on individual investors. The analysis finds a negative and statistically significant coefficient. These findings are consistent with those of Lin, Rahman, and Yung (2008) and Heinig et al. (2016), which demonstrate that commercial real estate returns are favourable during periods of high sentiment and diminish during times of negative sentiment.

Several reports show that institutional investors are predominantly risk-averse when making investment decisions (for example, see O'Connell & Teo, 2009). Although prior literature shows the information advantage of institutions over smaller entities (Shaw et al., 2007), this paper hypothesizes that institutional investors would react rationally to macroeconomic shocks given their aversive nature. The current study finds a positive and significant relationship between the *Employment* and *Sales Volume*, consistent with Liang and McIntosh's (1998) findings. *Immigration,* on the other hand, has a negative and statistically significant influence on volumes, which further supports the idea of diminishing demands for higher-priced units. Unsurprisingly, the *Index* has a positive and statistically significant influence on sale volumes across all periods, which further supports the findings of Quan and Titman (1999). With respect to *Money Supply,* this study finds a highly positive and statistically significant influence on institutional purchases, which clearly outlines the advantages of institutions in inflationary periods. An interesting finding is the negative and statistically significant measure of *Unexpected Inflation*, suggesting that institutional investors are sensitive to unanticipated shocks, in line with Hoesli, Lizieri, and MacGregor's (2007) research. As for *Work Started,* this study finds a positive and statistically significant relationship, further supporting the investment appetite of institutions in high rental demand periods. Unexpectedly, the *Exchange Rate* shows no significant differences, which may suggest that *Institutional Investors* are primarily situated in the Canadian market. The observation that a decrease in the value of the Canadian dollar relative to its major trading partners did not yield any statistical impact highlights this. Across all lag periods, the variable *Yield* has no statistical significance. However, when optimizing each value for its suitable lag period, this study finds a negative and statistically significant result, further supporting the idea that higher-rate environments are less attractive to institutional investors. Perhaps the most striking finding is the negative and statistically significant relationship between *Sentiment* and institutional *Sales Volume*. This intriguing finding may be related to the evidence that institutional investors rely on the *Sentiment* of individuals to make decisions, per Freybote and Seagraves (2016).

This study also aims to determine whether *Private Corporations* behave similarly to individual investors, since many of these entities are owned by individuals. The study finds that immigration has a negative and statistically significant impact on *Sales Volume*. *Money Supply* has a positive and statistically significant impact on volumes, supporting the findings of prior literature that associates inflation with positive returns. *Unexpected Inflation*, similar to

[3] Despite the laws prohibiting tenant evictions in all Canadian markets, there are measures landlords undertake to remove tenants. These measures include but are not limited to paying for departure (commonly known as cash-for-keys), informing the tenants about renovation plans (commonly referred to as renovictions), and removing essential amenities.

individuals, has a positive and significant coefficient estimate, supporting previous literature that unsophisticated investors have an overconfidence bias. Contrary to expectations, the study does not find a significant difference between *Employment*, *Exchange Rate*, *Index*, *Work Started*, and *Yield*. These insignificant relationships may be explained by the diversity of ownership structure in *Private Corporations*.

Implications

This research delves into the intricacies of Canadian multi-family investment by analyzing the responsiveness level of various investor types. The aim is to identify distinct investment strategies tailored to each investor. The study highlights the importance of considering lagged variables when forecasting the multi-family housing market and formulating strategic plans to generate accurate and sustainable results. To provide a more nuanced approach to measuring investor sentiment, the study incorporates Google Trends data, extending the use of internet searches as a valuable proxy for market sentiment.

Research Limitations

This research contends with a distinct set of challenges. First, information loss regarding missing sale prices from CoStar was significant. Consequently, the results of the analyses may have differed had the information been complete. Next, I retrieve macroeconomic variables at the national level. These measures may discount the regional effects that are not present in other markets. Third, most of the sample is represented in Toronto and Montréal, constituting 41% and 25% of the observations respectively. The overrepresentation of these markets potentially results in findings specific to these GMAs. Fourth, beyond the scope of this study, it is necessary to scrutinize the incentive behind Google searches. Most searches are likely driven by the desire to obtain information rather than make investments.

Further Research

Building on the findings of this study, which explores the impact of the transactional volumes of Canadian multi-family investment, I warrant further research in several key areas. First, extending this study to different asset classes could provide more insight into the commercial real estate market. Second, investigating each market independently, accounting for provincial-specific variables, could provide insight into investors' responsiveness, contingent on the economy in which they operate. Third, this research predominantly used quantitative methods. Incorporating qualitative methodologies, such as in-depth interviews with investors to assess appetite for investment, could prove beneficial. Lastly, the study employed a sample size determination criterion based on a minimum threshold of five million dollars. For future research, a revised threshold of 2.5 million dollars may be advantageous. Additionally, the application of a technique known as 'winsorizing' the data could further refine the outcomes. It is important to note that these methodological adjustments were not implemented in the current study but are recommended for subsequent studies to enhance the robustness and applicability of the findings.

Conclusion

This paper analyzes the investment behaviour of Canadian multi-family real estate investors in five metropolitan areas: Vancouver, Edmonton, Calgary, Toronto, and Montréal. The study examines the impact of macroeconomic variables on investor behaviour using monthly data from 2015 to 2023. The research uses a series of lagged regressions at intervals of one-month, three-month, six-month, and 12-month to measure the effect of these variables.

The study finds that developers are highly reactive to the state of the economy and market sentiment. They show positive reactions to increases in employment, indicating sensitivity to current economic conditions. However, the study also reveals that developers have a cautious approach to demographic changes that could affect rentability, as immigration has a negative influence on sales volumes. The study finds that developers tend to leverage inflationary conditions, but unexpected inflation indicates a risk-averse stance towards market uncertainty.

Contrary to literature that finds individuals to be overconfident and lacking sophistication in their investment decisions, the study finds that individuals benefit from economic downturns. They exhibit a nuanced view of economic variables and anticipate market corrections following economic upswings. The study observes a negative correlation with employment, suggesting that individuals invest cautiously. The significant positive relationship with money supply reveals that individuals benefit from inflationary periods. The positive impact of unexpected inflation suggests that individuals are not as worried about market volatility as other investors.

The study finds that institutional investors are rational, risk-averse, and responsive to economic conditions while monitoring market sentiment. They exhibit a methodical investment strategy that aligns with economic health indicators. The adverse reaction to immigration and unexpected inflation confirms their risk-averse nature and their reliance on stability and predictability. Consumer confidence is also an important factor in their decision-making process.

Private corporations exhibit mixed responses to economic indicators. They react similarly to individuals due to their ownership structure. The study finds a positive correlation between money supply and private corporations, particularly at the three- and six-month lags. However, the lack of significance across several variables challenges the hypothesis, suggesting that private corporations may possess a distinct investment identity that warrants further exploration.

In summary, the study affirms the complex investment behaviours of different entities within the Canadian multi-family real estate sector. Developers and institutional investors demonstrate a strategic response to economic indicators and sentiment, reflecting their sophisticated understanding of market dynamics. Individuals and private corporations exhibit investment savviness, particularly in leveraging economic conditions, contrary to traditional perceptions. These findings offer a profound understanding of investor behaviour, which could significantly influence investment strategies, policy formulation, and future academic inquiries into real estate market dynamics.

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Appendix A: Variable Definitions and Expected Coefficient Estimates

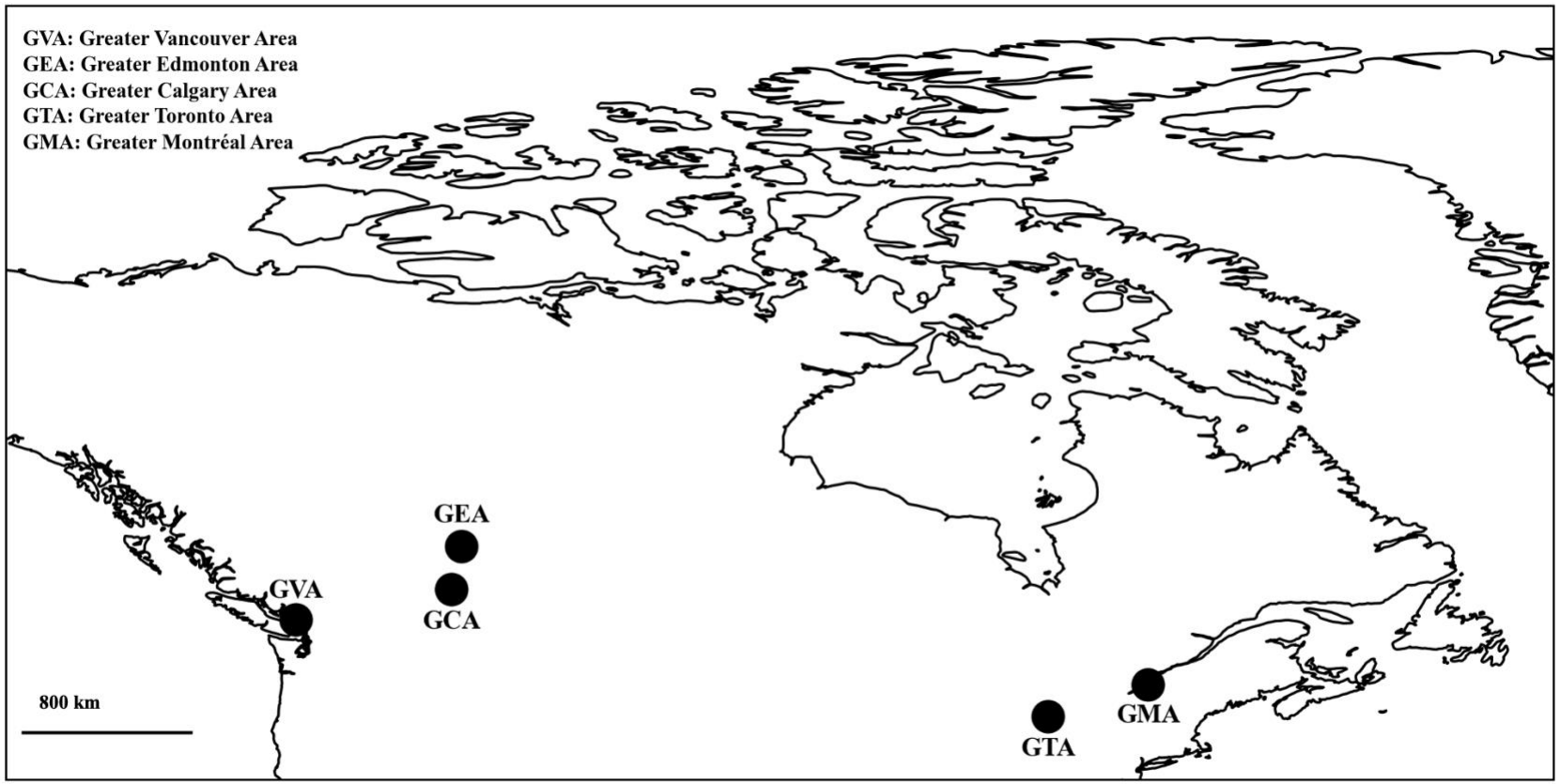
Variable	Expected Coefficient Estimate				Description
	Developers	*Individuals*	*Institutional Investors*	*Private Corporations*	**Reported monthly
Employment	Positive	Negative	Positive	Negative	Seasonally adjusted figures representing the percentage of Canadians, in thousands, employed for pay or profit, broken down by province.
Exchange Rate	Negative	Positive	Negative	Positive	Nominal currency index composed of the US dollar, euro, Japanese yen, British pound, Swiss franc, Australian dollar, and Swedish krona, relative to the Canadian dollar.
Immigration	Negative	Negative	Negative	Negative	Actual percentage of newly admitted permanent residents per province.
Index Return	Positive	Negative	Positive	Negative	The returns on the S&P/TSX Real Estate Capped Index (TTRE).
Money Supply	Positive	Negative	Positive	Negative	Defined as the percentage growth in M2++ Gross, encompassing physical currency, demand deposits, term deposits, retail investment instruments, and certain mutual fund contributions.
Unexpected Inflation	Negative	Positive	Negative	Positive	Expected level of inflation minus the unadjusted CPI.
Sentiment	Negative	Negative	Negative	Negative	A sentimental index was constructed utilizing Google Trends, focusing on the Canadian market within the real estate search category. Each search term was carefully selected for relevance and then normalized through principal component analysis. This process identified and preserved the principal components that captured the most significant variations in the dataset."
Work Started	Negative	Positive	Negative	Positive	Total percentage change in housing starts for all areas in Canada.
Yield	Positive	Negative	Negative	Negative	Defined as the monthly average 10-year Canadian bond yield minus the monthly average three-month Treasury bill.

Appendix B: TSX Real Estate Capped Index (TTRE) Portfolio Holdings

Company Name	Ticker
Altus Group Ltd	AIF-T
Allied Properties Real Estate Inv Trust	AP-UN-T
Boardwalk Real Estate Investment Trust	BEI-UN-T
CDN Apartment	CAR-UN-T
Choice Properties REIT	CHP-UN-T
Colliers International Group Inc	CIGI-T
Crombie Real Estate Investment Trust	CRR-UN-T
CT Real Estate Investment Trust	CRT-UN-T
Dream Industrial REIT	DIR-UN-T
First Capital REIT Units	FCR-UN-T
Firstservice Corp	FSV-T
Granite Real Estate Investment Trust	GRT-UN-T
H&R Real Estate Inv Trust	HR-UN-T
Interrent Real Estate Investment Trust	IIP-UN-T
Killam Apartment REIT	KMP-UN-T
Northwest Healthcare Prop REIT	NWH-UN-T
Primaris REIT	PMZ-UN-T
Riocan Real Estate	REI-UN-T
Smartcentres Real Estate Investment Trust	SRU-UN-T
Storagevault Canada Inc	SVI-T
Tricon Capital Group Inc	TCN-T

Note: The portfolio holdings, as of January 1, 2024, consist of assets traded on the Toronto Stock Exchange. The portfolio encompasses a diverse range of asset classes, including office, retail, multi-family, and industrial properties.

Figure 1: Greater Metropolitan Areas of Canada



Note: Figure 1 depicts the greater metropolitan areas of Vancouver, Edmonton, Calgary, Toronto, and Montréal. To avoid copyright issues, the actual layouts of these metropolitan areas were sourced from CoStar and subsequently estimated onto a blank map of Canada using Python. Each point on the map marks an area with a maximum distance of 100 kilometres from the center of each city.

Figure 2: Sales Volume per Metropolitan Area Over Time

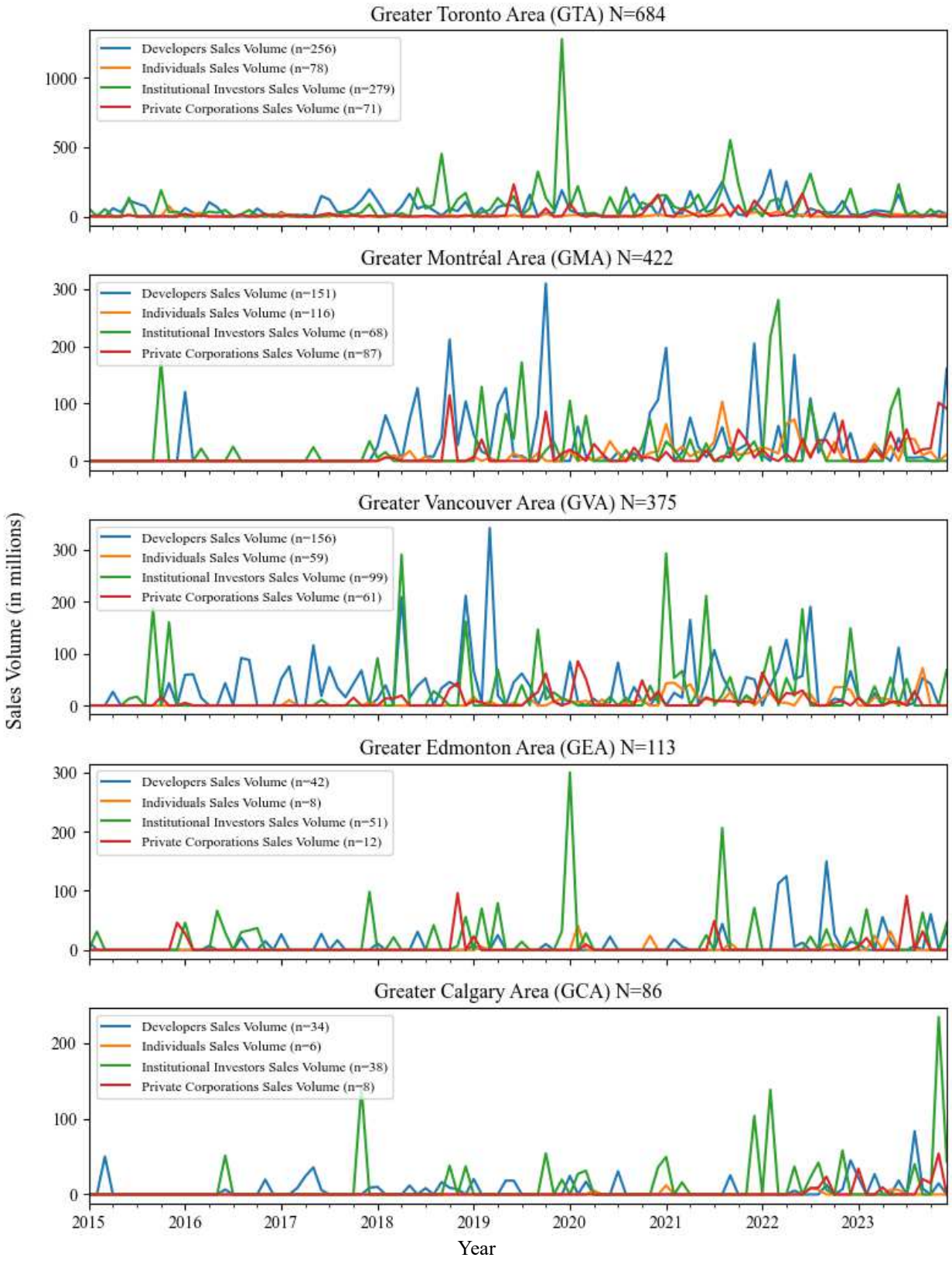
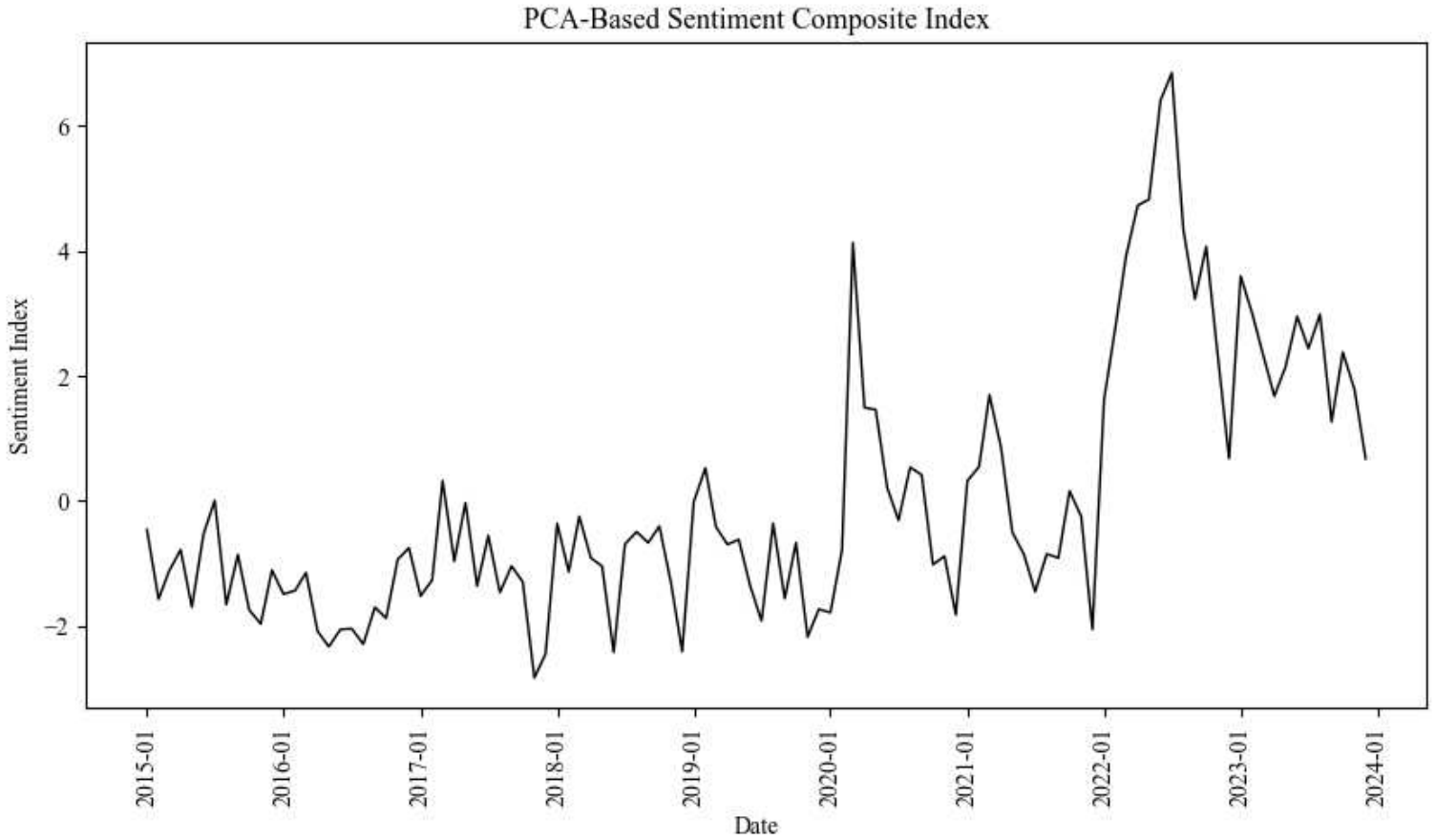


Figure 3: Principal Component Analysis of the Sentiment Composite Index



Note: Negative Google search terms were transformed using a PCA analysis to capture the variance of each term. The graph above represents the variance of the search terms for the sample period. The PCA-Based Sentiment Composite Index tracks negative sentiment fluctuations over time from 2015 to 2023. It demonstrates the dynamic nature of sentiment, with peaks indicating negative sentiment and troughs showing positive sentiment. The index is built upon searches in the Canada within the real estate search category.

Table 2: Investor Categorization

Investor Type	No. of Transactions	Total Sales Volume	Classified As
Developer/Owner	421	9,233	Developers
Investment Manager	282	8,476	Institutional Investors
Individual	267	2,765	Individuals
Developer	201	5,273	Developers
Public REIT	140	3,639	Institutional Investors
Corporation	124	2,726	Private Corporations
Other - Private	102	1,321	Private Corporations
Private REIT	27	703	Institutional Investors
Investment Manager | Developer	26	1,433	Institutional Investors
Equity Fund	21	712	Institutional Investors
Public REIT | Developer	15	293	Institutional Investors
Real Estate Operating Company	11	570	Institutional Investors
Corporation | Individual	8	49	Private Corporations
Equity Fund | Investment Manager	7	182	Institutional Investors
Other/Unknown-Institution	5	98	Private Corporations
Developer | Developer/Owner	4	56	Developers
Developer/Owner | Developer	4	33	Developers
Developer | Other – Private	4	85	Developers
Pension Fund	3	201	Institutional Investors
Developer/Owner | Equity Funds	2	38	Developers
Insurance Company	2	105	Institutional Investors
Bank	1	10	Institutional Investors
Developer/Owner | Investment Manager	1	56	Developers
Developer/Owner | Bank	1	45	Developers
Other - Private | Developer	1	9	Developers

Note: Total sales volume per investor type from January 1, 2015, to December 31, 2023. The sales volume are in millions of Canadian dollars rounded to five decimal places. Entities represented by "|" denote a specific investor type, where the investor embodies two investor types. In such cases, the initial entry signifies their primary business model, which was retained for the classification.

Table 3: Average Purchase Prices and Building Characteristics

Market	Investor Type	x̄ Sale Price	x̄ # Units	x̄ Price per Unit	x̄ Building SF	x̄ Price Per SF	x̄ Height	x̄ Year Built
Greater Toronto Area (GTA)	Developers	$23,400,000	84.41	$277,205	88,500	264.41	6.50	1960.76
	Individuals	$10,200,000	42.27	$241,310	39,900	255.64	4.55	1954.81
	Institutional Investors	$30,400,000	114.06	$266,516	132,700	229.09	7.96	1963.80
	Private Corporations	$23,100,000	74.23	$311,214	87,600	263.70	6.17	1962.50
Weighted Average GTA:		**$24,700,000**	**90.64**	**$272,492**	**100,900**	**244.80**	**6.84**	**1961.50**
Greater Montréal Area (GMA)	Developers	$22,300,000	98.89	$225,509	93,000	239.78	6.59	1968.33
	Individuals	$9,000,000	53.89	$167,013	42,800	210.28	4.07	1963.19
	Institutional Investors	$31,200,000	129.12	$241,640	118,200	263.96	9.27	1991.97
	Private Corporations	$13,300,000	63.60	$209,127	59,100	225.04	5.02	1965.03
Weighted Average GMA:		**$18,200,000**	**84.11**	**$216,374**	**86,200**	**211.14**	**6.64**	**1970.05**
Greater Vancouver Area (GVA)	Developers	$25,100,000	51.44	$487,986	48,000	522.92	4.79	1967.10
	Individuals	$12,200,000	32.15	$379,441	27,700	440.43	3.29	1961.88
	Institutional Investors	$29,400,000	73.92	$397,732	74,900	392.52	6.34	1977.84
	Private Corporations	$13,400,000	36.59	$366,219	39,700	337.53	3.72	1967.72
Weighted Average GVA:		**$22,300,000**	**51.92**	**$429,485**	**50,500**	**441.58**	**4.79**	**1969.22**
Greater Edmonton Area (GEA)	Developers	$22,100,000	111.69	$197,868	109,000	202.75	6.14	1994.27
	Individuals	$19,500,000	92.50	$210,811	100,600	193.84	4.43	2000.75
	Institutional Investors	$31,300,000	138.84	$225,434	152,400	205.38	7.24	2002.88
	Private Corporations	$33,400,000	149.08	$224,036	134,800	247.77	7.83	2000.45
Weighted Average GEA:		**$27,300,000**	**126.56**	**$215,712**	**130,700**	**208.88**	**6.69**	**1999.27**
Greater Calgary Area (GCA)	Developers	$18,200,000	89.26	$203,888	88,900	204.72	7.26	1983.41
	Individuals	$7,400,000	36.33	$203,670	55,700	132.85	4.50	1972.33
	Institutional Investors	$32,200,000	151.74	$212,210	197,100	163.37	7.05	1991.03
	Private Corporations	$21,600,000	93.25	$231,635	92,600	233.26	7.50	1995.86
Weighted Average CGA:		**$23,900,000**	**113.55**	**$210,486**	**134,700**	**177.43**	**7.00**	**1987.16**

Note: Average sale price is rounded to five decimal places. Building square footage is rounded to two decimal places.

Table 4: Google Trends Search Terms

Search Term	x̄ Normalized Popularity
Bankruptcy	49.88
Bubble	29.51
Bust	25.19
Cap Rate	58.64
Decline	32.01
Downturn	11.48
Dropping	22.43
Foreclosure	26.39
Interest Rate Hike	10.37
Interest Rates	32.13
Market Crash	33.13
Mortgages	44.13
Real Estate Crash	33.52
Recession	15.78
Renewal	57.26
Risks	39.06
Selling	64.59
Vacancy	62.57

Note: The search terms are for the period of January 1, 2015 to December 31, 2023. The normalized averages presented in the table above are for Canada. The averages are representative of the popularity of searches related to the real estate category only.

Table 5: Descriptive Statistics

	N	Mean	Std.Dev	Min	25%	50%	75%	Max
Dependent variables								
Sales_Volume_Developers	108	137.28	112.25	0	55.23	106.46	195.36	504.90
Sales_Volume_Individuals	108	25.60	29.61	0	0	13.63	41.01	124.62
Sales_Volume_Institutional_Investors	108	151.13	187.49	0	26.49	79.63	207.24	1341.80
Sales_Volume_Private_Corporations	108	38.83	53.60	0	0	17.58	54.11	232.64
Independent variables								
Employment	108	18,782.20	824.04	16,083.60	18,091.20	18,660.05	19,233.35	20,312.60
Exchange Rate	108	117.77	3.11	107.83	115.89	117.41	119.60	125.01
Immigration	108	27,881.19	9,356.78	4,105.00	21,792.50	26,627.50	33,645.00	50,935.00
Index Return	108	310.52	32.58	243.94	288.52	302.62	330.88	388.24
Money Supply	108	3,555.15	67.66	2,543.53	2,995.20	3,367.87	4,268.56	4,602.49
Unexpected Inflation	108	-0.02	0.01	-0.04	-0.02	-0.02	-0.02	-0.01
Sentiment	108	0	2.03	-2.83	-1.44	-0.67	0.72	6.84
Work Started	108	18,830.44	2,820.92	12,266.42	16,698.63	18,117.92	20,840.90	26,773.67
Yield	108	0.47	0.88	-1.80	0.03	0.80	1.09	1.54

Note: Std.Dev = Standard Deviation; Min = Minimum; Max=Maximum. Dependent variables are in millions of Canadian dollars. Employment figures are in thousands. The money supply is in billions of Canadian dollars.

Table 6: OLS Regression Results for Developers

	Model (1)	Model (2)	Model (3)	Model (4)
Constant	138.42***	140.49***	142.36***	149.00***
	(14.55)	(-13.90)	(13.72)	(14.02)
Employment	53.35**	26.60	18.88	-5.19
	(2.48)	(1.15)	(0.82)	(-0.24)
Exchange Rate	-19.06	-1.19	-16.60	0.49
	(-1.24)	(-0.07)	(-0.99)	(0.03)
Immigration	-17.07	0.32	-0.70	-43.30**
	(-1.15)	(0.02)	(-0.04)	(-2.59)
Index Return	24.31	-7.93	-13.99	12.20
	(1.40)	(-0.41)	(-0.69)	(0.54)
Money Supply	36.50	75.10***	75.01***	29.43
	(1.45)	(2.80)	(2.82)	(1.09)
Unexpected Inflation	-7.40	10.91	-2.90	-29.91**
	(-0.50)	(0.72)	(-0.20)	(-2.06)
Sentiment	-1.97	-26.76	-41.15**	-21.56
	(-0.12)	(-1.49)	(-2.26)	(-1.19)
Work Started	-15.08	-18.43	1.58	8.96
	(-0.91)	(-1.03)	(0.09)	(0.45)
Yield	62.12***	49.87***	50.29***	34.67**
	(3.53)	(2.75)	(2.90)	(2.34)
Adjusted R-Squared	0.23	0.15	0.14	0.15
No. Observations	107	105	102	96

T-Values are in parentheses.
*, **, *** indicates significance at the 1%, 5%, and 10% level, respectively.

Note: Sales volume, the dependent variable, is the total monthly sum of transactional prices by Developers for the sample period. The estimated coefficients, denoted in millions, encompass the period from January 1, 2015, to December 31, 2023. In each model, all independent variables are uniformly lagged by the same time interval. Model 1 examines variables with a 1-month lag, Model 2 introduces a 3-month lag, Model 3 incorporates a 6-month lag, and Model 4 extends to a 12-month lag. These models are designed to reflect the sales dynamics among developers within the metropolitan areas of Vancouver, Edmonton, Calgary, Toronto, and Montréal. During this timeframe, a comprehensive analysis of 654 transactions was conducted to ascertain the overall sales volume metrics.

Table 7: OLS Regression Results for Individuals

	Model (1)	Model (2)	Model (3)	Model (4)
Constant	25.84***	26.33***	27.00***	27.80***
	(12.66)	(12.25)	(12.50)	(12.16)
Employment	-6.14	-3.39	-12.41**	-6.82
	(-1.33)	(-0.69)	(-2.59)	(-1.49)
Exchange Rate	-1.94	0.22	2.17	-2.29
	(-0.59)	(0.06)	(0.62)	(-0.61)
Immigration	2.36	-0.61	0.94	-9.96***
	(0.74)	(-0.18)	(0.28)	(-2.76)
Index Return	3.19	0.93	1.46	7.39
	(0.86)	(0.23)	(0.35)	(1.53)
Money Supply	28.79***	28.50***	24.78***	18.62***
	(5.32)	(4.99)	(4.47)	(3.20)
Unexpected Inflation	6.27*	-0.11	4.15	4.83
	(1.96)	(-0.03)	(1.35)	(1.54)
Sentiment	-4.84	-8.59**	-7.13*	4.89
	(-1.35)	(-2.25)	(-1.88)	(1.26)
Work Started	2.86	0.82	8.18**	5.51
	(0.81)	(0.22)	(2.17)	(1.30)
Yield	2.34	4.51	-4.83	-4.89
	(0.62)	(1.17)	(-1.34)	(-1.53)
Adjusted R-Squared	0.49	0.45	0.47	0.44
No. Observations	107	105	102	96

T-Values are in parentheses.
*, **, *** indicates significance at the 1%, 5%, and 10% level, respectively.

Note: Sales volume, the dependent variable, is the total monthly sum of transactional prices by Individuals for the sample period. The estimated coefficients, denoted in millions, encompass the period from January 1, 2015, to December 31, 2023. In each model, all independent variables are uniformly lagged by the same time interval. Model 1 examines variables with a 1-month lag, Model 2 introduces a 3-month lag, Model 3 incorporates a 6-month lag, and Model 4 extends to a 12-month lag. These models are designed to reflect the sales dynamics among individuals within the metropolitan areas of Vancouver, Edmonton, Calgary, Toronto, and Montréal. During this timeframe, a comprehensive analysis of 272 transactions was conducted to ascertain the overall sales volume metrics.

Table 8: OLS Regression Results for Institutional Investors

	Model (1)	Model (2)	Model (3)	Model (4)
Constant	151.99***	154.08***	157.17***	158.72***
	(9.04)	(8.91)	(8.63)	(8.59)
Employment	27.79	-43.19	-27.84	102.78***
	(0.73)	(-1.09)	(-0.69)	(2.78)
Exchange Rate	-20.30	-9.20	-46.81	-3.30
	(-0.74)	(-0.33)	(-1.59)	(-0.11)
Immigration	-50.50*	13.55	-18.57	-62.25**
	(-1.93)	(0.50)	(-0.66)	(-2.14)
Index Return	86.29***	81.71**	75.14**	-65.52*
	(2.82)	(2.48)	(2.13)	(-1.68)
Money Supply	26.71	-23.52	1.18	108.92**
	(0.6)	(-0.51)	(0.03)	(2.32)
Unexpected Inflation	-26.80	-43.94*	-22.87	-14.19
	(-1.02)	(-1.70)	(-0.88)	(-0.56)
Sentiment	-13.93	-14.84	-12.45	-84.95***
	(-0.47)	(-0.48)	(-0.39)	(-2.71)
Work Started	-3.82	48.77	64.59**	-32.74
	(-0.13)	(1.59)	(2.03)	(-0.95)
Yield	20.88	-7.02	-5.76	40.29
	(0.67)	(-0.23)	(-0.19)	(1.56)
Adjusted R-Squared	0.15	0.12	0.07	0.13
No. Observations	107	105	102	96

T-Values are in parentheses.
*, **, *** indicates significance at the 1%, 5%, and 10% level, respectively.

Note: Sales volume, the dependent variable, is the total monthly sum of transactional prices by Institutional Investors for the sample period. The estimated coefficients, denoted in millions, encompass the period from January 1, 2015, to December 31, 2023. In each model, all independent variables are uniformly lagged by the same time interval. Model 1 examines variables with a 1-month lag, Model 2 introduces a 3-month lag, Model 3 incorporates a 6-month lag, and Model 4 extends to a 12-month lag. These models are designed to reflect the sales dynamics among institutional investors within the metropolitan areas of Vancouver, Edmonton, Calgary, Toronto, and Montréal. During this timeframe, a comprehensive analysis of 551 transactions was conducted to ascertain the overall sales volume metrics.

Table 9: OLS Regression Results for Private Corporations

	Model (1)	Model (2)	Model (3)	Model (4)
Constant	39.19***	39.94***	41.00***	42.92***
	(8.45)	(8.54)	(8.54)	(8.46)
Employment	16.35	9.60	-16.74	15.46
	(1.56)	(0.89)	(-1.58)	(1.52)
Exchange Rate	-7.45	-3.33	-0.52	5.02
	(-0.99)	(-0.44)	(-0.07)	(0.61)
Immigration	-2.99	-8.63	17.02**	-18.93**
	(-0.41)	(-1.19)	(2.30)	(-2.37)
Index Return	8.64	13.29	-3.66	-3.79
	(1.02)	(1.49)	(-0.39)	(-0.35)
Money Supply	15.39	25.64**	48.59***	16.61
	(1.25)	(2.06)	(3.95)	(1.29)
Unexpected Inflation	-8.72	11.94*	5.49	0.26
	(-1.20)	(1.70)	(0.80)	(0.04)
Sentiment	-3.73	-0.42	-18.64**	-10.35
	(-0.46)	(-0.05)	(-2.21)	(-1.2)
Work Started	-0.12	-4.11	-7.96	10.54
	(-0.02)	(-0.50)	(-0.95)	(1.12)
Yield	11.66	-2.83	-3.14	-3.50
	(1.36)	(-0.34)	(-0.39)	(-0.49)
Adjusted R-Squared	0.20	0.21	0.21	0.19
No. Observations	107	105	102	96

T-Values are in parentheses.
*, **, *** indicates significance at the 1%, 5%, and 10% level, respectively.

Note: Sales volume, the dependent variable, is the total monthly sum of transactional prices by Private Corporations for the sample period. The estimated coefficients, denoted in millions, encompass the period from January 1, 2015, to December 31, 2023. In each model, all independent variables are uniformly lagged by the same time interval. Model 1 examines variables with a 1-month lag, Model 2 introduces a 3-month lag, Model 3 incorporates a 6-month lag, and Model 4 extends to a 12-month lag. These models are designed to reflect the sales dynamics among private corporations within the metropolitan areas of Vancouver, Edmonton, Calgary, Toronto, and Montréal. During this timeframe, a comprehensive analysis of 241 transactions was conducted to ascertain the overall sales volume metrics.

Table 10: Granger Causality Test: Optimal Lag Periods per Variable

	Developers	Individuals	Institutional Investors	Private Corporations
Employment	1-month (0.00)	12-months (0.01)	1-month (0.06)	1-month (2.38)
Exchange Rate	1-month (0.01)	1-month (0.01)	1-month (0.14)	1-month (0.05)
Immigration	1-month (0.04)	11-months (0.00)	10-months (0.24)	1-month (0.01)
Index Return	1-month (2.71)	1-month (0.01)	1-month (0.00)	1-month (0.00)
Money Supply	1-month (0.01)	1-month (0.00)	1-month (0.06)	1-month (3.09)
Unexpected Inflation	7-months (0.18)	2-months (0.06)	7-months (0.01)	1-month (0.00)
Sentiment	1-month (0.25)	1-month (0.10)	12-months (0.37)	1-month (0.06)
Work Started	1-month (0.04)	1-month (0.00)	3-months (0.16)	1-month (0.00)
Yield	1-month (0.23)	9-months (0.46)	7-months (0.84)	1-month (0.17)

Note: P-values are in parentheses. The optimal lag values for each type of investor were determined based on the aggregated sales volume from January 1, 2015, to December 31, 2023, utilizing a Granger causality test for each investor. For a detailed explanation of the methodology used, refer to Chapter 3.

Table 11: OLS Regression Employing Optimal Lag Periods per Investor

	Developers	Individuals	Institutional Investors	Private Corporations
Constant	142.85***	27.80***	158.72***	39.19***
	(14.20)	(12.55)	(9.01)	(8.45)
Employment	54.83**	-4.48	23.62	16.35
	(2.48)	(-1.14)	(0.74)	(1.56)
Exchange Rate	-20.18	-2.28	-28.50	-7.45
	(-1.04)	(-0.59)	(-0.99)	(-0.99)
Immigration	-20.23	-1.59	-26.41	-2.99
	(-1.30)	(-0.46)	(-1.04)	(-0.41)
Index Return	25.57	3.77	68.49**	8.64
	(1.41)	(1.12)	(2.50)	(1.02)
Money Supply	37.94	25.70***	41.96	15.39
	(1.36)	(3.78)	(1.04)	(1.25)
Unexpected Inflation	-1.64	2.11	24.35	-8.72
	(-0.12)	(0.65)	(0.97)	(-1.2)
Sentiment	-1.17	-4.20	-73.04**	-3.73
	(-0.07)	(-1.00)	(-2.59)	(-0.46)
Work Started	-15.12	1.70	30.47	-0.12
	(-0.88)	(0.44)	(1.02)	(-0.02)
Yield	61.00***	-0.98	-56.02**	11.66
	(3.26)	(-0.34)	(-2.21)	(1.36)
Adjusted R-Squared	0.21	0.47	0.21	0.20
No. Observations	101	96	96	107

T-Values are in parentheses.
*, **, *** indicates significance at the 1%, 5%, and 10% level, respectively.

Note: Refer to Table 9 for the lag periods applied to each variable in the regression analysis.

Table 12: **OLS Regression Employing Optimal Lag Periods per Investor Percentage Change**

	Developers	Individuals	Institutional Investors	Private Corporations
Constant	0.68***	0.23***	0.92***	0.48*
	(0.18)	(0.19)	(0.32)	(0.29)
Employment	0.17**	0.11	0.58	0.11
	(0.21)	(0.22)	(0.37)	(0.36)
Exchange Rate	0.20	-0.25	-5.20	-0.05
	(0.19)	(0.21)	(0.35)	(0.31)
Immigration	0.12	-0.20	-0.25	0.04
	(0.20)	(0.22)	(0.36)	(0.33)
Index Return	0.23	-0.01	0.15	-0.02
	(0.20)	(0.21)	(0.35)	(0.32)
Money Supply	-0.02	-0.03	0.12	-0.25
	(0.18)	(0.20)	(0.33)	(0.30)
Unexpected Inflation	-0.07	0.06	0.35	-0.01
	(0.19)	(0.20)	(0.33)	(0.31)
Sentiment	0.07	0.06	0.13	0.08
	(0.18)	(0.20)	(0.32)	(0.29)
Work Started	-0.24	0.08	-0.17	0.01
	(0.19)	(0.21)	(0.34)	(0.32)
Yield	-0.17	-0.05	0.04	-0.56
	(0.19)	(0.20)	(0.33)	(0.30)
Adjusted R-Squared	0.08	0.03	0.21	0.20
No. Observations	106	104	96	107

Standard Errors are in parentheses.
*, **, *** indicates significance at the 1%, 5%, and 10% level, respectively.