



# Early warning indicators? The effect of consumer and investor sentiments on the restaurant industry

Elizabeth Yost\*, Jorge Ridderstaat, Murat Kizildag

Rosen College of Hospitality Management, University of Central Florida, 9907 Universal Blvd., Orlando, FL, 32819, United States

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## ABSTRACT

This study looks at the influence of cyclical fluctuations of the consumer confidence index (CCI) and the volatility index (VIX) as early-warning indicators of the variations in restaurant performance. The industry has traditionally focused on past data and on microeconomic influences to anticipate its future performance, a procedure that does not consider possible cyclical fluctuations in restaurant performance metrics. These fluctuations are driven by sentiments of consumers and investors. The study uses the cyclical component of the applied data, followed by unit root and cointegration testing, with subsequent application of the Limited Information Maximum Likelihood technique. The results show both indicators have an effect on restaurant performance, where VIX has an impact on the current, expected, and overall restaurant performance, while the CCI's influence is only partial (current performance). Policy-makers and planners could benefit from anticipating features of indicators to assess and steer the future performance of the restaurant industry.

## 1. Introduction

The restaurant industry is a large business in the United States. According to the National Restaurant Association, there are more than 1 million restaurant locations, employing about 10 % of the overall workforce, with projected sales of US\$ 863 billion in 2019 (NRA, 2019). Additionally, the industry impacts nearly \$1.6 trillion of the entire US GDP.

With such a large influence on 19.39 trillion dollars of U.S. GDP, understanding factors affecting restaurant performance warrant a deeper dive. It has been well documented in the literature that the restaurant industry is influenced by seasonal and cyclical factors (Lee and Ha, 2012; Kim et al., 2007; Choi, 2007; Parsa et al., 2005). While seasonal factors have a regular and predictable variation, repeating at the same time each year, cyclical factors have a longer duration, are less consistent than seasonal fluctuations, and are usually attributed to the ups and downs in the general level of business activities, also referred as the business cycle (Keating and Wilson, 2019). These cycles of economic growth are characterized by expanding business activity, rising household income and increased consumer spending and hiring, while the cycles of economic contraction are distinguished by limited consumer and business activities (Baumohl, 2013). Particularly, the contractions (recessions) may have enormous repercussions on businesses and individuals so it's especially important to understand and be able to

predict possible downturns. For example, the global financial and economic crisis (the Great Recession) during 2008–2010 gradually shocked financial markets and caused economic and unemployment crises worldwide (Gutner, 2015). Having the means to understand and possibly predict the ups and downs through measurable indicators could provide relevant insight into the restaurant industry as a whole.

Considering the fluctuating business cycles, this study investigates the relevance of consumers' and investors' sentiments as potential leading indicators of performance in the restaurant industry. More specifically, this research aims to examine the impact of the CCI (Consumer Confidence Index) and the VIX (Chicago Board Options Exchange Volatility Index) on the performance of the restaurant industry in the United States; the latter which is measured by the current, expected and overall restaurant performance index (RPI). The investigation focuses on how the cycles of consumers' and investors' sentiments affect the cyclical movements in the RPI, following a theory that the cycles demonstrate the ups and downs of economic activity. Therefore, the study proposes the following research questions:

- 1) What effect, if any, does the Consumer Confidence Index have on the Restaurant Performance Index?
- 2) What effect, if any, does the Volatility Index have on the Restaurant Performance Index?

\* Corresponding author.

E-mail addresses: [Elizabeth.Yost@ucf.edu](mailto:Elizabeth.Yost@ucf.edu) (E. Yost), [Jorge.Ridderstaat@ucf.edu](mailto:Jorge.Ridderstaat@ucf.edu) (J. Ridderstaat), [Murat.Kizildag@ucf.edu](mailto:Murat.Kizildag@ucf.edu) (M. Kizildag).

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The study contributes to the existing literature in a couple of ways. First, it explains the cyclical effects of the restaurant industry by applying a leading indicator approach, using the sentiments of both consumers and investors. This allows for the identification of potential early signs of forthcoming performance in an industry that has traditionally been based only on simple operational forecasts (Thompson, 2010). Using consumers' and investors' sentiments could provide early warning indicators that may then mitigate cyclical risks for the restaurant industry, thereby improving performance, investment decision, and allocation of resources at the restaurant level. Second, the study contributes to the literature by applying the VIX as an early indicator of restaurant performance, in an environment where studies have primarily looked at this indicator as a determinant of general stock return while underemphasizing a sector-based approach (Lelo de Larrea et al., 2019).

The analysis includes data decomposition, using the unobserved components model to extract the cyclical components of the variables. The obtained data are subsequently analyzed for unit root and cointegration, followed by the application of the Limited Information Maximum Likelihood technique.

The remainder of this study is organized as follows: section two describes the research problem and how this study fills the gap from prior research, while section three discusses the data and the applied methodologies. Section four presents and discusses the findings, while the last section concludes and discusses the managerial implications, study limitations, and future research plans.

## 2. Literature review

### 2.1. Problem identification

Given the relative importance of the restaurant industry to economic growth, an adequate understanding of factors that affect future performance is necessary to anticipate and steer future operations in the desired direction. While operators certainly attempt to predict impacts to return, the traditional focus of understanding restaurant industry performance has relied on understanding microeconomic influences (Lee and Ha, 2012) and past performance, as restaurant operators usually do not have enough resources available to investigate beyond the microeconomic factors that impact their business (Parsa et al., 2005). Additionally, operators are typically limited to establishment labor costs, activity level sales based on previous days, and changes in food costs in an attempt to determine what changing conditions might be squeezing or inflating margins (Hua and Templeton, 2010). All of this suggests that there is a practical research problem: restaurant operators may not have all the information available to maximize performance. Additionally, restaurants function in an uncertain environment, with potential impacts from changes in the economy, societal and demographic trends, political leadership, technology, and the natural environment (Ford and Sturman, 2020). Particularly, the changes in the business cycle are essential to understand, because they directly affect demand for products, for both long and short-term demand. The business cycle is crucial for businesses of all kinds, but especially for restaurants, due to the reliance on demand and consumer spending for its revenues and overall performance. This study notices that current research undercuts the importance of understanding the cyclical economic changes and the impact on performance.

Beyond the primary purpose of providing food and drink, restaurants fulfill a human need for connection and shape social relations through consumption and spending, so identifying indicators that offer a new understanding of probable future consumption behavior may be considered valuable. Consumers who are confident and optimistic about their future are more likely to spend instead of saving, which keeps the economy moving in a positive direction. Consumers who are not confident about the state of the economy tend to save instead of spend (Baumohl, 2013). This level of confidence is measured by the

economic indicator known as the consumer confidence index (CCI), which provides useful information to monitor consumers' feelings and subsequent consumption behavior. Generally, consumer confidence increases when the economy expands and decreases when the economy contracts and is viewed as a lagging indicator of stock market performance (confirming that market shifts have taken place).

However, consumers can also decide to invest a certain amount of their available funds in investments now, hoping to be able to consume more in the future (Fabozzi, 2015), which provides a rationale for also monitoring investors' sentiment. An indicator of investors' sentiment such as the volatility index (VIX), introduced in 1993 by the Chicago Board Options Exchange (Chicago Board Options Exchange, 2019), could provide an indication of future consumption, and, thus, could also be useful for monitoring the performance of the restaurant industry.

The long-run changes are associated with trends that can be projected by considering past patterns into the future (Bails and Peppers, 1993; Ford and Sturman, 2020). Projections by the restaurant industry already consider this approach in current forecasting practice. However, an economy is a reflection of human behavior (Baumohl, 2013), and without understanding how people adjust their expectations (which is impossible to predict accurately), any forecast with data from the past is unreliable (Knoop, 2015). Short-term economic changes are, therefore, also relevant in the forward-looking exercise in the restaurant industry.

As previously indicated, restaurants are also influenced by seasonal and cyclical factors that affect their performance. Seasonal factors are regular variations repeating themselves at the same time each year (Keating and Wilson, 2019), and their repetitive nature makes them more predictable than the cyclical factors. The latter is more challenging to forecast, compared to the trend and seasonal factors, because of their nonperiodic recurring variations and their variable duration of two to ten years or longer (Gaynor and Kirkpatrick, 1994). These periods of cyclical trade-offs in economic activity are generally referred to as business cycles and can reflect fluctuations in the production of goods and services as well as the number of employees (Mankiw, 2018). Their connection with consumer spending could make them an early-warning indicator of impending restaurant performance.

Taking into account both the CCI and the VIX as early warning indicators on restaurant performance (as measured via the restaurant performance index or RPI), this study posits the following hypotheses:

- H1.** There is a statistically significant relationship between CCI and overall RPI.
- H2.** There is a statistically significant relationship between CCI and current RPI.
- H3.** There is a statistically significant relationship between CCI and expected RPI.
- H4.** There is a statistically significant relationship between VIX and overall RPI.
- H5.** There is a statistically significant relationship between VIX and current RPI.
- H6.** There is a statistically significant relationship between VIX and expected RPI.

### 2.2. Prior literature regarding business cycles as early-warning indicators

Business cycles are characterized by periods of ups and downs, with, respectively, more or less consumer spending (Baumohl, 2013), making them an attractive leading indicator for the restaurant industry, which in itself is driven by consumption by its guests. The gross domestic product (GDP) is considered the best overall barometer of the ups and downs of the economy (Baumohl, 2013). Studies by Choi et al. (1999);

Lee and Ha (2012; 2014), and Sohn (2016) have looked at business cycles as a determinant of restaurant performance. For example, Lee and Ha (2014), using annual GDP, investigated the impact of the recession and non-recession periods on both limited- and full-service restaurants. Their results showed that full-service restaurants were more vulnerable than limited-service restaurants during recessions. This study used annual GDP to reflect periods of recession and non-recession, but according to Knoop (2015), to measure the business cycle from the GDP, one has to de-trend the data first to separate the long-term developments from the short-term ones. This is not the only problem with the GDP, as it has additional drawbacks that may make it not the most appropriate indicator to use for monitoring future restaurant performance.

It would sound logical for restaurant businesses to use the business cycle, measured by the de-trended gross domestic product (GDP), as an early warning system of the looming developments in their business operations. However, this is problematic for several reasons. First, the GDP is only published on a quarterly or annual basis and does not allow for more frequent monitoring of developments, such as every month (Dogru et al., 2017; Ridderstaat and Croes, 2017; Picci, 2001; Ozdemir and Kizildag, 2017). Second, its calculation is influenced, to some extent, by imputed data, that are based on assumptions, which may ultimately not reflect actual developments (Stiglitz et al., 2009). Third, as indicated by Knoop (2015), the GDP consists of different components (consumption, investment, exports, and imports), which may not always show the same behavior as the GDP itself. These downsides of the GDP suggest that other alternative indicators of economic activity are needed to warn businesses of forthcoming short-term developments that could affect their operations.

Other research suggests that economic actors are interested in the most frequently available data, and the need for more up to date information may increase depending on where the economy stands in the business cycle (Baumohl, 2013). Additionally, the calculation of the GDP is partially affected by imputed data, which tend to be less reliable than observed values, because they are based on assumptions (Stiglitz et al., 2009). This does not necessarily reflect real economic developments. Finally, the GDP is a composite of consumption, investment, export, and import activities that do not always behave in the same way as the GDP itself. For example, nondurable consumption (e.g., food) have a more stable movement than the GDP itself, and, as such, is less correlated with the business cycle. These drawbacks of the GDP contaminate the potential of this indicator to function as an adequate indicator of short-term future developments for business activities. Alternative leading indicators are seemingly needed to provide the early warning system for the restaurant industry. This study attempts to fill this gap by offering leading indicators with an underpinning of emotional and behavioral theories.

### 2.3. Proposed leading indicators: Consumer and investor sentiments

Considering the relevance of food consumption for the restaurant industry, information on the future development of the consumption behavior of visitors eating out could benefit the forward-looking view of this industry. According to the Permanent Income Hypothesis of Milton Friedman (PIH), the key determinant of current consumption is not actual income, but permanent income, which is the normal or average income (Friedman, 1957; Mankiw, 2018). Deviations from this PIH can be theoretically justified by liquidity constraints and uncertainty about future income, which can cause consumers to adjust their current consumption and build precautionary savings against an uncertain future for which consumer confidence indices could play an important role (Dées and Soares Brinca, 2011; Ludvigson, 2004). In other words, if consumers experience unexpected changes to their permanent income, then they may alter their future consumer behavior.

Additionally, human emotions play an essential role in the decision-making process (Curtin, 2019), a notion popularized more than eight

decades ago by John Maynard Keynes, who coined the term “animal spirit” in his work “The General Theory of Employment, Interest, and Money” (Keynes, 1936; 2018). He describes the animal spirit as “a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities.” (p: 141). In other words, human decision-making is not based on reasoning but rather on emotions. Their motives could be both economic and non-economic in nature (e.g., confidence, temptations, envy, resentment, and illusions), as they are not always rational in the pursuit of their economic interests (Akerlof and Shiller, 2009; Croes et al., 2018).

These theories are quite relevant to the restaurant industry. First, for the past three decades, the restaurant industry has steadily grown as part of a fundamental shift in American work: from making things to serving people. Second, restaurants’ share of the food budget has more than doubled since the 1950s, which mirrors what is happening with consumer spending. Further, for the first time in US history, Americans are spending more money dining out than in grocery stores (Wei and Long, 2015). To boot, spending at restaurants and bars has grown twice as fast as all other retail spendings, such as clothes and cars (Thompson, 2017). This restaurant renaissance of current times has provided evidence that food has replaced music at the heart of the cultural conversation, demonstrating that restaurants play an essential role in the business, intellectual, social and artistic life of a thriving society (Feldman, 2015). Given the importance of the restaurant industry to the economy, as demonstrated through consumer spending, the measurable factor of consumer confidence may be utilized to understand the ultimate effects on performance.

Studies on the connection between consumer confidence and business performance are rare. Ludvigson (2004), for example, found that the CCI may have an impact on real personal consumption in several sectors of the economy (e.g., motor vehicles, goods and services, and durables). Additionally, Choi (2003) included consumer confidence as part of a series of indicators aimed at developing a system for projecting the US hotel industry growth and turning points.

However, consumers can also decide to delay their consumption by investing a certain amount of their available funds now in the hope of being able to consume more in the future (Fabozzi, 2015). People owning financial assets such as stocks and bonds, can always sell these securities for money and use the proceeds to buy goods and services (Moss, 2014). Investors’ sentiment can ultimately affect their behavior for their investments, concerning the moment when they decide to (partially) liquidate the asset(s) for funds that could be used for the purchase of goods and services. From the perspective of the Behavioral Finance Theory, people often act irrationally, yet predictably, whether they focus on recent events when predicting future ones (anchoring bias), imitate other successful investors (herding behavior), or make irrational decisions to avoid sure losses (loss aversion) (Brigham and Ehrhardt, 2017). The Chicago Board Options Exchange introduced an indicator of investors’ sentiment in 1993, called the volatility index (VIX) (often referred to as the “fear gauge”), which has a negative correlation with stock market returns (Chicago Board Options Exchange, 2019). This indicator could provide an indication of future consumption, and, thus, can be useful for anticipating developments in the restaurant industry.

While the impact of the VIX on stock returns has been adequately covered in the literature (e.g., Antonakakis et al., 2013; Fleming et al., 1995; Giot, 2005; Grechi et al., 2017; Hibbert et al., 2008; Obi et al., 2015), generally reflecting a negative effect, a sector-based approach has only been limitedly investigated (Lelo de Larrea et al., 2019). In the entire hospitality industry, only two studies were found that have looked at the impact of the VIX and investment calibrations based on investment dynamics on this sector (Obi et al., 2015; Barreda and Kizildag, 2015; Lelo de Larrea et al., 2019). The results indicate that the VIX could be an appropriate indicator for anticipating developments in this industry, and could possibly have usefulness for predicting

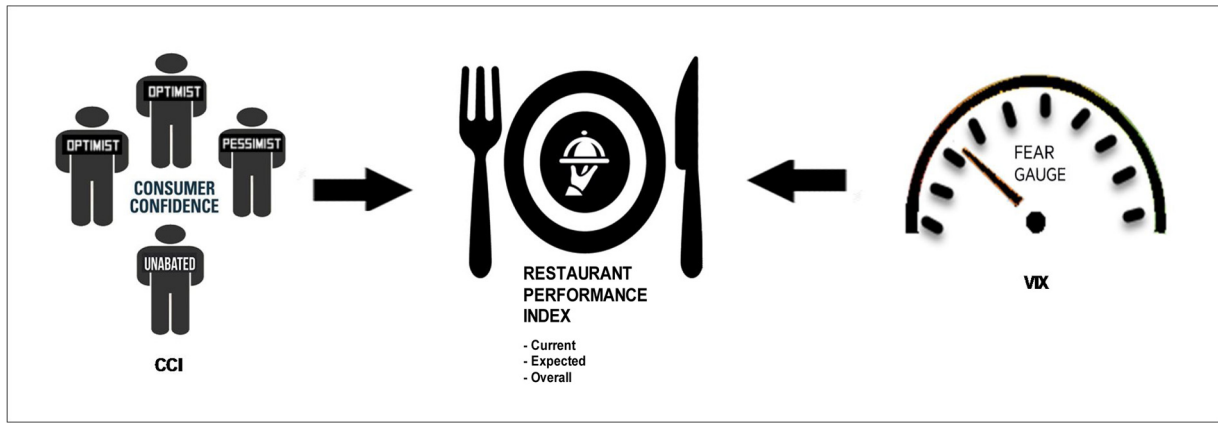


Fig. 1. Analytical framework.

activities in the restaurant industry.

A good understanding of the future developments of the restaurant industry requires information on possible future consumption behavior of consumers. The CCI and the VIX can offer this leading view on impending consumption behavior, and the next section will investigate whether there is a connection between the performance of the restaurant industry and both leading indicators.

### 3. Methodological procedures

#### 3.1. Data and sample selection

The central empirical premise looks explicitly at how cycles of the overall, current, and expected Restaurant Performance Indices (RPIs) are affected by both Consumer Confidence Index (CCI) and Chicago Board Options Exchange Volatility Index (VIX) (Fig. 1).

The monthly data for all of the RPIs were collected from the National Restaurant Association's (NRA) Tracking Survey among more than 400 restaurant companies nationwide for the period 2002–2017. RPI is measured in relation to a steady-state level of 100. Index values above 100 indicate that key industry indicators are in a period of expansion, while index values below 100 represent a period of contraction for key industry indicators. The RPI is further decomposed into a current situation index and the expected situation index. The current situation index measures changes in same-store sales, customer traffic, the total number of total employees and their average hours worked, as well as capital spending, all compared to the same month a year earlier. The expected situation index reflects a six-month outlook for same-store sales relative to the same period the previous year, the changes in the number of employees needed in the next six months, capital spending plans, and business operators' feelings about overall business conditions (Opincar, 2019).

Monthly CCI data were gathered from the University of Michigan's Consumer Sentiment (<http://www.sca.isr.umich.edu/>) to better reflect on consumer attitudes on financial and income situations, which are considered the most important driving force behind consumer spending (Baumohl, 2013). Additionally, it is critical and also empirically inevitable to factor in ex-post market volatility in the equity to capture the true and unbiased momentums in return patterns (Becker et al., 2009; Martens, 2002). Therefore, we employed "market-generated" sentiments and fear with a smoothing of 30-day ex-post price volatility to assess different return cycles better and to form econometric model-based ex-ante return calibrations and estimations both in the long and short-run implied by the S&P 500 index options (VIX). The mapping of cycle components are presented in Fig. 2.

#### 3.2. Estimation procedures and models

Before running the principal analyses, we followed some procedures and elimination for the final decomposition of the main data. Even though time-series data comprise of four components as; a trend, cycle, seasonal, and irregular elements (Bails & Peppers, 1993; Gaynor and Kirkpatrick, 1994; Keating and Wilson, 2019; Makridakis et al., 1998), we only used a specific element of the data, which is the cycle component. We have eliminated the trend component (the general upward and downward movement of the data), the seasonal component (a pattern of change in the data within a year), and the irregular factor (erratic or irregular movements in the data, after the trend, cycle, and seasonal factors have been eliminated). The main reason is that we focus on the non-periodical recurring variations around the trend, and arise from endogenous forces and/or exogenous shocks (Bails and Peppers, 1993). Therefore, based on the data decomposition technique we applied, the data is assumed to be additive of nature. For this reason, we transformed all of our applied variables into a logarithm, indicating that the relationship between the components changes from multiplicative to additive (Table 1).

Further, we applied the Unobserved Component Model (UCM) to split the existing time-varying structures in the observed data into a trend, seasonal, cyclical, and idiosyncratic components (Milhøj, 2013; Enders, 2010; StataCorp, 2013) as follows:

$$Y_t = \tau_t + \gamma_t + \psi_t + \beta X_t + \varepsilon_t \quad (4)$$

Where,

- $\tau$  = trend component;
- $\gamma$  = seasonal component;
- $\psi$  = cyclical component;
- $\varepsilon$  = idiosyncratic component
- $\beta$  = vector of fixed parameters;
- $X$  = vector of exogenous variables.

Next, we standardized the cyclical variables to make the cyclical components of all variables comparable (Gujarati and Porter, 2009) and tested the standardized variables for stationarity to prevent a biased standard error and untrustworthy relationships in regression analyses due to non-stationary properties in our data (Mahadeva and Robinson, 2004). For this purpose, the authors tested the standardized cyclical variables using the Augmented Dickey-Fuller test (ADF), the Phillips-Perron test (PP) and the modified Dickey-Fuller test based on general least squares (DF-GLS) (Dickey and Fuller, 1979; Phillips and Perron, 1988; Stock and Yogo, 2005; Elliott et al., 1996) to determine in what form (level or first difference) the variables should be included in the regression analysis (Table 2).

Additionally, we tested whether there were long-term relationships (co-integration) between the selected variables, using the Autoregressive Distributed Lags (ARDL) bound test method, which is



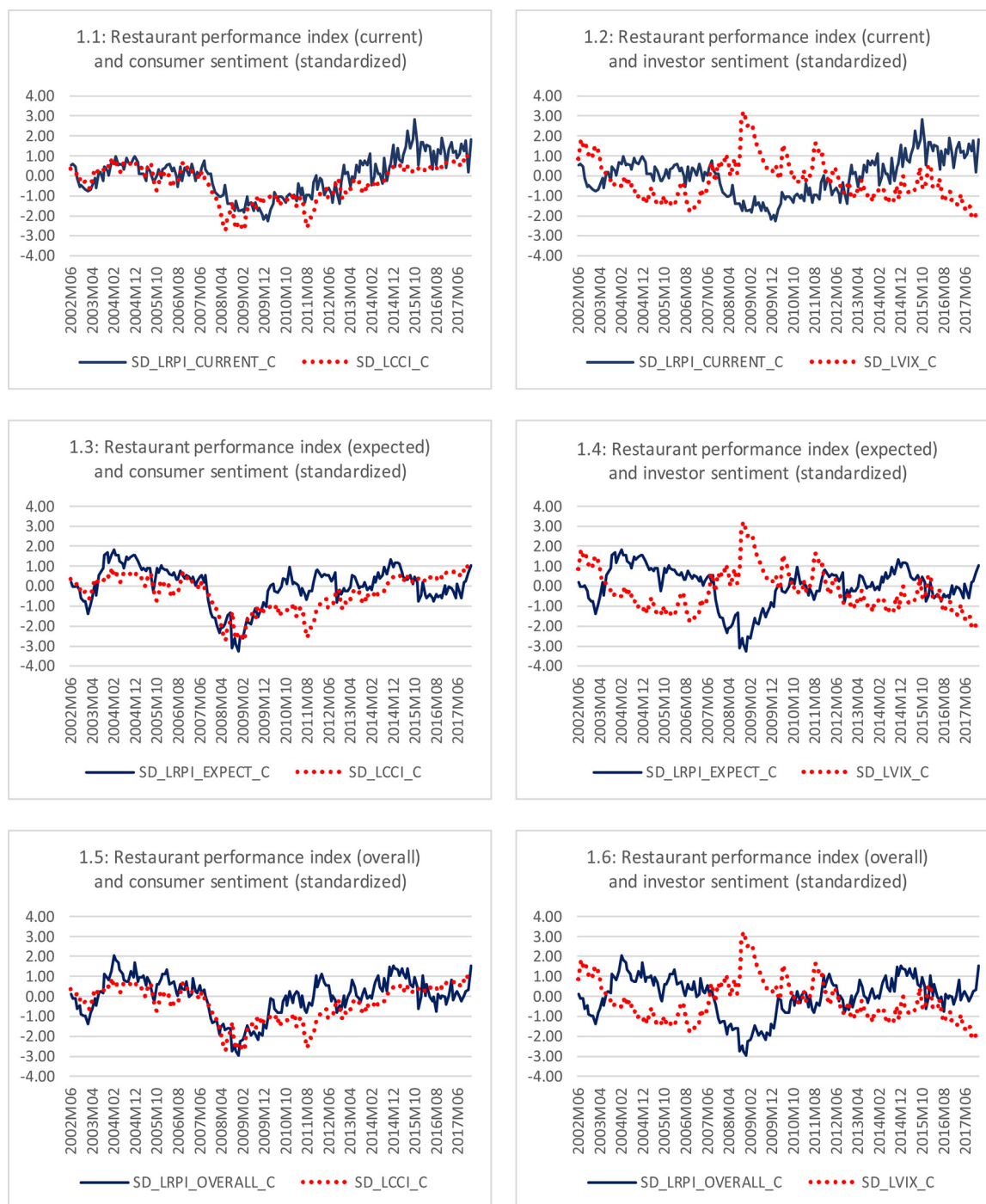


Fig. 2. Comparison of cyclical components.

Table 1

Applied variables and statistical characteristics.

Variable	Description	Median	Maximum	Minimum
SD_LCCI_C	Cycle of consumer confidence	0.2438	1.5126	-2.6930
SD_LRPI_CURRENT_C	Cycle of restaurant performance index (current situation)	0.0983	2.8172	-2.2196
SD_LRPI_EXPECT_C	Cycle of restaurant performance index (expected outcome)	0.1586	1.8120	-3.2523
SD_LRPI_OVERALL_C	Cycle of restaurant performance index (overall)	0.0621	2.0194	-2.9299
SD_LVIX_C	Cycle of volatility index (implied)	0.0084	3.2171	-2.1039

Note: All variables are in standardized version.

**Table 2**  
Unit root tests.

Variable		ADF		PP		DF-GLS		Integration
SD_LCCI_C	Level	−2.0297		−1.8629		−1.6200	*	I(0) or I(1)
	First difference	−12.8098	***	−14.7323	***	−11.1127	***	
SD_LRPI_CURRENT_C	Level	−1.6272	*	−3.2074	***	−1.5466		I(0) or I(1)
	First difference	−14.8290	***	−24.6766	***	−20.0392	***	
SD_LRPI_EXPECT_C	Level	−2.1533	**	−2.6362	***	−2.1599	**	I(0) or I(1)
	First difference	−17.1224	***	−17.0800	***	−5.2522	***	
SD_LRPI_OVERALL_C	Level	−2.2589	**	−2.7769	***	−2.2750	**	I(0) or I(1)
	First difference	−18.2866	***	−18.3371	***	−5.8173	***	
SD_LVIX_C	Level	−3.1981	***	−2.9438	***	−2.5038	**	I(0) or I(1)
	First difference	−13.4459	***	−17.1787	***	−11.3587	***	

Note: All variables are in standardized version.

**Table 3**  
Bounds test results.

	F-statistics	
$F_{SD\_LRPI\_CURRENT\_C}(SD\_LRPI\_CURRENT\_C SD\_LCCI\_C)$	68.4148	***
$F_{SD\_LRPI\_EXPECT\_C}(SD\_LRPI\_EXPECT\_C SD\_LCCI\_C)$	125.9726	***
$F_{SD\_LRPI\_OVERALL\_C}(SD\_LRPI\_OVERALL\_C SD\_LCCI\_C)$	130.3758	***
$F_{SD\_LRPI\_CURRENT\_C}(SD\_LRPI\_CURRENT\_C SD\_LVIX\_C)$	84.8028	***
$F_{SD\_LRPI\_EXPECT\_C}(SD\_LRPI\_EXPECT\_C SD\_LVIX\_C)$	132.6404	***
$F_{SD\_LRPI\_OVERALL\_C}(SD\_LRPI\_OVERALL\_C SD\_LVIX\_C)$	140.4825	***
Significance	10 Bound	11 Bound
10 %	6.84	7.84
5%	4.94	5.73
1%	4.04	4.78

Note: The symbols \*\*\*, \*\*, and \* indicate, respectively, the 1%, 5%, and 10 % significance levels.

suggested by Pesaran et al. (2001). The approach consists of testing a null hypothesis ( $H_0$ ) as the absence of co-integration against the alternative –  $H_1$ : there is co-integration. For variables that are integrated at the level form (I(0)), the lower bound critical value must be applied. For I(1) variables (variables that become stationary when in first difference form), the comparison must be made against the upper bound critical value (see Table 3 below). Five different possibilities could result from the comparison procedure (Ridderstaat et al., 2016):

- All variables are found to be I(0), and the calculated F-statistic is lower than the lower bound critical value → no co-integration (rejection of  $H_1$ ).
- All variables are found to be I(0), and the calculated F-statistic is higher than the lower bound critical value → co-integration (rejection of  $H_0$ ).
- All variables are found to be I(1), and the calculated F-statistic is lower than the upper bound critical value → no co-integration (rejection of  $H_1$ ).
- All variables are found to be I(1), and the calculated F-statistic is larger than the upper bound critical value → co-integration (rejection of  $H_0$ ).
- The mixed outcome, where some variables are I(0), and others are I(1) → co-integration if the variable is I(0) (rejection of  $H_0$ ) and no co-integration if the variable is I(1) (rejection of  $H_1$ ).

Lastly, we used the Instrumental Variable Approach (IV), in particular, the Limited Information Maximum Likelihood (LIML) technique to determine the effects of both cycles of consumer confidence and the fear index on those of the overall, current, and expected restaurant performance indices. This approach is suggested by several scholars (Kennedy, 2008; Hayashi, 2000; Poi, 2006; Gujarati, 2015; Stock et al.,

2002) since it eliminates one or more endogenous variables being correlated with their specific residual terms in our regressions. Our procedures to select the instrument variables were as follows: (1) variables must be correlated either positively or negatively with the endogenous variable(s) in the model; (2) the instrument variable must not be correlated with the related endogenous variable for which it acts as an instrument; and (3) the instrument variables must not be part of the model. The regressions models are configured as follows:

$$SD\_LRPI\_OVERALL\_C_t = \alpha_0 + \alpha_1 SD\_LCCI\_C_{t-m} + \alpha_2 SD\_LVIX\_C_{t-n} + \alpha_3 D\_SEP11_t + \alpha_3 D\_GLOBCRISIS_t + \epsilon_t \quad (1)$$

$$SD\_LRPI\_CURRENT\_C_t = \beta_0 + \alpha_1 SD\_LCCI\_C_{t-o} + \beta_2 SD\_LVIX\_C_{t-p} + \beta_3 D\_SEP11_t + \beta_3 D\_GLOBCRISIS_t + \theta_t \quad (2)$$

$$SD\_LRPI\_EXPECT\_C_t = \gamma_0 + \alpha_1 SD\_LCCI\_C_{t-q} + \gamma_2 SD\_LVIX\_C_{t-r} + \gamma_3 D\_SEP11_t + \gamma_3 D\_GLOBCRISIS_t + \omega_t \quad (3)$$

where

SD\_LRPI\_OVERALL\_C = the standardized cycle of overall restaurant performance index;

SD\_LRPI\_CURRENT\_C = the standardized cycle of current restaurant performance index;

SD\_LRPI\_EXPECT\_C = the standardized cycle of the expected restaurant performance index;

SD\_CCI\_C = the standardized cycle of the consumer confidence index

SD\_LVIX\_C = the standardized cycle of the implied volatility index;

D\_SEP11 = dummy variable demonstrating the pre and post-effects of the terrorist attacks on September 11, 2001;

D\_GLOBCRIS = dummy variable showing the effects of the global financial crisis of 2008–2010. See table four for summary results (Table 4).

#### 4. Discussion and conclusions

Previous research analyzing the cyclical and bilateral relationship among performance and macro and microeconomic factors for restaurant companies differs substantially from one another, yielding imprecise outcomes due to the presence of broad sets of elements and several industries combined in the samples. The common reason might be that there are several conventional research designs and statistical focus on the effect of triggering measures either individual or aggregate on stock return performance, which makes outcomes substantially imprecise. These approaches sometimes create unconnected results driven

**Table 4**  
Elasticity effect estimations (in beta values).

Dependent variable:	SD_LRPI_OVERALL_C	SD_LRPI_CURRENT_C	SD_LRPI_EXPECT_C
SD_LCCI <sub>Ct-3</sub>	0.2200	2.1200**	−0.8400
SD_LVIX <sub>Ct-2</sub>	−10.0200***	−3.3200***	−6.0000***
D_SEPI1 <sub>t</sub>	4.4400***	−0.3100	5.6500***
D_GLOBCRISIS <sub>t</sub>	−5.4700***	1.7800*	−5.2600***
<i>Underidentification test</i>			
Kleibergen-Paap rk LM statistic	61.4830 (p = 0.0000)	21.4100 (p = 0.0032)	78.0080 (p = 0.0000)
<i>Weak identification test</i>			
Kleibergen-Paap rk Wald F statistic	118.0810	4.3250	77.6680
<i>Stock-Yogo weak ID test critical values:</i>			
10 % maximal LIML size	4.0600	3.7800	5.4400
15 % maximal LIML size	2.9500	2.7300	3.8100
20 % maximal LIML size	2.6300	2.4300	3.3200
25 % maximal LIML size	2.4300	2.2700	3.0900
<i>Overidentification test of all instruments</i>			
Hansen J statistic	6.8410 (p = 0.1445)	6.6880 (p = 0.3507)	1.6940 (p = 0.1931)
Endogeneity test of endogenous regressors	4.1090 (p = 0.1282)	3.8280 (p = 0.1475)	3.7250 (p = 0.1553)
<i>Lags</i>			
SD_LCCI	3	3	4
SD_LVIX	2	3	2

Note: The symbols \*\*\*, \*\*, and \* indicate, respectively, the 1%, 5%, and 10 % significance levels.

by “not-so-much” relevant proxies examined in regressions overall. Additionally, anticipating future financial and operational performance in the restaurant industry requires more information than ex-post influences. Thus, the tangled findings go somewhat far away from yielding a solid consensus about what actually drives the performance return tied to investors’ sentiment and consumer confidence in S&P 500’s restaurant sub-sector index.

The notion behind this study is that the restaurant industry relies on consumer spending, and information about consumers’ and investors’ sentiments could provide an anticipated view about the consumption behavior in the restaurant industry. We aimed to tackle this matter by advancing previous research focus, putting forth promising outcomes, and seeking an accurate answer to a prominent question: “What specific indications of early warning systems do VIX and CCI signal when explaining restaurant firms’ return performance? In so doing, we investigated the impact of consumer confidence and the fear gauge U.S. stock market volatility on current, expected, and overall restaurant performance. Our main objective is to develop an extensive understanding in VIX and CCI, create an empirical relevancy in the information and physiological contents of stock return patterns, and demonstrate a broader economic outlook in explaining the possible early warnings system of VIX and CCI, which create divergences in investors’ choices, and thus, the performance returns of the restaurant companies.

We gleaned several interesting findings and obtained support for the objectives of the paper. One of the most intriguing results of the empirical models we tested against performance returns is that the shocks generated from VIX and CCI are only transitory, and they do not permanently mirror the long-term future behavior of the return cycles. Accordingly, the stationary nature of our proxies indicates that the long-term co-movement of cycles might possibly be due to other independent micro- and macroeconomic measures such as interest rates and/or core inflation readings, amounts of levered assets before and after the recent economic upheaval in 2007–09, etc. Given the preceding reasons, we observed that the cycle of fear index appeared to be significant and the main triggering factor for all three forms of the restaurant performance (current, expected, and overall). The fear gauge also has a negative impact on all three types of restaurant performance, while consumer confidence seems only statistically relevant for current restaurant performance. Moreover, the fear gauge has the potential to increase the anticipation period of restaurant performance by two more

months to eight months. CCI was not statistically significant for the overall and expected restaurant performance index. However, consumer confidence had the opposite magnitude on the cycle of the current index. Within this context, it appeared in our lag test that the consumer confidence cycle led all the restaurant performance indices by three months, whereas the cycle of the fear index, the results was two months. As a result, we observed similar early warning sign patterns between VIX and CCI demonstrating short-term significant leading effects on stock returns than that of long-term effects across restaurant companies. Overall, our results are important because they provide an early-warning system for the restaurant industry beyond what is currently available in the form of the existing indices on restaurant performance from the NRA.

## 5. Theoretical and practical lenses

We tried to grasp representative circumstances across investors’ fear, consumer confidence, and equity return performance through the lenses of sentiment, information, and leading indicator theories, and relate the outcomes of our study to the primary perspectives of these inter-linked theories in behavioral finance. Despite close resemblances in their intuitions, the main distinction between the sentiment and information theories reveals that the sentiment theory makes a clear and compelling prediction about the association between equity prices, which are driven by the fluctuating trading volume and investor pessimism over different time-frames. However, the information theory makes no obvious and/or reliable predictions on equity prices, and hence, stock returns. To put it differently, the sentiment theory predicts the cross-section of short-horizon stock returns which are reversed over the long haul, whereas the information theory predicts equity returns which are persistent regardless of the duration. As in other industries, price swings leading to stock return performance do not exist in the same form under heterogeneous restaurant corporations due to each firm’s different market values, financial structure, shareholder base, and business culture. Therefore, within the logic of the sentiment and information theories, our estimations and results confirm that value-weighting (large-cap) restaurant companies tend to obscure the relevant patterns in the short-term created by the sentiment in markets. We also observed the theoretical impact of increases (decreases) in negative (positive) investor sentiment on equity return in various

restaurant performance benchmarks rather than consumer confidence. Additionally, stemming from our results, we are confident to indicate that the cycles of consumer confidence and investors' sentiments have explanatory power on future consumption cycles, which are contrarily reflected in the performance of the restaurant index. For instance, if the investor sentiment surges, the expected performance of the restaurant index is possible to fall in the short-term, and vice versa.

Our estimations better approximate the reality compared to conventional parametric techniques such as regression models with least squares. Hence, we believe that the conceptualization of our results has valuable merits and critical relevance for practice, policymakers, and the restaurant industry as a whole. What is imperative to understand is that changes in consumer behaviors and investor sentiment are likely to be an exogenous force for the restaurant industry, meaning that these behavioral fluctuations originate externally. This implies that the restaurant industry may not be able to change the course of these developments, but may be able to weather these fluctuations to the best of their abilities. To achieve this, restaurants should consider strategic plans that are designed to be flexible and agile, considering the many uncertainties that can affect their operations (i.e., cash-flow management, costs controls, wages and salaries, marketing, etc.), and create contingency plans offering alternative strategies to meet changed circumstances (Ford and Sturman, 2020; Vecchiato, 2015).

In a nutshell, firms with high levels of growth potential and high book-to-market ratios are (small- and mid-caps) are likely to be more distressed, speculative, and thus, more sensitive to "usually" irrational crowd psychology in markets (Lelo de Larrea et al., 2019). This notion has a universal validity for restaurant companies because these firms relatively experience wider sales fluctuations, seasonality, volatile earnings and profits, as well as higher costs of informational asymmetry due to heavy dependence on acquiring fixed assets. Thus, investors' sentiment has generally more substantial disproportionate impacts on restaurant firms' core operations and revenue generation because they are more difficult to value and more subjective to market news and speculative demand from consumers. For this, our practical advice could be that broader risk identification (i.e., financial, business, operational, etc.) in restaurant firms' overall operations, financial investments, and/or fund allocations for capital projects should be assessed and re-assessed periodically and continuously according to the feeling or tone of a market. In this way, restaurant firms might likely be able to have a clear financial picture and operational strategies since these companies cannot afford to have weak net earnings results and/or liquidity conditions from the excess returns, as other companies in other industries. Parallel to this, because VIX uniquely captures the short-term variations in stock returns, our results are the pathfinders for a better asset allocation in restaurant firms' target portfolios and optimal diversification with lesser capital gains taxes to fund reasonable number of future capital/asset investments with lowest possible weighted average cost of capital (WACC).

The autonomous predictive power of the intrinsically elusive concept of investor sentiment brings up strong conditional patterns on restaurant firms' return cycles. Hence, risk-aversion is definitely a vital financial and operational strategy for restaurant companies as the recent severe downturn in the economy taught important lessons to these companies. For instance, the aftermath of the 2007–09 financial crisis demonstrated a great relief in stagnant equity investments, high levels of consumer confidence, and an upturn in macro and microeconomic foundations. This period also provided restaurant firms with substantial financial opportunities to reap higher rewards with higher risk levels. However, the main issue is the restaurant firms' high vulnerability to default risk because they are prone to high debt repayments, low debt service coverage, and high degrees of operating risk when compared to other firms. The fundamental basis for their high vulnerability to default risk is the declining cash flows due to widening volatility in prices overall, and especially while the economy is in a slowdown state. Therefore, to mitigate the possible negative scenarios, it might be a

good idea for restaurant firms to spread out their debt obligations over longer durations. Not only that, but they might also retire old outstanding debt later or aim to decrease the amount of collateralized asset value during the time when there are high productivity and output, relatively lower yields, and stable growth in the economy. Due to this, policymakers should be cautious, picking the most preferred to the least preferred financing options or aim to maintain a controllable balance between internal and external financing while considering the cash returns to their shareholders.

## 6. Limitations and future extensions

Our findings have some caveats and some minor exclusions, as in any other study. Our study uses the conjunction among theoretical arguments of investor behaviors, historical accounts of equity return episodes, and most importantly a novel proxy of investor sentiment only from the restaurant industry. Besides, we did not distinguish between the concentration (e.g., by state) and type of restaurant (e.g., full or fast-casual service) in our analyses. Hence, the main deductions from our results apply and generalizable within the boundaries of the overall population of publicly listed restaurant companies. A heterogeneous consideration of the US restaurant industry could produce different results compared to the current homogenous analysis.

Also, our arguments in this paper could not be tested without the structural estimations in time series regressions models with endogeneity. However, a worthwhile extension might pay attention to, for instance, set-theoretic methods to create "if ... then" simulations with our cyclical analysis to mitigate possible presumptive analytical problems. For instance, studies by Demirer et al. (2018), Madanoglu et al. (2012, 2018), Kizildag and Ozdemir (2017), and Kizildag (2015) have shown that there are different ways to interpret restaurant performance through stock returns (e.g., earnings before interest and taxes; market-to-book value of asset ratio), and liquidity (e.g., ratio between current assets and current liabilities), to name a few.

We did not consider restaurant firms' core balance sheet characteristics in our results since our sole intention to produce meaningful results regarding investors' behavioral participation in volatile patterns of equity returns. For instance, we did not price restaurant firms' debt value, leverage adjustments, and borrowing capacity in our cycles. Also, our results did not reflect or calculate the compensation for risks (i.e., systematic and/or idiosyncratic risk). Parallel to this, our work did not extend to risk-adjusted performance proxies (i.e., Upside Probability, Sharpe Ratio, Treynor Index, etc.) to quantify equity returns. In other words, our measures and proxies are free of the cyclical properties of firms (i.e., firm asset value) and markets (i.e., risk shocks driving the return cycles). If otherwise, our results would deviate from the prominent role of investors' psychological states in equity returns in our paper. We also did not factor in restaurant firms' core operational performance drivers such as sales, profit margins, hours worked, number of employees, capital spending and/or other relevant financial indicators.

Taken all together, preceding discussions can be evolving tasks for future research that academics might prompt alternative examination and models. We suggest these avenues would move this area of research forward, particularly for institutional investors, since the above-mentioned attributes seem conditionally relevant to share price swings, equity returns, and firm value. Even with these limitations, it is our belief that the evidence presented in our study developed an extensive outlook for restaurant companies and should be useful for the practice and beneficial for the investor sentiment literature.

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