Investigating Causal Relationships Between Inflation News Among Other News Topics In Philippine News Media Using Granger Causality

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***Abstract*— Inflation, a major economic issue in the Philippines, refers to the decline in the purchasing power of the national currency, affecting employment, welfare, healthcare, and other sectors. This has resulted in widespread media coverage, with numerous news outlets publishing articles centered on inflation. Beyond economic concerns, inflation has also influenced the media narratives of other topics. This study aims to explore how inflation news impacts various aspects of Philippine society by developing a time series model using Granger Causality to analyze the causal relationships between inflation-related news articles and other news topics. The research involved several key steps: (a) identifying and collecting reliable news data from prominent Philippine outlets from January to April 2024; (b) preprocessing and categorizing the data; (c) selecting the appropriate lag length using the Vector Autoregression (VAR) model; (d) conducting the Granger Causality test; and (e) validating the results through the Johansen Cointegration test with the Vector Error Correction Model (VECM). Findings indicate that inflation-related news from outlets such as *Business Mirror* and *ABS-CBN News* significantly influenced other topics, including business, welfare, and technology. This suggests that inflation coverage extends its influence beyond its economic context, though the lack of long-term cointegration indicates these effects are likely short-term.**

Keywords—inflation, multivariate time series, granger causality, causality testing, media analysis

I. INTRODUCTION

Inflation continuously erodes the purchasing power of the Philippine Peso, often at rates higher than the global norm. Between 2010 and 2020, the Philippines experienced an average inflation rate of 4.2%, within the central bank's target of 2-4% [1]. However, instances of inflation exceeding this range have created economic challenges, particularly for the low to middle income households, which constitute 98.4% of the total population [2]. Understanding the dynamics of inflation is critical for maintaining it at a controlled rate, as uncontrolled inflation can diminish household purchasing power, disrupt economic stability, and widen income inequality. Media coverage can be effectively utilized as data to understand the causes and effects of inflation. Studies indicate that the tone of news reports influences how different demographic groups perceive inflation, with positive or negative narratives leading to corresponding shifts in inflation expectations among households [3][4]. This implies that the content and frequency of inflation-related news not only inform consumers but also directly affect their behavior and economic decision-making. Such insights underscore the critical role that media plays in shaping economic perceptions and responses, providing Philippine policymakers and government officials with valuable information to improve existing laws and policies aimed at combating the rampant rise of inflation. By understanding how media narratives influence public expectations and behavior, policymakers can craft more effective communication strategies and implement targeted interventions that address the concerns of households, ultimately fostering greater economic stability and resilience.

While traditional methods like Consumer Price Index and Gross Domestic Product analysis are commonly used to understand inflation, this study introduces Granger causality (GC) to uncover causal relationships between inflation and media coverage—a method not previously explored in the Philippine context. This method allows the researchers to understand and determine any causal relationships between inflation and other news topics bi-directionally by using online news articles gathered from verified news agencies in the Philippines. GC is a time series analysis (TSA), it is essentially a method of investigating the characteristics of the response variable with time as the independent variable, and has many applications in different fields [5]. GC helps in comprehending the underlying forces and structure behind the observed data, in this case are the gathered articles indexed by their news topic as separate time series. GC can also be utilized for forecasting, monitoring, as well as feedback and feedforward control [6]. Taking advantage of this, TSA can help understand how news reacts to inflation by identifying their relationship with Granger causality. TSA and GC is not unfamiliar in the field of economics. This technique was applied to explore connections between two or more variables, as demonstrated in the research conducted investigating the link between the human development index and economic growth using GC [7]. So GC is more than capable to be used in determining causality in media context on topics surrounding inflation.

Due to the nature of the data used in this study, the researchers defined the scope and took into consideration the

following limitations: (1) The news articles are only the ones available online, not physical newspapers; (2) the origin of the articles must only come from verified Philippine news agencies; (3) the dates of the research articles must be from January 2024 to April 2024 due to storage limitations in data collection. Due to this scope, the study's findings may be influenced by the available articles on the specified scope. The Johansen Cointegration Test (JCT) and Vector Error Correction Model (VECM) were used in this study to validate the data before the causality tests and the latter for determine if any existing causal relationship goes on for a long period of time.

II. RELATED LITERATURE

A. Time Series

A time series represents a sequence of observations arranged in a specific order, typically over time, although it can also encompass spatial dimensions. These sequences can be classified as univariate, involving a single variable, or multivariate, which includes multiple variables. Ensuring data validity is a fundamental step before preprocessing for time series analysis, as it establishes the quality and reliability of the data being analyzed. Validity encompasses various constraints that assess whether the data points fall within specified ranges or exhibit fluctuations that may compromise their integrity [8]. Features, which are measurable characteristics derived from the data, play a crucial role in identifying patterns and relationships within the time series [9]. The process of feature engineering is essential to determine which features significantly influence predictive outcomes, as not all features contribute equally to understanding the data's behavior [10]. Moreover, correlated features can introduce confounding factors that obscure true causal relationships; thus, addressing these correlations is vital prior to conducting Granger causality tests [11]. Time series data can be categorized as stationary, exhibiting constant statistical properties over time, or non-stationary, where changing properties may disrupt the accuracy of causal inferences. Non-stationary data often necessitates transformation methods to achieve stationarity before analysis can proceed effectively [12]. Understanding these dynamics is critical for accurately interpreting time series data and for making informed predictions based on historical trends and patterns.

B. Inflation and News Media

Using news articles as a tool to understand inflation offers significant insights into how media coverage can shape public inflation expectations and reveal bi-directional relationships with various economic topics. Research indicates that media reporting significantly influences consumers' inflation expectations. Studies found that exaggerated media coverage contributed to a notable increase in inflation perceptions, explaining over 15% of the observed changes during specific economic events, while actual inflation accounted for only 1%[13][14]. This suggests that consumers often rely on media narratives to form their expectations, which can lead to a disconnect between actual inflation rates and public perception. Moreover, utilizing news articles allows researchers to explore the interplay between inflation and other news topics, enhancing the understanding of economic dynamics. Recent studies applied Granger causality tests to demonstrate that media coverage not only affects inflation expectations but also reflects broader economic sentiments, indicating a two-way relationship where news can influence perceptions and vice versa [15][3]. By analyzing various news topics alongside inflation data, researchers can uncover complex interactions that inform policymakers about public sentiment and potential economic outcomes. This approach enriches traditional economic analyses by integrating qualitative data from media sources, thereby providing a more comprehensive view of how inflation is perceived and reacted to within society.

C. Time Series Causality

Time series causality investigates the cause-and-effect relationships between variables within a time series framework, making it an essential tool for informed decision-making across various fields such as economics, medicine, and environmental sciences. Understanding these relationships allows researchers and policymakers to discern how changes in one variable may influence another over time, thereby facilitating more effective strategies and interventions [16]. It has two main objectives: treatment effect estimation and causal discovery. Treatment effect estimation focuses on quantifying the impact of a specific event or intervention on a target variable over time. This allows researchers to understand how certain shocks—such as policy changes, economic events, or external factors—affect key economic indicators like inflation or consumer behavior. In contrast, causal discovery is concerned with identifying underlying causal relationships between variables within a time series, helping to reveal how changes in one variable may directly influence another [17]. These two objectives align closely with the goals of this study, as we aim to not only assess the impact of inflation on media coverage but also to uncover any potential bidirectional causality between inflation-related news and other topics in Philippine media.

D. Granger Causality

GC assesses whether one time series can predict another by analysing if past values of one improve the forecasting of future values. Introduced by C.W.J. Granger, it compares the forecasting performance of two or more time series [18]. GC has been applied in a plethora of researches on multiple areas, such as in business economics in determining causality on foreign direct investments, export, and economic growth in South Africa [19], and on time–frequency relationship between COVID-19 pandemic, oil prices, geopolitical risks, economic uncertainty, and the US stock market [20], on environmental sciences notably on finding relations between economic policies and carbon dioxide emissions in the European Union [21], and in neurosciences with remarkable studies on large-scale brain dynamics [22] and neural features analysis on disorder origins [23].

E. Existing Works

Related works pertaining to news-based GC utilized much different methodologies to identify causal relationships between two or more topics. Some include using causal Bayesian networks, combination of causality models. One comparative study examined time-series causality techniques but on only one news source, and didn't infer topic causality [24]. Other methods include lexico-syntactic causal patterns on mined text [25],

supervised learning via language models [26], knowledge bases [27], and machine learning [28]. Beyond news, Granger causality has been used to show that indices like the RCI, A-COVID Index, and uncertainty index significantly predict stock market volatility in Latin America [29], and that geopolitical tensions influence oil prices and forecast accuracy [30].

III. METHODOLOGY

A. Sources of Data

The data for this study were sourced from a selection of high-traffic news media outlets in the Philippines, chosen based on their substantial viewership and high frequency of news publication. The time frame for data collection spanned from January to April 2024, covering articles published during this period. The collected data were categorized into nine major news topics: inflation, economy, politics, technology, environment, health, business, welfare, and foreign affairs.

B. Data Collection

To collect the data, the researchers utilized Meltwater, a comprehensive media monitoring platform. The data were filtered using Meltwater's tools with specific parameters: topics as keywords, a timeframe from January to April 2024, and articles written in English, Tagalog, and Cebuano. The resulting dataset comprised a total of 118,266 articles across various news topics. Among these, the business category had the highest number of articles with 32,505, followed by technology with 20,286 articles. Health and environment-related topics were almost identical in count, with 14,686 and 14,683 articles, respectively. Both the economy and politics categories had similar figures, with 11,618 and 11,616 articles each. Welfare-related news contributed 5,081 articles, while inflation-specific articles totaled 5,734. The foreign affairs category had the fewest articles, with 2,057. The data were sourced from a variety of news outlets, with notable contributions from major platforms such as *The Manila Times*, *Business World*, *Sunstar Philippines*, *ABS-CBN News*, *GMA News Online*, *Rappler*, *Cebu Daily News*, and *Visayan Daily Star*.

C. Preprocessing

The datasets were compiled into a single data frame, with each news outlet transformed by appending a suffix corresponding to its topic (e.g., *news-outlet_topic*). A thorough data cleaning process was then applied to ensure the integrity of the analysis. Columns containing more than 50% zero values were removed, and rows with missing data were dropped from the data frame. The following preprocessing steps were subsequently performed:

- **Variance Inflation Factor (VIF):** The VIF was calculated for each variable to detect multicollinearity. Variables exhibiting a high degree of correlation were eliminated. This enhances the reliability of the regression analysis by mitigating the effects of multicollinearity, which can compromise the accuracy of the model's coefficient estimates.
- **Augmented Dickey Fuller (ADF) Test:** The stationarity of each time series was assessed using the Augmented Dickey-Fuller test. Since Granger causality analysis requires stationary time series data, the ADF test was conducted to identify non-stationary variables with which would need further transformation.
- **Differencing:** Variables identified as non-stationary through the ADF test, differencing was applied to transform the data. This process removes trends and seasonality, thereby stabilizing the mean of the time series and converting the data to a stationary format.

D. Data Analysis and Design

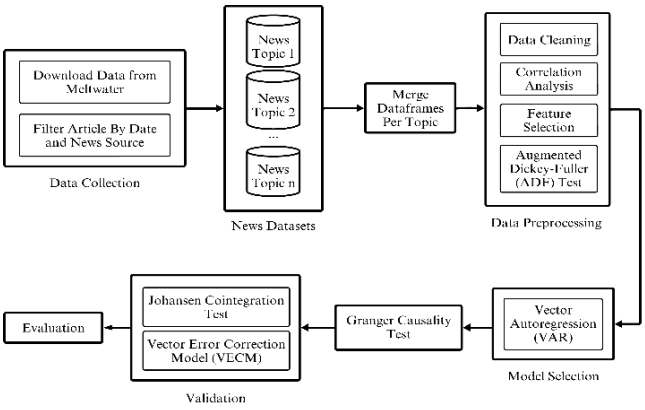

Fig 1. Conceptual Framework

Figure 1 illustrates the research process, beginning with data collection obtained from Meltwater by applying the necessary filters to ensure the relevance and quality of the datasets. Following data acquisition, the individual datasets were compiled into a single data frame, where extensive cleaning and preprocessing were conducted to prepare the data for analysis.

To assess the stationarity of the time series data, the Augmented Dickey-Fuller (ADF) test was performed. For any non-stationary time series identified, appropriate transformations were applied, specifically differencing (further discussed in Subsection C).

Subsequently, a Vector Autoregression (VAR) model was implemented to determine the optimal time lag that best fits the data. Following the identification of the appropriate lag order, the Granger Causality Test was conducted using the processed time series data. In this test, each time series was examined both as a predictor and a response variable, allowing for a comprehensive analysis of all possible causal relationships. The significance of these relationships was evaluated based on the resulting p-values, with a threshold of 0.05. A p-value below this significance level indicates that the predictor time series has a statistically significant ability to forecast the response variable.

To further evaluate the results, the Johansen Cointegration Test was conducted in conjunction with the VECM. This test assesses the presence of long-run equilibrium relationships among the time series data, providing additional insights into their interactions and dependencies (further discussed in Subsection E).

E. Validation

- **Vector Autoregression (VAR) Model Selection:** The VAR model selection is used to model multivariate time series data, serving as a basis for selecting the best-performing time lag model. In this approach, Information-Theoretic Criteria such as the Akaike Information Criterion (AIC) (1) and the Bayesian Information Criterion (BIC) (2) are applied to compare candidate models.

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_k Y_{k-2} + U_t \quad (1)$$

$$AIC = -2\log(L) + 2k \quad (2)$$

The model with the lowest criterion value is generally considered the best estimate of the true model. When conducting Granger Causality analysis, model selection typically relies on the AIC, where the model with the lowest AIC value is chosen as the optimal model for testing causal relationships [31].

- **Johansen Cointegration Test:** Johansen Cointegration analyzes long-term relationships between multiple non-stationary time series. Unlike the Granger Causality test, which requires differencing for stationarity, Johansen's test checks for a long-term equilibrium without differencing. If cointegration exists, it suggests the variables move together over time. This method is often paired with Vector Error Correction Models to capture both short-term and long-term dynamics [32].
- **Vector Error Correction Model (VECM):** The VECM (3) is derived from the VAR model and is used to model systems of integrated time series with cointegrating relationships. The VECM captures both short-term deviations and long-term equilibrium adjustments [33].

$$\Delta y_t = \alpha(\beta' y_{t-1}) + \theta_1 \Delta y_{t-1} + \mu_t \quad (3)$$

- **Trace Statistic**: Trace statistic (4) is a number calculated from a statistical test of a hypothesis. It shows how closely your observed data match the distribution expected under the null hypothesis of that statistical test [34].

$$Trace\ Statistic = -T \sum_{i=r+1}^{p} \ln(1 - \hat{\lambda}_i) \quad (4)$$

- **Max Eigenvalue Statistic (MES):** MES (5) tests the null hypothesis of having exactly r cointegrating vectors against the alternative of $r + 1$ [35].

$$MES = -Tln(1 - \hat{\lambda}_{r+i}) \quad (5)$$

IV. RESULTS AND ANALYSIS

A. Data Preprocessing

The data was compiled into a single data frame, after which it was thoroughly examined for any potential null values. Following the merging process, the Variance Inflation Factor (VIF) was computed for all variables to identify and subsequently remove highly collinear features. To assess the stationarity of the time series, the Augmented Dickey-Fuller (ADF) test was applied. Specific variables—namely *Philstar.com_inflation*, *Business Mirror_technology*, *Rappler_Business*, and *Rappler_foreign_affairs*—were found to be non-stationary. These series were then differenced, and correlations were re-evaluated to ensure the integrity of the data for further analysis.

B. Lag Length Selection

With the data stabilized through preprocessing, the VAR model selection was conducted. The model determines the optimal lag length by evaluating four key criteria: AIC, BIC, Final Prediction Error (FPE), and the Hannan-Quinn Information Criterion (HQIC).

TABLE I. LAG LENGTH CRITERIA VALUES

Lag	AIC	BIC	FPE	HQIC
0	27.49	27.83*	8.718e+11	27.63
1	28.33	33.37	2.046e+12	30.37
2	29.10	38.84	5.078e+12	33.05
3	29.58	44.03	1.220e+13	35.45
4	29.70	48.85	3.135e+13	37.47
5	28.05	51.91	3.022e+13	37.73
6	23.62	52.18	7.960e+12	35.21
7	10.76*	44.03	1.766e+10*	24.27*

This analysis focuses on minimizing the AIC, which balances model fit and complexity by penalizing overly complex models to prevent overfitting. The lowest AIC value, 10.76, was found at lag 7, indicating that the VAR model will use data from the previous 7 days to predict future values based on daily activities.

C. Granger Causality

The data frame comprised 43 distinct variables, which were subsequently subjected to the Granger Causality Test. In this context, p-values lower than 0.05 were deemed significant; however, the researchers focused their analysis on strong causal relationships with p-values below 0.01. The initial phase of the analysis identified inflation-related topics as predictors and various other topics as response variables, aiming to ascertain whether inflation granger-causes these additional topics.

TABLE II. BUSINESS MIRROR'S INFLATION DATA AS PREDICTOR

Predictors (X)	Response Variables (Y)	P_Values
Business Mirror (inflation)	ABS-CBN News (business)	0.0002
	Business World (welfare)	0.0002
	GMA News Online (welfare)	0.0003
	ABS-CBN News (environment)	0.0013
	InterAksyon (business)	0.0028
	ABS-CBN News (welfare)	0.0032
	GMA News Online (foreign_affairs)	0.0038

The results show that inflation news from Business Mirror significantly influences coverage of various topics across multiple outlets. Notably, inflation reporting strongly affects business news from ABS-CBN News and InterAksyon, and welfare coverage from outlets like Business World, GMA News, and Philstar. It also impacts foreign affairs reporting by GMA News and environment news from ABS-CBN. These findings suggest that inflation coverage shapes how socio-economic issues are reported across the media.

TABLE III. SUNSTAR' INFLATION DATA AS PREDICTOR

Predictors (X)	Response Variables (Y)	P_Values
SunStar Philippines (inflation)	Philstar.com (foreign affairs)	0.0015
	InterAksyon (business)	0.0030

SunStar's inflation news is a strong predictor of business topics in InterAksyon ($p = 0.0030$) and foreign affairs topics in Philstar ($p = 0.0015$). These results imply that SunStar's coverage of inflation has a significant influence on the way these other publications cover international news and business-related topics. Similar to earlier findings, this highlights how inflation shapes media narratives on a variety of platforms and has a wider impact on a range of socioeconomic and global issues.

TABLE IV. GMA'S INFLATION DATA AS PREDICTOR

Predictors (X)	Response Variables (Y)	P_Values
GMA News Online (inflation)	Philstar.com (environment)	0.0005
	Manila Standard (technology)	0.0011
	GMA News Online (foreignaffairs)	0.0013
	Business Mirror (welfare)	0.0048
	Rappler (technology)	0.0071
	Philstar.com (environment)	0.0005

Inflation news from GMA News Online is strongly linked to environmental coverage in Philstar ($p = 0.0005$) and technology topics in Manila Standard ($p = 0.0011$) and Rappler ($p = 0.0071$). It also significantly affects GMA News' own foreign affairs reporting ($p = 0.0013$) and welfare topics in Business Mirror ($p = 0.0048$). These results suggest that inflation coverage by GMA News influences a broad range of topics, impacting not just economic narratives but also technology, international affairs, and social welfare across various outlets.

TABLE V. ABS-CBN'S INFLATION DATA AS PREDICTOR

Predictors (X)	Response Variables (Y)	P_Values
ABS-CBN News (inflation)	Business Mirror (environment)	0.0004
	Philstar.com (environment)	0.0013
	Rappler (welfare)	0.0015
	ABS-CBN News (welfare)	0.0015
	Manila Standard (welfare)	0.0033
	Rappler (environment)	0.0039
	Manila Standard (technology)	0.0074
	Business Mirror (technology)	0.0079
	Daily Tribune (foreign affairs)	0.0084

Inflation coverage by ABS-CBN News is a strong predictor of environmental topics in Rappler ($p = 0.0015$), ABS-CBN News itself ($p = 0.0015$), and Manila Standard ($p = 0.0033$), as well as environmental topics in Business Mirror ($p = 0.0004$) and Philstar ($p = 0.0013$). Additionally, there are significant Granger causal relationships with environment topics in Rappler ($p = 0.0039$) and technology topics in Manila Standard ($p = 0.0074$) and Business Mirror ($p = 0.0079$). Lastly, the results indicate a significant influence on foreign affairs coverage in Daily Tribune ($p = 0.0084$).

TABLE VI. PHILSTAR'S INFLATION DATA AS PREDICTOR

Predictors (X)	Response Variables (Y)	P_Values
Philstar.com (inflation)	Manila Standard (technology)	0.0002
	ABS-CBN News (environment)	0.0016
	Manila Standard (welfare)	0.0033

	Philstar.com (welfare)	0.0063
	Rappler (environment)	0.0077

Inflation news from Philstar.com strongly predicts technology topics in Manila Standard (p = 0.0002), highlighting a close link between inflation reporting and tech discourse. It also significantly impacts environmental topics in ABS-CBN News (p = 0.0016) and welfare coverage in both Manila Standard (p = 0.0033) and Philstar.com (p = 0.0063). Additionally, there is a notable relationship with environmental reporting in Rappler (p = 0.0077).

TABLE VII. MANILA STANDARD'S INFLATION DATA AS PREDICTOR

Predictors (X)	Response Variables (Y)	P_Values
Manila Standard (inflation)	Rappler (environment)	0.0000
	Manila Standard (welfare)	0.0007
	Philstar.com (welfare)	0.0042
	Manila Standard (technology)	0.0048
	SunStar Philippines (environment)	0.0062
	GMA News Online (welfare)	0.0075
	Rappler (foreign affairs)	0.0095

Inflation news from Manila Standard shows a very strong causal relationship with environmental topics in Rappler (p = 0.0000). It also significantly predicts welfare topics in Philstar.com (p = 0.0042) and Manila Standard (p = 0.0007), linking inflation to welfare coverage. Additionally, it impacts technology topics in Manila Standard (p = 0.0048) and environmental issues in SunStar (p = 0.0062). There are also notable relationships with welfare coverage in GMA News Online (p = 0.0075) and foreign affairs in Rappler (p = 0.0095).

TABLE VIII. DAILY TRIBUNE'S INFLATION DATA AS PREDICTOR

Predictors (X)	Response Variables (Y)	P_Values
Daily Tribune (inflation)	GMA News Online (foreign affairs)	0.0011
	Rappler (economy)	0.0018
	Rappler (environment)	0.0018
	SunStar Philippines (welfare)	0.0025

Inflation news from The Daily Tribune shows a significant correlation with GMA News Online's foreign affairs coverage (p = 0.0011), suggesting that inflation reporting may influence foreign affairs coverage. It also has a strong causal relationship with Rappler's environmental and economic topics (both p = 0.0018). Additionally, Daily Tribune's inflation news significantly impacts SunStar Philippines' welfare reporting (p = 0.0025).

This phase of the analysis examines inflation-related topics as response variables to ascertain whether other news topics contribute to an increase in inflation reports.

TABLE IX. BUSINESS MIRROR'S INFLATION DATA AS RESPONSE VARIABLE

Response Variables (Y)	Predictors (X)	P_Values
Business Mirror (inflation)	GMA News Online (welfare)	0.0003
	ABS-CBN News (foreign affairs)	0.0007
	Cebu Daily News (technology)	0.0023
	The Manila Times (foreign affairs)	0.0029
	Business World (welfare)	0.0059
	ABS-CBN News (environment)	0.0061

Inflation news from Business Mirror reveals strong causal relationships with various topics from other outlets. Welfare news from GMA News Online (p = 0.0003) and Business World (p = 0.0059) shows significant causality. Foreign affairs topics from ABS-CBN News (p = 0.0007) and The Manila Times are also strong predictors, as are technology news from Cebu Daily News (p = 0.0023) and environmental news from ABS-CBN (p = 0.0061). These findings suggest that welfare, foreign affairs, technology, and environment coverage from several outlets can help predict inflation-related news.

TABLE X. SUNSTAR'S INFLATION DATA AS RESPONSE VARIABLE

Response Variables (Y)	Predictors (X)	P_Values
SunStar Philippines (inflation)	Business World (welfare)	0.0006
	ABS-CBN News (welfare)	0.0015
	Business Mirror (technology)	0.0016
	GMA News Online (welfare)	0.0062

SunStar Philippines' inflation news reveals substantial linkages with welfare, technology, and other themes covered by many media sites. Welfare news from Business World (p = 0.0006), ABS-CBN News (p = 0.0015), and GMA News Online (p = 0.0062) seem to substantially predict inflation-related news from SunStar Philippines. Technology news from Business

Mirror (p = 0.0016) likewise has a significant causal relationship with inflation coverage.

TABLE XI. GMA NEWS'S INFLATION DATA AS RESPONSE VARIABLE

Response Variables (Y)	Predictors (X)	P_Values
GMA News Online (inflation)	Cebu Daily News (technology)	0.0006
	Business World (welfare)	0.0087
	GMA News Online (foreign affairs)	0.0098

The results for GMA News Online inflation news show substantial Granger causal relationships with technology, welfare, and foreign affairs issues covered by other media sites. Specifically, technology news from Cebu Daily News (p = 0.0006) is a good predictor of inflation-related news from GMA News Online. Furthermore, welfare news from Business World (p = 0.0087) and foreign affairs news from GMA News Online (p = 0.0098) demonstrate substantial causality.

TABLE XII. ABS-CBN'S INFLATION DATA AS RESPONSE VARIABLE

Response Variables (Y)	Predictors (X)	P_Values
ABS-CBN News (inflation)	Business World (welfare)	0.0001
	Business Mirror (technology)	0.0009
	Rappler (environment)	0.0021
	InterAksyon (business)	0.0092

Granger causality results for ABS-CBN News inflation news show strong correlations with welfare, technology, environment, and business topics from various outlets. Welfare news from Business World has the strongest causal link (p = 0.0001), indicating a significant influence. Technology news from Business Mirror (p = 0.0009) and environmental news from Rappler (p = 0.0021) also show notable causality, suggesting these topics shape ABS-CBN's inflation coverage. Additionally, business news from InterAksyon (p = 0.0092) is a significant predictor.

TABLE XIII. PHILSTAR'S INFLATION DATA AS RESPONSE VARIABLE

Response Variables (Y)	Predictors (X)	P_Values
Philstar.com (inflation)	Rappler (environment)	0.0000
	ABS-CBN News (business)	0.0004
	Manila Standard (environment)	0.0007
	Philstar.com (foreign affairs)	0.0008
	Business Mirror (environment)	0.0020
	The Manila Times (foreign affairs)	0.0029
	GMA News Online (welfare)	0.0029
	ABS-CBN News (environment)	0.0044
	SunStar Philippines (environment)	0.0052
	Business Mirror (foreign affairs)	0.0071

Philstar.com's inflation news demonstrates strong predictive relationships with various topics, particularly from environmental, business, foreign affairs, and welfare coverage. Rappler's environmental news has the most significant causal influence (p = 0.0000), highlighting a robust connection between environmental reporting and inflation on Philstar.com. Other important predictors include business news from ABS-CBN News (p = 0.0004), environmental topics from Manila Standard (p = 0.0007), and foreign affairs from Philstar.com (p = 0.0008). Significant causality is also evident in environmental news from Business Mirror (p = 0.0020) and SunStar Philippines (p = 0.0052), as well as foreign affairs coverage from The Manila Times (p = 0.0029) and Business Mirror (p = 0.0071). Additionally, welfare news from GMA News Online (p = 0.0029) enhances Philstar.com's inflation coverage. Overall, these findings indicate that Philstar.com's inflation reporting is highly sensitive to environmental, foreign policy, and socioeconomic issues, with environmental news playing a particularly dominant role in shaping inflation narratives.

TABLE XIV. MANILA STANDARD'S INFLATION DATA AS RESPONSE VARIABLE

Response Variables (Y)	Predictors (X)	P_Values
Manila Standard (inflation)	GMA News Online (welfare)	0.0000
	The Manila Times (foreign affairs)	0.0044
	ABS-CBN News (welfare)	0.0072
	Manila Standard (foreign affairs)	0.0091

The strongest predictor is welfare news from GMA News Online (p = 0.0000), indicating a robust link between welfare coverage and inflation reporting on Manila Standard. Additionally, foreign affairs news from The Manila Times (p = 0.0044) and internal reporting from Manila Standard itself (p = 0.0091) significantly influence inflation news. ABS-CBN News' welfare reporting (p = 0.0072) also enhances the predictability of inflation coverage. These findings suggest that welfare and foreign affairs topics are key drivers of inflation

narratives in Manila Standard, with welfare-related news being the most significant causal factor.

TABLE XV. DAILY TRIBUNE'S INFLATION DATA AS RESPONSE VARIABLE

Response Variables (Y)	Predictors (X)	P_Values
Daily Tribune (inflation)	Rappler (environment)	0.0011
	SunStar Philippines (welfare)	0.0018
	Philstar.com (foreign affairs)	0.0041
	Manila Standard (foreign affairs)	0.0088

Daily Tribune's inflation news highlights significant relationships with environmental, welfare, and foreign affairs topics from various sources. Notably, environmental news from Rappler ($p = 0.0011$) strongly predicts inflation news on Daily Tribune, indicating that ecological issues significantly impact inflation reporting. Additionally, welfare news from SunStar Philippines ($p = 0.0018$) exhibits a significant causal relationship. Foreign affairs topics from Philstar.com ($p = 0.0041$) and Manila Standard ($p = 0.0088$) also serve as important predictors. These findings suggest that the Daily Tribune's coverage of inflation is influenced by a wide range of topics, including environmental and welfare issues, as well as international affairs.

D. Discussion

A notable trend is the strong correlation between inflation and welfare reporting, evident in publications like Business World, ABS-CBN News, SunStar, and Philstar.com. This highlights how economic pressures, such as inflation, directly affect social issues, prompting the media to underscore their interdependence. Additionally, the significant impact of inflation on environmental topics, as seen in outlets such as Rappler, ABS-CBN News, Manila Standard, and Philstar.com, suggests that inflation is framed in relation to environmental concerns, reflecting public discourse on the socioeconomic effects of environmental degradation and climate change.

Moreover, inflation news prominently influences foreign affairs coverage in outlets like Philstar, GMA News Online, and Manila Standard, indicating how inflation, as a global economic phenomenon, interacts with international relations, trade, and global policies. The impact of inflation on technology topics in publications such as Business Mirror and Manila Standard further emphasizes inflation's cross-cutting role in shaping the reporting of technological advancements and their societal consequences.

E. Cointegration Test

To validate the Granger causality results, the Johansen cointegration test was conducted after making all time series stationary through differencing. Although the individual non-stationary variables are not stationary, cointegration helps determine if they maintain a long-term equilibrium relationship.

The Johansen Cointegration test was followed by a Vector Error Correction Model, experimenting with time lags from 1 to 6 to find the best fit. However, no cointegrated relationships were found, indicating that the time series variables do not move together in the long run, suggesting that any correlation is likely short-term or spurious. This implies that the variables are either independent or influenced by different factors.

V. CONCLUSION

This study examined the causal relationship between inflation and various news topics using time series analysis, particularly the Granger causality test, on articles from selected Philippine news agencies. The Johansen cointegration test was also applied to assess potential long-term relationships. Results indicated that inflation news from outlets like Business Mirror and ABS-CBN News had significant predictive influence on topics such as business, welfare, and technology, showing that inflation news shapes media narratives beyond its economic indicator role. However, the Johansen test revealed no long-term cointegrated relationships, suggesting that while inflation news has short-term effects, these do not persist over time and are influenced by other factors.

In conclusion, the study highlights the complex, short-term dynamics between inflation news and socio-economic topics. The lack of long-term cointegration underscores the importance of distinguishing between temporary and lasting influences to better understand how economic indicators and media narratives interact.

To deepen the understanding of the relationships observed, the researchers recommend extending the analysis timeframe to reveal persistent trends and distinguish between short-term and long-term effects. Including foreign news outlets could provide insights into how global perspectives shape inflation discourse. Future studies should explore alternative methodologies that account for structural breaks or regime changes, improving the accuracy of time-series analysis and capturing shifts in inflation-related narratives. These recommendations aim to enhance the exploration of causal relationships and the factors shaping economic narratives.

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