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CONTENT

WHICH EPU HAS BETTER PREDICTIVE POWER IN FORECASTING THE RETURN AND VOLATILITY OF STOCK INDICES?

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ABSTRACT

Purpose- This study examines the predictive power of domestic and foreign Economic Policy Uncertainty (EPU) indices-specifically from the US, China, Europe, and globally-on the return and realized volatility (RV) of 20 global stock indices using monthly data spanning over 25 years.
Methodology- The dynamic connectedness method is applied to analyze the spillover effects of EPUs across stock markets.
Findings- The empirical results reveal that EPU impacts RV more significantly than returns, with Global and US EPUs emerging as primary drivers across most regions and periods. Notably, Chinese EPU consistently exhibits minimal influence, while local EPUs have pronounced effects in economies with heightened political, economic, and financial uncertainties. Contrary to expectations, EPUs from major trade partners and regional EPUs do not exhibit superior predictive power compared to Global and US EPUs. These insights are critical for investors, risk managers, and policymakers in optimizing strategies amidst evolving economic uncertainties.
Conclusion- The findings indicate that Economic Policy Uncertainty (EPU) has a stronger influence on realized volatility (RV) than on stock returns, with Global and US EPUs serving as the dominant predictors across most regions and periods. In contrast, Chinese EPU consistently has minimal impact, while local EPUs play a significant role in countries with pronounced political and economic instability. Surprisingly, EPUs from major trade partners and regional EPUs do not outperform Global and US EPUs in predictive power. These insights underscore the importance of focusing on global and US-driven uncertainties for strategic decision-making by investors, risk managers, and policymakers.

Keywords: Economic policy uncertainty (EPU), stock indices, return, realized variance, dynamic connectedness.
JEL Codes: C32, C58, D80, G12, G17

1. INTRODUCTION

Modeling and forecasting the return and volatility of financial assets are crucial tasks for investors, risk managers, and portfolio managers. These professionals seek to predict the behavior of financial time series using the best available indicators. Traditionally, macroeconomic and financial data were viewed as the most reliable tools for this purpose. However, recent research suggests that Economic Policy Uncertainty (EPU) has emerged as a valuable indicator in predicting financial series, particularly returns and volatilities (Phan et al., 2018; Chiang, 2019). EPU reflects the uncertainty surrounding economic policy decisions and their potential impacts on both economies and financial markets. For example, Chiang (2019) found evidence of EPU's predictive power over risk and stock returns in G7 countries, demonstrating the important role that policy uncertainty plays in shaping financial market outcomes. As a result, policymakers must consider how their decisions may influence EPU and, in turn, affect market stability and economic growth.

Despite the growing interest in the relationship between EPU and financial markets, previous empirical studies have produced mixed results regarding its impact on stock returns. While some researchers have identified a negative relationship between EPU and stock returns, others have found positive or insignificant effects (Sum, 2013; Antonakakis et al., 2013; Bhagat et al., 2013; Kang and Ratti, 2013; Ko and Lee, 2015; Phan et al., 2018; Tiryaki and Tiryaki, 2018; Helseth et al., 2020; Erdoğan et al., 2022; Uddin et al., 2020). The inconsistent results can be attributed to various factors, such as differences in the time periods studied, sample countries, or methodologies employed. Additionally, some authors suggest that the predictive power of EPU on financial series fluctuates over time (Ozoguz, 2009; Li et al., 2015; Kundu and Paul, 2022). The heterogeneous effects of EPU on stock returns may be linked to its influence on expected cash flows, discount rates, and the equity risk premium.

Furthermore, EPU's influence is not confined to domestic markets. Given the increasing economic and financial integration between countries, foreign EPUs may also have predictive power over the return and volatility of stock indices. This is particularly true due to the transmission of economic shocks from one country to another (Ko and Lee, 2015; Dakhlaoui and Aloui, 2016; Li et al., 2020). While many studies have focused on the impact of US or global EPU, the results vary across different countries and time periods (Sum, 2013; Alqahtani and Martinez, 2020; Mei et al., 2018; Li et al., 2020).

The primary objective of this research is to examine the predictive power of both domestic and foreign EPUs on the return and volatility of stock indices over time. This study offers three key contributions. First, it explores the effects of EPU on the returns and volatilities of 20 stock indices from both developed and developing countries, using a dataset spanning over 20 years. The volatility of the stock indices is calculated using realized volatility derived from daily returns. Most previous studies have concentrated on a limited number of stock indices, mainly analyzing the predictive power of domestic EPU on returns (Arouri et al., 2016; Guo et al., 2018; Phan et al., 2018; Xiong et al., 2018; Bahmani-Oskooee and Saha, 2019; Balcilar et al., 2019). Only a few have considered the effects of EPU on volatility (Liu and Zhang, 2015; Liu et al., 2017; Chiang, 2019; Kundu and Paul, 2022).

Second, this study incorporates both domestic and four foreign EPUs (Global, US, European, and Chinese) allowing for a comprehensive assessment of how different EPUs influence stock index returns and volatilities. By analyzing the predictive power of multiple EPUs, this research provides valuable insights into the interconnectedness of global financial markets and the cross-border transmission of economic policy uncertainty.

Third, this study employs the dynamic connectedness model proposed by Diebold and Yilmaz (2014) to assess how the predictive power of EPUs evolves over time. While few authors have accounted for the time-varying nature of the relationship between EPU and financial series (Arouri et al., 2016; Das and Kumar, 2018; Xiong et al., 2018; Bahmani-Oskooee and Saha, 2019), this research highlights the changing dynamics of EPU's influence on financial assets. Additionally, by utilizing the Forecast Error Variance Decomposition (FEVD) method, the connectedness model allows for an out-of-sample analysis of EPUs' predictive power on forecasted returns and volatilities, as opposed to the in-sample approach used in most existing studies.

The remainder of this paper is organized as follows: Section 2 provides the theoretical framework and a review of empirical studies, Section 3 discusses the data and methodology, Section 4 presents and analyzes the empirical results, and Section 5 offers concluding remarks and policy implications.

2. REVIEW OF LITERATURE

Economic policy uncertainty (EPU) can influence stock returns through its effects on expected cash flows and/or discount rates (Arouri et al., 2016). During periods of economic uncertainty, businesses and consumers often adopt a "wait-and-see" approach, delaying investment decisions, hiring, and demand for goods and services until uncertainty is resolved (Colombo, 2013; Baker et al., 2016; Meinen and Roehe, 2017; Kido, 2016). For instance, Baker et al. (2016) found that heightened US economic policy uncertainty negatively impacted production, investment, and employment. This reduction in real economic activity adversely affects expected cash flows and/or discount rates, leading to a decline in stock prices and returns (Phan et al., 2018).

By contrast, EPU can also affect stock prices by shaping investors' expectations and raising the cost of equity capital for firms. EPU may have a positive effect on stock prices if policy-induced uncertainty raises the equity risk premium (Brogaard and Detzel, 2015). Pastor and Veronesi (2013) demonstrated that political shocks can alter investor expectations, increasing both the equity risk premium and stock return volatility. Under these circumstances, risk-averse investors may demand higher returns to compensate for the additional risk taken during periods of high uncertainty (Veronesi, 1999).

Most empirical research has found a negative effect of EPU on stock returns (Sum, 2013; Antonakakis et al., 2013; Bhagat et al., 2013; Kang and Ratti, 2013; Ko and Lee, 2015; Phan et al., 2018; Tiryaki and Tiryaki, 2018; Helseth et al., 2020; Uddin et al., 2020; Erdoğan et al., 2022) and a positive effect on stock return volatility (Liu and Zhang, 2015; Liu et al., 2017; Chiang, 2019; Kundu and Paul, 2022). However, some empirical studies found mixed results. For instance, Phan et al. (2018) examined the predictive ability of EPU on stock returns in 16 countries and found that the results varied across countries. Additionally, some authors have noted that EPU's impact on stock returns depends on the state of the economy (Ozoguz, 2009; Kundu and Paul, 2022). Kundu and Paul (2022) analyzed EPU's effect on stock returns and volatility in G7 markets and found that EPU had a stronger negative impact on stock returns (and a stronger positive impact on volatility) during bear markets than during bull markets. Similarly, Li et al. (2015) discovered that the causal relationships between EPU and stock returns in China and India vary over time.

The dynamics of domestic stocks can also be influenced by foreign EPU due to the economic and financial integration between countries, which facilitates the transmission of shocks from one economy to another (Ko and Lee, 2015; Dakhlaoui and Aloui, 2016; Li et al., 2020). Additionally, heightened economic policy uncertainty in developed countries may have either

positive or negative spillover effects on emerging markets via capital flows (Gauvin et al., 2016). A positive spillover may occur when investors in developed markets redirect their investments to emerging markets due to a decline in the attractiveness of domestic investments caused by increased policy uncertainty. Conversely, a negative spillover can occur when investors reduce overall risk exposure by retreating to domestic markets and lowering allocations to emerging markets (Tiryaki and Tiryaki, 2019).

Most studies have examined the impact or predictive power of US and/or Global EPU on stock indices (Sum, 2013; Donadelli, 2015; Mei et al., 2018; Chiang, 2019). Many of these studies have shown that both US and Global EPUs have a negative effect on stock returns (Ko and Lee, 2015; Dakhlaoui and Aloui, 2016; Das and Kumar, 2018; Bahmani-Oskooee and Saha, 2019; Belke and Osowski, 2019; Chiang, 2019; Li et al., 2020). However, these studies tend to focus on developed and significant stock markets that are highly integrated into global financial systems. Negative impacts have also been observed in developing markets. For instance, Sum (2013) found that US EPU negatively affected stock returns in five Asian countries (Indonesia, Malaysia, the Philippines, Singapore, and Thailand), with the exception of the Philippines. Alqahtani and Martinez (2020) showed that Global and US EPUs had a significant negative impact on stock prices in Bahrain and Kuwait but had little impact on other GCC countries. Similarly, Tiryaki and Tiryaki (2019) found that US EPU negatively affected Turkish stock returns. On the other hand, Chiang (2019) reported that both domestic and Global EPUs positively impacted stock indices in G7 economies (Canada, France, Germany, Italy, Japan, the UK, and the US).

Some studies have found no significant linkage or spillover effect between EPU and stock returns. For example, Mei et al. (2018) discovered that European EPU indices did not have predictive power over the volatility of European stocks, whereas US EPU did, with its predictive power fluctuating between recessions and expansions. Using a VAR framework, Donadelli (2015) did not find a significant effect of US EPU on Asian stock returns in countries like China, India, Indonesia, Korea, and others. Tsai (2017) noted that while US EPU has historically been influential, Chinese EPU has become more significant and its contagion risk now extends to several regional markets, excluding Europe.

Beyond US and Global EPU, Uddin et al. (2020) examined the effects of EPU on the Bangladeshi stock market and found that the EPUs of Bangladesh's major importing countries (China and India) had a greater negative impact on stock returns than the EPUs of its major exporting countries (US and EU).

Several studies suggest that the predictive power of domestic and foreign EPUs on stock returns and volatilities can change over time (Ozoguz, 2009; Li et al., 2015; Arouri et al., 2016; Das and Kumar, 2018; Xiong et al., 2018; Bahmani-Oskooee and Saha, 2019; Al-Yahyaee et al., 2020; Aimer, 2021; Kundu and Paul, 2022). Xiong et al. (2018) found a time-varying relationship between EPU and stock returns in the Shanghai and Shenzhen markets, while Arouri et al. (2016) observed a stronger relationship between EPU and returns in the US during periods of heightened volatility. Das and Kumar (2018) further demonstrated that EPU's impact on stock returns can vary across different time scales, using a wavelet approach.

3. DATA AND METHODOLOGY

3.1. Data Presentation

This paper investigates the predictive power of domestic, US, Chinese, European, and Global Economic Policy Uncertainty (EPU) on the returns and volatility of 20 stock indices. We used news-based EPU indices as proxies for economic policy uncertainty, with the time series data obtained from the Economic Policy Uncertainty Index website. The study considers EPUs from 20 individual countries (domestic EPU), as well as US, European and Global EPUs, to predict stock returns and volatilities. These EPU's series have been retrieved from the Economic Policy Uncertainty internet pages Economic Policy Uncertainty Index.

The stock indices for each country were retrieved from the EIKON database. The countries and their respective stock indices are: Australia (ASX index), Belgium (BEL20), Canada (SP TSX), Chile (SP CLX IPSA), Croatia (CROBEX), France (CAC40), Germany (DAX30), Greece (ATHEX20), India (NIFTY50), Ireland (ISEQ), Italy (FTSE MIB), Japan (Nikkei225), South Korea (KOSPI), Mexico (SP BMV IPC), Netherlands (AEX), Russia (MOEX), Singapore (STI), Spain (IBEX35), the UK (FTSE100), and the US (SP500).

For most countries, monthly data from January 1997 to December 2022 was used (e.g., Canada, Chile, China, Ireland, Japan, Korea, Mexico, Russia, Spain, Sweden, UK, and the US). For the remaining countries, the EPU data begins later: Australia (October 1998 - December 2022), Croatia (January 2003 - December 2022), Greece (January 1998 - December 2022), India (January 2003 - December 2022), Netherlands (March 2003 - December 2020), and Singapore (January 2003 - December 2022).

The returns and volatilities of the selected stock indices are calculated from the monthly EPU data. The monthly return for each stock (i) is determined as $r_{i,t} = \ln(P_t/P_{t-1})$, where P_t represents the level of stock index i at the end of month t. The monthly volatility of each stock index i, or realized volatility (RV), is calculated as the sum of the squared returns observed during the month, $RV_{i,t} = \sum_{j=1}^{n} r_{i,j}^2$, where n is the number of working day in the month t.

3.2. Dynamic Connectedness Approach Proposed by Diebold and Yilmaz (2014)

The impact of EPU on financial returns has been modeled using various approaches in the literature, such as linear regression (Mei et al., 2018; Phan et al., 2018; Chiang, 2019), AR-GARCH models (Liu et al., 2017; Wu et al., 2019; Liming et al., 2020; Ersin et al., 2022), quantile regression (Wu et al., 2019), AR-Markov switching models (Arouri et al., 2016; Uddin et al., 2020; Kundu and Paul, 2022), Wavelet Coherence Analysis (Asafo-Adjei et al., 2020; Kundu and Paul, 2022), and Autoregressive Distributed Lag (ARDL) models (Tiryaki and Tiryaki, 2019; Aimer, 2021). Nonlinear ARDL models (NARDL) have also been used (Chang et al., 2022), as well as HAR-type models with exogenous variables representing EPU (Liu and Zhang, 2015).

However, most of these methods fail to account for the time-varying impact of EPUs on the dynamics of financial series. Additionally, they often do not distinguish the contribution of each EPU to the dynamic of retained financial series.

In contrast, the dynamic connectedness approach allows for an assessment of the time-varying effects of different EPUs on financial series (returns and realized volatility) while identifying the contribution of each EPU. This method enables a direct investigation of the predictive power of EPUs by analyzing their impact on forecasted error variance decomposition.

The connectedness method has been applied by a few authors to analyze the impact of EPU on financial series. For example, Yang (2019) explored the relationship between EPU and oil prices using the connectedness method proposed by Diebold and Yilmaz (2014) and the Wavelet approach.

In this study, the connectedness framework introduced by Diebold and Yilmaz (2014) is used to quantify the strength and duration of the impact of EPU shocks on the returns and realized volatility of stock indices. This approach relies on the generalized forecast error variance decomposition (GFEVD) of a vector autoregressive (VAR) model.

Let y_t be a 6×1 time-series vector at time t, including monthly return (or monthly realized volatility (RV)) of a retained country, and 5 EPU (domestic as well as US, Chinese, European, and Global EPU).

$$y_t = \sum_{s=1}^{p} \theta_j y_{t-s} + \epsilon_t, \tag{1}$$

where $\theta_j (j = 1, \ldots, p)$ are nxn matrices of parameters. Residuals (ϵ_t) are assumed to be serially uncorrelated $(\epsilon_t \sim (0, \sum))$. The optimum lag p is determined by using AIC.

The moving average representation of y_t is expressed as:

$$y_t = \Psi(L)\epsilon_t = \sum_{k=0}^{\infty} \Psi_k \epsilon_{t-k}, \tag{2}$$

The (nxn) dimension coefficient matrices (Ψ_k) are defined as:

$$\Psi_k = \theta_1 \Psi_{k-1} + \theta_2 \Psi_{k-2} + \cdots + \theta_l \Psi_{k-l}, \tag{3}$$

where Ψ_0 is nxn identity matrix and $\Psi_k = 0 \; for \; k < 0$.

The *H-step* ahead generalized forecast error variance decomposition is:

$$\phi_{ij}(H) = \frac{\sigma_{jj}^{-1} \sum_{h=0}^{H} ((\Psi_k \sum)_{ij})^2}{\sum_{h=0}^{H} (\Psi_k \sum \Psi_h^T)_{ii}}, \tag{4}$$

where σ_{jj} represents the standard deviation of the error term of variable j. $\phi_{ij}(H)$ measures the contribution of variable i to the generalized forecast error variance of variable j. In case i=j, $\phi_{ij}(H)$ measures its own contribution to its own forecast error variance.

$\phi_{ij}(H)$ is normalized such as:

$$\tilde{\phi}_{ij}(H) = \frac{\phi_{ij}(H)}{\sum_{j=1}^{n} \phi_{ij}(H)}. \tag{5}$$

$\tilde{\phi}_{ij}(H)$ enables to determine the percentage in the forecast error variance of variable i that is explained by variable j.

4. EMPIRICAL RESULTS: PRESENTATION AND DISCUSSION

The directional spillovers between the variations in the retained EPUs and the stock returns (and realized volatility (RV)) were determined by estimating the GFEVD model (defined in Eq. 1-5) across successive sub-periods using a rolling-window approach. Each window spans 150 months (12.5 years). Since the starting dates of the datasets vary across countries, the number of windows differs as well (see the data description section). For instance, there are 163 windows for 10 countries.

This approach allows us to quantify the contribution (in percentage terms) of each retained EPU to the forecast error variance of both returns and RVs for each stock index in each sub-period. The results are presented in table form, but due to the large

number of windows (around 163), it is impractical to display all of them. Instead, we summarize the findings by plotting the percentage of the forecast error variance of each stock's return and RV explained by variations in the EPUs (Figures 1-20).

First, we discuss the impact of EPU variations on realized volatility, followed by their impact on stock returns.

4.1. Realized Volatility (RV) Responses to EPU

The contribution of EPU variations to the forecast error variance of each stock's RV is shown in Figures 1b to 20b. According to these figures, the RV of most retained stocks is primarily driven by the Global EPU, followed by the US EPU (e.g., Croatia (Fig. 2b), Belgium (Fig. 1b), Italy (Fig. 6b), France (Fig. 3b), the Netherlands (Fig. 8b), Mexico (Fig. 14b), and Chile (Fig. 13b)), with some short-term exceptions. For instance, British RV mainly responded to Global and US EPUs (Fig. 10b), except during sub-periods of heightened uncertainty caused by Brexit (June 2016 to January 31, 2020). A similar pattern is observed for Russia's RV (Fig. 19b), which responded primarily to Global and US EPUs for most sub-periods, though this influence diminished over time. More recently, the local EPU has had a stronger effect, particularly due to international tensions surrounding Ukraine.

In the case of Canada, the stock market's RV initially responded more to local EPU (Fig. 12b). However, this influence waned over time, and the Global EPU, followed by the US EPU, became the dominant drivers. In the later sub-periods, US EPU had a greater impact than Global EPU. For Germany, RV was mostly driven by Global and US EPUs throughout the observation period, though the influence of the local EPU increased and even surpassed that of Global and US EPUs during the most recent sub-periods, which were marked by the COVID-19 pandemic and the Russia-Ukraine war (Fig. 4b).

For Greece, RV primarily reacted to Global EPUs in the early sub-periods, followed by local EPUs (Figure 5b). Over time, local EPU became the dominant driver, followed by Global EPU. Greece's RV also responded to European and US EPUs in similar magnitudes. The strong impact of local EPU can be attributed to numerous significant economic and policy issues in Greece, including its 2010 request for financial support from the IMF, EU, and ECB, the downgrading of Greece's credit rating, the European debt crisis, political uncertainties, and the 2015 referendum on the EU bailout conditions. Although the referendum rejected the bailout terms, a package was eventually agreed upon, and capital controls were introduced in June 2015.

Japan's RV primarily responded to local EPU, followed by Global and US EPUs (Figure 16b). Similarly, US RV was mostly influenced by Global and local EPUs, with a relatively small contribution from European EPU, which accounted for about 5% of the variance, increasing slightly after Brexit (Fig. 11b). US RV's response to Chinese EPU was limited, except for certain sub-periods, such as during the US-China trade war and the election of President Trump, when it rose sharply. By contrast, the RV of most other retained stocks was minimally affected by Chinese EPU (Figures 1b-20b).

Regarding the influence of regional EPUs, their contribution to the forecast error variance of most RVs was generally lower than that of Global and US EPUs, with few exceptions in more recent sub-periods. For example, the RV of European stocks was primarily driven by Global and US EPUs, with European EPU playing a minor role (Figures 1b-8b). Similarly, Asian RVs showed limited responses to variations in Chinese EPU, with a few exceptions in certain sub-periods (Figures 15b-18b).

4.2. Stock Return Responses to EPU

The responses of stock returns to EPU variations are plotted in Figures 1a to 20a. Compared to the results for RV, the dominance of Global and US EPUs is also evident in the case of stock returns, although to a lesser extent. For instance, the returns of Croatia (Figure 2a), the UK (Figure 10a), Ireland (Figure 7a), France (Figure 3a), Mexico (Figure 14a), and Spain (Figure 9a) were predominantly driven by Global and US EPUs. Similar patterns are observed for several other countries, though with variations during certain sub-periods.

For Germany, stock returns initially responded primarily to Global EPU, followed by US and European EPUs in the earlier sub-periods (Figure 4a). However, as time progressed, the influence of Global EPU decreased, while the response to local EPU increased. In the most recent sub-periods, Germany's returns were mainly driven by local and US EPUs. Italy's stock returns were initially driven by Global EPU, followed by European, US, and local EPUs during the first sub-periods (Figure 6a). Over time, the influence of European EPU became more pronounced, while the contributions of Global and US EPUs diminished before rising again in the later sub-periods.

In contrast, some stock returns were primarily influenced by local EPUs, followed by Global EPU. For example, the returns of Korea (Fig. 17a), India (Fig. 15a), the Netherlands (Fig. 8a), and Greece (Fig. 5a) followed this pattern. Greece's stock returns, in particular, responded mainly to local EPUs, followed by Global and European EPUs (Figure 5a), which is consistent with the RV response. This is likely due to Greece's prolonged period of economic and policy challenges, as discussed earlier. Similarly, Japan's stock returns were driven by Global EPU in the early sub-periods, with local EPU playing a larger role in the later sub-periods (Figure 16a). Singapore exhibited similar patterns (Fig. 18a).

Similar to RV responses, most stock returns showed minimal reaction to Chinese EPU.

For each stock, the total response of both returns and RV to EPUs was calculated, and the differences (total RV response minus total return response) were determined. These differences are displayed in Figure 21, which shows that the RV response to EPUs is consistently higher than the return response across all retained series. This finding is logical, as EPUs are measures of uncertainty, which tends to have a more pronounced effect on volatility than on returns.

4.3. Impact of Main Trade Partners

Some authors have suggested that the dynamics of domestic stock markets should be more responsive to the EPUs of their main trading partners, as economic integration facilitates the transmission of foreign EPU shocks (Uddin et al., 2020). However, our results do not support this hypothesis. The European countries in our sample have the majority of their trade partnerships with other European countries, yet their stock returns and RVs reacted mainly to Global and US EPUs rather than to European EPU (e.g., Croatia (Figure 2b), France (Figure 3b), Germany (Figure 4b), the Netherlands (Figure 7b), and Spain (Figure 8b)). For instance, Croatia's top trade partners are from Europe and Central Asia, and the US ranks only 10th in terms of trade volume. Despite this, Croatia's stock returns and RVs were more influenced by Global and US EPUs than by European EPU (Figure 2a).

In contrast, the contribution of Chinese EPU to the forecast error variance of US stock returns increased over time (Figure 11a), which can be attributed to the growing trade relationship between the US and China.

Figure 1.a: Belgium stock return reaction to EPUs
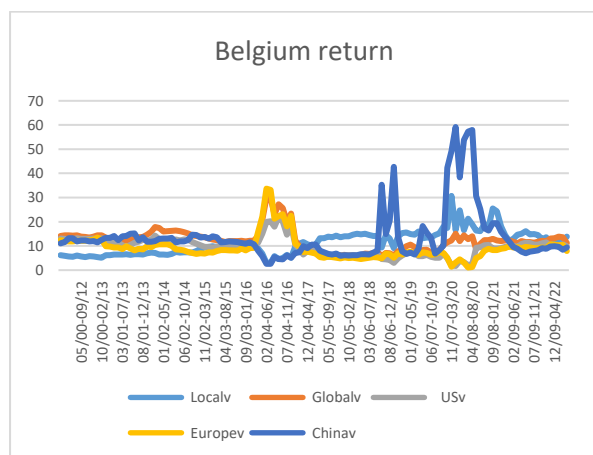
Figure 1.b: Belgium stock RV reaction to EPUs
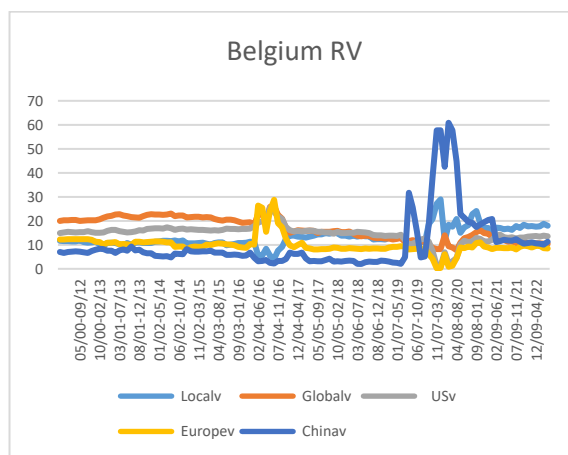
Figure 2.a: Croatia stock return reaction to EPUs
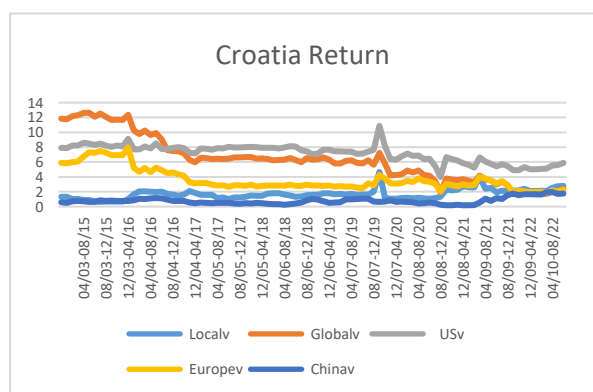
Figure 2.b: Croatia stock RV reaction to EPUs
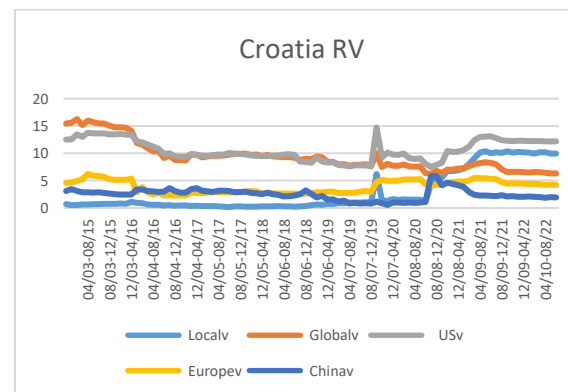
Figure 3.a: France stock return reaction to EPUs
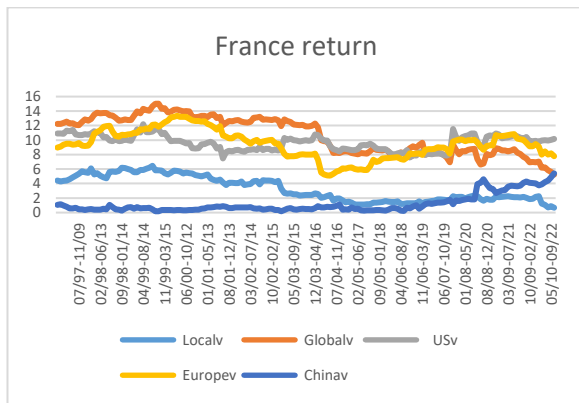
France return

Figure 3.b: France stock RV reaction to EPUs

France RV
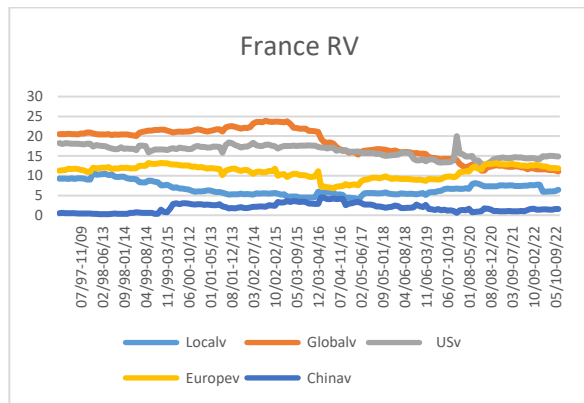
Figure 4.a: Germany stock return reaction to EPUs
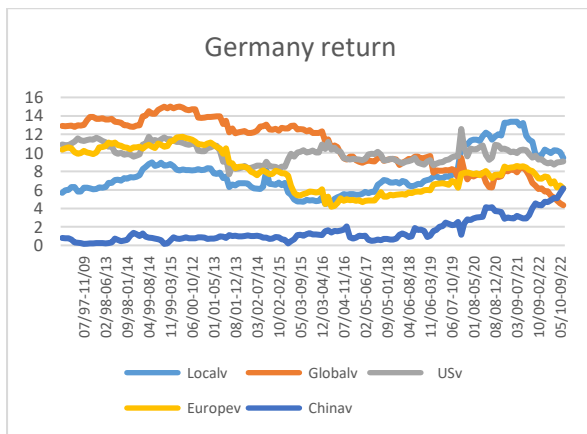
Germany return

Figure 4.b: Germany stock RV reaction to EPUs

Germany RV
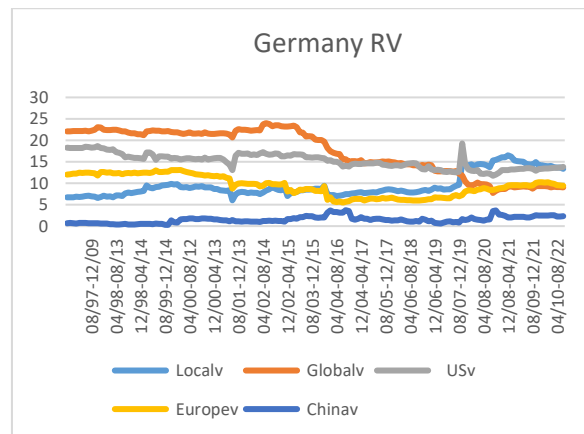
Figure 5.a: Greece stock return reaction to EPUs
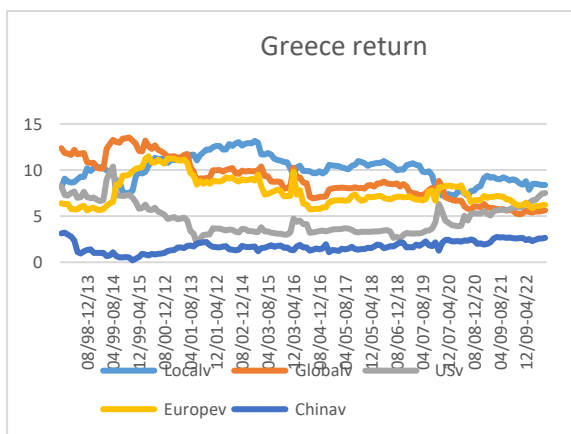
Greece return

Figure 5.b: Greece stock RV reaction to EPUs

Greece RV
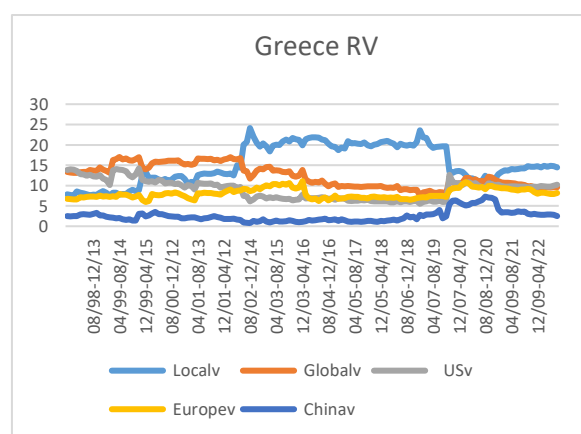
Figure 6.a: Italy stock return reaction to EPUs
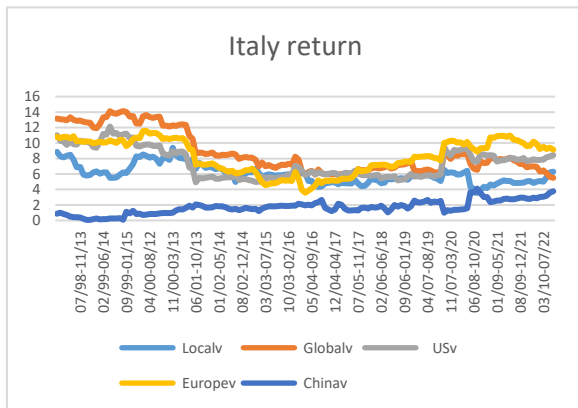
Italy return

Figure 6.b: Italy stock RV reaction to EPUs

Italy RV
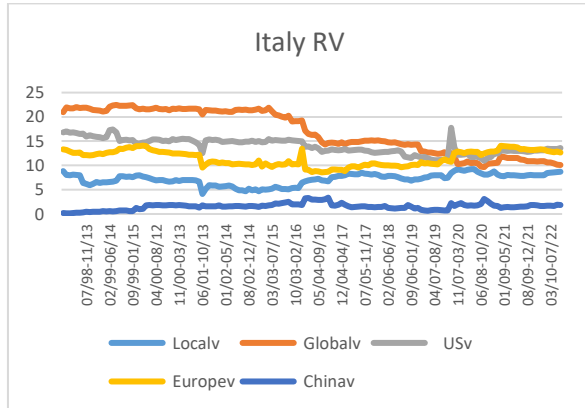
Figure 7.a: Ireland stock return reaction to EPUs
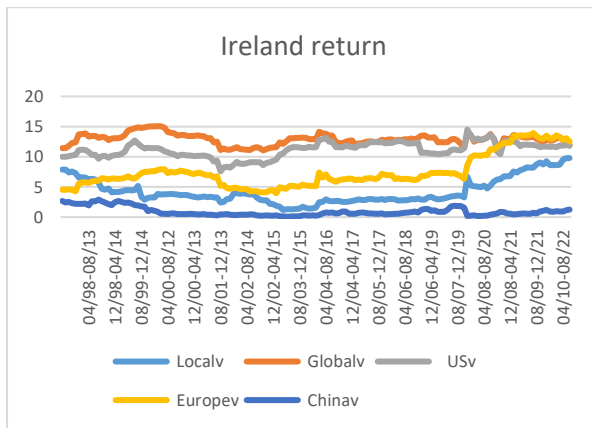
Ireland return

Figure 7.b: Ireland stock RV reaction to EPUs

Ireland RV
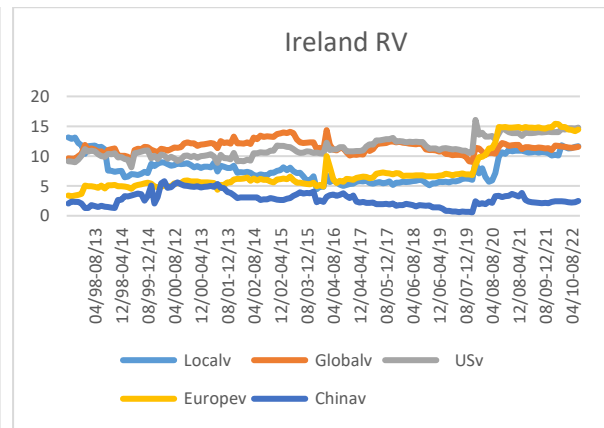
Figure 8.a: Netherlands stock return reaction to EPUs

Netherlands return
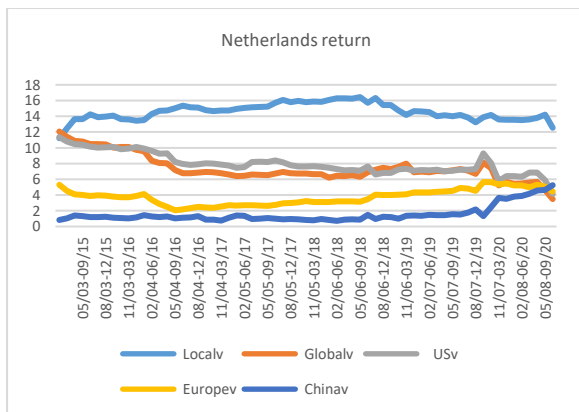
Figure 8.b: Netherlands stock RV reaction to EPUs

Netherlands RV
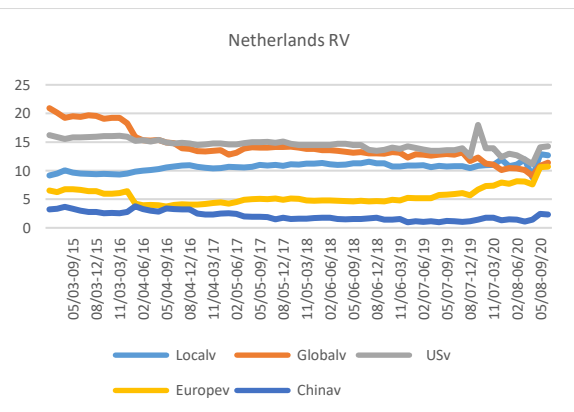
Figure 9.a: Spain stock return reaction to EPUs
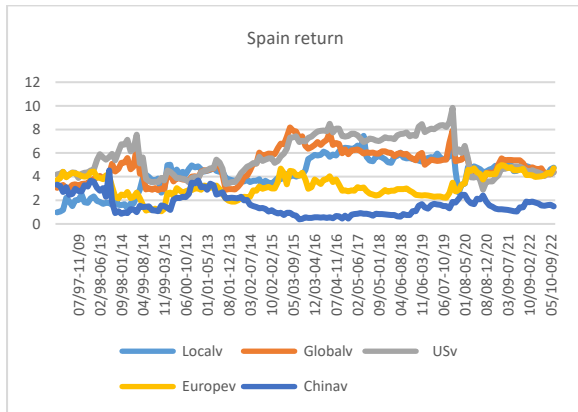
Spain return

Figure 9.b: Spain stock RV reaction to EPUs

Spain RV
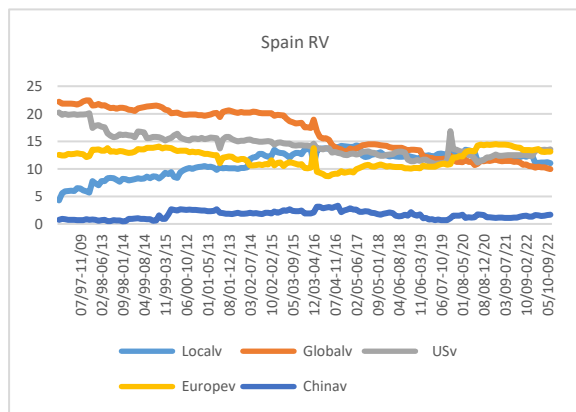
Figure 10.a: UK stock return reaction to EPUs
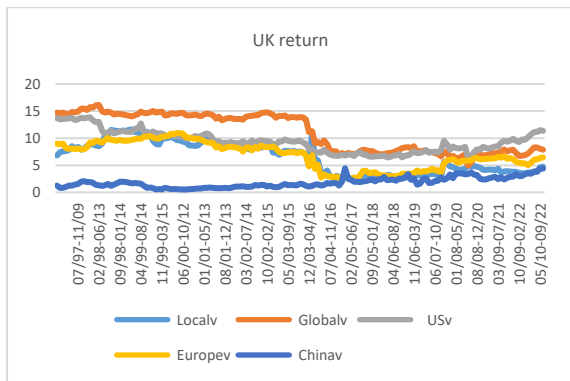
UK return

Figure 10.b: UK stock RV reaction to EPUs

UK RV
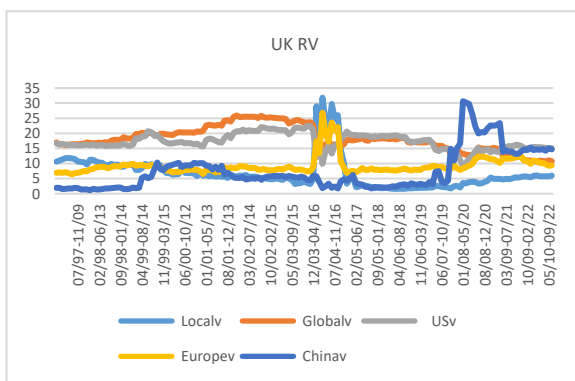
Figure 11.a: US stock return reaction to EPUs
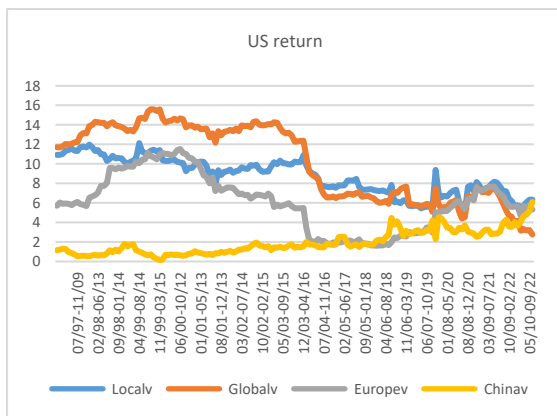
US return

Figure 11.b:) US stock RV reaction to EPUs

US RV
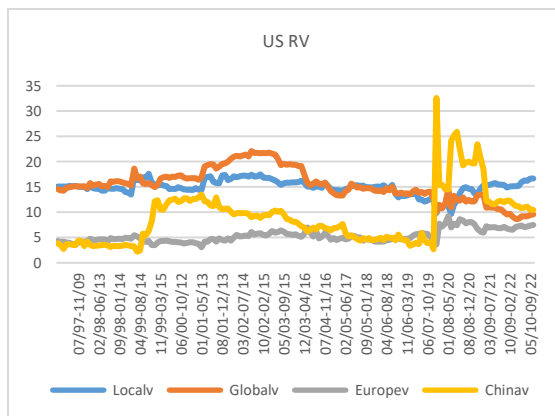
Figure 12.a: Canada stock return reaction to EPUs
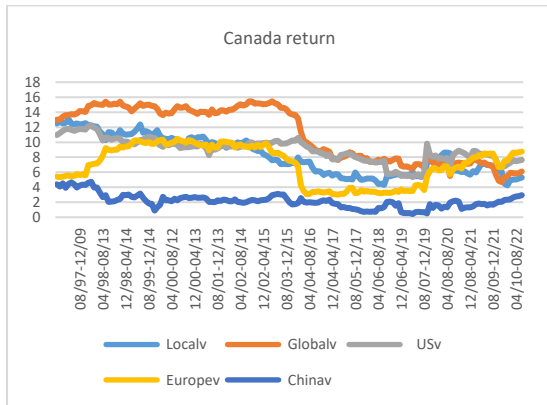
Canada return

Figure 12.b: Canada stock RV reaction to EPUs

Canada RV
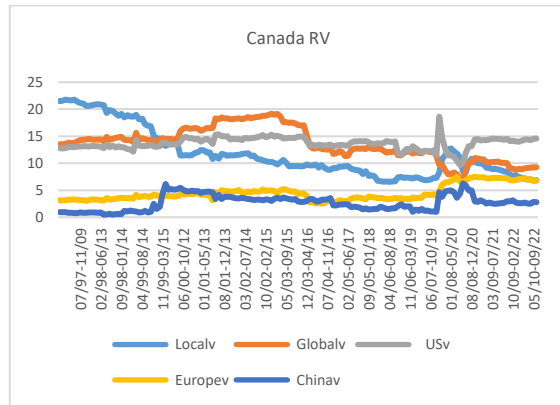
Figure 13.a: Chile stock return reaction to EPUs
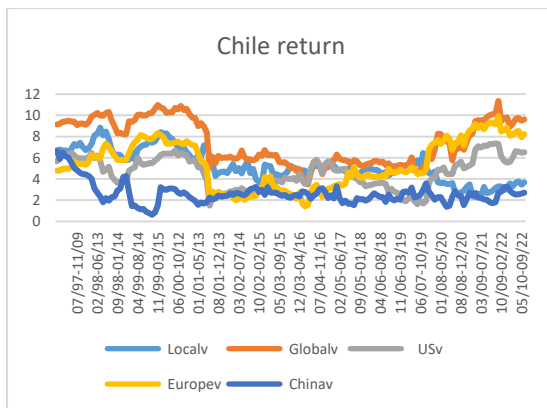
Chile return

Figure 13.b: Chile stock RV reaction to EPUs

Chile RV
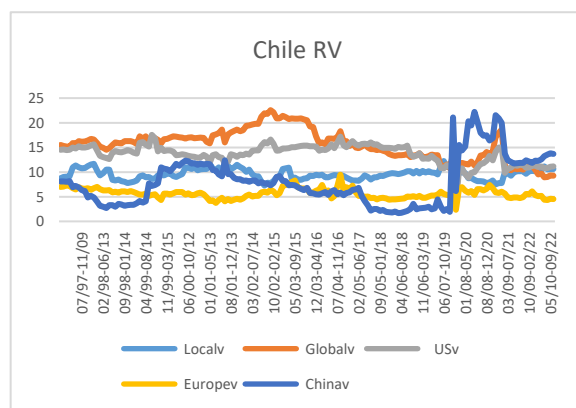
Figure 14.a: Mexican stock return reaction to EPUs
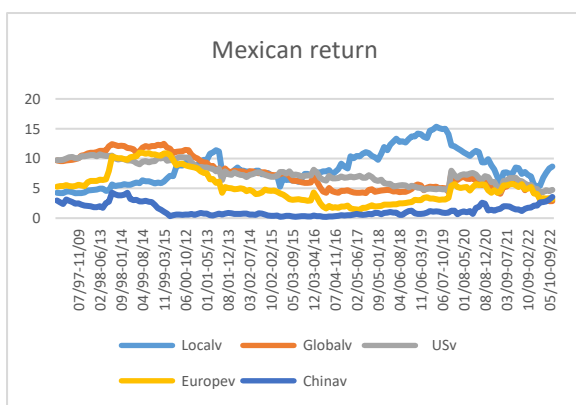
Mexican return

Figure 14.b: Mexican stock RV reaction to EPUs

Mexica RV
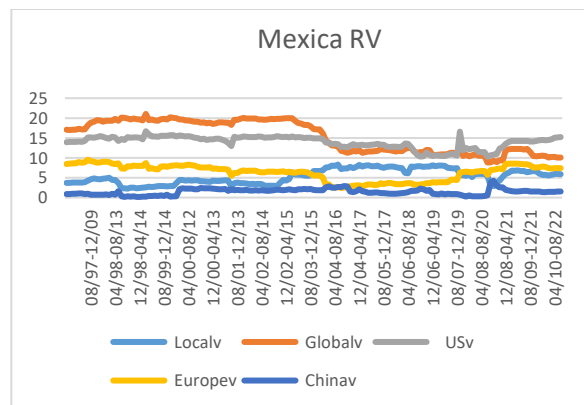
Figure 15.a: India stock return reaction to EPUs
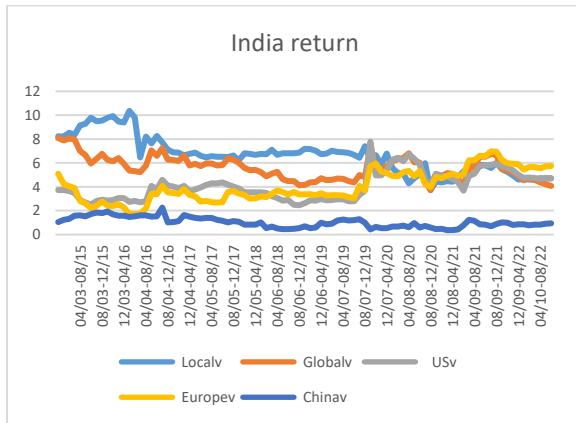
India return

Figure 15.b: India stock RV reaction to EPUs

India RV
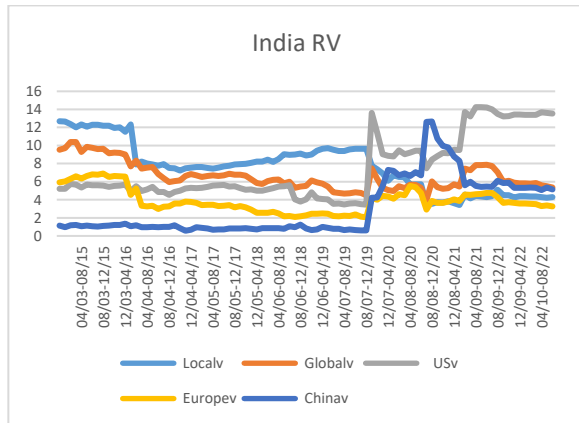
Figure 16.a: Japan stock return reaction to EPUs
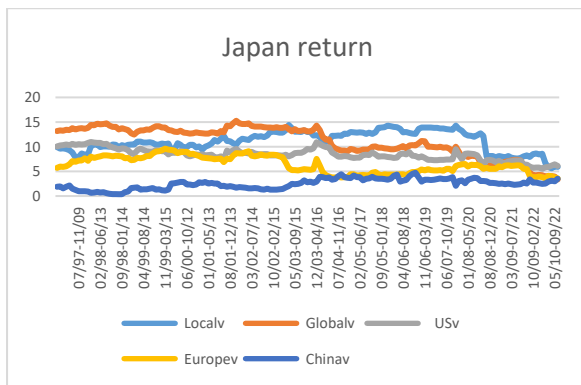
Japan return

Figure 16.b: Japan stock RV reaction to EPUs

Japan RV
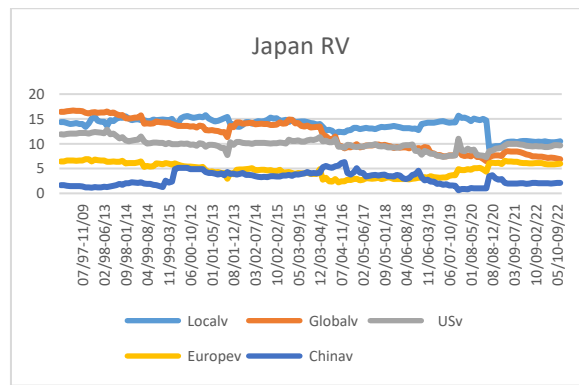
Figure 17.a: Korea stock return reaction to EPUs
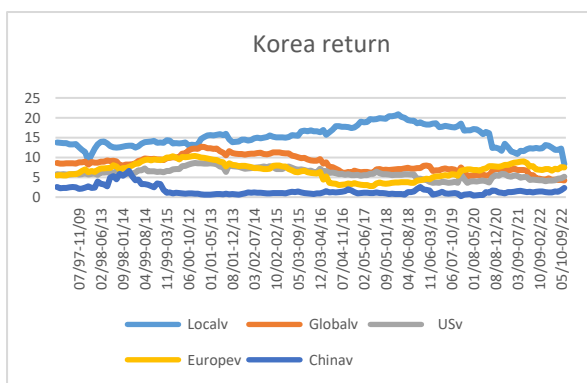
Korea return

Figure 17.b: Korea stock RV reaction to EPUs

Korea RV
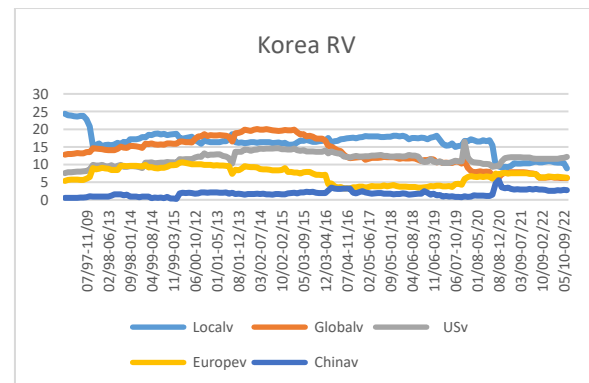
Figure 18.a: Singapore stock return reaction to EPUs
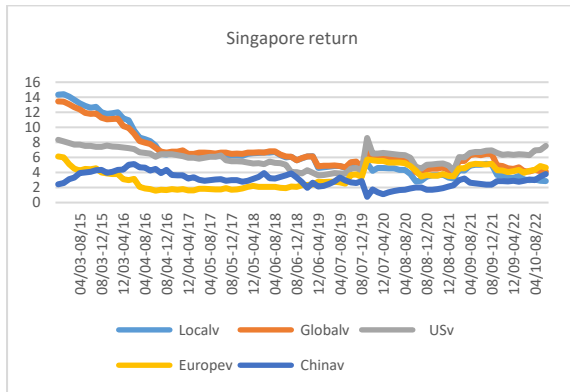
Singapore return

Figure 18.b: Singapore stock RV reaction to EPUs

Singapore RV
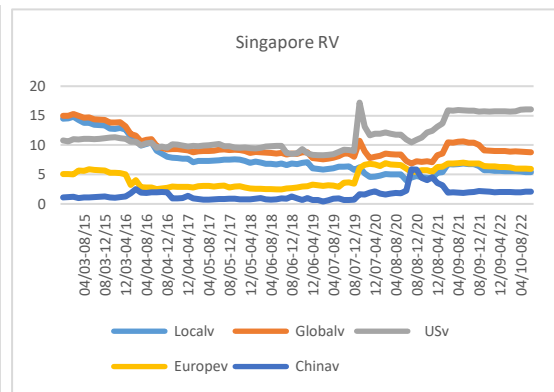
Figure 19.a: Russian stock return reaction to EPUs
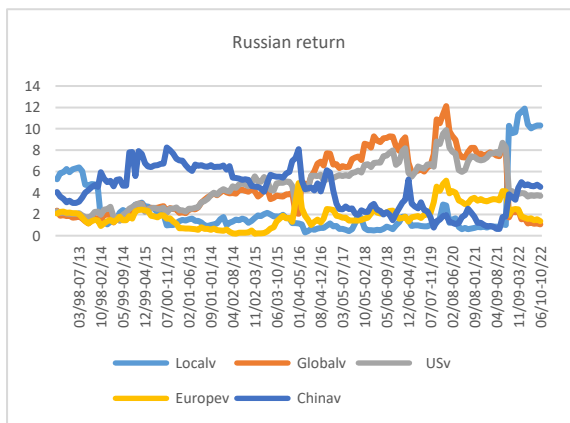
Russian return

Figure 19.b: Russian stock RV reaction to EPUs

Russian RV
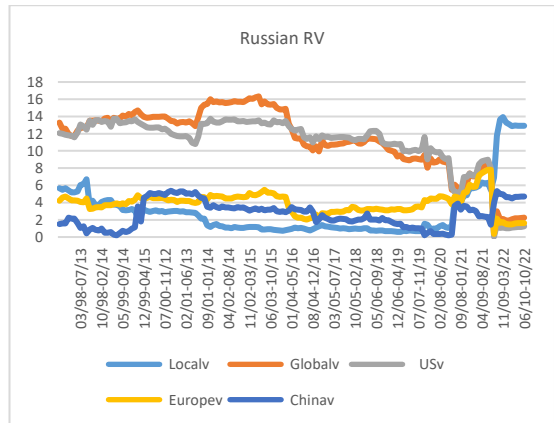
Figure 20.a: Australia stock return reaction to EPUs
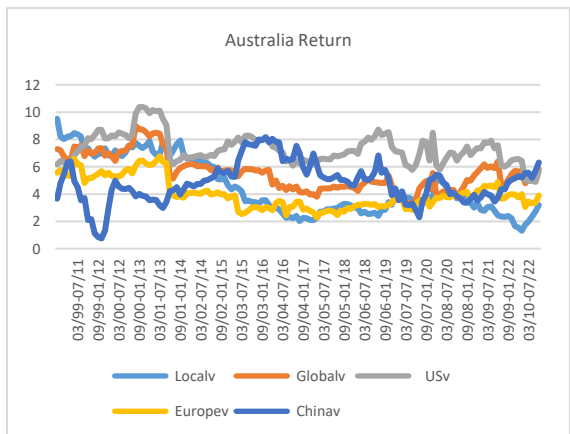
Australia Return

Figure 20.b: Australia stock RV reaction to EPUs

Australia RV
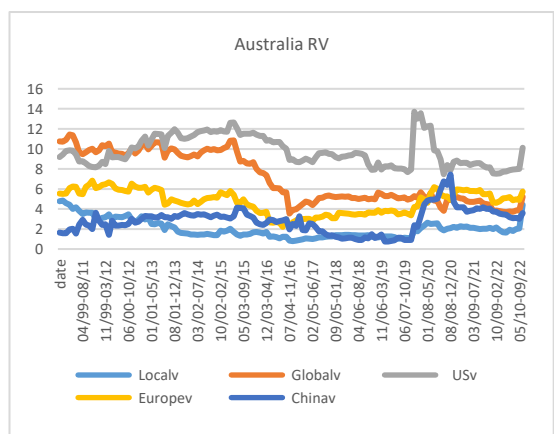
Figure 21: Differences between total reaction of RV to EPUs – total reaction of return to EPUs
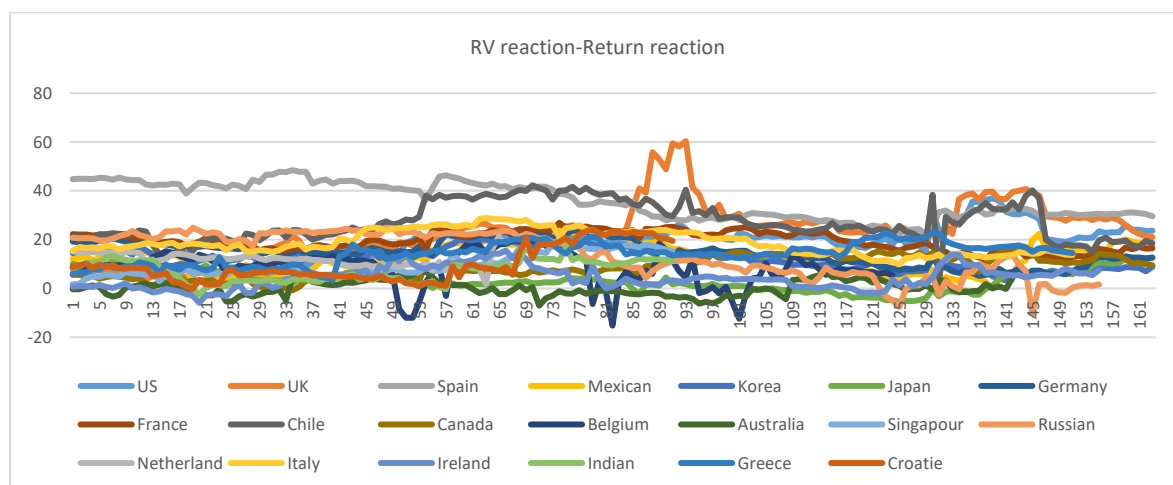
A summary of these findings are given in the following table (Table 1).

Table 1: Summary results

Country /Region	Primary Driver of RV	Primary Driver of Returns	Role of Local EPU	Role of Regional EPU	Role of Chinese EPU
USA	Global EPU, US EPU	Global EPU, US EPU	Moderate	N/A	Increasing (US-China trade)
Europe (General)	Global EPU, US EPU	Global EPU, US EPU	Minimal	Lower than Global/US	Minimal
Germany	Global EPU, US EPU	Transition from Global and US EPU to Local EPU over time	Increasing (COVID-19, war periods)	Moderate (Temporary)	Minimal
UK	Global EPU, US EPU	Global EPU, US EPU	Increasing (Brexit period)	Minimal	Minimal
Greece	Mainly Local EPU, Global EPU	Local EPU	Dominant (Financial crises)	Minimal	Minimal
Japan	Local EPU, Global EPU	Global EPU, Local EPU	Increasing over time	Minimal	Minimal
China	Local EPU	Local EPU	Dominant	N/A	N/A
India	Local EPU	Local EPU	Dominant	Minimal	Minimal
Russia	Global EPU, US EPU	Global EPU, US EPU	Increasing (Ukraine conflict)	Minimal	Minimal
Australia	Global EPU, US EPU	Global EPU, US EPU	Moderate	Minimal	Minimal
Mexico	Global EPU, US EPU	Global EPU, US EPU	Minimal	Minimal	Minimal

5. CONCLUSION

This research investigates the predictive power of both domestic and foreign Economic Policy Uncertainty (EPU) on the returns and realized volatility (RV) of 20 global stock indices over a span of more than 20 years by using the dynamic connectedness approach. The study provides significant insights into how fluctuations in EPU influence the stability and predictability of global stock markets, offering several key findings and contributions to the existing literature.

Firstly, the empirical results demonstrate that the impact of EPU on realized volatility is generally more pronounced than on stock returns. Across the sample, the Global EPU consistently emerges as the dominant driver of realized volatility, followed by the US EPU. This pattern is evident in countries such as Croatia, Belgium, Italy, and Mexico, among others. The US EPU's influence is particularly strong in markets with close financial ties to the US, highlighting the cross-border transmission of policy uncertainty from major economies to smaller or more interconnected financial markets. For instance, British RV exhibited heightened sensitivity to Global and US EPUs during the Brexit period, indicating how specific regional events can amplify the effect of foreign EPUs.

Secondly, domestic EPUs also play a significant role in certain markets, especially during periods of heightened local uncertainty. For example, Greece and Japan experienced stronger local EPU effects on both RV and returns due to economic and policy turbulence specific to their regions, such as Greece's sovereign debt crisis and Japan's ongoing economic challenges. However, the overall contribution of local EPUs to stock market dynamics is typically lower than that of Global and US EPUs. The findings suggest that while domestic economic policy uncertainty matters, the broader, global economic environment has a more substantial influence on market volatility.

Thirdly, stock returns, though less sensitive to EPU variations compared to RV, still exhibit significant responses to both Global and US EPUs. The results show that stock returns in developed markets like Germany, France, and Italy were largely driven by Global and US EPUs, particularly during the early sub-periods. However, the influence of local EPUs on stock returns has grown in recent times, as seen in Germany and Japan, reflecting the changing dynamics of local versus global factors over time.

A key takeaway from the study is the minimal impact of Chinese and European EPUs on most stock markets outside their respective regions. This is an intriguing finding given the increasing global importance of China and the European Union in international trade and economic policy. For instance, US stock market volatility was only marginally affected by Chinese EPU, except during specific periods like the US-China trade war. This underscores the ongoing dominance of US economic policy uncertainty in driving global market behavior.

Additionally, the study challenges the assumption that the EPUs of a country's major trade partners exert more influence on its stock market than global EPUs. For example, European countries in the sample, despite their close trade ties with other European nations, responded more to Global and US EPUs than to European EPU. This highlights the complex nature of economic integration and the fact that financial linkages may not always align with trade relationships in determining market sensitivity to policy uncertainty.

From a practical perspective, these findings offer valuable insights for both investors and policymakers. For investors, understanding how global and local EPUs affect market returns and volatility is crucial for risk management and portfolio diversification. The study suggests that investors should pay close attention to Global and US EPUs, especially during periods of heightened uncertainty, and adjust their strategies accordingly to mitigate risks. For policymakers, the results underscore the importance of coordinating economic policies at the international level. Given the global transmission of policy uncertainty, particularly from major economies like the US, efforts to stabilize global markets should include concerted actions to reduce uncertainty at both domestic and international levels.

In conclusion, this study highlights the significant role that both domestic and foreign EPUs play in shaping the return and volatility dynamics of stock markets worldwide. By incorporating a dynamic connectedness model and a comprehensive dataset spanning over two decades, this research provides a nuanced understanding of how economic policy uncertainty affects financial markets over time. The findings emphasize the importance of considering both local and global factors in financial forecasting and offer important implications for future research on economic policy uncertainty and its effects on financial markets.

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EXPLORING THE INTERPLAY BETWEEN SENSATION SEEKING, BIOLOGICAL INDICATORS, AND FINANCIAL RISK-TAKING BEHAVIOR: A DIGITAL RESEARCH PERSPECTIVE

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ABSTRACT

Purpose- This study investigates the complex relationship between sensation-seeking, biological indicators, and financial risk-taking behavior. Utilizing a digital research approach, the study examines how individual differences in sensation seeking, measured by the Zuckerman Sensation Seeking Scale (SSS-V), correlate with financial risk tolerance.
Methodology- Each unit of analysis is categorized as a risk-averse, risk-neutral, and risk-lover according to both biological and probabilistic game attitudes. Biological indicators, specifically the 2D:4D ratio, are used to categorize individuals as risk-averse, risk-neutral, or risk-lover. The research employs a probabilistic lottery game to further classify participants' risk preferences.
Findings- Findings reveal that while sensation seeking is generally associated with higher financial risk-taking, the interplay between biological indicators and risk behavior is nuanced. Probabilistic game categorization results indicate that sensational-seeking score not only for total but also for subdimension is not statistically significant.
Conclusion- Notably, individuals with higher sensation-seeking scores do not always exhibit higher financial risk tolerance. Biological indicators and probabilistic game classification will indicate the different mean values of the sensational-seeking score. Biological indicators differentiate the mean difference of individuals' sensational-seeking scores. The study contributes to the understanding of how psychological traits and biological factors jointly influence financial decision-making.

Keywords: Financial risk-taking, 2D:4D ratio, digital research, sensation seeking, risk tolerance
JEL Codes: D81, D84, D91

1. INTRODUCTION

Risky decision-making in real life is a very complex structure. That is why several explanations have been attempted from different disciplines. Some researchers have tried to explain the factors that affect risky behavior by using human biology, such as prenatal testosterone exposure (PTE), gender, certain hormones like salivary testosterone levels in men (Apicella, et al., 2008), and some genes like the 7-repeat allele of the dopamine receptor D4 gene (Dreber, et al., 2009). Some other researchers try to explain risky behavior through individual character traits or psychological factors such as sensation seeking, self-control, and personality. The whole process of decision-making and engaging in risky behavior is complex, involving a combination of several factors that ultimately shape our decisions. Ju and Wallraven (2023) found a significant positive correlation between the BART (Balloon Analogue Risk Task) score, sensation-seeking, and risky driving behavior. In this study, sensation seeking is used to understand risky decision-making behavior. Individuals' risky behavior is measured using a probabilistic lottery and the 2D:4D ratio. The individual will be categorized as risk-lover, risk-neutral, or risk-averse either by accepting the guaranteed money in the lottery or by the ratio of 2D:4D. According to the literature, if the individual's ring finger is longer than the index finger, they are categorized as risk-lover; if they are equal, as risk-neutral; and if the index finger is longer, as risk-averse. The lottery game categorization is done by calculating the expected value of the lottery: if the individual plays the lottery when the expected value is less than the guaranteed money, they are categorized as risk-lover; if the expected value and guaranteed money are equal, as risk-neutral; and if the expected value is greater than the guaranteed money, as risk-averse. In the research, sensation-seeking scores and sub-dimension scores are compared by the categorized individuals to determine if there is any mean difference among the categories. One should always remember that sensation-seeking tends toward financial risk-taking behavior, as it creates both a fear of loss and a thrill of gain (Wong & Carducci,

2015). Hanoch et al. (2006) argued that individuals who prefer high risk in one domain can prefer lower risk levels in another domain. For this study, the sensation-seeking trait is defined by individual differences "in the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience" (Zuckerman, 1994, p. 17). Although there is a correlation between sensation-seeking scale and risk-taking behavior (Dahlen, Martin, Ragan, & Kuhlman, 2005; Dunlop & Romer, 2010; Adams & Moore, 2007), low sensation seekers are not just risk-averse in their view of sensation-seeking activities; they also believe that activities are not worth the high level of risk.

The existing literature on sensation seeking, biological indicators, and financial risk-taking behavior is first reviewed to provide a comprehensive background for the study. Following this, the methodology is detailed, which includes the use of the Zuckerman Sensation Seeking Scale (SSS-V) and the 2D:4D ratio to categorize individuals' risk preferences. The findings are then presented, highlighting the nuanced relationship between sensation-seeking and financial risk-taking, as well as the role of biological indicators. Finally, the implications of the results for understanding financial decision-making are discussed.

2. LITERATURE REVIEW

Zuckerman & Kuhlman, (2000) found that several types of risky activities, including substance use (drugs, alcohol, etc.), risky driving, unprotected sex, and gambling, are significantly related to sensation seeking. Similar findings have been reported by various studies (Quinn & Harden, 2013; Leeman, Hoff, Krishnan-Sarin, Patock-Peckham, & Potenza, 2014; Vayısoğlu, Öncü, & Güven, 2019). Based on such evidence, some researchers have used the tendency to engage in risky behavior as a proxy for sensation seeking. Among those researchers Grinblatt and Keloharju (2009) proposed that sensation seeking can be associated with speeding violations, as sensation seekers may take pleasure in risky driving. The findings of the study indicate that drivers who engaged in speeding violations (measured by the number of speeding tickets and severity of the violations) tend to trade more in the stock market. Moreover, increasing the severity of speeding violations is a more significant predictor of trading activity. The study also documents that sports car ownership is related to trading activity. In a similar vein, Brown et al. (2018) examined the trading activity and risk-return composition of hedge fund managers who own performance cars. Their findings indicate that hedge fund managers who own sports cars tend to take more risks but do not generate higher returns. Such managers tend to trade more and invest in lottery-like stocks. Lee et al. (2019) explore the relationship between alcohol consumption, which represents sensation-seeking behavior, and retail investor stock investment and trading behavior. They found that alcohol consumption positively relates to investing in lottery-type stocks and portfolio turnover. Using drug use as a measure of sensation seeking, Rabbani et al. (2021) report a significant positive relationship between risk tolerance and sensation seeking. Moreover, gender, race, and education were significantly associated with financial risk tolerance. In addition to using some proxies for sensation seeking, some researchers relied on the Zuckerman Sensation Seeking Scale to measure individuals' tendencies for risk-taking. Among these studies, Wong and Carducci (1991) found that men have higher sensation-seeking scores and a greater tendency to take financial risks compared to women. Regardless of gender, those with high sensation-seeking scores tend to take higher financial risks. Using the Zuckerman Sensation Seeking Scale Form V (SSS-V), Worthy et al. (2010) found that college students with high sensation-seeking scores tend to have problematic financial issues, such as difficulties in paying bills and overdrawn checking accounts. Moreover, they also documented that students' financial scores are related to gambling behavior. Mishra and Lalumière (2010) documented that individual differences, measured by questionnaires (including Zuckerman's sensation-seeking scale) and laboratory-based behavioral measures of risk acceptance, can play an important role in risk-taking where there is no constraint. On the other hand, they also found that individual differences do not have a significant role in risk acceptance if there is a need constraint. On both questionnaires and laboratory measures, men have higher risk scores than women. Vela (2023) found that males consistently demonstrated higher risk-taking behaviors than females in financial, health/safety, recreational, and ethical domains, while no significant sex differences were observed in the social domain, and no notable decline in these differences over time or with age was found. Sokolowska and Makowiec (2017) analyzed the individuals' risk preferences under different market conditions by controlling for sensation seeking. The findings of the study show that the investors' risk preferences are subject to change under different market conditions and such risk preference is also linked to sensation seeking. Under a bear market, differences in sensation-seeking among individuals do not have an impact on risk perception, but under bull market conditions individuals with higher sensation-seeking scores tend to have lower risk perception than individuals with low sensation-seeking scores. While Grinblatt and Keloharju, (2009), Brown et al. (2018), Lee et al. (2019) and Rabbani et al. (2021) use some proxies as an aggregate sensation-seeking measure, Antonelli-Filho et al. (2021) found that it is not the aggregate sensation seeking (ZKA-PQ–the Zuckerman-Kuhlman-Aluja Personality Questionnaire) but individual facets that affect the trading volume of day traders. They document that both the thrill and adventure facet and the boredom susceptibility/impulsivity facet have a positive impact on daily trading activity, while the experience-seeking facet has a negative effect. Patterson et al. (2023) used a mixed-methods approach to refine and validate the construct of positive risk-taking in adolescence, finding that it aligns with traits like extraversion and openness, and differs from negative risk-taking in its developmental benefits and associations with personality. Li, Zhou, Ge, and Qu (2023) investigated the relationships among sensation seeking, difficulties in emotion regulation, and driving behavior, revealing that difficulties in emotion regulation mediate the effect of sensation seeking on driving behaviors, supporting the dual-process model.

Other than Zuckerman's Sensation Seeking Scale, some other scales and questionnaires have been used to examine the link between financial risk-taking and sensation-seeking. Among these types of studies, Sjöberg and Engelberg (2009) found that finance students have a higher tendency to take economic risks, gamble, and seek sensations, whereas students have less money concern than non-students. Women have fewer financial concerns in both groups. Zabel et al. (2009) found that age and financial risk-taking are negatively correlated; moreover, sensation-seeking is correlated with both age (negative correlation) and financial risk-taking (positive correlation). Controlling for sensation seeking (Brief Sensation Seeking Scale), no significant relation can be found between age and financial risk-taking.

Several studies have been conducted to examine the relationship between personal traits, risk aversion, and risk tolerance. Wong and Carducci (2015) examined risk tolerance and personal traits. The findings of their study showed that sensation seeking, and locus of control have direct effects on financial risk tolerance. The relationship between sensation seeking and financial risk tolerance is not affected by gender, age, or academic success. Desmoulins-Lebeault et al. (2018) found that women are more risk-averse. Respondents with a master's degree and a quantitative background are more risk-averse, while those following stock markets are less risk-averse. Using the Myers-Briggs Type Indicator personality measures, respondents classified as Introversion, Sensing, Feeling, and Judging are more risk-averse. Rahman (2020) reported that propensity for regret, propensity for trust, attributing success to luck, and overconfidence have significant positive relationships with financial risk tolerance, but happiness in life has a significant negative effect. Moreover, Rahman (2020) found that religiosity has a moderating effect between such behavioral factors and financial risk tolerance. Thanki and Baser (2021) found that personality type, financial literacy, gender, income, marital status, occupation, and number of dependents significantly affect financial risk tolerance, while age and education do not. Personality type is the most significant variable, with Type A personalities being more risk-tolerant. Additionally, men have higher risk tolerance than women. De Sá et al. (2024) empirically investigated gender differences in financial risk aversion among Brazilian investors, concluding that statistically significant higher risk aversion is exhibited by women compared to men, as reflected in lower portfolio volatility.

There are a limited number of studies in Turkish literature that examine the relationship between sensation-seeking and financial risk-taking. Most related literature documents the relationship between demographic and socio-economic factors and financial risk tolerance or perception. Among these studies, Çankaya et al. (2013) studied the risk attitudes of university students and examined gender differences. The findings indicate that male students perceive financial risk as a thrill and opportunity, while female students are reluctant to take financial risks and are less risk-tolerant, which is related to their potential regret. A similar finding is reported by Çatak and Arslan (2023), where women are less risk-tolerant. Kübilay and Bayrakdaroğlu (2016) documented the relationship between personality traits and financial tolerance, noting that extraverted, neurotic, and open personalities tend to have high financial risk tolerance, while agreeable and conscientious personalities have low financial risk tolerance. Aydemir and Aren (2016) explored the motives behind insurance and found that sensation seeking, along with Type A personality, can explain financial risk tolerance. Bayrakdaroğlu and Kuyu (2018) examined the financial risk perceptions of female investors. The findings of their study indicated that the level of income, financial literacy, upbringing style, avoiding regret, and lack of courage affect women's financial risk perceptions. They also concluded that female investors are risk-averse and, as a result, are unable to tolerate financial risks. Bayar et al. (2020) found that the level of financial literacy, education, and income have a positive effect on financial risk tolerance, while age has a negative effect. Men have a higher risk tolerance than women.

While the above studies documented the relationship between demographic and socio-economic factors and financial risk tolerance or perception, Anbar and Eker (2009) argue that although several demographic and socioeconomic factors (like gender, age, income, marital status, financial literacy, education level, etc.) have been documented to impact individual financial risk tolerance, such demographic and socio-economic factors may not be sufficient to measure financial risk tolerance, which is a multi-dimensional behavioral issue.

While the effects of demographic, socio-economic, and physiological factors on financial decision-making have been documented by several studies, some researchers also argue that biological factors may play a determining role in such decisions. For example, Manning (2002) claims that the relationship between prenatal testosterone exposure (PTE) affects the fetus's brain and endocrine system and subsequent behavior. Scientists try to understand economic behavior by using biological differences such as the ratio of the length of the index and ring fingers (2D:4D or digit ratio, with lower ratios associated with higher prenatal testosterone levels). The longer the ring finger, the higher the level of risk-taking. Gender is an important discriminator of the ratio, with men typically having lower ratios than women (Lutchmaya, Baron-Cohen, Raggatt, Knickmeyer, & Manning, 2004; Hönekopp & Watson, 2010). There is no consensus about the effects of PTE; some studies have shown that higher PTE yields lower risk aversion (Garbarino, Slonim, & Sydnor, 2011; Branas-Garza & Rustichini, 2011; Barel, 2019; Stenstrom, Saad, Nepomuceno, & Mendenhall, 2011), while others do not support this finding (Parslow, et al., 2019; Alonso, Di Paolo, Ponti, & Sartarelli, 2018; Apicella, et al., 2008; Neyse, et al., 2020; Pearson & Schipper, 2012).

3. METHODOLOGY

Risk can be defined as the possibility that something unpleasant or undesirable might happen. There are several methodologies to measure people's risk perception. Some use Likert scale questionnaires, some use probabilistic games, and others use task choice procedures to measure risk. Some studies have found a correlation between biological differences and risk-taking behavior, such as the 2D:4D ratio. In this study, risk is measured using a probabilistic game and the 2D:4D ratio. The Zuckerman (1994) Sensation Seeking Scale (SSS-V) is used to understand the relationship between risk perception and sensation seeking.

For this purpose, we conducted an online survey to evaluate the relationship between sensation seeking and risk aversion. The application used for data collection in the research survey was developed as a single-page application on the .NET 8.0 platform using the C# programming language and the ASP.NET MVC framework. The application is hosted on Azure App Service, and the data collected from participants is stored in an MSSQL database. Participants accessed the application through a link.

3.1. Zuckerman Sensational Seeking Scale

The sensation-seeking scale has four dimensions, each containing ten questions with two possible answers: A or B. Respondents select one of the options and are assigned a value of zero or one according to their answer. The summation of the ten questions produces each dimension's value and total score for each respondent. Reliability and validity analysis of the sensation-seeking scale (SSS-V) has been conducted by several researchers (Zuckerman, Eysenck, & Eysenck, 1978; Ridgeway & Russell, 1980; Ball, Farnill, & Wangeman, 1984; Pérez & Torrubia, 1986; Öngen, 2007).

The four dimensions of the sensation-seeking scale are Thrill and Adventure Seeking (*TAS*), Experience Seeking (*ES*), Disinhibition (*Dis*), and Boredom Susceptibility (*BS*). The items used in the scale are phrased as desired experiences, not actual ones. *TAS* is measured by adventure through socialized but exciting activities such as driving fast or skiing down extreme slopes. *ES* is measured by items that describe seeking novel experiences through the senses, such as in music, art, and travel. *Dis* is measured by a desire to engage in disinhibited social behavior, often facilitated by alcohol at parties. *BS* is measured by items that express an intolerance for routine work and boring people or a need for change and unpredictability in stimulation.

3.2. 2D:4D Ratio

In this study, three different ratios of left-hand pictures (index finger longer, equal, or shorter than the ring finger) were shown to the respondents, and they were asked what kind of hand shape they had (see **Figure 1**). A lower 2D:4D ratio (where the index finger is shorter than the ring finger) leads to less risk aversion (risk-lover). An equal ratio (where the index and ring fingers are the same length) is assumed to be risk-neutral. If the 2D:4D ratio is higher (where the index finger is longer than the ring finger), the individual will be risk-averse.

Figure 1: Hand Type Selection

Please look at your left hand and pick the shape that looks like your hand.		
2D:4D is bigger than one	2D:4D is equal to one	2D:4D is less than one
Risk-Averse	Risk-Neutral	Risk-Lover
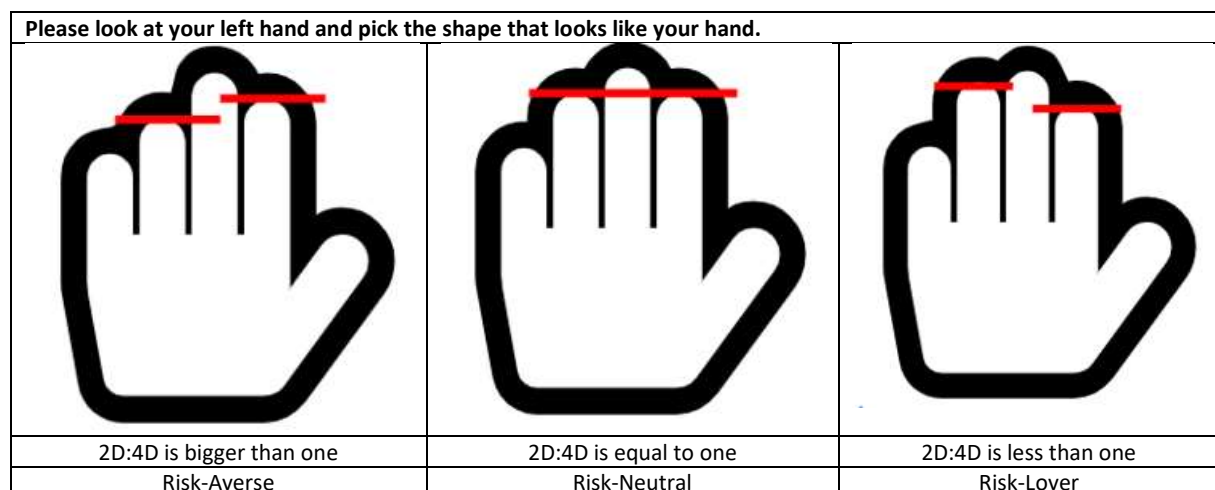
3.3. Probabilistic Game

There are three lotteries in the questionnaire where the expected value of the lottery is less than, equal to, and more than the guaranteed money in the first, second, and third lottery, respectively (see **Hata! Başvuru kaynağı bulunamadı.**). Respondents make a preference between the lottery and the guaranteed money. Whenever the respondent selects the guaranteed money, they will not see the subsequent lottery option(s). This means that if the respondent selects the money

instead of the lottery in the first lottery, they will not see the second and third lotteries and will continue with the rest of the questionnaire. The logic behind this is that since the guaranteed money increases with each lottery, it is logical that a respondent who selects the smaller guaranteed money will not change their selection for the larger guaranteed money. In the research, respondents will be classified as risk-averse, risk-neutral, and risk-lover based on their selections in the lottery. In the first lottery, respondents who select the guaranteed money will be categorized as risk-averse. In the second lottery, respondents who select the guaranteed money will be categorized as risk-neutral. If the respondents see the third lottery but take the guaranteed money, they will be categorized as risk-neutral; if they play the lottery, they will be categorized as risk-lover.

Figure 2: Probabilistic Game

First Game	Second Game	Third Game
At this stage of the study, you are being offered a game. You can either take 100TL without playing the game or flip a coin with a 50% chance to win 1,000TL and a 50% chance to win 0TL. Would you like to play this game?	At this stage of the study, you are being offered a new game. This game is completely independent of the first game, so please disregard any previous winnings and assume you are starting from scratch. You can either take 500TL without playing the game or flip a coin with a 50% chance to win 1,000TL and a 50% chance to win 0TL. Would you like to play this game?	At this stage of the study, you are being offered a new game. This game is completely independent of the first two games, so please disregard any previous winnings and assume you are starting from scratch. You can either take 600TL without playing the game or flip a coin with a 50% chance to win 1,000TL and a 50% chance to win 0TL. Would you like to play this game?
The expected value of the game is greater than the guaranteed money. Individuals who take the guaranteed money will be categorized as <u>risk-averse.</u>	The expected value of the game is equal to the guaranteed money. Individuals who take the guaranteed money will be categorized as <u>risk-neutral.</u> Individuals who play the game will be categorized based on the other game.	The expected value of the game is less than the guaranteed money. Individuals who take the guaranteed money will be categorized as <u>risk-neutral.</u> Individuals who play the game will be categorized as <u>risk-lover.</u>
Risk-Averse	**Risk-Neutral**	**Risk-Neutral OR Risk-Lover**

4. FINDINGS

125 undergraduate and graduate students answered the questionnaire voluntarily. 45% of them (56 students) are female, and 55% of them (69 students) are male. 5.6% of the students took the guaranteed money in the first lottery, and 118 students saw the lottery. 40.8% of the 118 students took the guaranteed money in the second lottery, and 70 of them saw the result of the lottery. Among these 70 students, only 15.7% (11 students) took the guaranteed money, and 59 of the students saw the lottery result. According to the calculated expected monetary value of the lottery, students were categorized as risk-averse, risk-neutral, or risk-lover. Students in the first lottery who took the guaranteed money were categorized as risk-averse since the expected value of the lottery was higher. Students in the second lottery who took the guaranteed money (48 students) and saw the third lottery and took the guaranteed money (11 students) were categorized as risk-neutral because the expected value of the lottery was equal to or less than the guaranteed money. Students who played the third lottery were categorized as risk-lover. According to this classification, 7 students (5.6%) were risk-averse, 59 students (47.2%) were risk-neutral, and the remaining 59 students were risk-lover. These findings can also be seen in detail in Table .

Table 1: Participant Preferences in Probability Games and the Number of Participants per Risk Category

	Guarantee Money	Play Lottery	Risk Averse	Risk Neutral	Risk Lover
First Game	7	118	7		
Second Game	48	70		48	
Third Game	11	<u>59</u>		11	<u>59</u>

Total			7	**59**	59

The four sub-dimensions of the Sensation Seeking Scale and the total score are calculated using the respondents' answers and transformed into standardized scores using the tables in Zuckerman (1994). To compare the values of *TAS*, *ES*, *Dis*, *BS*, and *total score* with respect to risk categories, a nonparametric Kruskal-Wallis H (KW test) was conducted. The KW test is a nonparametric counterpart of ANOVA, and the mean ranks of the categories are compared. A higher mean ranking indicates a higher score for the corresponding dimension. The scores of 125 students were compared with respect to risk categories, and no statistical differences were found. The same comparison was done separately for males and females; no statistically significant results were found. In summary, it was found that there was no significant difference in the *TAS*, *ES*, *Dis*, *BS*, and *total score* of participants categorized as risk-averse, risk-neutral, or risk-loving based on their game preferences. No difference was found in the gender-based analysis either.

Risk classification was also done using hand pictures (2D:4D ratio, see Figure 1) and found that 22.4% of participants (28 individuals) were categorized as risk-averse, 24.8% of participants (31 individuals) were categorized as risk-neutral, and the remaining 52.8% of participants (66 individuals) were categorized as risk-lover. A KW test was conducted to find significant differences in the mean rank among the categories, and only the significant results are provided in the following Table .

Table 2: Kruskal-Wallis H Test Results for TAS and Total Scores Based on the 2D:4D Finger Ratio Classification

		Number of Students	Mean Rank	KW test Statistics	Df	Asymptotic Significance
TAS Score	Risk Averse	28	79.70	8.829	2	.012
	Risk Neutral	31	52.58			
	Risk Lover	66	60.81			
Total Score	Risk Averse	28	77.05	5.585	2	.061
	Risk Neutral	31	56.89			
	Risk Lover	66	59.89			

As shown in Table above, a significant difference was found only in the *TAS* and *total score* values of participants based on the 2D:4D finger ratio classification. Individuals with high average scores in both TAS and total scores tend to be risk-averse, while those with low average scores tend to be risk-neutral. Those categorized as risk-lover based on 2D:4D finger ratios have a mean rank close to risk-neutral individuals, but they tend to have lower average values than risk-neutral ones. In a general sense, it is expected that risk-loving individuals would have higher scores, whereas risk-averse individuals having such scores seems contrary to the expectation.

The KW test was conducted separately for males and females, as they have different 2D:4D ratios, to further deepen the analysis (Table 3).

Table 3: Kruskal-Wallis H Test Results per Gender based on the 2D:4D Finger Ratio Classification

		Number of Students	Mean Rank	KW test Statistics	Df	Asymptotic Significance
TAS Score Female	Risk Averse	19	35.55	5.918	2	.052
	Risk Neutral	16	22.84			
	Risk Lover	21	26.43			
ES Score Female	Risk Averse	19	36.63	7.393	2	.025
	Risk Neutral	16	24.41			
	Risk Lover	21	24.26			
Total Score Female	Risk Averse	19	35.39	5.914	2	.052
	Risk Neutral	16	22.31			
	Risk Lover	21	26.98			
ES Score Male	Risk Averse	9	24.22	7.090	2	.029
	Risk Neutral	15	45.40			
	Risk Lover	45	33.69			

The Kruskal-Wallis test results show distinct patterns in risk categories based on gender. For females, a significant difference was found in the *ES* (Experience Seeking) scores among different risk categories, with risk-averse individuals having the highest mean rank. This indicates that risk-averse females had the highest *ES* scores, suggesting they tend to seek new and varied experiences more than their risk-neutral and risk-loving counterparts. While the differences in *TAS* (Thrill and Adventure Seeking) and Total Scores for females were significant at ten percent, mean ranks indicate that risk-neutral females' scores are greater than that of both risk-neutral and risk-lover females. It is obvious that risk risk-averse females who answered the questionnaire indicated that they wanted to do things but they did not take action.

On the other hand, for males, there was a significant difference in *ES* scores, with risk-neutral individuals having the highest mean rank. The risk-neutral males had the highest *ES* scores, indicating a stronger tendency to seek novel experiences compared to risk-averse and risk-loving males. These findings suggest that the *ES* score, which reflects the tendency to seek novel experiences, varies significantly among different risk categories for both genders, whereas the *TAS* and Total Scores show less pronounced differences for females. Both male and female participants exhibited significant differences in their *ES* scores among different risk categories. However, the patterns differ: risk-averse females had the highest mean ranks in *ES*, while for males, it was the risk-neutral group that topped the mean ranks. These findings highlight gender-specific tendencies in seeking new experiences based on their risk preferences.

5. CONCLUSION

In conclusion, this study explored the intricate relationship between sensation-seeking, biological indicators, and financial risk-taking behavior through a digital research perspective. The findings revealed that there is no significant difference in the sensation-seeking scores and sub-dimension scores (*TAS*, *ES*, *Dis*, *BS*) among participants categorized as risk-averse, risk-neutral, or risk-loving based on their game preferences. Additionally, the study found that individuals with high average scores in both *TAS* and *total scores* tend to be risk-averse, while those with low average scores tend to be risk-neutral.

When comparing these findings with other research, it is evident that the relationship between sensation-seeking and risky behavior is complex and multifaceted. For instance, Zuckerman & Kuhlman (2000) found that various risky activities, including substance use and gambling, are significantly related to sensation seeking. Similarly, Grinblatt and Keloharju (2009) proposed that sensation-seeking can be associated with speeding violations and trading activity in the stock market. However, the current study's findings contrast with those of Wong and Carducci (1991), who found that men have higher sensation-seeking scores and a greater tendency to take financial risks compared to women.

The digital research aspect of this study played a crucial role in data collection and analysis. The online survey and application developed on the .NET 8.0 platform allowed for efficient data collection and storage, enabling a comprehensive analysis of the relationship between sensation-seeking and financial risk-taking behavior.

The research on the interplay between sensation-seeking, biological indicators, and financial risk-taking behavior offers significant academic and practical implications. Academically, it contributes to the understanding of how psychological traits and biological factors jointly influence financial decision-making. This study provides a nuanced perspective on the relationship between sensation-seeking and financial risk tolerance, challenging the assumption that higher sensation-seeking scores always correlate with higher financial risk tolerance. Practically, the findings can inform financial risk management strategies by highlighting the importance of considering both psychological and biological factors when assessing an individual's risk profile. Financial advisors and institutions can use these insights to tailor their advice and products to match their clients' risk preferences better, potentially leading to more effective and personalized financial planning.

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DETERMINANTS OF INFLATION IN ETHIOPIA: AN ECONOMETRIC ANALYSIS USING ARDL BOUNDS TESTING APPROACH

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ABSTRACT

Purpose- The main purpose of this paper is to examine the macroeconomic factors that drive inflation in Ethiopia. Nonetheless even with different economic liberalization reforms and attempts on macroeconomic level, inflation stands as one of the most crucial issues affecting the Ethiopian economy. The purpose of this study is thus to investigate circumstances that triggered inflation during the period of 2003 to 2023 in an effort to identify key sources of sustained inflation and to determine the best ways of managing it.

Methodology- This study employs the ARDL technique to analyze the determinats of inflation through various macroeconomic variables in Ethiopia. The ARDL approach is particularly suitable for examining the short-run and long-run dynamics of the variables involved. Data for this research is sourced from reputable institutions, including the NBE, the EEA, the IMF, the WB, the CSA, and the MoFD, spanning from 2003 to 2023.

Findings- The study's findings indicated that exchange rate, broad money supply, import price, government expenditure, and budget deficit all have a positive and statistically significant impact on inflation in both the long and short run. On the other hand, interest rates and GDP growth exhibit a negative effect on inflation. While interest rates have an inflationary effect in the short run, they demonstrate a deflationary impact in the long run. In the short run, the budget deficit has a negative effect on inflation, suggesting that managing fiscal imbalances can contribute to lower inflation rates.

Conclusion- This study suggests that Ethiopian policymakers should improve fiscal and monetary policies by controlling money circulation, stabilizing exchange rates, ncreasing government spending efficiency. Moreover, reinforcing the institutions and adapting to global fluctuations can further reduce inflation.

Keywords: Macroeconomic drivers, time series, ARDL model, Bond test
JEL Codes: E31, C32, O55

1. INTRODUCTION

Inflation has emerged as a significant and persistent challenge to sustainable development across many African countries, exacerbating unemployment, amplifying poverty, and undermining financial stability (Dondashe & Phiri, 2018; Ngoma et al., 2019). Inflation involves an increase in the cost of consumer goods and erodes purchasing power, particularly affecting low-income populations, and can deepen poverty levels by increasing the cost of essential goods and services (Nguyen et al., 2017). Various inflationary tendencies have been observed in African countries during the last decades owing to numerous domestic and foreign factors (Afari et al., 2021). They include butt-shifting global commodity prices, exchange rate fluctuations, structural factors, and political risks (Ahmed, 2024). Some African countries have partly addressed the challenge of economic stability; however, inflation is still a major challenge (Asfuroğlu, 2021). Since most African countries depend more than 50% on imports of various necessary products, these economies are vulnerable to the global economic conditions that may enshrine or fuel inflationary forces (Charles et al., 2022) (Mavikela et al., 2019).

In sub-Saharan Africa, however, factors driving inflation rates bear features different from those seen in other regions, largely due to regional integration in trade, agricultural sector dependency, as well as the countries dependency on aid and foreign direct investment (Mavikela et al., 2019). SSA countries have, on average, been among the most affected by the situation, as they saw their inflation rates increasing constantly and unpredictably (Emeru, 2020; Musa & Yousif, 2018). Several cross-

sectional empirical studies have been conducted in different years to analyse the factors impacting inflation at the macroeconomic level in these countries. In SSA, inflation is the major problem faced by countries like Somalia, Kenya, Tanzania, Zimbabwe, Brundi, and, most importantly, Uganda (Ayebare, 2019; Maonga, 2022; Warsame et al., 2023).

Empirically, a number of studies, such as (Alehegn, 2021), identify key drivers of inflation in Sub-Saharan Africa, including increased money supply, exchange rate volatility, global commodity prices, and structural constraints like low agricultural productivity. Political instability and high external debt further exacerbate inflation, highlighting the need for a balanced approach to monetary, fiscal, and structural reforms. Similarly, (Nsafoah et al., 2024) use an empirical panel data approach to analyze post-COVID-19 inflation drivers in sub-Saharan Africa. Their study finds that inflation is influenced by factors such as currency depreciation, rising public debt, global commodity price surges, and disrupted supply chains, suggesting policy focus on stabilising exchange rates and reducing debt. (Melaku, 2021) employs a systematic review method, analyzing multiple econometric models from existing studies in sub-Saharan Africa to identify inflation determinants. Key drivers identified include increased money supply, exchange rate volatility, global commodity prices, and structural constraints. The review underscores the importance of monetary policy and structural reforms to curb inflation effectively.

Similar to other Sub-Saharan nations, Ethiopia has faced persistent inflationary challenges. Ethiopia's inflation crisis has reached alarming levels, with rates exceeding 30% at times since 2014 (Bane, 2018). This persistent inflation affects various sectors, including food, housing, and transportation, significantly impacting the cost of living (Kuma & Gata, 2023). The scope of this crisis encompasses urban and rural populations, disproportionately affecting vulnerable communities and exacerbating poverty. Moreover, the inflationary pressures challenge government policies aimed at economic reform and stability, highlighting the urgent need for comprehensive monetary and fiscal strategies to address the underlying causes and restore economic equilibrium in the country. The widespread impact of inflation poses a serious threat to Ethiopia's overall socio-economic development (Fufa & Legese, 2020).

Several studies have attempted to address the underlying macroeconomic determinates of inflation in Africa, particularly in Ethiopia. For instance, research conducted by (Abate, 2020; Kahssay, 2017; Kerorsa, 2023) also investigated determinants of inflation in Ethiopia using the ordinary least squares technique. They discovered that many important variables that cause the differences in the inflation rates include public spending, exchange rate, money stock, and food production. Worthy of note is the fact that while money supply expansion increases the amount of money in circulation in the economy or expected to circulate in the economy, it increases inflation because more money is turned over in trade without a corresponding increase in the achievable purchasing power relative to goods and services.

The studies by (Abate, 2020; Melaku, 2020; Tolasa et al., 2022) provide important insights into the macroeconomic determinants of inflation in Ethiopia, with each identifying key drivers that influence inflationary trends. (Abate, 2020) discovered that the exchange rate, agricultural output, exchange rate fluctuations, and public expenditure significantly influence Ethiopian inflation. (Tolasa et al., 2022), using the ARDL approach, highlighted that import price, broad money supply, and interest rate play significant roles in shaping inflation dynamics, confirming long-term cointegration between these variables and inflation. similarly, (Melaku, 2020) emphasised the brade money supply, government spending, global oil price, and exchange rate have a positive and significant impact on inflation. Collectively, these works implied that the fiscal policy or money supply, the endogenous factors and exchange rates, and international commodity prices, the exogenous factors, must be recognised as prominent drivers of inflation in Ethiopia; hence, it requires both short-term and long-term policies to combat inflation.

Although there has been significant focus on identifying and quantifying the determinants of inflation in Ethiopia, the majority of the prior studies established regression models using time series data and OLS estimation methods. However, as a standard econometric method, OLS has its deficiencies, particularly when operationalizing the short-run and long-run effects of the determinants of inflation. This research intends to do so by using the autoregressive distributed lag (ARDL) modeling technique that is best suited for analysing both short-run and long-run effects of different macroeconomic variables on inflation.

However, since 2017, Ethiopia has been experiencing a critical inflation problem, including a hyperinflationary state, which has a deep impact on the nation and the people. The need to develop a stronger analytical framework for this situation stems from the fact that the inflation in this country is complex. However, using ARDL modeling, this research not only targets to present an empirical analysis of the determinants of inflation but also tries to draw policy insights into the appropriateness and feasibility of controlling this chronic problem through monetary and fiscal policy tools. By adopting the ARDL model in this paper, this research seeks to offer policymakers relevant information in minimizing inflation risks and developing a stable economy for development. Furthermore, this study brings into the pool of scholarly work regarding inflation in sub-Saharan Africa and is useful for comparison to similar contexts in other countries.

Therefore, the major aim of this study is to identify the key macroeconomic determinants of inflation in Ethiopia, focusing on variables such as global commodity price, public expenditure, exchange rate, real GDP, and money supply.

2. LITERATURE REVIEW

2.1. Theoretical Considerations and Empirical Evidence on Inflation

This section comprises the theoretical frameworks on determinants of inflation in the context of developing countries, particularly Ethiopia. In recent times, different theories have been proposed depending on the theoretical point of view, and we will be focusing on the most appropriate and research-proven ones. Some of these are the quality theory of money, structuralism theory, and monetary theory, which are some of the fiscal theories. It is noteworthy that some theories are developed on the basis of the primary concepts of the theories that are described above, while others offer other hypotheses. In the following sections, we explain the theoretical framework of the model in detail, discuss the hypotheses tested in this paper, and briefly discuss the main points of each theory.

2.1.1. Quantity Theory of Money

The quantity theory of money states that the total amount of money in a country's economy determines the price level of that economy, as demonstrated by the equation $MV=PTMV = PTMV = PT$, where M is the total money, V is the rate at which money changes hands, P is the price level, and T is the volume of transactions (Machaj, 2023). As the third reason for influencing the price level, in this theory, we have the money supply if the velocity of this money for carrying out transactions is fixed (Ball, 2017). QTM holds the view that inflation is predominantly a monetary event due to the efforts made by the central banks to reduce inflammation through the conduct of monetary policies. In this case, the QTM (Quantity Theory of Money) holds that inflation is experienced due to the central bank's reluctance to embark on controlling the money supply; it argues that change in money supply always leads to change in the price level in proportion to the variation (Castañeda & Cendejas, 2023). This theory has served to explain the tendencies of inflation, most especially where there is an establishment of rapid growth in the unit of money.

2.1.2. Monetarist Theory

Monetarists are economists who promote monetary policy as a more effective instrument for stabilizing the economy than fiscal policy, particularly regarding prices. According to them, an increase in the money supply beyond the rise of actual output results in inflation (Johnson, 1972). Monetarists argue that inflation results from excessive growth in the money supply relative to economic output. Consequently, they assert that "inflation is invariably a monetary phenomenon resulting from a more accelerated increase in the money supply than in overall output." According to (Friedman & Schwartz, 1963), price is primarily (but not solely) influenced by money supply in both the short and long run, whereas money supply impacts output only in the short run (Johnson, 2013). They contend that regulating the money supply is essential for preserving price stability and oppose interventionist fiscal policies, promoting a consistent and foreseeable increase in the money supply that corresponds with long-term economic growth. Monetarism has significantly shaped central banking policies, resulting in an increased emphasis on managing inflation via monetary policy instruments, including interest rates and open market operations.

2.1.3. Structuralism Theory

Structuralist theory emphasizes certain structures that cause inflation in developing countries, especially in sub-Saharan Africa. This theory assumes that structural factors inherent in these economies, including most notably institutional weaknesses, import dependency, reliance on agricultural market imperfections, supply-side constraints, and external vulnerabilities, primarily cause inflation (Canavese, 1982). Structuralists opine that inflation may originate from structural factors like physical constraints in the production processes, weak transportation and communication networks, and unexpected events taking place in the global economy (Kim, 2024). According to structural economists, a set of radical economic reforms should be implemented to help deal with these structural problems and curb inflation. This perspective is of particular relevance, especially in sub-Saharan countries, as is the case with Ethiopia, where inflation is not only driven by monetary factors but also driven more by structural issues, including overdependency on primary commodities and exports, weak institutions, constrained supplies, or import dependency.

2.2. Review of Empirical Studies

Following recent advances in econometrics techniques, the amount of empirical studies studying the relationship between institutions and growth has expanded dramatically in recent decades. This study includes selected most relevant and recent empirical evidence from developing countries and Ethiopia about how macroeconomic variables affect inflation.

2.2.1. Studies on Developing Countries

Using empirical evidence from African countries, the results of the research show that inflation is brought about by monetary, fiscal, and structural factors unique to the African economy. Several studies of SSA show that fluctuations in exchange rates,

government expenditure, and supply-side factors are key to inflation. For instance, (Alehegn, 2021) investigated and systematically reviewed the key determinants of inflation in SSA. He found that currency depreciation was a major cost-push factor, not only because most imported goods are expensive this year. Higher government expenditure unsupported by revenue usually implies inflation since most governments worldwide work towards minimizing their fiscal deficits, more so in countries with high fiscal deficits. (Melaku, 2021) also examined determinants of inflation in East Africa using the ordinary least squares method. They reveal that agricultural productivity constraints are a major determinant of inflation—an aspect that is structural given the region's agriculture-based economy. Fluctuations in the supply chain, extended climate change, and inadequate structural facilities also constrain supply, leading to food and associated inflation volatility.

A study by (Makena, 2020) investigates the determinants of inflation in Zimbabwe, a dollarised economy that understands how macroeconomic factors affect inflation. In this study, using the econometric analysis, it is revealed that import prices, money supply, and exchange rates are the significant determinants of inflation in Zimbabwe. Fluctuating exchange rates are considered relevant to inflation because most of Zimbabwe's imports are priced in the U.S. dollar, and local currency is also volatile. Also, in the light of the structure of the model, an increase in money supply has pronounced effects on inflation, thus supporting the factual evidence that when dollarization has taken place, liquidity expansion fuels or amplifies inflation. The study also indicates that import prices make a significant contribution given the fact that imports account for a major chunk of Zimbabwe's consumption basket; hence, any shift in global prices affects the inflation rate. The study concludes that in a dollarized economy such as Zimbabwe, the management of the exchange rate, alongside controlling the supply of money, replenishes the key approach to combating inflation.

In African countries, studies also indicate that both domestic and external factors influence inflation. (Charles et al., 2022) in Nigeria investigated the determinates of inflation; they found that exchange rate depreciation, broad money supply, and fiscal policy decisions have a significant role in inflationary trends. Furthermore, these studies hint at the quality of institutional frameworks because the absence of a governance structure leads to a spurt in inflation due to policy inconsistencies. In a study conducted by (Christian, 2023) the analysis of drivers of inflation using the ARDL model helps evaluate short- and long-run causality between key macroeconomic variables and inflation in the Democratic Republic of the Congo. The study also presents evidence to show that the major determinants of inflation in the DRC are public expenditure, exchange rate, and money supply. In particular, the paper proves that the money supply has a positive and significant impact on inflation, both in the short-run and long-run regressions.

In recent years, (Madito & Odhiambo, 2018) investigated the key drivers of inflation in South Africa. They employed the ARDL model in order to analyze the short-run and long-run relationship between macroeconomic variables and inflation. The main variables are such as exchange rate, broad money supply, and economic growth rate. Their findings reveal that the findings of the study show that money supply, as well as exchange rate depreciation, has positive and significant effects on inflation in the short run and the long run, while economic growth has negative and significant effects on inflation in South Africa. Nevertheless, by applying the ARDL model, it is shown that government expenditure has a positive effect on inflation, especially in the long run.

Similarly, studies in West Africa, such as those by (Nahoussé, 2019), examine a number of macroeconomic variables that have an impact on inflation in the seven West African countries, and the findings show that some of the most important variables are: This study establishes that money supply, exchange rates, and government spending mainly influence West African countries' inflation rates. Moreover, Nahoussé notes that fluctuations in global oil prices and trade imbalances significantly impact inflation, highlighting the region's sensitivity to global market conditions since most of the countries there import manufactured products.

2.2.2. Empirical Studies on Ethiopia

A study by (Kahssay, 2017) also examined determinants of inflation in Ethiopia using the ordinary least squares method, and the data obtained spans from 1975 to 2014. The research identifies several key factors influencing inflation, including exchange rate fluctuations, agricultural production constraints, and money supply. His research emphasises that monetary expansion plays a significant role in driving inflation, whereas structural challenges, particularly in the agricultural sector, exacerbate price instability. A similar study by (Bedada et al., 2020) analyzed inflation determinants in Ethiopia from 1974/75 to 2014/15 using Johansen's cointegration and vector error correction methods. Findings show that in the long run, real GDP, money supply, and budget deficits have significantly impacted inflation, whereas only the previous year's budget deficit impacts short-run inflation.

The most recent paper, which was undertaken by (Abate, 2020), examines macroeconomic determinants of inflation in Ethiopia using annual data spanning from 1985 to 2018 using the OLS econometric model. The study's findings revealed that the real interest rate, real GDP, and real exchange rate are significant determinants of inflation during the study period, both in the long run and short run. On the other hand, a broad money supply affects inflation only in the long run, while gross

domestic savings are found to have an insignificant impact on price growth both in the short run and long run. The study, however, excludes important variables considered by other researchers, such as real GDP.

An empirical study was undertaken by (Tolasa et al., 2022) to examine macroeconomic determinants of inflation in Ethiopia. The study employed an ARDL model using annual data for the period 1981–2020. The study's findings revealed that the lending interest rate, real exchange rate, and real GDP are positive and significant drivers of inflation in the long run. On the other hand, population growth, broad money supply, gross national savings, broad money supply, and imports are found to be significant determinants of inflation in the short run. The findings suggest that, among other things, initiatives to reduce the real effective exchange rate and use the broad money supply in productive economic activities, as well as supply-side measures, should be implemented to keep inflation under control in Ethiopia.

Moreover, the recent study conducted by (Emeru, 2020) investigates the major sources of inflation in Ethiopia. The study presented a VAR, co-integration analysis, and the VECM allied with the descriptive analysis. In the short run, the broad money supply, real GDP, the imported inflation of international petroleum prices, and the nominal exchange rate have an insignificant effect on inflation. On the other hand, the nominal exchange rate, interest rate, real GDP, budget deficit, and broad money supply all have significant effects in the long run.

In conclusion, though there are many studies on inflation determinants in Ethiopia, a research void exists for analyzing the compressed factors using the ARDL econometric technique. Since inflation dynamics have changed significantly since 2016 moving from double-digit inflation to a series of hyperinflationary peaks and troughs—the ability to identify macroeconomic drivers here is critical. Most of the prior studies implemented less dynamic models or used less up-to-date data, making them less relevant to current inflationary trends, particularly due to the new macroeconomic policies implemented by the Ethiopian government. Most existing studies have relied on less dynamic models or outdated data, limiting their applicability to the current inflationary landscape shaped by these policy shifts. Therefore, this study employing the structural break and robust ARDL model and the theme autoregressive distributed lag model is expected to fulfill this research gap by capturing not only the short-run equations but also the long-run co-integration relationships of inflation and its determinants in Ethiopia. Therefore, not only has this research updated the empirical data utilizing the ARDL model, but it has also brought policy-relevant solutions to the policymakers managing the persistent inflation menace in the contemporary economic setting and policy environment.

3. METHODOLOGY OF THE STUDY

3.1. Model Specification and Variables

This study investigates the determinants of inflation in Ethiopia from 2003 to 2023, applying ARDL modeling analysis to examine key macroeconomic factors influencing inflation. The model identifies the consumer price index (inflation) as the dependent variable, and independent variables include budget deficit, broad money supply, GDP growth, government expenditure, exchange rate, and import price. This model aims to elucidate how these factors collectively influence inflation in Ethiopia over the specified period, with the ARDL approach determining the relative impact and significance of each factor.

The above regression model was translated into a regression equation as stated below:

$LCPI = \beta_0 + \beta_1 (LBMS) + \beta_2 (LIM) + \beta_3 (LGDP) + \beta_4 (LINT) + \beta_5 (LGOVEXP) + \beta_6 (LEXR) + \beta_7 (LBDEF) + \epsilon$

3.2. Methods of Data Collection and Source of Data

The data used throughout this study is only secondary sources of annual time series data spanning the period of 2003 to 2023, which were obtained from reputable sources such as the International Monetary Fund (IMF), the World Bank (WB), the Ethiopian Central Statistical Agency (CSA), and the Ministry of Finance and Development (MoFD), which provide comprehensive economic indicators relevant to the study.

3.3. Methods of Data Processing and Analysis

The study employed quantitative methods to analyze data collected on the macroeconomic determinants of inflation in Ethiopia. Descriptive statistics were utilized to summarize the quantitative data obtained from various economic indicators. Calculations included mean, median, maximum, minimum, and standard deviation for each variable, such as consumer price index, budget deficit, broad money supply, GDP growth, government expenditure, exchange rate, interest rate, and import price, of each item using SPSS version 21 to perform the necessary analyses. Moreover, for this time series data, employed co-integration techniques based on ARDL modeling to examine the determinants of long-term inflation in Ethiopia.

4. RESULTS AND DISCUSSIONS

4.1. Descriptive Analysis

The descriptive statistics for the variables analysed in this study, encompassing inflation and related economic indicators in Ethiopia from 2003 to 2023, are presented in Table 1. This table summarises key statistical measures, including the minimum, maximum, mean, median, and standard deviation values for each variable.

Table 1: Summery of Descriptive Statistics

Statistics	LCPI	LBMS	LGDP	LGOVEXP	LINT	LIM	LEXR	LBDEF
Mean	16.5111	10.4917	9.3382	8.2766	2.4846	5.6729	2.5836	1.7319
Median	16.2220	11.0170	9.3518	8.4128	2.6213	5.9231	3.2428	1.6503
Maximum	17.8110	11.7279	9.4267	9.1003	3.1028	6.4023	4.5038	2.5124
Minimum	15.000	8.5911	9.2227	7.5329	1.7613	4.9821	0.7981	1.1290
Std. Dev.	0.5000	1.0826	0.0618	0.4803	0.4990	0.6173	1.4831	0.4722

Table 1 shows the results of the statistics for the variables examined in this study, encompassing inflation (LCPI), money supply (LBMS), GDP (LGDP), government expenditure (LGOVEXP), lending interest rates (LINT), imports (LIM), exchange rate (LEXR), and budget deficit (LBDEF). The mean values reveal that inflation averages 16.5 money supply is 10.49, GDP stands at 9.34, government expenditure is 8.28, lending interest rates average 2.48, imports are at 5.67, the exchange rate is 2.58, and the budget deficit averages 1.73. Notably, the money supply (LBMS) and GDP (LGDP) exhibit the highest maximum values, reaching 11.73 and 9.43, respectively, indicating that these variables have seen significant peaks during the study period. Conversely, the minimum values highlight the lowest recorded levels for each variable, with the exchange rate (LEXR) dropping to 0.80, suggesting periods of currency depreciation.

From the above table, we can infer that the standard deviation values indicate variability within each variable. The exchange rate (LEXR) shows the highest standard deviation (1.48), indicating substantial fluctuations and potential sensitivity to external economic conditions.

4.2. Unit Root Test

The analysis is begun where the lag length is determined, and stationarity tests are used to prepare the time series variables for co-integration analysis. Spurious results may occur without a unit root test being conducted. All model variables are made sure to be integrated of order I(0), or I(1) by this test thus enabling the use of bounds testing in the ARDL framework. The ADF and PP unit root tests were used in the study. The Akaike Information Criterion (AIC) was selected for the ADF test for small sample accuracy, and automatic lag selection using Newey-West bandwidth was applied for the PP test. These test results are summarized in the following table.

Table 2: ADF and PP Unit Root Test

Variables	At Level			At First Difference			
Series	Intercept	Intercept & Trend	ADF Unit Root Test	Intercept	Intercept & Trend	Phillips-Perron	
LCPI	1.602	-0.799	-5.351***	-5.800***	-5.204***	1.687	-0.903
LBMS	-0.241	-3.222	-3.998***	-3.911**	-3.785**	-0.586	-2.07
LGDP	2.388	-1.432	-4.989***	-5.242***	-5.137***	2.441	-1.400
LGOVEXP	0.247	-1.802	-5.101***	-4.896***	-4.719***	1.358	-1.682
LINT	-1.231	-2.132	-4.688***	-4.302***	-4.207***	-1.802	-2.455
LIM	0.278	-1.504	-2.202*	-8.934***	-8.799***	-0.066	-1.827
LEXR	-0.481	-2.283	-4.112***	-4.641***	-4.522***	-0.632	-1.883

Note: ** and * indicate level of significance at 1% and 5%.

It has been shown by the ADF and PP unit root tests that all model variables, other than LIM, are non-stationary at their levels. It has been revealed by the ADF test results that, when the first difference is taken at a 5% importance level, stationarity is achieved for all variables except LIM in the intercept-only, and intercept-trend models. In the intercept-trend model, only at the fourth difference does LIM become stationary. These observations are further validated by the PP test which confirms that nearly all variables are integrated of order one, I(1).

4.2.1. Result of Bound Test for Co-Integration

A co-integration bounds test is used to determine whether a long-run equilibrium relationship exists among variables in a

model, particularly in cases where variables may be non-stationary. This test is crucial in analyzing whether changes in one variable have a lasting impact on others, which would imply a stable, long-term connection among them. By applying the bounds test, we can confirm if the variables are co-integrated, meaning they share a consistent relationship over time. This finding enables us to proceed with both long-run and short-run estimations, as co-integration confirms that despite short-term fluctuations, the variables do not diverge indefinitely.

Table 3: Bound test for co-integration

Table: Bounds Co-integration Testing Result		
Null Hypothesis: No long run relationship exists (No level relationship)		
Test Statistic	**Value**	**K**
F-statistic	5.87	**7.12**
Critical Value Bounds	Lower bound	**Upper bound**
Significance	I0 Bound	**I1 Bound**
10%	2.08	**3.23**
5%	2.36	**3.55**
2.5%	2.5	**3.84**
1%	**2.89**	**4.3**

In Table 3, the important values at the 1% importance level are exceeded by the F-statistic value of 5.87. The alternative hypothesis is supported by this result, indicating that a long-run relationship among the variables is suggested. Thus, the null hypothesis of no level relationship is rejected. Strong evidence of co-integration is provided by this finding, allowing both long-run, and short-run relationships to be estimated reliably.

4.2.2.   Diagnostics Testing Result

Before applying any statistical regression analysis, the first step is always to diagnose the presence of model assumptions. Various diagnostic tests used in this study include the Breusch-Godfrey LM test for serial correlation, the Ramsey's RESET test for functional form, the Jarque-Bera for normality and Breusch-Pagan for heteroscedasticity. The recognition or refusal of the null hypothesis in each test results from the p-value of the-test-statistics; if the p-value is less than 5%, the null hypothesis is rejected.

Table 4: Diagnosing testing results for ARDL Model

Test Type	Null Hypothesis (H_0)	Alternative Hypothesis (H_1)	Test Used	F-statistics (p-value)	Decision (P ≥ 0.05)
Serial Correlation	No serial correlation	Serial correlation	Breusch-Godfrey Serial Correlation LM Test	0.045 (0.83)	Accept H_0
Homoscedasticity	Homoscedastic	Heteroscedastic	Breusch-Pagan Test	1.32 (0.27)	Accept H_0
Omitted Variable	No omitted variable	Omitted variable	Ramsey RESET Test	1.75 (0.25)	Accept H_0
Normality of Residuals	Residuals are normally distributed	Not normally distributed	Jarque-Bera Test	1.15 (0.61)	Accept H_0

As shown in Table 4, the diagnostic tests conducted on the estimated ARDL model confirm that the model meets all necessary assumptions. The serial correlation test shows no presence of serial correlation, with a p-value of 0.83, well above the 0.05 significance threshold. The Breusch-Pagan test for heteroscedasticity indicates homoscedasticity, with a p-value of 0.27, suggesting that the error variance remains constant. Additionally, Ramsey's RESET test, with a p-value of 0.25, suggests no omitted variable bias in the model. Lastly, the Jarque-Bera test confirms normally distributed residuals, with a p-value of 0.61, which also exceeds the 0.05 significance level. Overall, the model is statistically sound, having successfully passed all key diagnostic tests.

4.2.3. Stability of the Model

Following the short-run and long-run estimations, model stability is checked. Based on these results, the constancy of the parameters of the long-run and short-run form is checked using CUSUM and CUSUMSQ. These tests enable the identification of whether the parameter coefficients vary in a systematically or abruptly manner or not. The null hypothesis which postulates parameter instability is accepted when the blue line crosses the red critical line without going back to the upper critical line. On the other hand, if the cumulated sum stays in the lower and upper critical lines then the null hypothesis is rejected signifying it that the parameters are stable in the long but not in the short run.

Figure 1: Model stability testing results
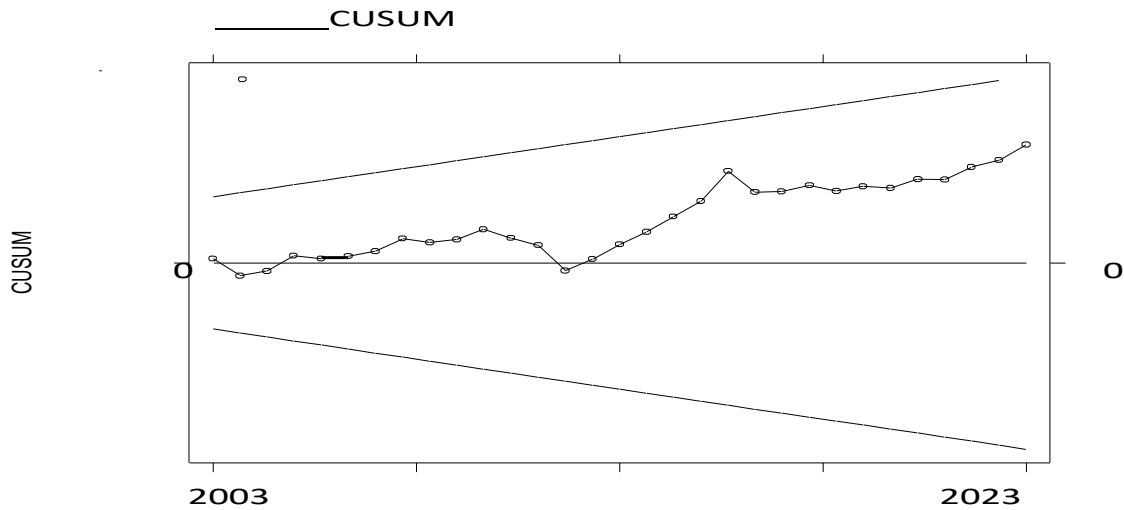
Figure 2: CUSUM of Squares for model stability test
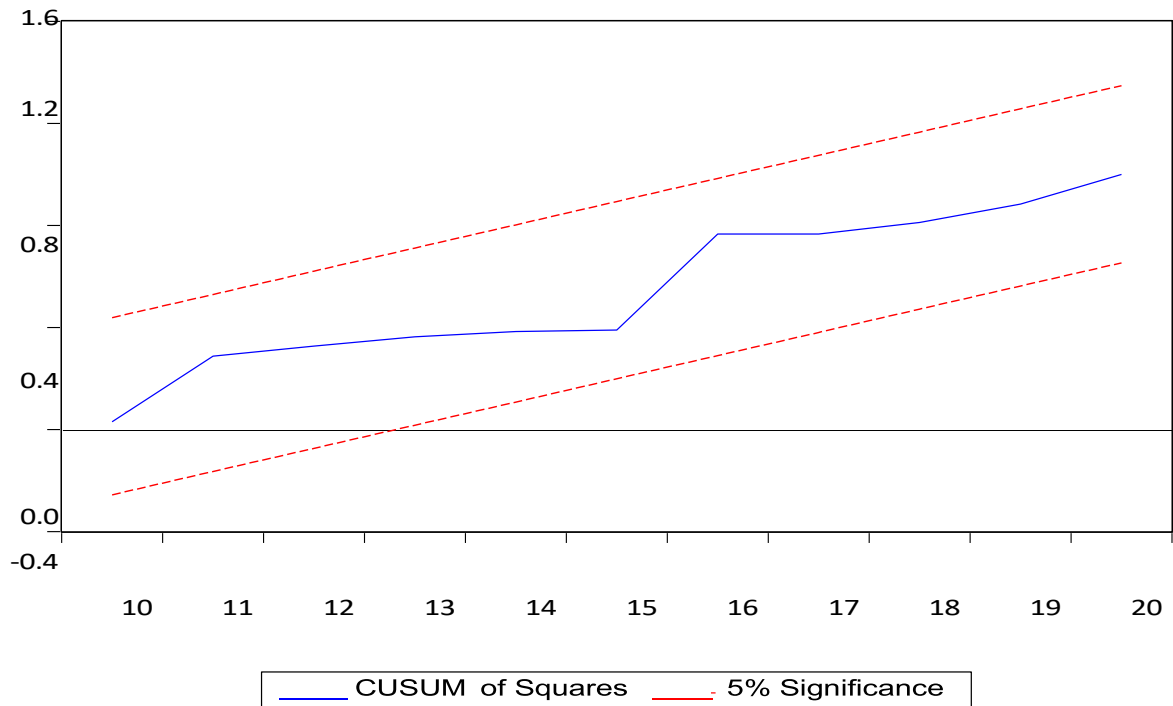
Using the CUSUM, the stability of the model parameter is analyzed and this is presented in the first and second Stata data graph. As shown in figure 1, the CUSUM chart is within critical limits which show that the model is stable with no flunctuations. Same to the outcome of CUSUM of squared residuals (CUSUMSQ) test, the plots of the residuals involved do not violate the lower and upper boundary limits. Moreover, this finding also carrying an implication that there is no presence of structural breaks and therefore in the long run the coefficients of the model are constant. Figure 1 and 2 demonstrate that the estimated model meets the stability condition, as all roots lie within the significance level, indicating a stable model.

4.3. Long Run ARDL Model Estimation

Given that real inflation and its determinants are cointegrated, we proceed to estimate the long-run parameters of the ARDL model. The results of this estimation are presented in the table below:

Table 5: Long Run Coefficients Co Integrating Equation

Variables	Coefficients	Std. Error	t-statistics	P-value
LBMS	0.5022	0.0501	10.022***	0.000
LEXR	1.1322	0.0455	24.876***	0.000
LGDP	-0.4124	0.1243	-3.317**	0.002
LGOVEXP	0.2785	0.0857	3.250**	0.003
LIM	0.3301	0.1012	3.261**	0.003
LBDEF	0.4987	0.0914	5.455***	0.000
LINT	-0.2674	0.0809	-3.305**	0.002
N(obs)	37			

Note: The dependent variable is DINFI*t* over the sample period 2012-2023. The asterisks ***, ** and * marks statistical significance of coefficients at, 1, 5 and 10 percent level of significance, respectively

Table .5 presents long-run result of ARDL model illustrate the significant determinants of long-term consumer price index (inflation. The broad money supply (LBMS) therefore confirms high positive effect on inflation with a coefficient of 0.5022, t-statistic of 10.022, p-value of 0.000 hence, reject the null hypothesis at 1% significance level. This means that expansion in the total money stock is in a causative relationship with inflation rates. Similarly, the exchange rate which statistically has a strong positive effect on inflation with the coefficient equaled to 1.1322, the t-statistic equals 24.876 and p- value equals 0.000, which also confirms the effect of fluctuations in the exchange rate on the inflation process.

Table 5 provides information on the determinants of long-run inflation and suggests that the government expenditure is also positively correlated with inflation, reflected in a coefficient of 0.2785, a t-statistic of 3.250, and a p-value of 0.003, signifying a significant impact at the 5% level. This indicates that heightened government spending can further exacerbate inflationary pressures. Similarly, the imports rate shows a positive and significant effect on inflation, with a coefficient of 0.3301, a t-statistic of 3.261, and a p-value of 0.003, suggesting that higher import levels may contribute to rising inflation. Moreover, the budget deficit reinforces this trend, revealing a significant positive effect on inflation, with a coefficient of 0.4987, a t-statistic of 5.455, and a p-value of 0.000. This highlights the budget deficit's role as a contributing factor to inflationary dynamics.

On the other hand, the coefficient estimate of real GDP growth is negative (-0.4124) and statistically significant with the t-statistic of -3.317 and p= 0.002 hence establishing a negative relation with inflation. The implication of this is that greater GDP growth can play a moderating role in the level of inflationary pressures in the economy, and may in fact provide stability to the growth environment. Similarly, interest rate has a negative coefficient of -0.2674 and it is statistically significant with t-statistic of -3.305 and p-value of 0.002 for the argument that increased interest rate has a depressing effect on inflation.

4.4. The Short Run ARDL Model Estimation

Within the multiple time series framework for the short-run empirical analysis, the error correction model (ECM) is perhaps the most commonly employed technique for the analysis of data with co-integrated, that is, with non-stationary stochastic trends. The term error correction indicates that the deviation from long-run equilibrium in the previous period affects the short-run behaviour of the model. Therefore, the ECMs give some measure of how fast the dependent variable; in this case the general inflation rate, moves back to the equilibrium having been affected by other variables. The results of the short-run model estimation are summarized in the following table.

Table 6: The Determinants of Short-Term Inflation Estimation Result

Variables	Coefficients	Std. Error	t-statistics	P-value
D(LBMS)	0.5022	0.0501	10.022***	0.000
D(LEXR)	1.1322	0.0455	24.876***	0.000
D(LGDP)	-0.4124	0.1243	-3.317**	0.002
D(LGOVEXP)	0.2785	0.0857	3.250**	0.003
D(LIM)	0.3301	0.1012	3.261**	0.003
D(LBDEF)	0.4987	0.0914	5.455***	0.000
D(LINT)	-0.2674	0.0809	-3.305**	0.002
ECM(-1)	-1.0245	0.1521	-6.735***	0.000
N(obs)	37			

Note: The dependent variable is DINFI_t over the sample period 2012-2023. The asterisks ***, **, and * mark the statistical significance of coefficients at the 1, 5, and 10 percent level of significance, respectively.

The result from the error correction model (ECM) in Table .6 reveals that the broad money supply has a positive and highly significant effect on inflation, with a coefficient of 0.50, a t-statistic of 10.02, and a p-value of 0.000, indicating significance at the 1% level. Similarly, the exchange rate (LEXR) is positively associated with inflation, showing a coefficient of 1.13 and a very high significance level (t = 24.88, p = 0.000). Government expenditure also exerts a positive and statistically significant influence on inflation, with a coefficient of 0.28, a t-statistic of 3.25, and a p-value of 0.003, all of which are significant at the 5% level. Imports rate follow a similar trend, contributing to inflation with a coefficient of 0.33, t-statistic of 3.26, and a p-value of 0.003, also significant at the 5% level. Furthermore, the budget deficit is positively related to inflation, with a coefficient of 0.50, a t-statistic of 5.46, and a p-value of 0.000, underscoring its strong inflationary effect at the 1% significance level.

On the other hand, the interest rate is deemed to have negative effects on inflation, although the coefficient is statistically insignificant (-0.27, t = -3.31, and p = 0.002) if inflation slows down at the 5% significance level through the effect of a high interest rate. The error correction term (ECM) in the long-run equation has a coefficient estimate of -1.02 and is significant at the 1% level (t = -6.74, p = 0.00). This suggests a high speed of return to equilibrium each time there are shocks. Consequently, empirical findings suggest that factors such as government spending, exchange rate, budgetary deficits, imports, and broad money are influential for inflation while interest rates can be influencingly used as modulating factors.

5. CONCLSION AND RECOMMENDATIONS

5.1. Conclusion

The main objective of this study was to analyze the determinants of inflation in Ethiopia using annual time series data from 2003–2023. Considering the effects of structural change in Ethiopia's economy, especially during the last seven years of the launch of economic reforms and trade liberalization initiatives, an econometric model was constructed and estimated using the co-integration techniques based on ARDL modeling. The results of ADF and PP unit tests reveal that all variables in the model, except for LIM, are non-stationary at level. However, the results of the ADF test reveal that all variables except for LIM become stationary after the first difference, integrated of order one (I(1)). This indicates that the series exhibits mixed orders of integration, I(1) and I(0), thereby rendering the ARDL methodology suitable for application to the specified time series.

In the long run, the results reveal that the exchange rate, imports, budget deficit, public expenditure, and broad money supply all exhibit positive and significant coefficients for inflation, indicating that increases in any of these variables lead to higher inflation levels. On the other hand, interest rates and real GDP growth demonstrate a negative relationship with inflation, suggesting that higher GDP growth and interest rates may effectively mitigate inflationary pressures.

In the short run, the findings further reinforce many of the long-run results, as the exchange rate and broad money supply have as significant positive influences on inflation. This observation aligns with the idea that expansionary monetary policy can lead to inflationary outcomes. Moreover, the significant positive effect of imports on GDP highlights the interplay between trade dynamics and inflation fluctuations. Moreover, the budget deficit exhibits a negative effect on inflation, suggesting that effective management of fiscal imbalances can contribute to lower inflation rates in the short term.

5.2. Recommendations and Policy Implications

Based on the findings, this study recommends a multi-pronged approach to curb inflation in Ethiopia through effective fiscal, monetary, and trade policies. In order to mitigate this position, a high level of money supply should be attended to by sound monetary policy approaches and controls by the National Bank of Ethiopia so as to contain the inflationary effects of a high

money supply. This approach would be achieved by fine-tuning the broad money by eventually controlling monetary policies like interest rates. Together with the growth of money control, one can predict the tendency towards an inflationary spree and ensure the main goal of setting the price level in the long run. However, it will ensure that efforts are made not only to stabilise the inflation rate but also to contribute to enhancing the predictability of the economic environment by providing credible support to the longer-run steady economic growth and by sustaining the public's confidence in the monetary system.

Exchange rate sophistication is relevant since it controls one of the leading indicators: inflation. The government should follow the rate of depreciation of currency effectively to prevent inflationary consequences emanating from fluctuations in exchange rates. A policy to gradually depreciate or appreciate the foreign exchange rate, with policies aimed at cutting the dependence on imported goods, can help contain pass-through in its pursuit of inflation. Through actions to steady the exchange rate and promote home production, the government can develop an economy that is less sensitive to foreign prices, which, in turn, stimulates the process of long-term price stability and overall economic protection.

In order to check inflation and reduction of the fiscal deficit problem in spending, only the betterment of fiscal discipline is required. Efficient investments in capital equipment and workforce resources can solve the inflation problem and, at the same time, foster sustainable economic development. Besides, prudent implementation of fiscal measures that improve tax competence and boost the level of budget openness would curb the inflationary effects of the budget deficit.

High levels of imports increase the inflation rate, and therefore, policies that support local production and reduce import dependency must be exercised. The support of local industries will minimize demand for imported products, besides pulling down the vulnerability to inflation fueled by high import prices in Ethiopia.

To effectively address inflation through the synchronization of fiscal and monetary policies, the demand-driven inflation focus needs to be addressed by policymakers in Ethiopia. A balanced approach is required for sustainable inflation control in managing exchange rates, fiscal deficits, and money supply within the macroeconomic framework. Economic stability is encouraged and long-term development is supported by implementing these policies.

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TURKIYE ON THE GROWTH-DEVELOPMENT AXIS: AN EMPIRICAL EXAMINATION OF THE RELATIONSHIP OF INDUSTRY-FOREIGN TRADE

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ABSTRACT

Purpose- This research examines the interplay between the industrial sector and foreign trade in Türkiye, emphasizing their significance in fostering the nation's economic progress and development. By analyzing this dynamic interaction, the research provides insights into Türkiye's economic trajectory toward sustainable development.
Methodology- The analysis employs advanced stationarity and cointegration tests, including the Lee-Strazicich (2003), Narayan-Popp (2010), and Carrion-i-Silvestre et al. (2009) unit root tests, as well as the Hatemi-J (2008) and Maki (2012) cointegration tests.
Findings- The results reveal that industry and foreign trade were cointegrated during the 1923–1979 period, but no such relationship was identified post-1980. Between 1923 and 1979, a 1% growth in exports was associated with a 0.38-unit increase in the share of industry within GDP, whereas a 1% rise in imports resulted in a 0.24-unit reduction in the same metric.
Conclusion- The findings suggest that Türkiye should adopt a development-focused, planned economic system and prioritize export-oriented industrialization policies. This study is distinctive in its use of industry/GDP data, contributing a novel perspective to the literature.

Keywords: Development, economic growth, Industry-to-GDP share, export and import dynamics.
JEL Codes: F14, F43, O11, O14

1. INTRODUCTION

After the destruction in the Second World War, the countries started an intensive development effort with the industrial move. It is seen that foreign trade strategies play a key role in these intensive development moves. In developing countries, exports often serve as a foundation for certain developmental initiatives, while imports play a crucial role in others, particularly in fostering economic development. For instance, the importation of capital goods and advanced technologies can significantly contribute to the modernization and expansion of an economy. By acquiring cutting-edge technologies, a country can enhance its productivity and competitiveness, paving the way for sustainable economic growth. Additionally, the import of essential raw materials or intermediate goods, which may not be available domestically, is vital for supporting the development of specific industries. Such imports enable local enterprises to produce goods and services more efficiently and at competitive standards. Ultimately, these activities aim to elevate social welfare and overall economic well-being.

Developing countries (DCs) are nations undergoing significant economic growth and transformation. These countries typically exhibit characteristics such as high population growth, moderate income levels per capita, and deepening integration into the global economy. Regions like Asia, Latin America, and Africa are home to many DCs. Prominent examples of emerging economies include China, India, Brazil, Russia, South Africa, Mexico, Indonesia, Türkiye, and Thailand. Recent economic progress in these nations has been fueled by factors such as globalization, increased foreign direct investment, and the expansion of their middle-class populations. However, emerging economies also face significant challenges such as corruption, political instability, inadequate infrastructure, and a lack of skilled labor. Despite these challenges, the

growth potential of emerging economies continues to attract investors and businesses from around the world.

The concepts of development and economic growth were used interchangeably until the middle of the 20th century. However, the concept of growth, which explains quantitative changes, is an expression of GDP growth. The concept of development, which explains both quantitative and qualitative changes, includes social changes and renewals as well as economic changes. In addition, *growth* is a concept related to developed and underdeveloped countries. *Development*, on the other hand, relates to underdeveloped or developing countries. Therefore, development is a much broader concept that includes growth and cannot be expressed in monetary terms (Ersungur, 2009:19-20). In this context, it is of vital importance to consider the development phenomenon from a socio-economic perspective, rather than reducing the discussions only to economic growth (Todaro, 2000:17). The negativities experienced especially after the 1970s show that development is a multifaceted event that encompasses all of life, related to culture, politics, and especially the social structure (Brainard, 1975:154). The foundations of the development phenomenon, which is an international problem (Savaş, 1986:183), were laid for the first time in 1776 with Adam Smith's Wealth of Nations (Todaro, 2000:7).

Developing countries (DCs) are nations undergoing substantial economic progress and structural transformation. They are typically defined by features such as elevated population growth, moderate income per capita, and a growing connection to the global economic system.

Emerging economies are predominantly situated in regions like Asia, Latin America, and Africa. Prominent examples include China, India, Brazil, Russia, South Africa, Mexico, Indonesia, Türkiye, and Thailand. These nations have witnessed significant economic expansion in recent years, fueled by globalization, rising foreign investments, and the emergence of a growing middle class. However, emerging economies also face significant challenges such as corruption, political instability, inadequate infrastructure, and a lack of skilled labor. Despite these challenges, the growth potential of emerging economies continues to attract investors and businesses from around the world.

After the destruction in the Second World War, the countries started an intensive development effort with the industrial move. The concepts of development and growth were used interchangeably until the middle of the 20th century. However, the concept of growth, which explains quantitative changes, is an expression of GDP growth. The concept of development, which explains both quantitative and qualitative changes, includes social changes and renewals as well as economic changes. In addition, growth is a concept related to developed countries. Development, on the other hand, relates to underdeveloped or developing countries. Therefore, development is a much broader concept that includes growth and cannot be expressed in monetary terms (Ersungur, 2009:19-20). In this context, it is of vital importance to consider the development phenomenon from a socio-economic perspective, rather than reducing the discussions only to economic growth (Todaro, 2000:17). The negativities experienced especially after the 1970s show that development is a multifaceted event that encompasses all of life, related to culture, politics, and especially the social structure (Brainard, 1975:154). The foundations of the development phenomenon, which is an international problem (Savaş, 1986:183), were laid for the first time in 1776 with Adam Smith's Wealth of Nations (Todaro, 2000:7). Along with the studies of economists such as David Ricardo, Robert Malthus, Karl Marx on development economics, Adam Smith and John Stuart Mill made important contributions. Development economics is a science that emerged during the Second World War (Krueger, 1997:1).

It is seen that foreign trade strategies play a key role in intensive development moves in DCs. Especially in Developing Countries (DCs), it is seen that exports form the basis of some development moves and imports in others. The main purpose of all of them is to increase social welfare. Foreign trade plays a crucial role in the economic development of developing countries by facilitating the exchange of goods and services across borders. Developing countries typically specialize in the production of commodities such as agricultural products, minerals, and natural resources, which they export to developed countries in exchange for manufactured goods and other products that they cannot produce domestically. A key challenge facing the foreign trade sector in developing countries is the insufficient infrastructure and resources needed to support and sustain trade activities. This includes issues such as inadequate transportation networks, limited access to financing, and a lack of skilled labor. In addition, developing countries often face stiff competition from established players in the global market, which can make it difficult to secure favorable trade terms. Despite these challenges, the foreign trade sector in developing countries holds significant potential to promote economic growth and development.

Overall, the stance of emerging economies in the global space has been one of growth and development, with a focus on increasing their presence in international trade and building their manufacturing capabilities. While challenges remain, many of these countries are making significant progress in their efforts to become major players in the global economy.

Along with the studies of economists such as David Ricardo, Robert Malthus, Karl Marx on development economics, Adam Smith and John Stuart Mill made important contributions. Development economics is a science that emerged during the Second World War (Krueger, 1997:1).

Growth, Development and Foreign Trade - It is claimed that foreign trade is effective in growth, development in technology, and increase in welfare (Young, 1991: 369); foreign trade is effective in the development process (Salvatore, 1999:317). It is seen that the studies questioning the relationship between the variables started in the 19th century. In the 20th century, development began to be identified with industrialization. By discussing the roles that foreign trade should undertake to achieve industrialization, a trend towards the use of foreign trade as a tool in the industrialization strategies of developing countries has begun (Krueger, 1990:104-105). Income rises and poverty rates decline as a result of development. Although it is obvious that growth, development, and international trade are strongly correlated, there is ongoing disagreement on the existence and direction of this relationship. According to classical economic theory, foreign trade affects economic development positively. Among the later economists, the debate continues whether foreign trade is the engine or the servant of development. Several economists, including Cairncross, Myrdal, Nurkse, Prebisch, and Singer, have emphasized the negative impact of foreign trade on the economic growth of emerging nations (Doru, 2013: 69). Research exploring the relationship between economic growth and international trade can generally be classified into four main categories:

Exports-led Growth (ELG) - Empirical studies have examined the impact of exports on economic growth, often referred to as *the Export-led Growth (ELG) Hypothesis*. *The ELG Hypothesis* is a development strategy that extends beyond developing countries and encompasses all nations, aiming to enhance production capacity by emphasizing foreign exports (Panta et al., 2022). Researchers such as Balassa (1978), Fajana (1979), Onafowora et al. (1996), Al-Yousif (1997), Bahmani-Oskooee and Oyolola (2007), Narayan et al. (2007), Rani and Kumar (2018), Hagemejer and Mućk (2019), and Arteaga et al. (2020) have provided empirical evidence supporting *the ELG Hypothesis*. Additionally, Raghutla and Chittedi (2020) concluded that *the ELG Hypothesis* holds true for Brazil and Russia.

Imports-led Growth (ILG) - *The Import-led Growth Hypothesis* suggests that imports is a key driver of economic growth. According to this theory, long-term economic growth is fostered through imports, particularly by gaining access to intermediate goods and foreign technology (Coe & Helpman, 1995), as well as by transferring growth-enhancing research and development (R&D) expertise from developed to developing countries (Lawrence & Weinstein, 1999; Mazumdar, 2001). A significant paradigm shift occurred in the 1970s, moving from an Export-led Growth model to an Import-led Growth model. Raghutla and Chittedi (2020) found that *the Import-led Growth (ILG)* Hypothesis holds true for Russia.

Growth-led Exports (GLE) - In contrast to *the Export-led Growth (ELG) Hypothesis, the Growth-led Exports (GLE) Hypothesis*, which is also supported by neoclassical trade theory, posits that an increase in economic growth can lead to higher exports through the realization of economies of scale and a reduction in production costs (Bahmani-Oskoee, 2009). Bhagwati (1988) argues that a rise in GDP typically results in an expansion of trade. A study by Raghutla and Chittedi (2020) found that *the GLE Hypothesis* holds for India, South Africa, and China.

Growth-led Imports (GLI) - The concept where imports drive growth is referred to as *the Import-led Growth (ILG)* strategy. Raghutla and Chittedi (2020) found that *the Growth-led Imports (GLI) Hypothesis* holds for Brazil, China, India, and South Africa.

Development, Planning, and the Planning Period in Turkiye - Preparations are done before acting to accomplish a specified goal is the general definition of planning (TODAIE, 1961). Long-term plans are frequently used by developing or undeveloped nations (Husted&Melvin, 2003:256). The notion that trading with other countries contributes significantly to development led to the creation of development plans based on foreign commerce. According to Saatçioğlu (2001:59), the welfare level can be increased. To achieve this, all development plans aim to transition from an agriculture-based economic structure to an industry, advanced technology, and capital-intensive economic structure (Seyidoğlu, 2001:597). In Turkiye, with the 1961 Constitution, it was decided to carry out the development within the framework of a plan (Hiç, 1993:70). The years 1960-1963 are transition periods, and the planned development period started in

1963. In this process; First Five-Year Development Plan (FYDP) (1963-1967), Second FYDP (1968-1972), the Third FYDP (1973-1977), Fourth FYDP (1979-1983) were formed. The rising trend of planning was realized in Turkiye thanks to the establishment of the DPT and the First Development Plan. While the first cadre was developmental, leftist, and populist at the beginning, then it was shaped in the line of developmentalism, which was shaped in line with class interests, and the Fourth FYDP failed as a result of the Republic People's Party (Cumhuriyet Halk Partisi, CHP)'s withdrawal from the political administration (Boratav, 2010:370-371). Along with this, "The January 24 decisions and the transition to neoliberalism through the September 12 regime have also removed the "developmental" features of planning" (Boratav, 2010:370-371). And also two factors that prevented the anticipated goals from being achieved: the oil crisis and the escalating foreign deficit. These factors had a negative impact on the economy, and one of the consequences was that foreign trade could not play the key role that was expected from it in the industrialization process. This study's goal is to determine whether there is a connection between international commerce and the process of development, which includes the transition to industry, cutting-edge technology, and capital-intensive economic structure, as predicted in earlier research in Turkiye. The study's treatment of the industry-to-GDP ratio as a measure of industrialization will take a different approach from earlier empirical studies that used very different metrics, and it will be the topic of numerous analyses employing import and export data. This study, which takes into account the contribution of industry to Gross Domestic Product (GDP), supports the Export-Led Growth Hypothesis (ELG) and identifies that imports have a negative impact on economic growth. Additionally, it emphasizes the need for Turkiye to transition back to a "developmentalist and populist" planned system for sustainable growth and proposes a strong export promotion policy within the framework of an export-oriented industrialization program. These findings underscore the importance of a comprehensive approach to achieving sustained economic growth in Turkiye.

In this study, the literature on Growth, Development, Foreign Trade, and Planning will be followed by an empirical literature review, and then empirical testing will be conducted. Finally, based on the findings, policy recommendations will be proposed.

In the empirical section, the 1923-1979 period and the post-1980 period will be analyzed separately to investigate the relationship between the variables.

2. EMPIRICAL LITERATURE REVIEW

Studies that empirically contest the link between foreign trade and development and growth will be presented in this section.

Table 1: Literature Summary (Studies Using Development-Specific Indicators)

Researcher	Period/Country	Variables	Methods	Result
Çakmak (1992)	1970-1989, 13 Countries	GDP, Export, Energy, Transportation, Communication, Education.	Least Squares Method (LSM), Granger Causality Analysis	Positive/ Negative
Torres&Mendez (2000)	1973-1995, Colombia	Geography, Infrastructure and Human Capital Variables, Population Density.	Least Squares Method (LSM)	Positive
Aguayo, Exposito&Lamelas (2001)	1990-1999, 22 Countries	Services, Agriculture, Industry, Export.	Least Squares Method (LSM)	Positive
Guisan&Aguayo (2002)	1980-1999, 22 Countries	Export, Education Level, Sectoral Productivity Level and Fertility Rate.	Comparative Analysis	Positive
Guisan&Cancelo (2002)	1960-1997, 25 Countries	Export, GDP, Duration of Education, Price Indicators.	Least Squares Method (LSM) (log-linear model)	Positive
Guisan&Exposito (2002)	1980-1999, 40 Countries	Export, Education Level, Sectoral Productivity Level, and Fertility Rate.	Comparative Analysis	Positive
Aguayo, Alvares&Gardella (2003)	1990-2000, 22 Countries	GDP, Exports.	Least Squares Method (LSM)	Positive

Guisan&Martinez (2003)	1960-2000, Argentina	GDP, Education Level, Imports, Fixed Capital Investments.	Least Squares Method (LSM) (linear and log-linear models)	Positive
Guisan (2005)	1964-2004, 2 Countries	Export, Import, and Education Level.	Least Squares Method (LSM), Granger Causality Test	Positive
Güngör&Kurt (2007)	1968-2003, Turkiye	Export+Import, Import/GDP, HDI, GDP, Education Index.	Johansen Cointegration Test, Error Correction Model	Positive
Dumlupınar (2008)	1981-2005, Turkiye	Foreign Trade/GDP, Education, Health, Transportation, Communication.	Johansen Cointegration Test, Granger Causality Test	Negative
Nourzad&Powell (2003)	1965-1990, 47 Countries	Lots of variables	Panel Regression	Positive

Table 2: Literature Summary (Studies Using GDP as a Growth Indicator) / Foreign Trade-Growth Relationship

Researcher	Period/Country	Variables	Methods	Result
Heller&Potter (1978)	1950 – 1973, 41 Countries	Export, GNP	Spearman Rank Correlation	Positive
Tyler (1981)	1960-1977, 55 Middle-Income Developing Countries	Growth, Increases in Manufacturing Output, Investment, Total Exports, and Exports of Manufactured Goods	With the Cross-Sectional Data, a Production Function Model was also defined and estimated.	Explaining the inter-country variation in GDP growth rates required a consideration of export performance.
Jung&Marshall (1985)	1950-1981, 37 Countries	Exports and Growth	Granger Causality Test	Positive relationship for 4 countries, no relationship for 33 countries
Chow (1987)	1960-1970, 8 newly industrialized countries	Economic Growth and Export Growth	Sims and Granger Causality Tests	Bidirectional in 6 countries, positive for one country, no relationship for one country
Afxentious&Serletis (1991)	1950-1985, 16 Countries	GDP, Exports	Engle-Granger EB, Granger Causality Test	Positive for only two countries
Marin (1992)	1960-1987 USA, Germany, Japan and UK	Productivity and Export Growth Rates	Cointegration and Granger Causality Test	Positive
Dutt&Ghosh (1996)	1953-91, 26 Countries	GDP, Exports	Engle-Granger EB, Granger Causality Test	Positive
Henriques&Sadorsky (1996)	1870-19, Canada	Real Canadian GDP, real Canadian terms of trade, and real Canadian exports.	VAR Model	Growth → Exports
Anwer&Sampath (1997)	1960s-1992, 96 Countries	GDP, Exports	Johansen Cointegration Test, Granger Causality Test	Positive in 20 countries
Thornton (1997)	1850'ler-1945, 6 Countries	GDP, Exports	Engle-Granger EB, Granger Causality Test	Positive
Shan&Tian (1998)	1990:1-1996:12 Shanghai	GDP, total employment, imports, FDI, and gross fixed capital expenditures are all indicators of trade.	Toda and Yamamoto Causality Test	Growth → Exports
Ekanayake (1999)	1960-97, 8 Countries	GDP, Exports	Engle-Granger, Johansen Cointegration Test, Error	Positive Relationship

			Correction Model, Granger Causality Test	
Frankel&Romer (1999)	1985, 63 Countries	Same to the data on bilateral trade presented by Frankel et al. (1995) and Frankel (1997)	OLS t-test	Positive Relationship
Afxentiou&serletis (2007)	1970-93, 50 developing Countries	GNP, Export, Import	Engle-Granger Cointegration Test, Granger Causality Test	Negative Relationship
Smith (2001)	1950-97, Costa Rica	GDP, Export Investment, Capital, Population	Engle-Granger, Johansen Cointegration Test, HDM, and VHDM	Positive Relationship
Hatemi-J (2002)	1960-1999 Japan	Export and Economic Growth Rates	Granger Causality Test	Exports↔Growth
Dritsakis (2004)	1991-2001, 2 Countries	GDP, Exports	Johansen Cointegration Test, Granger Causality Test	Positive Relationship
Saatçioğlu&Karaca (2004)	1950-2000, Turkiye	GDP, Exports	Engle-Granger Cointegration Test, Granger Causality Test	No relationship between 1950-1980, positive relationship between 1980-2000
Demirhan (2005)	1990-2004, Turkiye	Export, Import, GDP	Johansen Cointegration Test, HDM	Positive Relationship
Karagöl-Serel (2005)	1955-2002, Turkiye	GDP, Exports	Johansen Cointegration Test, HDM	Positive Relationship Cointegrated in the Long Run
Keong et al. (2005)	1960-2001 Malaysia	Real GDP, real exports, real imports, labour force and exchange rate	Granger Causality Test	Exports-Led Growth (ELG) Hypothesis Accepted
Mamun&Nath (2005)	1976-2003, Bangladesh	Economic Growth and Exports	Granger Causality Test	Positive Relationship
Schneider (2005)	1970-1990, 47 countries (19 developed and 28 developing countries)	Trade in high-technology, IPRs and FDI, innovation, and economic expansion	Least Squares Method (LSM)	Positive Relationship
Shirazi-Manap (2005)	1960'lar-2002, 5 Countries	GDP, Exports, Imports	Johansen Cointegration Test Granger Causality Test	Positive Relationship
Özer&Erdoğan (2006)	1987-2006, Turkiye	GDP, Exports, Imports	Johansen Cointegration Test, Granger Causality Test	Positive Relationship
Siliverstovs&Herzer (2006)	1960-2001, Chile	Real capital stock in Chile, the total number of persons employed annually, real imports of capital goods, real exports of manufactured goods, and real exports of primary goods are all non-export indicators.	Granger Causality Test	Positive Relationship
Yaprakli (2007)	1970-2005, Turkiye	GNP, Export	Johansen Cointegration Test, HDM	Positive Relationship Export → Output Level
Kaushik et al. (2008)	1971-2005, India	Gross fixed capital creation, export expansion, export volatility, and economic growth.	Granger Causality Test	Exports-Led Growth (ELG) Hypothesis Accepted
Kurt&Berber (2008)	1989-2003, 1	Total Foreign Trade, Import,	VAR	Positive Relationship

	country	Export, GNP		
Furuoka (2009)	1985-2002, 5 Countries	GDP, Exports	Panel Regression, Panel Cointegration	Regression Pozitive, Cointegration Negative
Altıntaş&Çetintaş (2010)	1970-2005, Turkiye	Lots of Variables	Johansen Cointegration Test, Granger Causality Test	Positive Relationship
Herrerias&Orts (2010)	1964-2004, China	GDP, investment, exports in FOB terms, Chinese economic R&D expenditure, real exchange rate, and USGDP	Johansen Cointegration Test, ECM	Positive Relationship
Shan&Sun (2010)	1987-1996, China	Real exports, real output (GDP), nonagriculture labour, real imports, industrial production index, and real gross capital formation.	Granger Causality Test, ADF, VAR	Bidirectional Causality
Türedi&Berber (2010)	1970-2007, Turkiye	Total Foreign Trade, GDP, Private Sector Loans	Johansen Cointegration Test, Granger Causality Test	Positive Relationship
Ağayev (2011)	1994-2008, 12 Countries	GDP, Exports	Pedroni Cointegration Test, Granger Causality Test	Negative Relationship
Kılavuz&Topçu (2011)	1998-2006, 22 Countries	Exports, Investments, Population, GDP	Panel Regression	Positive Relationship
Lorde (2011)	1960-2003 Mexico	Real GDP excluding exports, real imports, and real exports, real gross fixed capital formation, and annual employment.	Johansen Cointegration Test, ECM	In the long-term Growth-Led Exports (GLE)
Nişancı et al. (2011)	1970-2009, 6 Countries	National Income Per Capita, Import, Export	Johansen Cointegration Test, Granger Causality Test	Positive Relationship
Sandalcılar (2011)	1975-2010, 4 Countries	GDP, Exports	Pedroni Cointegration Test, HDM	Positive Relationship
Tekin (2011)	1970-2009, 18 Countries	GDP, Exports	Granger Causality Test	Positive in only 3 countries
Uddin et al. (2011)	1973-2006 Bangladesh	Industrial Production Index, Exports	Johansen Cointegration Test, ECM, and Granger Causality Test	A reciprocal relationship between exports and growth
Mangır (2012)	2002-2011, Turkiye	GDP, Exports	Johansen Cointegration Test, Granger Causality Test	Positive Relationship
Hüseyni (2012)	1980-2010, Turkiye	Exports, GDP, Capital, Population	Johansen Cointegration Test, Granger Causality Test	Positive Relationship
Alimi&Muse (2013)	1970-2009 Nigeria	GDP, total exports, oil and non-oil exports	Granger Causality Test	Export-led Growth Hypothesis Rejected
Jawaid & Raza (2013)	1980-2010 India	Trade, Growth	ARDL Bound Testing, Granger Causality, Toda-Yamamoto Modified Wald Causality, Variance Decomposition Tests	Trade ↔Economic Growth
Belloumi (2014)	1970-2008 Tunisia	Trade openness, growth, and foreign direct investment.	Granger Causality Test	No Relationship
Machado et al. (2014)	1995-2013 Brazil, China,	GDP per capita, exchange rate, unemployment rates	Non-dynamics panel with threshold	Positive Relationship

	India, and the Republic of South Africa	and interest rate.		
Nosakhare&Iyoha (2014)	1981:01-2010:04, Nigeria	Exports, FDI, exchange rates, and the real gross domestic products.	Johansen Cointegration Test , Granger	Positive Relationship
Sağlam&Egeli (2015)	1999-2013, Turkiye	Export, Growth	Johansen Cointegration Test and Granger Causality Test	Exports ↔ Growth (In the Short-Term), Exports → Growth (In the Long-Term)
Korkmaz&Aydın (2015)	2002:01-2014:02, Turkiye	GDP, Export and Import Unit Value Indexes	Granger Causality Test	Imports ↔ Economic Growth
Hina et al. (2016)	1974-2016 Pakistan	GDP, FDI, inflation, External debt, capital formation, and trade.	ARDL Bounds Test Approach	Positive Relationship
Şerefli (2016)	1975-2014 Turkiye	Growth, Foreign Trade	Granger Causality Test	No causality
Lawal& Ezeuchenne (2017)	1985-2015 Nigeria	Growth, Foreign Trade	Johansen Co-integration Test, Vector Error Correction Model (VECM), Granger Causality Test	According to the findings, there exists relationship between economic growth and international trade in the long run.
Temiz Dinç et al. (2017)	some developing countries, including Iran and Turkiye	Growth, Foreign Trade	Panel Co-integration Method	Foreign trade has a positive impact on economic growth
Altomonte et al. (2018)	1995-2007	Growth, Foreign Trade	Gravity Models	Trade has a positive effect on GDP per capita
Raza et al. (2018)	1974-2011, United Arab Emirates (UAE)	Growth, Foreign Trade	ARDL Bounds Test Approach, Johansen and Juselius Cointegration	Cointegration between trade and economic growth. Exports have (+), but imports have (-) effect on economic growth
Panta et al. (2022)	1965 – 2020, Nepal	Growth, Trade (Exports+Imports)	Cointegration and the Vector Error Correction Model.	There is no evidence that foreign trade supports growth in the long run.

As can be seen in Table 1-2, many different variables were included in the analysis to test the relationship between foreign trade and development and growth. However, in none of them the data related to the industry, which is the engine of growth and development, was used in the analysis. Therefore, this study differs from other studies in the literature and expands the typology.

3.METHODOLOGY

3.1.Dataset and Method

In this study, the share of industry in GDP was used as an indicator of industrialization. Import and export values were used as foreign trade data. Import and export series were included in the analysis with their logarithmic values. The share of industry in GDP data has been compiled from the studies of TURKSTAT (Turkish Statistics Institution) and Gökçen (2013). Export and import data were obtained from TURKSTAT data. Figure 1,2,3 shows the time-path trajectories of the series.

Figure 1: 1923-1979 Period
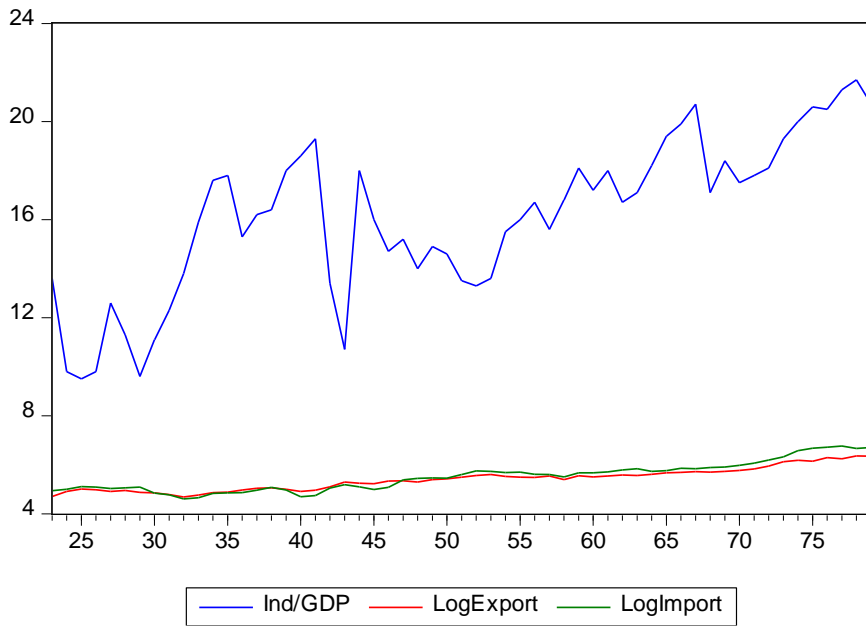
Figure 2: 1980-2021 Period
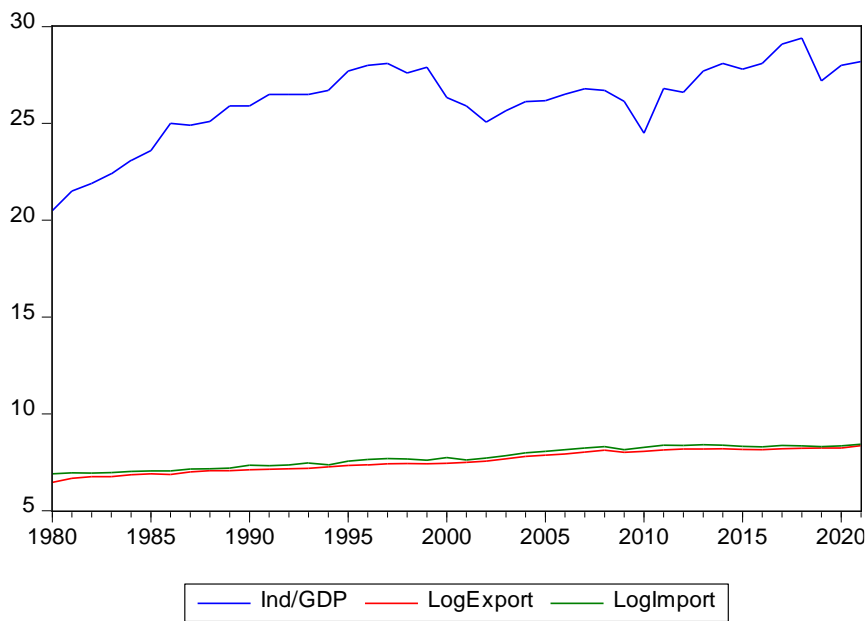
Figure 3: 1923-2021 Period
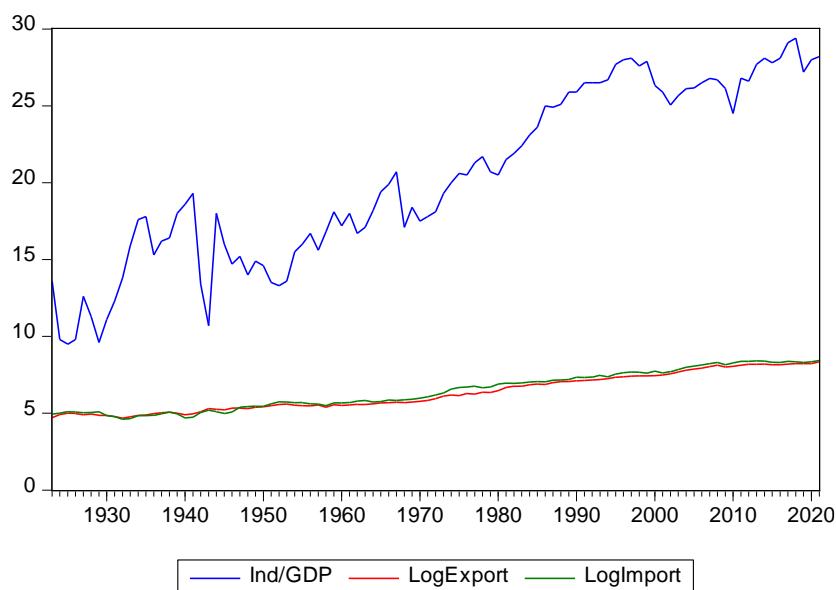
In the study, the Turkish economy is discussed in two sub-periods. The period of 1923-1979 refers to the period when more statist and import substitution industrial policies were dominant. The second sub-period is the post-1980 period (1980-2021), which is considered the time period when more liberal and open economy policies were implemented. In this context, separate analyzes were made for two sub-periods and the relationship between foreign trade and industrialization was investigated.

The method of the study was determined as the Maki cointegration test. According to the concept of cointegration, even if the series analyzed themselves are not stationary, a linear combination of them can be stationary. Series showing such features are called cointegrated (Maddala and Kim, 2004: 34). Granger and Newbold (1974) showed that when regression analysis is performed with non-stationary time series, significant regression estimations can be obtained even if the series is not related to each other. This situation is known as spurious regression. In cointegration analysis, on the other hand, it is possible to obtain significant and non-spurious results with non-stationary time series. This study, it is aimed to investigate the cointegration relationship between export, import, and industrialization for two sub-periods. For cointegration analysis, the series must be stationary at the same rank. In this context, first of all, unit root tests for the variables were applied.

The unit root tests used in the study were determined as unit root tests that take into account structural breaks. In traditional unit root tests such as Dickey-Fuller (1979), Phillips-Perron (1988), KPSS (1992), shocks in time series are assumed to be temporary. However, Nelson and Plosser (1982) demonstrated in their study that shocks can be permanent. Perron (1989) on the other hand showed that if there is a structural break in the time series and the break is not taken into account, the stationary series can be modeled as if they have unit roots. In this study, structural break unit root tests were preferred considering the structural changes in the Turkish economy data. Unit root tests with structural breaks, such as Perron (1989), Zivot-Andrews (1992), consider only one break. In addition, in the Perron (1989) test, the breaking time is determined exogenously. Lumsdaine-Papell (1997) unit root test, which takes into account the two breaks developed to eliminate these shortcomings, does not take into account the structural breaks in the basic hypothesis, but only includes them in the alternative hypothesis. In this case, rejecting the basic hypothesis means rejecting the unbreakable unit root, not the unit root with a structural break. In line with these criticisms, Lee and Strazicich (2003) developed a new unit root test that allows structural breaks in the basic hypothesis and takes two breaks into account. One of the unit root tests used in this study is the Lee-Strazicich (2003) unit root test. The data generation process in the Lee-Strazicich unit root test, which is based on the Lagrange multiplier developed by Schmidt and Phillips (1992), works as follows;

$$Y_t = \delta' Z_t + \varepsilon_t \tag{1}$$

$$\varepsilon_t = \beta \varepsilon_{t-1} + u_t \tag{2}$$

Z_t in the above equations is defined as the vector of exogenous variables and is expressed as follows for Model C used in this study;

$$Z_t = [1, t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}] \tag{3}$$

The dummy variables D_{it} and DT_{it} in the above vector are shown as follows;

$$D_{it} = \begin{bmatrix} t - TB_i, & t \geq TB_i + 1 \ then \\ 0, & otherwise \end{bmatrix} \tag{4}$$

$$DT_{it} = \begin{bmatrix} t - TB_i, t \geq TB_i + 1 \ then \\ 0, & otherwise \end{bmatrix} \tag{5}$$

The regression equations used for the null hypothesis and counter-hypothesis in Model C are as follows;

$$Y_t = \mu_0 + d_1 B_{1t} + d_2 B_{2t} + y_{t-1} + \varepsilon_{1t} \tag{6}$$

$$Y_t = \mu_1 + \gamma t + d_1 D_{1t} + d_2 D_{2t} + \omega_1 DT_{1t} + \omega_2 DT_{2t} + \varepsilon_{2t} \tag{7}$$

In the Lee-Strazicih unit root test, the test statistic is found using the following regression equation. The null hypothesis used for the unit root test is defined as $\emptyset = 0$.

$$\Delta y_t = \delta' \Delta Z_t + \emptyset S_{t-1} + \sum \gamma_i \Delta S_{t-i} + u_t \tag{8}$$

The break dates are determined at the point where the t statistic is minimum. If the calculated test statistic is found to be less than the critical value, the unit root hypothesis cannot be rejected under structural breaks. Since the critical values depend on the breakpoints ($\lambda = TB_i/T$), they are used by the estimated breakpoints (Çil, 2018:314).

Another unit root test used in the study is the Narayan-Poop (2010) unit root test. The test developed by Narayan and Poop (2010) allows for two structural breaks and also deals with the structural break in the unit root hypothesis. Two models, M1 and M2, are used in the test, and separate test statistics are calculated for both models. The following regression models are estimated within the framework of the Narayan-Poop unit root test.

$$d_t^{M1} = \alpha + \beta t + \varphi^*(L)\big(\theta_1 DU'_{1,t} + \theta_2 DU'_{2,t}\big), \tag{9}$$

$$d_t^{M2} = \alpha + \beta t + \varphi^*(L)(\theta_1 DU'_{1,t} + \theta_2 DU'_{2,t} + \gamma_1 DT'_{1,t} + \gamma_2 DT'_{2,t}) \tag{10}$$

In the above equations, $DU'_{i,t} = 1(t > T'_{B,i})$, expresses the structural changes in the constant term while $DT'_{i,t} = 1(t > T'_{B,i})(t - T'_{B,i})$, represents the structural changes in the slope. ($T'_{B,i}$), represents the structural break times. The coefficients θ_i and γ_i express the severity of the structural changes in level and slope. $[\varphi^*(L)]$, ensures that the structural changes in the series occur slowly over time. The test statistics calculated for the M1 and M2 models in the decision process of the test are compared with the critical values obtained by Narayan and Poop (2010). If the calculated test statistic is greater than the critical value, the null hypothesis that the series has unit root cannot be rejected. In other words, it is understood that the series is not stationary.

Another unit root test applied within the framework of this study is Carrion-i Silvestre et al. (2009) is a unit root test that allows up to five structural breaks. Three different models are considered in the Carrion-i Silvestre et al unit root test. Model 0 considers the change in level, while Model 1 takes into account the change in slope. Model 2 models the change in both level and slope. During the testing process, five different test statistics described below were developed.

$$P_T(\lambda^0) = [S(\bar{\alpha}, \lambda^0) - \bar{\alpha} S(1, \lambda^0)]/s^2(\lambda^0) \tag{11}$$

$$MZ_\alpha(\lambda_0) = [T^{-1}\hat{Y}_t^2 - s(\lambda^0)^2](2T^{-2}\sum_{t=1}^{T}\hat{Y}_{t-1}^2)^{-1} \tag{12}$$

$$MSB(\lambda)^0 = [s(\lambda^0)^{-2}T^{-2}\sum_{t=1}^{T}\hat{Y}_{t-1}^2]^{1/2} \tag{13}$$

$$MZ_t(\lambda)^0 = [(T^{-1}\hat{Y}_t^2 - s(\lambda^0)^2)(4s(\lambda^0)^2 T^{-2}\sum_{t=1}^{T}\hat{Y}_{t-1}^2]^{1/2} \tag{14}$$

$$MP_t(\lambda^0) = [c^{-2}T^{-2}\sum_{t=1}^{T}\hat{Y}_{t-1}^2 + (1 + \bar{c})T^{-1}\hat{Y}_t^2]/s\lambda^0)^2 \tag{15}$$

The main hypothesis of the test suggests the existence of a unit root under structural breaks. The alternative hypothesis is defined as a trend stationary process with a structural break. The test statistics calculated during the decision process are compared with the critical values produced by Carrion-i Silvestre et al (2009). If the calculated test statistic is greater than the

critical value, the unit root hypothesis cannot be rejected under structural breaks. In other words, it is concluded that the analyzed time series is not stationary under structural breaks.

The Maki cointegration test, which is used as a cointegration test, allows five structural breaks. In the case of structural breaks, traditional cointegration tests such as Engle-Granger (1987) and Johansen (1988) give biased results. The structural break cointegration test was first developed by Gregory and Hansen (1996). The Gregory-Hansen test considers a single structural break. The cointegration test developed by Hatemi-J (2008) allows two structural breaks. Maki (2012) cointegration test used in this study is superior to the previous cointegration tests in terms of analyzing five structural breaks. Four different models are used in the Maki cointegration test process. These models are expressed with the following regression equations.

$$y_t = \mu + \sum_{i=1}^{k} \mu_i D_{i,t} + \beta' x_t + u_t \tag{16}$$

$$y_t = \mu + \sum_{i=1}^{k} \mu_i D_{i,t} + \beta' x_t + \sum_{i=1}^{k} \beta'_i x_t D_{i,t} + u_t \tag{17}$$

$$y_t = \mu + \sum_{i=1}^{k} \mu_i D_{i,t} + \gamma t + \beta' x_t + \sum_{i=1}^{k} \beta'_i x_t D_{i,t} + u_t \tag{18}$$

$$y_t = \mu + \sum_{i=1}^{k} \mu_i D_{i,t} + \gamma t + \sum_{i=1}^{k} \gamma_i t D_{i,t} + \beta' x_t + \sum_{i=1}^{k} \beta'_i x_t D_{i,t} + u_t \tag{19}$$

Models defined above with regression equations; are expressed as Model 0, Model 1, Model 2, and Model 3, respectively. Model 0 and Model 1 are trend-free models. Model 0 only consider a break in level, Model 1 consider a break at a constant level and slope. Model 2 and Model 3 are defined as models with the trend. Model 2 considers breaks in level and slope, while Model 3 considers breaks in trend and slope. D_i variables are dummy variables. Dummy variables take the value 1 if $t > TB_i$, 0 otherwise. The TB_i values show the breaking times. The main hypothesis of the Maki cointegration test is that there is no cointegration relationship between the variables under structural breaks. The alternative hypothesis is that there is a cointegration relationship under structural breaks. If the calculated test statistic is greater than the critical value, the basic hypothesis cannot be rejected. In other words, it is concluded that there is no cointegration between the variables. Critical values table can be obtained from Maki (2012).

3.2. Empirical Findings

First of all, unit root tests for the variables were carried out. Since the Turkish economy is considered as two sub-periods, unit root tests were first applied to the variables for the period 1923-1979. In Table 3, the results of the Lee-Strazich unit root test, which is among the structural break unit root tests, are summarized for the level values of the variables. The model considered in the Lee-Strazich unit root test was determined as Model 2, which allows two breaks in the level and the slope of the trend function.

Table 3: Lee-Strazich Unit Root Test Results with Level Values of Variables (1923-1979)

	Lag Length	Minimum t Statistic	Break Dates		Critical Value (1%)	Critical Value (5%)	Result
Ind/GDP	12	-5.8115	1940, 1956		-6.45	-5.67	Stationary (5%)
LogExport	2	-4.4950	1945, 1963		-6.42	-5.65	Unit Root (1%)
LogImport	5	-5,3469	1941, 1963		-6,42	-5,65	Unit Root (1%)

As seen in Table 3, the unit root hypothesis was rejected at the 5% significance level according to the Lee-Strazicich unit root test regarding the share of industry in GDP variable representing industrialization for the 1923-1979 sub-period. For other variables, the unit root process is valid at both 1% and 5% significance levels. When the breaking dates are examined, it is noteworthy that the years of the Second World War come to the fore. The second breaking year for the export and import series was determined as 1963. In this context, it can be evaluated that a structural change took place in the planned economy period. Narayan-Popp unit root test was applied once to clarify the stationarity situation in the variable regarding the share of industry in GDP. Narayan-Popp unit root test results are summarized in Table 4.

Table 4: Narayan-Popp Unit Root Test Results with Level Values of Variables (1923-1979)

	Industry/GDP M1 Model	Industry/GDP M2 Model	LogExport M1 Model	LogExport M2 Model	LogImport M1 Model	LogImport M2 Model
The 1st Break	1941	1941	1942	1942	1941	1941
The 2nd Break	1943	1944	1957	1957	1946	1946
Optimal Lag	0,000	0,000	0,000	0,000	0,000	1,000
t Statistic	-3,776	-4,227	-2,986	-3,097	-1,692	-2,664
Critical Value (1%)	-5,259	-5,949	-5,259	-5,949	-5,259	-5,949
Critical Value (5%)	-4,514	-5,181	-4,514	-5,181	-4,514	-5,181
Result	Unit Root (1%)	Unit Root (1%)	Unit Root (1%)	Unit Root (1%)	Unit Root (1%)	Unit Root (1%)

As seen in Table 4, the calculated t statistics are greater than the critical values for all three variables in both models at both 1% and 5% significance levels. In other words, the basic hypothesis suggesting that the series have unit roots for all three variables could not be rejected. With the application of the Narayan-Popp unit root test, strong evidence has been obtained that the industry's share of GDP variable, which indicates industrialization, is unit rooted. To perform cointegration analysis, it is important to what extent the variables become stationary. In this context, unit root tests were repeated by taking the first difference of all three variables. In Table 5, the results of the two-break Lee-Strazicich unit root test applied to the series with the first difference are summarized. Model 2 was used as in the test with level values.

Table 5: Lee-Strazich Unit Root Test Results with First Difference Values of Variables (1923-1979)

	Lag Length	Minimum t Statistic	Break Dates		Critical Value (1%)	Critical Value (5%)	Result
Ind/GDP	0	-9,7601	1940, 1943		-6,16	-5,59	Stationary (1%)
LogExport	0	-7,2903	1940, 1958		-6,45	-5,67	Stationary (1%)
LogImport	1	-7,0460	1965, 1972		-6,32	-5,73	Stationary (1%)

As seen in Table 5, the series became stationary when the first difference of all variables was taken for the 1923-1979 sub-period. Since the calculated test statistics are smaller than the critical values at 1% and 5% significance levels, the basic hypothesis suggesting that the series have unit roots for all three variables was rejected, and it was observed that they were stationary under two structural breaks. To make the test results more reliable, the Narayan-Popp unit root test, which takes into account two structural breaks as well as the level values, was applied once. The test results are summarized in Table 6.

Table 6: Narayan-Popp Unit Root Test Results with First Difference Values of Variables (1923-1979)

	Ind/GDP M1 Model	Ind/GDP M2 Model	LogExport M1 Model	LogExport M2 Model	LogImport M1 Model	LogImport M2 Model
The 1st Break	1940	1942	1941	1941	1940	1940
The 2nd Break	1942	1955	1956	1956	1945	1957
Optimal Lag	0,000	0,000	0,000	0,000	0,000	1,000
t Statistic	-10,70	-8,577	-8,569	-8,408	-6,554	-5,956
Critical Value (1%)	-5,259	-5,949	-5,259	-5,949	-5,259	-5,949
Critical Value (5%)	-4,514	-5,181	-4,514	-5,181	-4,514	-5,181
Result	Stationary (1%)	Stationary (1%)	Stationary (1%)	Stationary (1%)	Stationary (1%)	Stationary (1%)

As seen in Table 6, all variables became stationary when the first difference of the variables was taken. The test statistics calculated in both the M1 model and the M2 model are smaller than the critical values. In this case, the basic hypothesis that the series is unit rooted with two structural breaks was rejected for all three series. These results are also compatible with the Lee-Strazich unit root test results. In this context, it is understood that the series for the period considered are I(1). In other words, there is no obstacle to the cointegration test. However, it is important to conduct unit root tests for the 1980-2021 sub-period before proceeding to the cointegration test. First of all, the Lee-Strazich unit root test was applied, and the results summarized in Table 7 were obtained for the period in question. In this test, Model 2, which considers two structural breaks in the level of the series and the slope of the trend function, was used.

Table 7: Lee-Strazich Unit Root Test Results with Level Values of Variables (1980-2021)

	Lag Length	Minimum t Statistic	Break Dates		Critical Value (1%)	Critical Value (5%)	Result
Ind/GDP	12	-7,2643	1998, 2015		-6.42	-5.65	Stationary (1%)
LogExport	11	-6.4612	1996, 2012		-6.42	-5.65	Stationary (1%)
LogImport	5	-5,7837	1996, 2008		-6,42	-5,65	Stationary (1%)

As seen in Table 7, the calculated test statistics are smaller than the critical values. Only the test statistic for the import variable is greater than the critical value at the 1% significance level. In this case, the basic hypothesis suggesting that the series is unit rooted under two structural breaks for all three variables at the 5% significance level was rejected, and it was concluded that the series were trend stationary with two structural breaks. As it was applied from 1923 to 1979, the stationarity of the variables was examined with the Narayan-Popp unit root test for the period of 1980-2021, and the results obtained are presented in Table 8.

Table 8: Narayan-Popp Unit Root Test Results with Level Values of Variables (1980-2021)

	Ind/GDP M1 Model	Ind/GDP M2 Model	LogExport M1 Model	LogExport M2 Model	LogImport M1 Model	LogImport M2 Model
The 1st Break	1999	1999	2003	2003	2000	2000
The 2nd Break	2008	2008	2008	2008	2008	2008
Optimal Lag	0,000	0,000	0,000	0,000	0,000	1,000
t Statistic	-4,440	-4,235	-1.887	-3,796	-1,781	-5,710
Critical Value (1%)	-5,259	-5,949	-5,259	-5,949	-5,259	-5,949
Critical Value (5%)	-4,514	-5,181	-4,514	-5,181	-4,514	-5,181
Result	Unit Root (1%)	Unit Root (1%)	Unit Root (1%)	Unit Root (1%)	Unit Root (1%)	Unit Root (1%)

As seen in Table 8, according to the Narayan-Popp unit root test, all variables were found to have unit root with their level values. This result contradicts the Lee-Strazich test. An important advantage of the Narayan-Popp test over the Lee-Strazicich test is that it maximizes the importance of the coefficients of the dummy variables related to structural breaks (Yurtkuran, 2021: 74). In this context, strong evidence has been obtained that the series are unit rooted. However, to reduce uncertainty, the stationarity of the series was investigated once again with the Carrion-i Silvestre et al unit root test, which can take into account more than two structural breaks, and the test results are presented in Table 9.

Table 9: Carrion-i Silvestre et al Unit Root Test Results with Level Values of Variables (1923-1979)

	Industry/GDP Break in Trend Model	Industry/GDP Break in Level and Slope Model	LogExport Break in Trend Model	LogExport Break in Level and Slope Model	LogImport Break in Trend Model	LogImport M2 Model
PT	11,11 [6,62]	21,11 [6,56]	12,78 [6,97]	0,48 [7,04]	10,37[5,91]	10,8 [6,4]
MPT	11,56 [6,62]	18,22 [6,56]	13,04 [6,97]	0,48 [7,04]	9,98 [5,92]	10,7 [6,4]
MZA	-19,45 [-33,79]	-11,26 [30,70]	-18,69[-33,4]	-515,9 [-33,2]	-19,4[31,5]	-19,3 [-31]
MSB	0,16 [0,12]	0,21 [0,13]	0,16 [0,12]	0,03 [0,12]	0,16 [0,13]	0,16 [0,13]
MZT	-3,11 [-4,09]	-2,37 [-3,92]	-2,95 [-4,08]	-16,05 [-4,07]	-3,1 [-3,95]	-3,1 [-3,9]
Break	1986,97,02	1999,10,18	1982,01,07	1982,02,08	1997,01,08	2000,08,11
Result	Unit Root (5%)	Unit Root (5%)	Unit Root (5%)	Unit Root (5%)	Unit Root (5%)	Unit Root (5%)

The numbers in square brackets in Table 9 show the critical values. Within the framework of the data period, the unit root test was carried out with three structural breaks. When the test results are examined, a stationary process has been determined only for the export variable in the break-in level and slope model. In all other models, the unit root basis hypothesis is rejected. When the break dates are examined, it is seen that the years of 2001 and 2008 crises come to the fore. When the obtained results are combined with the results of the Narayan-Popp unit root test, it is seen that there is strong

evidence that the series are unit rooted. It is important to what extent these variables become stationary. The Narayan-Popp unit root test was applied by taking the first difference of the series and the results are presented in Table 10.

Table 10: Narayan-Popp Unit Root Test Results with First Difference Values of Variables (1980-2021)

	Industry/GDP M1 Model	Industry/GDP M2 Model	LogExport M1 Model	LogExport M2 Model	LogImport M1 Model	LogImport M2 Model
The 1st Break	1998	1998	2001	2001	2002	2002
The 2nd Break	2001	2007	2007	2007	2007	2007
Optimal Lag	0,000	0,000	1,000	1,000	1,000	1,000
t Statistic	-7,420	-7,156	-6.090	-5,989	-6,462	-6,350
Critical Value (1%)	-5,259	-5,949	-5,259	-5,949	-5,259	-5,949
Critical Value (5%)	-4,514	-5,181	-4,514	-5,181	-4,514	-5,181
Result	Stationary (1%)	Stationary (1%)	Stationary (1%)	Stationary (1%)	Stationary (1%)	Stationary (1%)

As seen in Table 10, all three variables became stationary when the first difference of the series was taken. It is seen that the calculated test statistics are smaller than the critical values at the 1% and 5% significance levels. In other words, the basic hypothesis suggesting that the series have unit roots was rejected for all three series. In this context, it was concluded that all variables for the 1980-2021 sub-period were I(1). As in the 1923-1979 period, there is no obstacle to the cointegration test for the 1980-2021 period.

The Maki cointegration test, which considers five breaks, was used as the cointegration test. First of all, the cointegration test was applied for the 1923-1979 sub-period, and the test results presented in Tables 11, 12, 13, and 14 were found.

Table 11: Maki Test Model 0 Results (1923-1979)

	5 Breaks	4 Breaks	3 Breaks	2 Breaks	1 Break
The 1st Break	1964	1964	1964	1964	1964
The 2nd Break	1932	1932	1932	1932	
The 3rd Break	1949	1949	1949		
The 4th Break	1972	1972			
The 5th Break	1954				
t Statistic	-7,002285	-6,0642061	-5,652576	-5,1635438	-4,3709996
Critical Value (1%)	-6,296	-6,075	-5,943	-5,717	-5,541
Critical Value (5%)	-5,760	-5,550	-5,392	-5,211	-5,005
Result	Av (1%)	Av (5%)	Av (5%)	NA	NA

Table 12: Maki Test Model 1 Results (1923-1979)

	5 Breaks	4 Breaks	3 Breaks	2 Breaks	1 Break
The 1st Break	1972	1972	1972	1972	1972
The 2nd Break	1947	1947	1947	1947	
The 3rd Break	1967	1967	1967		
The 4th Break	1941	1941			
The 5th Break	1934				
t Statistic	-6,27094	-6,27094	-6,27094	-6,27094	-5,2276011
Critical Value (1%)	-6,530	-6,329	-6,169	-6,011	-5,840
Critical Value (5%)	-5,993	-5,831	-5,691	-5,518	-5,359
Result	Av (5%)	Av (5%)	Av (1%)	Av (1%)	NA

Table 13: Maki Test Model 2 Results (1923-1979)

	5 Breaks	4 Breaks	3 Breaks	2 Breaks	1 Break
The 1st Break	1943	1943	1943	1943	1943
The 2nd Break	1935	1935	1935	1935	
The 3rd Break	1957	1957	1957		
The 4th Break	1933	1933			
The 5th Break	1947				
t Statistic	-5,9455651	-5,9455651	-4,7436862	-4,6189187	-4,0985624
Critical Value (1%)	-7,839	-7,470	-7,031	-6,628	-5,840
Critical Value (5%)	-7,288	-6,872	-6,516	-6,093	-5,359
Result	NA	NA	NA	NA	NA

Table 14: Maki Test Model 3 Results (1923-1979)

	5 Breaks	4 Breaks	3 Breaks	2 Breaks	1 Break
The 1st Break	1941	1941	1941	1941	1941
The 2nd Break	1945	1945	1945	1945	
The 3rd Break	1953	1953	1953		
The 4th Break	1949	1949			
The 5th Break	1933				
t Statistic	-7,5233701	-7,194978	-7,194978	-6,5758297	-5,9248369
Critical Value (1%)	-8,713	-8,217	-7,673	-7,153	-6,523
Critical Value (5%)	-8,129	-7,636	-7,145	-6,657	-6,055
Result	NA	NA	Av (5%)	NA	NA

Av: Available, NA: Not Available

The above tables show cases where there is a cointegration relationship according to the model and the number of breaks. Accordingly, a cointegration relationship was found in models with three, four, and five breaks for Model 0. According to Model 1, there is a cointegration relationship for cases with one, two, three, and four breaks. According to Model 2, the cointegration relationship could not be determined. In Model 3, on the other hand, there is a cointegration relationship for three breaks spesification. In this framework, strong evidence has been obtained that there is a cointegration relationship between the variables for the period 1923-1979. At this stage, the Maki cointegration test for the period 1980-2021, which is the second sub-period, was conducted and the results summarized in Tables 15, 16, 17, and 18 were obtained.

Table 15: Maki Test Model 0 Results (1980-2021)

	5 Breaks	4 Breaks	3 Breaks	2 Breaks	1 Break
The 1st Break	2007	2007	2007	2007	2007
The 2nd Break	1993	1993	1993	1993	
The 3rd Break	1999	1999	1999		
The 4th Break	1988	1988			
The 5th Break	1983				
t Statistic	-4,8369929	-4,8369929	-4,8369929	-4,8030376	-3,968134
Critical Value (1%)	-6,296	-6,075	-5,943	-5,717	-5,541
Critical Value (5%)	-5,760	-5,550	-5,392	-5,211	-5,005

*Cointegrated, **Not Cointegrated (%5)

Table 16: Maki Test Model 1 Results (1980-2021)

	5 Breaks	4 Breaks	3 Breaks	2 Breaks	1 Break
The 1st Break	2007	2007	2007	2007	2007
The 2nd Break	1991	1991	1991	1991	
The 3rd Break	1995	1995	1995		
The 4th Break	2001	2001			
The 5th Break	1999				
t Statistic	-5,5535359	-5,5535359	-5,3474237	-5,3281812	-3,936335
Critical Value (1%)	-6,530	-6,329	-6,169	-6,011	-5,840
Critical Value (5%)	-5,993	-5,831	-5,691	-5,518	-5,359

*Cointegrated, **Not Cointegrated (%5)

Table 17: Maki Test Model 2 Results (1980-2021)

	5 Breaks	4 Breaks	3 Breaks	2 Breaks	1 Break
The 1st Break	2016	2016	2016	2016	2016
The 2nd Break	1985	1985	1985	1985	
The 3rd Break	2009	2009	2009		
The 4th Break	2007	2007			
The 5th Break	2005				
t Statistic	-4,9581938	-4,8356875	-4,6600079	-4,6600079	-4,0601231
Critical Value (1%)	-7,839	-7,470	-7,031	-6,628	-5,840
Critical Value (5%)	-7,288	-6,872	-6,516	-6,093	-5,359

*Cointegrated, **Not Cointegrated (%5)

Table 18: Maki Test Model 3 Results (1980-2021)

	5 Breaks	4 Breaks	3 Breaks	2 Breaks	1 Break
The 1st Break	1985	1985	1985	1985	1985
The 2nd Break	2000	2000	2000	2000	
The 3rd Break	2004	2004	2004		
The 4th Break	2018	2018			
The 5th Break	2010				
t Statistic	-6,4105701	-6,4105701	-6,4105701	-5,2634075	-5,2634075
Critical Value (1%)	-8,713	-8,217	-7,673	-7,153	-6,523
Critical Value (5%)	-8,129	-7,636	-7,145	-6,657	-6,055

*Cointegrated, **Not Cointegrated (%5)

As seen in the last four tables above, no cointegration relationship was found between the variables for the 1980-2021 sub-period. However, there is a cointegration relationship between the same variables for the 1923-1979 sub-period. When this result is evaluated in the context of opening-up policies implemented after 1980, it reveals that the growth in foreign trade did not cause a structural change in the direction of industrialization. It is understood that the statist and import substitution economic policies that were dominant between 1923-1979 affected industrialization. In the framework of the cointegration relationship obtained for the 1923-1979 sub-period, it is important to determine the long-term coefficients and to study the error correction model. The long-term coefficients for the mentioned period were determined by the DOLS method. With the DOLS method, it is possible to produce effective estimations against varying variance and autocorrelation problems. During the determination of the long-term coefficients, the break dates obtained from the Maki cointegration test Model 3 were also included in the model as a dummy variable. The results of the DOLS method, in which the variable related to industrialization is considered as the dependent variable, are presented in Table 19.

Table 19: Long-Term FMOLS Estimation Results (Dependent Variable: Industry/GDP)

Variable	Coefficient	t Statistic	Probability
LogExport	37,99754	4,975216	0,0000
LogImport	-24,46697	-4,599080	0,0001
K1	-10,35080	-3,927270	0,0004
K2	5,060124	1,862132	0,0715
K3	3,032598	2,514810	0,0170
Constant	-52,06842	-3,970898	0,0004

K1: 1985 Break Date, K2: 2000 Break Date, K3: 2004 Break Date

As seen in Table 19, parameter estimates for independent variables were found to be statistically significant. The sign of the coefficients is in line with the theoretical expectations. In addition, the break dates obtained by the Maki cointegration test are statistically significant. The significance level of only the second break date was found to be 7.15%. Since the model is built as semi-logarithmic, it is important to interpret the parameter estimates obtained within this framework. In the semi-logarithmic model in this study, logarithmic transformation was performed for the independent variables. No transformation was applied for the dependent variable industry/GDP. However, since the dependent variable is considered as a ratio scale, each unit can be interpreted as 0.01. While a 1% increase in exports increases the industry/GDP ratio by 0.38 units, a 1% increase in imports decreases the said ratio by 0.24 units. For these estimates to be valid, the error correction model must also work. To establish the error correction model, the first difference values of the variables and the one-term delayed series of the residuals obtained from the long-term estimation regression equation were analyzed by DOLS method. For the error correction model to work, the coefficient of the one-period lagged series for the residues must be negative and significant. The results of the error correction model are given in Table 20.

Table 20: Error Correction Model

	Coefficient	t Statistic	Probability
Residual (-1)	-0,560582	-2,340378	0,0246

As seen in Table 20, the error correction term was found to be negative and statistically significant. In other words, the error correction model works. The short-term deviations for the 1923-1979 sub-period disappear in the long-term and the equilibrium relationship is restored.

4.CONCLUSIONS

The concepts of growth and development, which were used interchangeably until the mid-20th century, were differentiated with quantitative and qualitative distinctions; while the concept of growth, which is an expression of a monetary phenomenon, represents developing and developed countries, the concept of development, which covers a much wider area than growth, includes developing and underdeveloped countries. There is another variable, which is related to these two important concepts, in which discussions and research about the existence and direction of the relationship are concentrated; foreign trade. Although certain studies assert that international trade drives economic development and growth, others contend that it merely serves as a tool to support such growth. What can be said about these critically important variables in Turkiye, which strives for both development and growth and has different experiences? The aim of this study, which started with this curiosity; is to question the relationship between the development process and the industry, where the transition is aimed, and foreign trade. First of all, two sub-periods, 1923-1979 and after 1980, were determined and different analyzes were applied to the data. Stationary tests in the analyzes were carried out with unit root tests that take into account structural breaks *(Lee-Strazicich (2003) Unit Root Test,* which takes into account two breaks, Narayan-Poop (2010) Unit Root Test, which allows two structural breaks, Carrion-i Silvestre et al. (2009) Unit Root Test, which allows up to five structural breaks). Then, *Hatemi-J (2008) Cointegration Test*, which allows two structural breaks, and *Maki (2012)* Cointegration Test, which allows five structural breaks, were applied to the data. In light of the analyses completed;

1. It has been determined that foreign trade and industry/GDP are cointegrated in the 1923-1979 period. On the other hand, no cointegration relationship was found between the variables in the post-1980 period. The fourth FYDP (1979-1983), "failed with the Republic People's Party (CHP)'s withdrawal from power at the end of 1979; the "developmental" aspects of planning have also been eliminated as a result of the January 24 judgments and the shift to neoliberalism under the September 12 regime (Boratav, 2010:371).

2. It has been determined that a 1% increase in exports increases industry/GDP by 0.38 units. This is a result that supports the Export-led Growth Hypothesis (ELG). The result obtained in this context is the result of

Keong (2005), Kaushik et al. (2008) and Raza et al. (2018) are compatible with the study.

3. A 1% increase in imports reduces industry/GDP by 0.24 units. Owing to the incapacity to incorporate novel technologies into the technology-reliant industry, obstructions and impediments in manufacturing were encountered, and the policy of import substitution industrialization was relinquished. This outcome serves as an empirical marker of said progression. Then, the transition to an export-oriented industrialization policy was made. This result, on the other hand, supports the study result of Sulaiman&Saad (2009) and Raza et al. (2018), which determined that imports affect economic growth negatively.

These findings are crucial for comprehending how the industrial sector and international commerce interact, as well as how this interaction affects economic growth. Furthermore, it may be deduced that these results should be taken into account while developing and putting into practice economic policies.

The proposed export promotion policy in Turkiye is a significant step toward achieving sustainable economic growth. Export-based industrialization has been proven to be an effective strategy for developing countries to boost their economies, as it allows them to tap into global markets and increase their competitiveness. However, to fully realize the benefits of export-based industrialization, a strong policy framework is needed to support and promote exports. The proposed "developmental and populist" planned system can provide a solid foundation for sustained economic growth by promoting industrialization, enhancing the competitiveness of domestic industries, and increasing exports. By doing so, Turkiye can achieve long-term sustainable growth, create employment opportunities, and improve the standard of living for its citizens.

This study, which empirically questions the relationship between foreign trade and industry, which is the engine of growth and development, contributes to the literature by being different from other studies because the share of industry in GDP is used in its analysis. The study recommends implementing a policy aimed at promoting exports in Turkiye as part of an export-based industrialization program. The proposed policy would entail a shift to a developmental and populist planned system for economic development to promote sustainable growth. The implications of this recommendation are significant. A strong export promotion policy would likely involve measures such as financial incentives, trade agreements, and marketing efforts to encourage Turkish businesses to increase their exports. By prioritizing exports, the policy aims to create new markets for Turkish goods and services, which can drive economic growth and create jobs. The switch to a developmental and populist planned system suggests that the policy would prioritize the needs and interests of the Turkish people over those of foreign investors. This approach aims to promote economic development that is inclusive and sustainable, with a focus on creating jobs and increasing wages for Turkish workers. Such an approach could help address some of the social and economic inequalities that exist in Turkiye. Overall, the proposed policy has the potential to significantly impact the Turkish economy, particularly if it is implemented effectively. However, it may also face opposition from those who prioritize foreign investment and free-market principles over developmental and populist policies.

The findings of this study highlight the importance of considering the share of the industrial sector in national income when analyzing the relationship between industry and foreign trade. Additionally, it is recommended that future research explore more comprehensive studies to better understand the impact of the industrial sector on economic growth and development.

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COVID-19 SPECIFIC GOING CONCERN DISCLOSURES IN THE FINANCIAL STATEMENTS: EVIDENCE FROM AN EMERGING MARKET

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ABSTRACT

Purpose- This paper aims to evaluate whether companies in Bangladesh have properly disclosed the implications of the pandemic in their "Going Concern section" in annual reports.
Methodology- To achieve this goal, this study analysed COVID-19-specific disclosures in the "Going Concern" section of annual reports for listed textile and banking companies for 2020 and 2021 using discourse analysis. The study also utilized the impression management theory and techniques suggested by Caliskan et al. (2021) to explain the results.
Findings- The findings revealed that companies did not adequately evaluate the impacts of the pandemic on the going concern problem and instead used language strategically to manage stakeholder impressions. Companies predominantly employed defensive and performance-showcasing devices in their pandemic-related going concern disclosures, with assertive tactics being used in only a few cases.
Conclusion- The study's findings will have policy implications for the board of directors, management, and regulators of companies in shaping directives regarding future disclosures under crises such as COVID-19. Additionally, shareholders will benefit greatly from the findings in assessing the going-concern problem of companies. This study is groundbreaking in its assessment of going concern disclosures from a COVID-19 perspective and will expand the literature with new insights.

Keywords: Covid-19, going concern problem, going concern disclosures, impression managementi developing economy.
JEL Codes: G33, G38, M41

1. INTRODUCTION

COVID-19 has caused severe damage to many sectors of the global economy, including Bangladesh (Yamin, 2020). It is predicted that COVID-19 has significant implications for going concern uncertainty requiring adequate disclosure (KPMG, 2020). The assumption of going concern is one of the fundamental accounting concepts, which means that a company is financially stable enough to continue its operations in the long term or beyond the next fiscal period. This ensures that the company is less likely to be liquidated, can fulfil its obligations by utilizing its existing assets, and has the potential to earn profits in the future without having to liquidate its entity. The COVID-19 pandemic has disrupted global markets through factors such as supply chain and production disruptions, restrictions on the workforce and travel, reduced consumer spending, and negative sentiments, which adversely influence the financial outcomes, liquidity status, and cash flow forecasts of enterprises (Karim, Shetu, & Razia, 2021; Boissou & Phelps, 2020; Karim & Shetu, 2023). Therefore, it is predicted that the pandemic may affect the continuity of companies and thus may create a growing concern problem.

According to news published in The Financial Express (2020), manufacturing companies have experienced disruptions in their production, and their sales have started to decline due to various crises that certainly affect their company's continuity. Export-dependent industries have experienced severe crises because they cannot import their raw materials, purchase fuel, or export manufactured goods, as many countries have suspended their import and export activities. All types of transportation, including air, sea, road, and rail, were closed. All types of businesses, offices, and factories were also closed, except for the establishment of essential goods. Initially, the lockdown lasted for a few days, but later, it was extended several times. The International Monetary Fund (IMF) predicted that global growth could decrease three percent of the economy due to the coronavirus. There were significant disruptions in the economies of the nations that depended on tourism and hospitality for their prosperity. As the world's appetite for risk declined and currency pressures started to peep, emerging markets and developing economies started to face new concerns. In the latter half of 2020, the pandemic began to wane, and governments worldwide took measures to prevent widespread bankruptcies and financial turmoil, leading to a projected

global growth of 5.8% in 2021. The pandemic has caused significant changes worldwide. To control the outbreak, countries implemented essential measures such as quarantines and social distancing, leading to a global lockdown (IMF, 2020).

As stated by Pippo (2020), the pandemic has had a notable influence on the performance of numerous businesses, potentially leading to operational closures for many firms due to a variety of factors such as a dollar crisis, decreased demand for goods or services, escalated levels of indebtedness, and higher-than-anticipated inflation rates. These elements could result in a decrease in a company's operational effectiveness and financial standing (Karim and Shetu, 2023). Managing these challenges and transparently communicating them to investors is a task facing both management and the board. Providing detailed and high-calibre information about the company's prospects and its capacity to navigate uncertainties is crucial. Hence, it is imperative to reveal the concerns about COVID-19-associated going concern concerns in companies' financial statements. The evaluation of businesses' adeptness to persist as a going concern has become significantly crucial with the propagation of the novel coronavirus. As outlined by KPMG (2020), certain considerations merit the attention of company management when evaluating the going concern scenario given the uncertainties prompted by the COVID-19 pandemic. Specific sectors have been more severely impacted, experiencing substantial disruptions to their business models due to the spread of the virus (Shetu and Karim, 2023).

The concept of "going concern" holds substantial significance within accounting principles and stands as a key assumption under the IFRS framework. It becomes the duty of management to evaluate this aspect at the conclusion of the accounting period while finalizing the financial statements. However, the prevailing economic landscape shaped by the pandemic has led numerous entities to face notable declines in revenue, profitability, and liquidity. This, in turn, has triggered apprehensions about their ability to sustain themselves as a "going concern." Consequently, the determination of whether financial statements should be formulated on a going concern basis might necessitate a heightened level of judgment compared to normal circumstances (IFRS, 2021). This judgment should stem from pertinent considerations such as the industry and geographical context, the financial health of the clientele and suppliers, the entity's liquidity and solvency, and its access to financial resources, among others (Stancheva-Todorova, 2021). If substantial uncertainties loom over the entity's ability to continue as a going concern, the board has a responsibility to communicate these events or conditions to investors, lenders, and other creditors. Furthermore, the board must factor in all foreseeable information that could substantially impact the entity's viability as a going concern (Stancheva-Todorova, 2021). The disclosures made must possess reliability and pertinence to enable prudent decision-making among users. In assessing the reliability of a management disclosure, investors typically consider four main facets: the context driving the disclosure, the credibility and capability of the management team, the extent of support for the message from both internal and external sources, and specific attributes of the disclosure itself, including its precision, timing, location of release, and timeframe (Rahman, 2012; Mercer, 2004).

This paper aims to examine whether company management has given adequate attention to the implications of the pandemic on a firm's 'going concern section' and to determine the management's responsibility to disclose the effects of COVID-19 ongoing concern following the International Financial Reporting Standards (IFRSs). To address these issues, various studies have been conducted. These evaluations include analysing how frequently the term "going concern" appears in the entire annual report by both auditors and management, as well as examining the statements made by managers and auditors concerning the going concern assumption and the impacts of COVID-19. This study also identifies new challenges arising from the continuing uncertainty of the COVID-19 situation in assessing the assumption of going concern and highlights the need for improved disclosure requirements in the context of COVID-19. The results are interpreted from the perspective of impression management.

This study considered Bangladesh as the sample of study for several reasons. The central point of this research has been to investigate pandemic-related going concern disclosures from the perspective of the Bangladesh economy, as there is a lack of studies that examine this emerging and growing economy. According to Karim and Riya (2022), there is regrettably little observance of disclosure standards in this context. Furthermore, corporate governance is weak in this emerging economy, as observed by Karim, Mitra, and Khan (2020), and fraudulent financial reporting is likely taking place in developing countries, as noted by Karim and Hossain (2020). In addition, the independence of independent directors in this economy is compromised through various means, as indicated by Karim and Mitra (2019), and shariah compliance in the country's Islamic banks' operations involves eye washing. (Karim & Shetu, 2020). Therefore, it is essential to conduct more research that focuses on developing economies.

From the perspective of Bangladesh's emerging market, this study reveals significant insights into COVID-19-specific going concern disclosures. Despite regulatory and professional directives, many companies have strategically managed stakeholder impressions rather than adequately disclosing the pandemic's impact on their going concern status. This behavior underscores a broader issue of compliance and transparency within the corporate governance framework of developing economies. The findings of this research have substantial implications for policymakers, regulators, and corporate boards. They highlight the need for more stringent and clear guidelines for crisis-related financial reporting to enhance transparency and stakeholder trust. By employing discourse analysis and impression management theory, this study provides a novel methodological approach to understanding pandemic-specific disclosures. This research not only fills a critical gap in the

literature by focusing on the underexplored context of an emerging economy but also offers practical insights for improving disclosure practices. Future studies should continue to investigate these dynamics across different sectors and economies to build a more comprehensive understanding of global financial reporting standards and practices during crises such as COVID-19.

The remainder of this article is organized as follows: Section Two provides a comprehensive review of the relevant literature, highlighting key studies and findings related to the topic. Section Three delves into the theoretical framework underpinning the research, outlining the concepts and theories that guide the study. Section Four details the methodology used and explains the research design, data collection, and analysis methods employed. Section Five presents a thorough analysis of the data and discusses the findings in depth. Finally, Section Six offers the conclusion, discusses the study's limitations, and provides recommendations for future research and practice.

2. LITERATURE REVIEW

The global business landscape has been deeply affected by COVID-19, disrupting supply chains (Shetu and Karim, 2023), causing significant declines in revenue (Karim and Shetu, 2023), and affecting the going concern status of many companies. As a result, there has been increased attention given to the importance of going-concern disclosures in financial reporting, particularly in light of the unpredictability and instability brought about by the pandemic.

According to KPMG (2020), the COVID-19 pandemic has amplified the necessity for transparent and informative disclosures regarding going concern considerations. The firm underscores that companies should evaluate the influence of the syndemic on their operations, financial standing, and future outlook while assessing their going concern status. KPMG proposes that companies should furnish comprehensive and pertinent disclosures encompassing sensitivity analysis and scenario planning. These disclosures are intended to enhance investors' comprehension of the vulnerabilities and uncertainties associated with the company's viability as a concern. In a similar vein, Deloitte (2020) underscores the significance of lucid and succinct disclosures concerning going concern matters within the purview of the pandemic. The firm highlights the importance of companies openly sharing their assumptions and methodologies employed in evaluating their going concern status. Additionally, any uncertainties or risks tied to the pandemic that could impact the company's potential to continue operation should also be communicated transparently. Deloitte (2020) suggested that companies should establish transparent channels of communication with stakeholders and furnish insightful disclosures tailored to their unique circumstances. Similarly, PWC (2020) emphasizes the significance of strong and comprehensive disclosures concerning going concern matters due to the syndemic. The firm highlights the necessity for companies to meticulously assess their liquidity position and take into account the potential ramifications of the pandemic on their financial condition and future possibilities. PwC suggests that companies should offer transparent and succinct disclosures that shed light on the pivotal assumptions and uncertainties associated with their going concern situation. Additionally, these disclosures should encompass any potential measures that could be implemented to alleviate liquidity and financial risks.

Baskan (2020) conducted research that centered on the independent auditor's report and scrutinized the uncertainty associated with the going concern concept amid the syndemic. This paper sought to underscore the significance of going concern and how to handle the challenges brought about by the pandemic. The primary focus of the research was on the examination of the International Standard on Auditing Going Concern (ISA-570) and the discussion of requisite measures for incorporating it into entity auditor reports during emergencies. Stancheva-Todorova (2021) delved into the repercussions of COVID-19 on ongoing concern assessments from a managerial perspective. The research acknowledged the persistent uncertainty within the COVID-19 context and aimed to address the obstacles encountered by company management when evaluating the presumption of going concern. Despite the absence of explicit mandates, the responsibility of appraising the firm's potential to endure operational continuity rests with the business's management, given that it remains a principal assumption under the accounting framework (KPMG, 2020).

The European Securities and Markets Authority (ESMA, 2020) provided a public statement clarifying the concept of going concern amid the COVID-19 epidemic's influence on half-yearly financial statements of listed issuers. ESMA's directives centered on transparency in the financial statements of capital market participants stress the importance of accurately representing the real and potential financial impacts of COVID-19 on their financial state. The statement highlighted the necessity for accuracy and transparency in financial information for informed investor decision-making. Moreover, the IFRS (2020) issued clarifications on the application of IFRS 9 Financial Instruments and related standards in assessing going concern during the uncertain conditions caused by the COVID-19 pandemic.

However, the literature linking COVID-19 with going concern disclosures is very scarce. Hossain et al. (2022) evaluated COVID-19-specific disclosures from the impression management perspective and identified several strategies for hiding such disclosures. One such strategy was the use of vague and ambiguous language, which made it difficult to discern the actual effect of the pandemic on their activities. Another tactic was to downplay the impact of the pandemic on their business, either by minimizing the severity of the situation or highlighting their ability to overcome it. Additionally, Karim, Reza & Shetu (2024) have evaluated overall accounting disclosures with no focus on going concern issue. Another study by Donatella et al.

(2022) examined the disclosure of subsequent events related to COVID-19 by public entities. The researchers found that there was a positive correlation between the number of confirmed COVID-19 cases and the reporting of COVID-19 as a subsequent event by these entities.

Previous research has explored COVID-19 disclosures, yet no studies have specifically assessed the impact of COVID-19 on going concern disclosures. Moreover, this study introduces impression management theory, which is rarely applied to going concern assessments. Additionally, there is a lack of research addressing these disclosures in emerging economies. While Baskan (2020) focused on auditor reports about the effects of COVID-19 on going concern, this study aims to comprehensively analyse this impact by considering both the auditor and management perspectives. This research addresses these gaps by employing impression management strategies to scrutinize COVID-19-related going concern disclosures in Bangladesh's banking and textile sectors.

3. THEORETICAL FRAMEWORK

Impression management theory provides a useful framework for understanding how organizations may strategically communicate their response to the COVID-19 pandemic to shape stakeholder perceptions. Impression management theory posits that individuals and organizations engage in various strategies to influence the perceptions and attitudes of others toward them (Goffman, 1959). Clatworthy and Jones (2001) defined impression management as the control and manipulation of the impression presented to accounting information users to influence their decisions. Although impression management theory was originally developed to explain individual behavior, it has since been applied to organizational contexts (Hoogheimstra, 2000). After analysing various articles on the topic, Caliskan et al. (2021) categorized impression management into three primary groups—assertive strategies, performance-driven strategies, and defensive strategies. The authors also identified several subcategories within each of these main categories.

The management of organizations employs defensive strategies to address poor performance by manipulating the impressions of accounting information users (Clatworthy & Jones, 2001). These tactics encompass disassociation, excuses, justification, apologies, restitution, concealment, and omission (Caliskan et al., 2021; Fialho, 2021). During the COVID-19 pandemic, studies underscore organizations' utilization of impression management techniques. Performance-oriented tactics involve emphasizing performance to stakeholders through selectivity and performance comparison (Caliskan et al., 2021). Conversely, assertive tactics establish a specific reputation using methods such as ingratiations, self-promotion, exemplification, entitlement, and enhancement (Caliskan et al., 2021).

Impression management theory can be applied to the context of going concern disclosures in financial reporting. The management's decision to make or not make a going concern disclosure can be influenced by impression management motives. For example, if a company is experiencing financial difficulties, management may use defensive tactics such as concealment or omission to avoid negative disclosures that could harm the company's reputation and financial performance. On the other hand, if a company is performing well, management may use assertive tactics such as self-promotion or enhancement to emphasize positive information in disclosures.

From the perspective of COVID-19, organizations may use impression management tactics to shape stakeholders' perceptions of their response to the crisis (Hossain et al., 2022). Several studies have explored the use of impression management strategies observed in COVID-19-related disclosures. Hossain et al. (2022) analysed the financial statements of insurance companies and identified strategies such as downplaying the impact of the pandemic and highlighting CSR activities to build a favourable impression of the firm's response. Similarly, Li et al. (2021) examined the corporate social media posts of Chinese firms and found that they used tactics such as expressing empathy and emphasizing crisis management efforts to shape stakeholder perceptions. The extent of subsequent event disclosure related to COVID-19 has also been explored from the impression management perspective. Donatella et al. (2022) found that public entities exhibited a greater likelihood of reporting COVID-19 as an adjusting event in financial statements when there were confirmed cases of the virus in their jurisdiction, suggesting that they may be using disclosure to manage stakeholder perceptions of their response to the crisis. Nevertheless, the literature on going concern disclosure from an impression management perspective, let alone the COVID-19 viewpoint, is scarce. This study identified a significant research gap and sought to enrich the literature with new findings.

4. RESEARCH METHODOLOGY

To investigate COVID-19-specific disclosures in the financial statements of textile and banking firms in Bangladesh, this paper utilized discourse analysis and adopted an explanatory research approach. This study relied on impression management techniques, as suggested by Caliskan et al. (2021), to analyse the qualitative data.

4.1. Sample

This article analysed the financial statements of 58 textile companies and 33 banking companies in Bangladesh for the fiscal years 2020 and 2021. The data were collected directly from the reports by hand. These industries were selected for several reasons. First, the textile and banking sectors are significant contributors to the country's GDP and reflect the overall

economy. The textile sector represents the manufacturing industry, while banks represent the service industry. Therefore, this study can compare the results between these two sectors.

4.2. Discourse Analysis

Previous research has employed discourse analysis to uncover impression management techniques in firm disclosures (Ahmad and Hossain, 2019). This method considers the broader context of language use (Dijk, 1990), examining speech and writing beyond single sentences. Context is crucial in effective discourse analysis (Mazumder and Hossain, 2019). Unlike content analysis, discourse analysis delves into "how" companies navigate the impact of COVID-19 rather than just "what" they disclose in annual reports. Various scholars approach discourse analysis differently.

This study adopts Caliskan et al.'s (2021) framework for analysis. Impression management theory is the core concept, identifying three tactics—performance-focused, defensive, and assertive—each with subcategories. This framework emerged from studies of various sources.

5. FINDINGS AND INTERPRETATIONS

5.1. Textual Analysis

The analysis of the study commences by evaluating the proportion of companies providing COVID-19-specific going concern disclosures within their financial statements. Table 1 shows the percentage of companies in the textile industry that disclosed their ability to sustain operations during the COVID-19 pandemic in 2020 and 2021.

In 2020, among a total of 58 companies in the textile industry, two companies (3%) included COVID-19-related going concern disclosures, leaving the remaining 56 companies (97%) without such disclosures. The following year, in 2021, the number of companies making these disclosures slightly increased to three (5%), while the percentage of companies abstaining from such disclosures decreased to 55 (95%). Overall, the degree of compliance is exceedingly minimal, implying that companies largely neglected to assess going concern issues stemming from the pandemic.

Table 1: Percentage of Textile Industry Companies with COVID-19-Related Going Concern Disclosures

Industry	Textile Industry (n=58)			
	2020	Percentage	2021	Percentage
Firms with disclosures related to COVID-19's impact on going concern.	2	3%	3	5%
Firms lacking disclosures regarding COVID-19's influence on going concern.	56	97%	55	95%
Total	58	100%	58	100%

Table 2 presents data on the percentage of companies in the banking industry that revealed their capacity to sustain operations in light of the COVID-19 pandemic for both 2020 and 2021. In 2020, among a total of 33 companies in the industry, 13 companies (39%) incorporated going concern disclosures related to COVID-19, while the remaining 20 companies (61%) did not. In the subsequent year, 15 companies (45%) included such disclosures, showing an increase, whereas the percentage of companies without such disclosures decreased to 18 (55%).

Table 2: Percentage of Banking Industry Companies with COVID-19-Related Going Concern Disclosures

Industry	Banking Industry (n=33)			
	2020	Percentage	2021	Percentage
Firms with disclosures related to COVID-19's impact on going concern.	13	39%	15	45%
Firms lacking disclosures regarding COVID-19's influence on going concern.	20	61%	18	55%
Total	33	100%	33	100%

In both industries, the percentage of companies making such disclosures increased from 2020 to 2021. However, in the banking industry, the increase was more significant (from 39% to 45%) than that in the textile industry (from 3% to 5%). Additionally, in both industries, most companies did not make COVID-19-related going concern disclosures in either year. However, the percentage of companies that did not make such disclosures was greater in the textile industry (97% in 2020 and 95% in 2021) than in the banking industry (61% in 2020 and 55% in 2021). This indicates the noncompliance and negligence of disclosures by corporations.

5.2. Analysis from Impression Management Perspective

After textual analysis, this section extends the assessment of why companies did not make disclosures and how they are trying to communicate with stakeholders. Here, we applied different impression management tools suggested by Caliskan et al. (2021) to explain disclosure and nondisclosures.

5.2.1. Defensive Tactics

The companies employed various defensive approaches, such as dissociation, justification, rhetorical manipulation, and manipulation of reading ease, to defend themselves. This section reports how companies have used defensive strategies for going concern disclosures during the pandemic.

Disassociation and justification

Disassociation and justification tactics encompass strategies employed by companies to distance themselves from negative outcomes while pledging to make improvements to mitigate these effects. In situations such as the COVID-19 pandemic, a company may admit to losses or damage while asserting that its actions are not responsible for adverse consequences. This approach allows the company to acknowledge its role without accepting full blame for the negative impact. It is a way of balancing accountability with the need to preserve its image in the face of challenging circumstances. Examples 1 and 2 elucidate how firms have used the justification of not disclosing the implications of the pandemic on the going concern assumption.

Example 1: "The Directors have chosen to use the Going Concern Basis while preparing the accounts because they believe that the company possesses sufficient resources to sustain its operations in the foreseeable future. Although the company is suffering from consecutive net losses, the management has taken adequate plans to overcome the situation. These plans include ensuring the maximum use of production capacity, which has increased in this reporting period, and increasing the sale through finding new customers. Although still negative, EPS has been improved compared to last year…………… The company is facing some difficulties with short and long-term bank loan which is disclosed below. The management has taken the necessary steps to reschedule the loans to ensure the working capital availability of the company."   -Tallu Spinning Mills Ltd., (2021).

Example 2: "Due to the constantly changing and unpredictable nature of the situation, we do not believe it is feasible to give a specific numerical assessment of the potential effects of this outbreak on the Corporation."   – AB Bank, (2020)

The company acknowledges that it is experiencing consecutive net losses but denies that COVID-19 has had any negative impact on its capacity to continue operations or on its outcomes. The company states that management has developed plans to overcome the situation and justifies its position by pointing out that although the earnings per share (EPS) is still negative, it has improved compared to last year. The company suggested that increasing sales volume is helping it manage to pay financial expenses with available operating profit. Additionally, the company has justified that the assessment of the impact of COVID-19 is impractical. This is an example of justification, where the company avoids responsibility for a negative outcome. Higgins and Walker (2012) argue that the presentation of factual information and logical reasoning can help to establish the credibility of the communicator and shape stakeholders' perceptions. In this case, the company presents facts and logical arguments in support of the going concern basis previously adopted.

Rhetorical manipulation

Rhetorical manipulation is a tactic that utilizes complex and unclear performance information alongside persuasive language and employs storytelling to hide details that could have negative impacts. This technique is aimed at altering the audience's perception of the information presented (Fialho et al., 2021). Companies have also adopted this technique in going concern reporting.

Example 3: "The Bank's financial statements have been prepared with the assumption that it will remain in operation for the foreseeable future, and there are no plans or legal requirements to reduce the scope of its activities or liquidate. Over the past few years, the Bank's key financial indicators, including liquidity, profitability, asset quality, provision adequacy, and capital adequacy, have all been positive. Additionally, all rating agencies have reported a "stable" outlook for the bank. The management is not aware of any significant uncertainties that could cast doubt on the bank's ability to continue as a going concern."   -United Commercial Bank Ltd, (2020, 2021).

Example 4: "Company management is hopeful about its continuing operation as well as its product diversification and expansion of businesses, although all the matters have slowed down as a consequence of the pandemic coronavirus." - Alltex Industries Ltd., (2021)

In examples 3 and 4, the companies used rhetorical manipulation to highlight positive outcomes by emphasizing certain information and minimizing negative information through carefully chosen keywords and expressions. Despite experiencing some challenges, companies have continued to show a healthy trend for a few years, and rating agencies have given them a stable outlook. Business expansion and product diversification strategies are overemphasized to overcome the negativities of the pandemic. These keywords are used to highlight positive outcomes that influence stakeholders' impressions (Higgins and Walker, 2012).

Concealment and omission

Concealment and omission refer to intentionally hiding information that could have negative effects (Fialho et al., 2021). According to Rutherford (2005), managers tend to disclose less about the actual situation, which results in reduced clarity in their writing. In the case of examples 5 and 6, the companies emphasized their compliance with regulations by stating that their financial statements were prepared following accounting standards and were based on a going concern basis. However, they then provided reasoning to support their statement that there were no material uncertainties. Merkl-Davies and Brennan (2007) suggest that managers may intentionally use such arguments, reasoning, and defensive justifications to confuse readers and prevent them from investigating the issue further. The aim may be to conceal a crisis or prevent parties from investigating the actual situation of the company.

Example 5: "The bank, in particular, has no plans or legal requirements to halt its operations and liquidate its assets in the short term, potentially at low fire sale prices. Additionally, the management is not aware of any significant uncertainties that could cast doubt on the bank's ability to continue operating as a going concern."   *- One bank ltd, (2020, 2021)*

Example 6: "The management does not perceive any concerns regarding the bank's ability to continue as a going concern in light of the recent COVID-19 pandemic."   *- AB Bank Ltd. (2020)*

5.2.2. Performance-Oriented Tactics

Certain companies utilized performance-based strategies, focusing on highlighting their achievements and successes to impress their stakeholders. The following examples serve as evidence.

Example 7: "For the past few years, the Bank's key financial indicators, such as liquidity, profitability, asset quality, provision adequacy, capital adequacy, and credit rating, have exhibited a positive trend. Furthermore, the management is not aware of any significant uncertainties that could give rise to concerns about the Bank's ability to continue operating as a going concern." - Shahjalal Islami Bank Ltd. (2021)

Example 8: "The Bank has maintained a positive trend for several years and has recently been awarded an AA rating for long term and an ST-2 rating for the short term by Emerging Credit Rating Limited."   *-Dhaka Bank Ltd. (2020, 2021)*

According to Merkl-Davies and Brennan (2007), companies have two choices when disclosing earnings: they can opt for the lowest previous-period baseline earnings figure to enhance year-on-year earnings (referred to as the benchmark earnings number), or they can use performance indicators for self-comparison or industry benchmarks. Examples 7 and 8 illustrate how, despite pandemic challenges, companies emphasized positive outcomes such as profit, credit payment, robust available capital, and favourable bank loan service ratings (CRISL). By presenting factual data in this manner, companies aimed to cultivate a positive perception of their capabilities. As noted by Schleicher (2012), managers may selectively present performance details to downplay negative news in favour of positive aspects. This approach elevates positive themes and language, resulting in a greater prevalence of favourable information. This strategic reporting enhances the credibility of communicators (Higgins and Walker, 2012; Hossain, 2017).

5.2.3. Assertive Tactics (Self-Promotion)

There is the testimony of several firms using self-promotional assertive tactics in managing impressions without showing any damaging effects on performance and the going concern assumption. Self-promotion is a widely known strategy for creating positive vibe in an organization (Caliskan et al., 2021). The management of organizations overemphasizes their capabilities and achievements, thereby increasing their reliability and proficiency (Caliskan et al., 2021). Examples 9 and 10 serve as evidence of self-promotion while having little focus on going concern disclosures.

Example 9: "EBL has no plans or legal obligations to decrease or shut down any of its operations. Additionally, the management team is not aware of any significant concerns that would jeopardize the bank's ability to continue operating." - Eastern Bank Ltd. (2021)

Example 10: "Management of the company makes such assessment (going concern) each year." -Anlimayarn Dyeing Ltd. (2020, 2021)

Regulations require management to assess the going concern assumption, but their emphasis on "management making assessment each year" can be interpreted as a method of self-advertisement. Leary and Kowalski (1990) suggest that impression-handling strategies adopted by managers depend on both their current and potential future image. In the two examples provided, management has emphasized their proficiency and dedication to successfully handling a crisis such as a pandemic. By doing so, they created a positive image of the organization for stakeholders during the pandemic while allowing people to know little or no perception of the implications of the crisis on the assumption of going concern.

6. CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS

The pandemic has significantly impacted businesses globally, including the banking and textile industries in Bangladesh. The industries in Bangladesh have faced various challenges because of the pandemic, such as decreased demand for products and services, supply chain disruptions, and liquidity issues. These difficulties have significantly influenced the company's application of the going concern assumption, which is a foundational accounting principle supporting the creation of financial statements. Professional accounting bodies have urged specific disclosure of going concern assessments due to the pandemic. This study has attempted to assess disclosure compliance from an impression management perspective based on the banking and textile sectors of Bangladesh for the period 2020-2021.

The outcomes of the study suggest that most companies in the textile and banking industries did not assess and disclose the implications of the syndemic on the firm's capacity to carry on operations. These firms have used defensive and performance-related strategies in going concern disclosures, with only a few using self-promotion tools. This finding is consistent with Schleicher & Walker's (2010) study, which found that risky and loss-making companies tend to use positive language in their disclosures and reduce the number of negative statements.

This study provides a preliminary understanding of how companies manage crises through strategic corporate communication. The application of impression management tools suggested by Caliskan et al. (2021) to analyse going concern disclosures is also unique. This approach offers a new perspective for interpreting corporate narratives and may attract attention from policymakers and the business community given the long-term impact of the pandemic on the economy.

The study under discussion possesses several noteworthy limitations that warrant consideration. Foremost among these limitations is its restricted scope, which encompasses only two sectors. While the study's findings may provide valuable insights into these sectors, they cannot be readily generalized to other industries. This is an important aspect to consider, as the impact of COVID-19 and the motivations behind disclosure practices can vary substantially across different sectors. Another aspect that bears mentioning is the exploratory nature of the study. As an exploratory study, its primary goal was to delve into the landscape of COVID-19-related disclosures and gain a preliminary understanding of the factors at play. While this approach is valuable for generating hypotheses and uncovering initial trends, it falls short of offering definitive conclusions or establishing causal relationships. Therefore, the findings should be regarded as suggestive rather than conclusive. In light of these limitations, there is ample room for future research endeavors to build upon and refine the insights provided by this study. Quantitative studies could be conducted across a more extensive range of industries. By doing so, researchers can not only broaden the understanding of how COVID-19 disclosures manifest but also identify sector-specific nuances that might impact disclosure practices. Such an approach would enable a more comprehensive assessment of the factors that influence the decision-making behind COVID-19-related disclosure. Furthermore, a cross-industry comparison would likely be a productive avenue for future exploration. This could unveil novel issues and considerations pertinent to COVID-19 disclosures that might not have been apparent within the confines of the current study's focus on just two sectors. Cross-industry comparisons can shed light on variations in disclosure practices, potential challenges, and even best practices that transcend sector boundaries.

In conclusion, the ongoing viability of a business is a pivotal consideration in financial reporting, particularly during times of crisis. Accounting standards, independent auditing, and management responsibilities collectively emphasize the significance of evaluating a company's ability to continue its operations. This helps maintain the integrity of financial reporting and equips stakeholders with the information needed to navigate uncertain and challenging circumstances.

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DETERMINANTS OF CRYPTOCURRENCY ADOPTION: EVIDENCE FROM AN EMERGING ECONOMY

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ABSTRACT

Purpose- Cryptocurrency adoption has tremendously improved in Sub-Saharan Africa's emerging economies. Despite this trend, less emphasis has been placed on determinants of cryptocurrency adoption in such economies. This study extended the Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Technology Acceptance Model (TAM), to examine aspects that determine cryptocurrency adoption in Kenya. The study findings may assist policymakers in developing a sturdy regulatory framework for adopting digital assets and monitoring Virtual Asset Service Providers (VASPs).
Methodology- Data was collected through questionnaires from 400 students, graduates, and investors who had information about cryptocurrency. The study employed a structural equation model to estimate our latent constructs.
Findings- Results confirmed the hypotheses that perceived utility, perceived ease of usage, perceived risk, attitude, and subjective norms are significant constructs in determining behavioral intent to use cryptocurrency in Kenya. Further, the mediatory role of attitude on cryptocurrency adoption was also confirmed.
Conclusion- Policies that promote the introduction of an e-cash platform, regulation of digital system currencies, social mass awareness, and cryptocurrency companies with good reputations should be introduced by the government to ensure the development of the cryptocurrency market in Kenya.

Keywords: Cryptocurrency, perceived risk, perceived utility, perceived usability, subjective norm
JEL Codes: G15, O30, E32

1. INTRODUCTION

Cryptocurrency has experienced significant growth over the last decade, and this led to a record increase in digital assets in the world. Despite fluctuations in the value of cryptocurrency, the industry is still stable. This is demonstrated by the fact that in the first and second quarters of 2022 and 2023, big businesses and financial institutions were participating in the cryptocurrency market in addition to private investors. Africa is also steadily venturing into the crypto market with countries like Kenya, Nigeria, and South Africa being ranked among the world's ten largest Bitcoin markets (Ordu and Golubski, 2022). Chinalysis (2023) recorded a 1200 percent increase in cryptocurrency payments from 2020 to 2022 in Africa.

UNCTAD (2023) ranked Kenya as first in the world on peer-to-peer (P2P) volume of cryptocurrency transactions, on-chain cryptocurrency value received (analyzes all total crypto activities), and on-chain retail value transferred (captures the volume traded by individuals). It is estimated that 4.5 million people, which is 8.5 percent of Kenya's population owned and participated in the cryptocurrency market (Chainalysis, 2023). According to Local Bitcoins, a firm that facilitates P2P crypto trading with local currency, Kenya recorded Kshs.150 million which equates to almost $ 1.3 million in trading volume of cryptocurrency per week by the second quarter of 2022. This placed Kenya at the top of countries on Local Bitcoins by transaction volumes. Kenya's Bitcoin holding equates to 2.3% of the GDP which translates to more than $1.5 excluding other cryptocurrencies, such as Ethereum or Dogecoin (Chainalysis, 2023). According to these figures, it is apparent that the Kenyan society accepts cryptocurrencies even though the Central Bank of Kenya (CBK) has issued advisories against their use. Ndemo (2022) posits that blockchain technology is the future of Kenya because it has facilitated the financing of important sectors of the economy like the housing sector, Micro, Small and Medium-sized businesses (MSMEs), and remittance payments.

In 2020, Kenya witnessed an initial pilot testing of Akoin, a cryptocurrency project introduced by American musician Akon in Africa. The project achieved tremendous success in the Western County of Kakamega under the Mwale Medical and Technology City (MMTC), setting the platform for a national rollout. By 2025, it is anticipated that $2 billion worth of transactions would occur each month in MMTC. Kenya has also seen an increase in Sarafu, a community currency established in 2017 in the coastal region that has since transitioned into a cryptocurrency. The Sarafu network aimed to cushion the poor in Kenya during times of financial crisis by distributing income tokens that operate like vouchers, which can be used as a medium of exchange. The Kenya Red Cross Society partnered with the Danish Red Cross and Grassroots Economics who introduced the Sarafu network to issue blockchain-based Sarafu vouchers to Kenyans. This move was inspired by the success of the trial program in 2020 which saw a subscription of more than 40,000 households and business enterprises into the network during the COVID-19 outbreak (Mattsson et al., 2022).

However, despite the high cryptocurrency dealings, many African countries do not have a legal framework to regulate the crypto market. The Central Bank of Kenya in 2015 only advised discretion regarding cryptocurrency usage while not aggressively banning them. Nonetheless, CBK is required by Kenya's Money Remittance Regulations to oversee cryptocurrency transactions by granting licenses to allow money transmission entities to conduct business in Kenya. On 11th February 2022 CBK delivered a detailed discussion paper that evaluated the pertinence of Central Bank Digital Currency (CBDC) in Kenya's market and cross-border remittances. The CBK requested commentaries from Kenyans on the Discussion Paper and this was the beginning of discussions on the possible opportunities and dangers of implementing the CBDC in Kenya. Currently, there is no legal framework to regulate the cryptocurrency market. Therefore, this means that Kenyans can hold cryptocurrencies but cannot lawfully use exchanges to trade them for legal tender. The government in April 2024 appointed a technical committee to develop a regulatory and monitoring framework for the adoption of cryptocurrency also known as Virtual Assets (VAs) and Virtual Asset Service Providers (VASPs) which will regulate other digital money services in Kenya.

Many studies have been steered toward cryptocurrency as a new venture opportunity (Lone and Naaz, 2021; Sagheer et al., 2022; Shahzad et al., 2024). In Kenya, the cryptocurrency market has shown it has the potential to grow the economy due to its proficiency, fast, safety, collaboration, and worldwide opportunities. This research advances policy in addition to knowledge in three areas. First, the government of Kenya is in the process of designing a regulatory and monitoring framework for the adoption of Virtual Assets and Virtual Asset Service Providers. Thus, it is crucial for policymakers to determine what inspires Kenyans to utilize cryptocurrencies. This helps in coming up with regulations that would not discourage the uptake of cryptocurrency and also ensure financial system soundness. Kenya, like other African emerging economies, has been grey-listed and is currently struggling to improve its financial system standing before the Financial Action Task Force (FAFT). Second, Policymakers need to understand what determines cryptocurrency adoption due to the rising uncertainties of increased dealings of virtual assets that could surge the risks of financing terrorism and money laundering. Third, considering the extreme swings in inflation rates and monetary policy ineffectiveness in Kenya, cryptocurrency could offer protection against inflation due to its caping policy and its trustworthiness in the electronic marketplace (Sudzina et al. 2023). The usage of cryptocurrency in Kenya has an important role in its future value and use.

Specifically, this study analyzes the direct and indirect association between technology awareness and acceptability by users of cryptocurrency through observable factors such as; usability, usefulness, and risks associated with cryptocurrency adoption. Furthermore, we examine the encouraging and impeding features on the use of electronic currency by the Kenyan population. The adoption of blockchain technology is still at its infant stage in emerging economies like Kenya. This empirical study provides insights on the advancements made in blockchain technology as a means of exchange in developing nations like Kenya. First, we augment a body of existing literature linked to technology awareness. We also examine the variables that affect Kenyan consumers' acceptance of bitcoin use in order to assess their capacity to adopt blockchain technology. This will provide valuable insights and references to interested parties including the public, government, and investors. Second, our findings will assist the regulatory authority in coming up with a policy framework that will guide the monetary system on how to accommodate the cryptocurrency market. Third, we examine the potential ability of Kenya to adopt and use digital money for commerce and business ventures in the future due to the changing nature of technology. Finally, we examine cryptocurrency in terms of a link between man, finance, and technology using existing models. This fills the knowledge gap since majority of studies on cryptocurrency adoption center on the technological viewpoint. In this study, the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), and the Theory of Reasoned Action (TRA) are experimentally tested together with other constructs drawn from pertinent technology adoption models that are unique to Kenya.

This study is organized as follows: interrogation of previous existing studies concerning our topic is exhausted in the second chapter. Consequently, section three and four introduces and applies the research technique utilized in the study and the estimation approach. The concluding section discusses the findings of our regression results and policy commendations to the regulatory authority in Kenya.

2. LITERATURE REVIEW

Many existing theories assess the determinants of cryptocurrency adoption in the world. The pioneering works of Rogers Everett which commenced in the 1960s examined the Diffusion of Innovation Theory (DIT). This theory elucidates how innovation is spread among members of society over time through particular channels (Rogers, 1976). Consequently, the Reasonable Action hypothesis (Ajzen and Fishbein, 1977), Task Technology Fit theory (Goodhue and Thompson, 1995), and Technological Willingness theory (Parasuraman and Colby, 2001), evaluated individuals' attitudes and norms, their actual utilization of technology, willingness to embrace innovations and utilize them in their daily professional activities. Hu et al. (1999) introduced the Technological acceptance model (TAM) which linked perceived usability, technology anxiety, and efficacy to the perceived ease of utilizing a given technology. In this theory, a complete set of determinants was introduced which examined specific differences, social impact, system features, and moderating conditions. The Planned Behavior hypothesis (TPB) introduced by Ajzen (1991) has also been employed in research that predict social behavior of human beings. This theory holds that perceptions of behavior, attitudes, and subjective norms all influence group behavior, which is proxied by behavioral intent to use (BIU). The reasoned action hypothesis (TRA) introduced by Ajzen and Fishbein (1977) demonstrates how individuals behave when influenced by others. Ajzen (2011) concluded that attitude and subjective norms linearly affect the behavior intention of an individual. Ajzen and Fishbein (1977) indicate that subjective norm looks at what individuals perceive regarding peer pressure towards adopting or not adopting a certain behavior, while attitude is a person's valuation of implementing the behavior in question. Therefore, higher attitudes and subjective norms influence an individual's real behavior. TRA studies are popular among researchers because it is simple, easily interpreted, and can combine various constructs, especially those that influence an individual's conduct in a linear and successive pattern (Boxer and Thompson, 2020). In order to understand how consumers accept technology, Venkatesh et al. (2003) advanced the Unified Theory of Acceptance and Use of Technology (UTAUT), which looked at expectations for effort, performance, and societal impact in addition to enabling conditions. They further expounded on this theory by changing some original prevailing linkages and introducing new associations borrowed from the general principles introduced by Johns (2006) on the development of a hypothesis by bringing in new concepts.

Existing research has shown the necessity of integrating TAM, TPB, and TRA in order to have a more profound comprehension of the elements impacting the acceptance of novel technologies (Fu et al., 2006). Therefore, in our suggested research we combine TAMs (perceived utility, perceived simplicity of use, observed risk) and TPBs (attitude, subjective norm, supporting conditions). The use of cryptocurrencies is the focus of the hidden construct of supporting conditions because end-users must possess the technology and expertise required to enable their use of cryptocurrencies. This inspires confidence while making a given technology (digital money) easier to adopt.

2.1. Hypothesis Development

2.1.1. Intervening Role of Perceived Usefulness

This is one of the variables that influences intentional behavior by users to accept or reject innovation. Perceived utility (PEUS) is the notch to which a buyer of digital knowledge believes it contributes to his efficiency at work (Davis and Davis, 1989). PEUS considerably forecasts planned behavior to utilize cryptocurrencies. Shahzad et al. (2024) examined the role of trust as a cornerstone while featuring perceived usefulness as a mediatory construct. The research discovered that perceived utility had an impact on cryptocurrencies. In the same vein, Recksco et al. (2024) extended the UTAUT theory by examining the determinants of users' adoption of cryptocurrencies in Central Europe. The study concludes, that PEUS is significant in influencing the use of cryptocurrencies in Central Europe countries. Therefore, it is reasonable to conclude that PEUS facilitates the desire to utilize cryptocurrency (Sagheer et al., 2022, El-Chaarani et al., 2023). We hypothesize that PEUS motivates consumer behavior and intent to use cryptocurrencies (BIUC). Jariyapan et al. (2022) conclude that if people believe that adopting a novel technology will boost their aptitudes and skills, then their desire to accept an innovative technology will rise. PEUS is, therefore, a significant factor that influences the plan to employ cryptocurrency as a means of payment (Mailizar and Johar, 2021). In their study, Schaupp and Festa (2018) employed the Planned Behavior Hypothesis (TPB) to explore the variables that impact cryptocurrency adoption. They found out that perceived usefulness is important as a moderator between technological know-how and users' behavioral intent to adopt a given innovation. Previous studies have therefore emphasized how crucial perceived utility is in influencing a consumer's decision to adopt new technologies. (see Khan et al., 2020; Kher et al., 2021; Sagheer et al., 2022). Our hypothesis is that customers' inclination to utilize cryptocurrencies as a medium of exchange is positively impacted by perceived usefulness.

2.1.2. Intervening Role of Perceived Ease of Use

This variable looks at how straightfoward or intricate people think it is to employ technology in their lives. Sudzina et al. (2023) confirm that as it becomes easy to use technology, individuals will be persuaded to incorporate it into their businesses. This argument

has been widely researched, and it supports the Technological Acceptance Model. Shahzad et al. (2024) studied the mediatory role of perceived simplicity of usability in determining the usage of cryptocurrency in Pakistan. The investigation discovered that perceived simplicity of use was a vital mediator in cryptocurrency use. Further, consistent with this finding is that of Shahzad et al. (2022) which confirmed that factors such as computer self-efficiency, playfulness, reduced anxiety, and external control affect people's beliefs on perceived ease of usefulness. Further, Almuraqab (2020) concludes that experience and familiarity with computers will improve self-efficiency and reduce unease about adopting new technologies. In their study on determinants of e-government uptake in Togo, Chen and Aklikokou (2019) confirmed that perceived simplicity of use is vital in behavioral purpose to utilize e-government services. Consistent with this finding is that of Maruf et al. (2021) who scrutinized the role of conceived danger, perceived utility, and conceived simplicity of use in determining the intent to adopt ride-sharing services. The authors conclude that observed ease of utilization and conceived usefulness are vital in the adoption of ride-sharing services in China. Consequently, Nadeem et al. (2021) investigated factors that affect virtual assets adoption in China using TAM. The findings conclude that conceived simplicity of usage and conceived usefulness are key in cryptocurrency adoption in China. Jariyapan et al. (2022) Using TAM 3, investigate the variables that contributed to the acceptance of cryptocurrencies in developing nations during the COVID-19 era. They discover that perceived usefulness played a mediatory role on subjective norms and believed ease of usefulness resulting in crypto adoption in Pakistan. Consistent with these findings is that of Sagheer et al. (2022). Our hypothesis thus concludes that perceived ease of usefulness has a beneficial bearing on behavioral intent to adopt cryptocurrency usage.

2.1.3. Perceived Ease of Use and Perceived Usefulness

When it comes to technology, users will adopt a simple innovation more comfortably than those they find unnerving even if they think it's easy to utilize. Individuals will utilize technology that they believe is easy to utilize and requires less effort (Wilson et al., 2021; Shahzad et al., 2024). Chen and Aklikokou, (2019) conclude that PEOU positively affects PEUS of electronic government services in Togo. Along the same line, Sagheer et al. (2022) examine determinants of cryptocurrency use in Pakistan by the Z generation using TAM. The authors found out that besides the state's moderating function, observed ease of usage significantly affects perceived utility which in turn impacts the behavioral intent to utilize cryptocurrency. Consequently, Jariyapan et al., (2022) confirm that during COVID-19, emerging economies utilized digital money mainly because of their perceived simplicity of use and conceived utility. This research therefore acclaims that perceived ease of use is significantly affects conceived usefulness of cryptocurrency.

2.1.4. Intervening Role of Perceived Risks

Illia et al. (2023) investigated what influences the adoption of cryptocurrency exchange using a multi-theory approach. Apart from psychological innovation resistance, technological resistance, and functional and innovation resistance, the authors confirmed that perceived risks, subjective norms, and critical mass users also significantly affect the usage of cryptocurrency. Wilson et al. (2021), Jariyapan et al. (2022), and Sagheer et al. (2022) also emphasize the significance of seeming risk in determining cryptocurrency adoption. Al-Fagih (2016) in his research on variables that indicate non-shoppers' inclination to embrace online shopping, described perceived risk (PERI) as customers' understanding of the extent of probable risks of purchasing and utilizing an invention. Consumers will consider the risks before they purchase a given product (Muttaqin et al., 2023) or adopt a certain technology (Mweetwa and Mwange, 2024). Utilizing an extended UTAUT model, modulated by factors related to cultural variables, Khan et al. (2020) analyze the constructs influencing the implementation of online banking in emerging Asian economies. The study concludes that perceived security is a key variable that influences behavioral intent to utilize virtual assets. Consistent with this finding is that of Almajali et al. (2022) who analyzed the determinants of electronic currency adoption in Jordan. The findings demonstrated a noteworthy association between perceived danger, perceived ease of usage, perceived utility, perceived satisfaction, and trust in the intent to utilize cryptocurrency. Further, Shaikh et al. (2018) confirmed that whereas the unswerving effect of perceived danger on behavioral intent to adopt mobile banking is frail, it is imperative in the pre-adoption stage, which later influences other constructs that determine intention to use. However, Mendoza-Tello et al. (2019) discovered no discernible effect of perceived danger on behavioral intent to adopt cryptocurrency for e-commerce. Further, Farah et al. (2018) determined that observed risk has no influence on mobile banking adoption in Pakistan. Consistent with these findings is that of Jariyapan et al. (2022) who analyzed the determinants of cryptocurrency adoption in emerging economies using TAM 3. The study confirmed that perceived risk has little impact on behavioral intent to use cryptocurrency (see also, Ter Ji-Xi et al, 2021; Widyanto et al., 2021). Considering that cryptocurrency is an invented financial technology that has probable risks, our hypothesis posits that conceived risk has a detrimental influence on behavioral intent to utilize cryptocurrency.

2.1.5. Intervening Role of Subjective Norm

Ajzen (2011) defines subjective norm (SUNO) as a behavior that is approved by a person or a particular group of people. It determines how a person behaves due to the perceived social pressure from other people's perceptions. Sagheer et al. (2022) conclude that

subjective behavior has a notable incentive on conceived utility and behavioral intent to utilize cryptocurrencies. In line with these conclusions are those of Illia (2023). Johnston et al. (2024) found out that an individual will be biased towards utilizing a given technology if he believes that his social groups (family, friends, etc.) would also be inclined to use it. SUNO plays a major role in cryptocurrency acceptance. In their study of determinants of electronic currency use, Al-Amri et al. (2019) also verified that the way other people use cryptocurrencies affects their uptake. Furthermore, in his study of Bitcoin acceptance in the USA during the COVID-19 pandemic,) Kim, (2021) determined that SUNO contributes significantly to the behavior intention of adopting Bitcoin use. Consistent with these findings, Gazali (2019) in their study of Bitcoin investment behavior concluded that SUNO is a valid and reliable construct that determines cryptocurrency adoption. Therefore, the hypothesis to be used in this study proposed that intent to adopt cryptocurrencies in Kenya is significantly impacted by subjective norm.

2.1.6. Intervening Role of Facilitating Conditions

Hussain et al. (2023) explored the variables that impact the uptake of cryptocurrency using smart least square estimation on 342 respondents in Pakistan. The study confirmed that facilitating conditions (FACO), effort anticipation, social effect, and performance expectation play an essentiall role in establishing the behavioral intent to adopt a certain technology. FACO has also been employed in different studies including online banking (Khan et al, 2017), information technology adoption (Angorani, 2024), and social media (Al-Qaysi et al., 2020). For example, in their research, Khan et al (2017) found a statistically meaningful effect of enabling conditions on online banking. Studies that examine the effect of supporting conditions on cryptocurrency adoption have mixed outcomes. Venkatesh et al. (2003) determined that a substantial and favorable correlation exists between FACO and uptake of cryptocurrency. The same conclusion was recently verified by Arias-Oliva et al. (2019) in Spain. On the contrary, Almajali et al. (2022) in their study of factors that influence cryptocurrency adoption in Jordan found that facilitating conditions are irrelevant in deciding the acceptance of cryptocurrencies. After examining these studies, we hypothesize a major meaningful association between facilitating conditions and intent to utilize electronic currency in Kenya.

2.1.7. Intervening Role of Attitude

Vetrichelvi and Priya (2022) defined attitude (ATTI) as a secondary variable that facilitates the adoption of technology. Arpaci and Bahari (2023) and Idrees et al. (2024) reiterated the importance of attitude and awareness levels towards the adoption of new technologies. Doblas (2019) examined how awareness and attitude affect behavioral intention of cryptocurrency usage among university students in the Philippines. Results confirmed that attitude significantly affects the adoption of cryptocurrency. Furthermore, Fettahoglu and Sayan (2021) conclude that the attitude of individuals about using cryptocurrency influences their adoption in Turkey. Consistent with these outcomes is that of Almajali et al. (2022) who found that attitude had an intervening impact on the association between observed risk, perceived utility, subjective norm, perceived enjoyment, and behavioral purpose to adopt cryptocurrency use. Nonetheless, Vetrichelvi and Priya (2022) confirmed that the interceding role of attitude toward behavioral intent to use cryptocurrency was only partial. Al-Bashayreh et al. (2022) found that attitudes toward using mobile banking acted as an arbitrator in the relationship between people's desire to use mobile banking and their perception of risk. Taking into account the outcomes of past studies, we hypothesize that: attitude plays an intervening role amid observed risk and behavioral intent to use cryptocurrency, attitude will facilitate the link between conceived usefulness and intent to adopt cryptocurrency usage, attitude will also arbitrate the association between perceived usability and intent to utilize cryptocurrency as a mode of payment.

Based on the existing empirical studies that show the growing need to understand and regulate cryptocurrency use in the world (see, Fettahoglu and Sayan, 2021; Vetrichelvi and Priya, 2022; Bashayreh et al., 2022; Arpaci and Bahari, 2023; Sagheer et al., 2023; Jaripayan et al., 2023; Illia et al., 2023; Angorani, 2024; Shahzad et al., 2024; Johnston et al., 2024), there is scant knowledge on determinants of cryptocurrency adoption in Africa's emerging economies, especially Kenya. Furthermore, many emerging economies in Africa have not established the determinants of cryptocurrency use in their jurisdictions. Therefore, to come up with a regulatory framework and policies that regulate Virtual Assets and Virtual Assets Service providers is more of a challenge than an opportunity. There are also scant existing studies that try to combine the different models that explain behavior intent to use electronic money in the world. This research attempts to close this knowledge gap by adopting a unique research model that combines constructs from the attitudinal TRA model (attitude, and subjective norm) and TAM (behavioral intent to utilize technology, perceived ease of usage, perceived utility, and perceived risk) to examine determinants of cryptocurrency adoption in Kenya. We also factor in facilitating conditions that possess an effect on behavioral intent to utilize a new system in different settings.

3. RESEARCH METHODOLOGY

The study utilized the Structural Equation Model (SEM) to determine the association between our constructs of interest which are qualitative in nature. The currently available empirical publications on this topic supports the selection of this estimation approach

(see, Jariyapan et al., 2022; Vetrichelvi and Priya, 2022; Al-Bashayreh et al., 2022). We estimate a multivariate model that incorporates measurement items to proxy latent constructs. The estimated constructs in this research were modified from earlier empirical works. Preceding theories, models, and hypotheses were also tested. A structured cross-sectional questionnaire was utilized to gather data on our variables of interest through the Internet. Bhattacherjee (2012) confirms that the use of the Internet to collect data has several advantages which include, cost-effectiveness, easy access to a wider population, and less time consumption. A projected conceptual framework was authenticated and the propositions were measured using data attained from the questionnaires. The study focused on university students, graduates, and investors who at least have some basic knowledge of internet usage and the financial market in Kenya. The choice of this sample was borrowed from existing empirical literature on our topic (see Almajali et al., 2022; Shahzad et al., 2024). Data was collected between 1st March 2024 and 30th April 2024. Any correctly completed questionnaire was seen as the participant's implicit authorization to have their data utilized for the investigation.

The intent of the survey was communicated to the participants and their confidentiality was assured in regards to their responses. To estimate PEUS, SUNO, ATTI, and BIUC a 5-item scale introduced by Venkatesh (2000) and later adopted by Almajali et al. (2022) was used. To measure FACO and PEOU, a 5-item scale presented by Venkatesh et al. (2016) and later adopted by Jariyapan et al. (2022) and Almajali et al. (2022) was utilized. Aloosh and Ouzan (2019) and Almajali et al. (2022) used a 5-item scale to estimate PERI which we employed in our study. All the measurement constructs were gauged using a five-point Likert scale (1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree and 5= strongly agree). For confirmation, the questionnaire was also given to scholarly experts on technology adoption field.

All of the latent constructs' reliability satisfied the 0.50 level upon completion of a preliminary study. Figure 1 shows the conceptual framework of our model.

Figure 1: Research Model
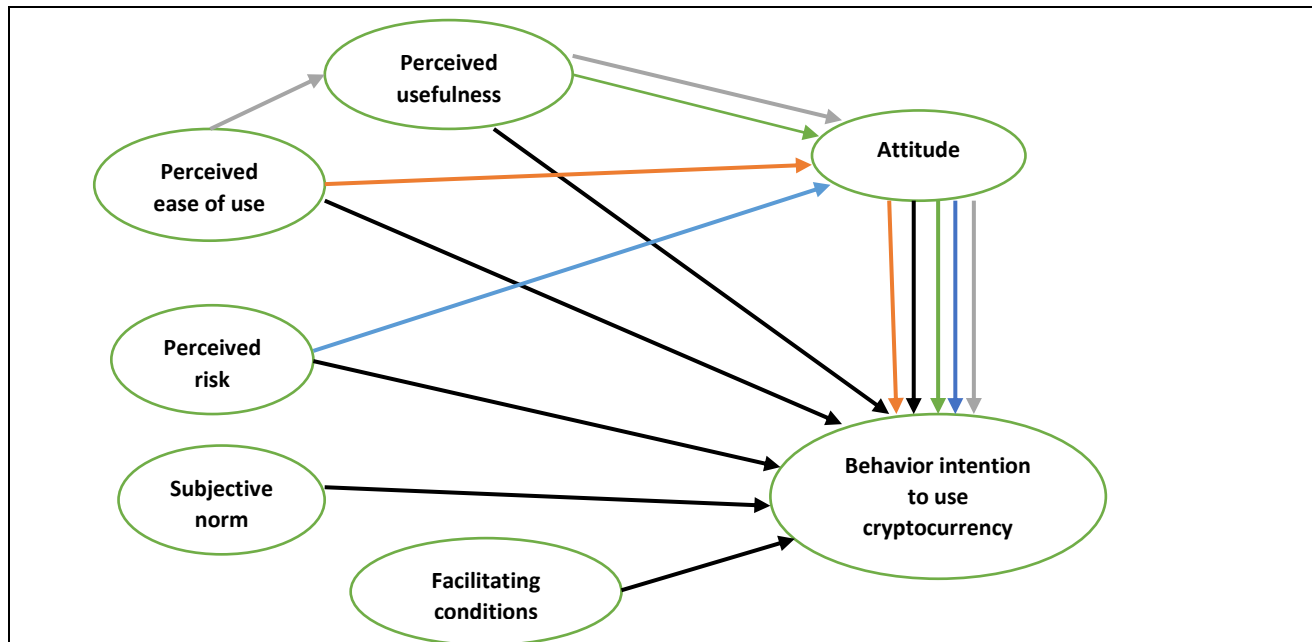
There were 34 questions in the questionnaire that measured the variables in our proposed conceptual framework. Details of the particulars of the questionnaire are presented in Table 1.

Table 1: Measurement of Constructs

Factor	Theoretical foundation	Code	Measurement item
Behavior Intention to Use	TAM2 (Venkatesh and	BIUC1	I'll use cryptocurrencies to make future merchandise purchases.
		BIUC2	I plan to utilize cryptocurrencies on a regular basis.

Cryptocurrency (BIUC)	Davis, 2000; Oliva et al., 2019; Almajali et al., 2022; Chen et al., 2022)	BIUC3	I am going to educate people about using cryptocurrencies.
		BIUC4	I have no doubt that utilizing cryptocurrencies helps me to complete my tasks on schedule.
		BIUC5	I plan to transact internationally using cryptocurrencies.
Perceived Usefulness (PEUS)	TAM2 (Venkatesh, 2000; Nadeem et al., 2021; Almajali et al., 2022; Sagheer et al., 2022)	PEUS1	The cost of paying using cryptocurrency is lower than that of conventional methods.
		PEUS2	I believe that using cryptocurrencies will simplify my transactions.
		PEUS3	With cryptocurrencies, I think I'll make wiser purchases.
		PEUS4	Making payments using cryptocurrencies is quicker and more efficient.
		PEUS5	I'm going to switch to using cryptocurrencies as my payment method.
Perceived Ease of Use (PEOU)	TAM2 (Davis, 1989; Venkatesh and Davis, 2000; Almajali et al., 2022)	PEOU1	I believe using cryptocurrencies will be simple.
		PEOU2	Cryptocurrency, in my opinion, will be simple to utilize.
		PEOU3	I have no doubt that mastering the technology will be difficult.
		PEOU4	In my view, technology has made the use of cryptocurrencies flexible.
Perceived Risks (PERI)	TAM2 (Venkatesh, 2000; Nadeem et al., 2021; Almajali et al., 2022; Sagheer et al., 2022)	PERI1	I think that cryptocurrency use is risky compared to other currencies.
		PERI2	My cryptocurrency transaction details will be misused by other people.
		PERI3	I think that cryptocurrency is too expensive.
		PERI4	I can easily control my money with cryptocurrency.
		PERI5	I believe it is dangerous to exchange my personal information for cryptocurrency payments.
		PERI6	It is difficult to convert cryptocurrency into fiat money.
Subjective Norm (SUNO)	TRA (Ajzen and Fishbein, 1977; Almajali et al., 2022; Jariyapan et al., 2022)	SUNO1	My close friends have persuaded me to transact with cryptocurrencies.
		SUNO2	My close pals insist that I give cryptocurrencies a try.
		SUNO3	The decision I make to buy cryptocurrency is influenced by my close friends.
		SUNO4	My partners encourage me to use cryptocurrencies with positivity.
		SUNO5	My future cryptocurrency use is inspired by my friends.
Facilitating Conditions (FACO)	UTAUT2 (Venkatesh et al., 2012; Abbasi et al., 2021; Almajali et al., 2022)	FACO1	I possess the necessary tools to apply cryptocurrencies.
		FACO2	I have all the essential data to utilize cryptocurrencies.
		FACO3	With the other tools I use, cryptocurrency pairs well.
		FACO4	When I run into issues with cryptocurrencies, I may receive help from others.
Attitude (ATTI)	TRA (Ajzen and Fishbein, 1977; Mazambani and Mutambara, 2019; Abbasi et al., 2021, Chen et al., 2019)	ATTI1	I'm confident that investing in cryptocurrencies is a wise move.
		ATTI2	Using cryptocurrencies for business purposes is undoubtedly a smart idea.
		ATTI3	It makes sense in my opinion to use cryptocurrencies as money.
		ATTI4	Using cryptocurrencies in my business dealings makes me appreciate it.
		ATTI5	The idea of using cryptocurrency makes me feel excited.

The sample comprised 400 people above the age of 20 years living in Kenya. Out of this sample, only 310 people completed the questionnaire, which was approximately 78% of the total sample. 90 questionnaires (22%) were cast off as they were incomplete or wrongly filled. Hair et al. (2014) and Kline (2013), state that the minimal sample size when using a structural equation model (SEM) should be at least 200. Therefore, our sample met the minimum threshold. Evidence shows that one should aim for a higher sample size a bigger sample size in SEM estimation to avert non-response misrepresentations (Sekaran and Bougie, 2019). The cluster area sampling method was employed in the gathering of data. The study was based in Nairobi County where it is estimated that more than 70% of the population is digitally literate and owns at least a phone (Odera and Matiy, 2023). Data was collected from students, graduates, and investors who had information about cryptocurrency (Jariyapan et al., 2022; Sagheer et al., 2022). There were two sections to the questionnaire. The first section comprised four pre-screening queries to select the targeted population. These four closed-ended questions were concerned with the respondents' demographic characteristics. These comprised age, gender, education attainment, and prior internet usage knowledge represented in Table 2. If the interviewees fulfilled these criteria, they would qualify

to participate in the study. The cluster area sampling method was preferred over other probability sampling methods because it was cheap, effective, and time-saving.

Table 2: Characteristics of the Respondents (N=310)

Characteristics	Number	Percentage
Gender		
Male	170	62%
Female	140	38%
Total	310	100%
Age		
20-29	130	42%
30-39	90	29%
40-49	70	22%
50 & above	20	7%
Total	310	100%
Highest Education Level		
High school	30	10%
Diploma	90	29%
Bachelor's degree	110	35%
Master's degree	70	23%
P.h.D	10	3%
Total	310	100%
Experience on Internet Usage (Years)		
1-5	80	26%
6-10	130	42%
11-15	70	23%
16-20	30	9%
Total	310	100%

4. EMPIRICAL ANALYSIS

4.1. Descriptive Statistics

The study used a univariate normality test and inter-construct correlation to determine the distribution and reliability of each latent construct. The results indicate that our constructs are typically dispersed based on the values of skewness which is lower than the threshold of 3 and kurtosis which has values less than 8, as proposed by Kline (2013). The standard deviation of each variable is also small implying a small dispersion from the mean. The correlation matrix further suggests a strong and favorable association between our independent and dependent latent constructs as represented in Table 3.

Table 3: Descriptive Statistics and Correlation Matrix

	Mean	SD	Kurtosis	Skewness	BIUC	ATTI	FACO	SUNO	PERI	PEOU	PEUS
BIUC	4.092	1.024	1.876	0.889	1.00						
ATTI	3.856	1.057	1.567	0.983	0.21	1.00					
FACO	4.263	1.320	3.215	1.030	0.32	0.28	1.00				
SUNO	4.067	1.020	2.632	0.874	0.01	0.10	0.33	1.00			
PERI	3.995	1.045	3.320	1.320	0.40	0.28	0.18	0.56	1.00		
PEOU	3.890	0.956	4.678	1.585	0.20	0.07	0.32	0.22	0.31	1.00	
PEUS	4.126	0.876	3.45	1.675	0.19	0.14	0.02	0.16	0.24	0.17	1.00

4.2. Exploratory Factor Analysis (EFA)

To ascertain if our model was fit for structural equation modeling (SEM), we assessed the main fit indices which included, the Chi-square test (CMIN/DF), Comparative Fit Index (CFI), Tucker-Lewis's measure (TLI), Root Mean Square Error of Approximation (RMSEA)

and Standardized Root Mean Square Residual (SRMSR). The outcome of our model fit indices as shown in Table 4 were as follows: CMIN/DF=4.10, CFI=0.68, TLI=0.75, RMSEA=0.04, and SRMSR=0.08. based on these results various indices, especially CFI, TLI, and SRMSR were found to be weak. To improve the model's fitness Bryne (2010) suggested the application of preliminary factor analysis to observe the factor loadings and modify them to fit the model. Further, Holmes-Smith et al. (2006) proposed the use of a standardized covariance matrix to improve the model fitness.

After dropping the five measurement items we further re-examined our model of fit indices which showed a significant improvement from the previous test as shown in Table 4. The outcome was regarded as acceptable based on the suggestion by Fornell & Larcker (1988). The CMIN/DF=1.55, CFI=0.92, TLI=0.95, RMSEA=0.02 and SRMSR=0.04. for a model to be deemed fit CMIN/DF≤3.0, CFI and TLI ≥ 0.90, RMSEA and SRMSR≤0.05. There was no need to improve or re-organize the estimation model due to the great degree of quality of fit that was achieved by the model (Bryne, 2010).

Table 4: The Goodness of Fit Indices

Model	CMIN	DF	P	CMIN/DF	CFI	TLI	RMSEA	SRMSR
Preliminary model	1124	275	0.00	4.10	0.68	0.75	0.04	0.08
Modified model	410	265	0.00	1.55	0.92	0.95	0.02	0.04

Threshold: CMIN/DF≤3.0, CFI and TLI ≥ 0.90, RMSEA and SRMSR≤0.05

EFA was conducted to choose the best factors that have a significant effect on our model. Seven factors with eigenvalues exceeding one were extracted. These factors described 95% of the disparity in our sample. We constructed a scree plot to determine whether the seven factors affected our statistical model. Furthermore, Varimax orthogonal matrix rotation was conducted to determine the variables that would constitute each factor in our model. Five measurement items were lower than the 0.50 criterion as advised by Hair et al. (2014) and were therefore dropped from our regression. These items included: Behavior intention to use cryptocurrency BIUC3, perceived ease of use PEUS5, perceived risk PERI6, subjective norm SUNO4, and attitude ATTI5. Table 5 shows the items that load on the seven extracted factors in our model. In this table all the measurement items exceeded 0.6, implying the reliability of our factors.

4.3. Confirmatory Factor Analysis

4.3.1. Construct Reliability Test

To evaluate the internal coherence of our latent components, the study used Cronbach's alpha (CA), Composite Reliability (CR), and Average Variance Extracted (AVE). The study confirmed that all the standardized items were statistically significant with values above the recommended threshold. For the Cronbach alpha test, the recommended limit is 0.7 as proposed by Nunnally and Bernstein (1994). Consequently, for the Composite dependability test, the suggested threshold is also 0.7 while the AVE cutoff stands at 0.5 as recognized by Hair et al. (2010). Table 5 illustrates that Perceived Usefulness (PEUS) scored the highest CA value while Facilitating Condition (FACO) had the lowest CA value. Further, our AVE values are above the 0.5 verge with Subjective Norm (SUNO) Having the highest AVE of 0.876 and Attitude having the lowest AVE of 0.754. Perceived Ease of Use (PEOU) scored the maximum CR value at 0.894 while Perceived Risk scored the lowest CR value of 0.765, which was still above the recommended cutoff value.

4.3.2. Construct Validity Test

The study used factor loadings to establish the extent to which a given item represents the latent construct. All the retained items were statistically meaningful (p<0.05) with factor loadings of more than 0.6 which surpassed the tolerable limit of 0.50 as proposed by Hair et al. (2010). Table 5 displays the loadings of each measurement item in our model. To assess the level of discriminant validity we utilized the Fornell-Larcker (FL) condition. According to Fornell-Larcker (1988), the variances of measurement items that signify a latent construct should not exceed their AVEs. The FL test shows how measurement items are different from each other. Table 6 confirms that the transverse results that characterize the square root of individual latent construct AVE are higher than its standardized correlation coefficients, and they differ from each other. This outcome confirms that there is discriminant validity in our model (Kline, 2013).

Table 5: Measurement Constructs and Factor Loadings

Constructs & Items	FL	SE	SMC	EV	CA	CR	AVE
Behavior intention to use Crypto (BIUC)					0.941	0.794	0.781
BIUC1	0.651	0.012	0.534	0.467			

BIUC2	0.783	0.023	0.678	0.576			
BIUC4	0.832	0.042	0.743	0.534			
BIUC5	0.824	0.052	0.654	0.489			
Perceive Usefulness (PEUS)					0.967	0.876	0.810
PEUS1	0.754	0.032	0.763	0.657			
PEUS2	0.882	0.043	0.682	0.546			
PEUS3	0.781	0.024	0.589	0.432			
PEUS4	0.843	0.065	0.756	0.487			
Perceived Ease of Use (PEOU)					0.898	0.894	0.834
PEOU1	0.782	0.043	0.738	0.632			
PEOU2	0.761	0.056	0.548	0.532			
PEOU3	0.704	0.034	0.645	0.432			
PEOU4	0.822	0.023	0.765	0.543			
Perceived Risk (PERI)					0.912	0.765	0.798
PERI1	0.693	0.045	0.652	0.432			
PERI2	0.764	0.032	0.764	0.321			
PERI3	0.721	0.046	0.788	0.462			
PERI4	0.802	0.055	0.540	0.635			
PERI5	0.783	0.021	0.636	0.534			
Subjective Norm (SUNO)					0.941	0.832	0.876
SUNO1	0.801	0.065	0.691	0.444			
SUNO2	0.831	0.043	0.786	0.598			
SUNO3	0.874	0.029	0.587	0.322			
SUNO5	0.823	0.032	0.671	0.435			
Facilitating Conditions (FACO)					0.889	0.865	0.765
FACO1	0.682	0.032	0.678	0.456			
FACO2	0.703	0.056	0.784	0.576			
FACO3	0.751	0.021	0.534	0.321			
FACO4	0.713	0.041	0.687	0.422			
Attitude (ATTI)					0.902	0.865	0.754
ATTI1	0.831	0.067	0.765	0.587			
ATTI2	0.863	0.034	0.556	0.354			
ATTI3	0.882	0.041	0.678	0.456			
ATTI4	0.791	0.026	0.641	0.345			

Note: FL (Factor Loadings), SE (Standard Errors), SMC (Square Multiple Correlation), EV (Error Variance), CA (Cronbach Alpha), CR (Composite Reliability), AVE (Average Variance Extract)

Table 6: Fornell-Larcker (FL) Criterion

	BIUC	ATTI	FACO	SUNO	PERI	PEOU	PEUS
BIUC	0.872						
ATTI	0.465	0.943					
FACO	0.356	0.254	0.894				
SUNO	0.654	0.675	0.334	0.856			
PERI	0.422	0.453	0.465	0.563	0.987		
PEOU	0.324	0.645	0.532	0.325	0.356	0.875	
PEUS	0.54	0.521	0.467	0.532	0.243	0.452	0.921

The key transverse displays the square root of the mean variance resulting from the whole measurement item constructs. While off-diagonal represents correlations between constructs.

4.4. Structural Equation Model Results

The goodness of fit of the model confirms that our structural model is appropriate for SEM with CMIN/DF=2.25, CFI=0.90, TLI=0.92, RMSEA=0.04, and SRMSR=0.01. Further, our path coefficients confirm that many of the construct relationships are statistically meaningful at p<005 as shown in Table 7. Out of the ten hypotheses, only one hypothesis was not supported. Our regressed model confirmed that conceived usefulness and conceived ease of use had a positive outcome on behavior intent to use cryptocurrency among Kenyans with P=0.00 and P=0.039 respectively. Consequently, the effect of perceived utility and perceived usability on attitude was found to be significant with all the paths having P=0.000. Additionally, perceived usefulness and convenience of use were favorably correlated with P=0.000. Perceived risk had an adverse but statistically meaningful relationship with attitude and behavior intent to utilize cryptocurrency at P=0.014 and P=0.010 respectively. Attitude and subjective norm affected behavior intention to use cryptocurrency positively with P=0.010 and P=0.000 respectively. Finally, facilitating conditions also confirmed its significant role in behavioral intent to utilize cryptocurrency with P=0.000. Almajali et al. (2022)

Table 7: Structural Equation Model Results

Hypothesis	Proposed Path	Betas (β)	Std. error	t-value	p-value	Empirical Results
Direct effect						
H1	PEUS —> BIUC	0.123	0.032	3.844	0.000	Supported
H2	PEUS —> ATTI	0.264	0.066	4.100	0.000	Supported
H3	PEOU —> BIUC	0.196	0.039	5.026	0.039	Supported
H4	PEOU —> ATTI	0.567	0.078	7.269	0.000	Supported
H5	PEOU —> PEUS	0.653	0.085	7.683	0.000	Supported
H6	PERI —> BIUC	- 0.108	0.043	2.512	0.010	Supported
H7	PERI —>ATTI	- 0.223	0.090	2.478	0.014	Supported
H8	ATTI —> BIUC	0.109	0.042	2.595	0.010	Supported
H9	SUNO —> BIUC	0.383	0.067	5.716	0.000	Supported
H10	FACO —> BIUC	0.178	0.101	1.762	0.593	Not supported

The role of attitude as a mediatory construct was also established in Table 8. When an indirect effect exceeds a direct effect, then a complete mediating outcome will be supported (Hair et al., 2010). The mediating hypotheses outcomes confirmed that attitude had a significant mediating effect on the association between perceived usability, perceived ease of use, perceived risk, and behavior intention to use cryptocurrency in Kenya.

Table 8: Mediating Hypotheses Results

Hypothesis	Proposed Path	Direct outcome	Indirect outcome	Mediation	Findings
Mediating effect					
H11	PEUS—>ATTI—>BIUC	0.040	0.145	Mediation	Supported
H12	PEOU—>ATTI—>BIUC	0.002	0.157	Mediation	Supported
H13	PERI—>ATTI—>BIUC	0.003	0.167	Mediation	Supported
H14	PEUS —> PEOU —> ATTI—> BIUC	0.010	0.134	Mediation	Supported

The favorable impact of perceived utility on the intent to utilize cryptocurrencies implies that if users are convinced that implementing an innovative technology will increase their capabilities and skills, then their behavioral intent to embrace usage of cryptocurrency will rise (Jariyapan et al., 2022). Consistent with this finding is that of Kher et al. (2021), Jariyapan et al. (2022), and Sagheer et al. (2022). Further, our verdict confirms that people are prone to utilize cryptocurrency when their experience and familiarity with technology improve their self-efficiency and reduce anxiety about using computers. Thus, our results confirm that the perceived ease of using technology is significant in determining cryptocurrency use (Wilson et al., 2021; Chen et al., 2019; Shahzad et al., 2022).

Further, individuals who are computer literate find it easy to adopt cryptocurrency and use it in their daily transactions. During COVID-19 it was estimated that more than 80% Kenyans utilized technology to do business because of their perception to easily use computers. Therefore, perceived usability played an important part in the perceived utility of cryptocurrency (see, Sagheer et al., 2022; Illia et al., 2023). Conversely, conceived risk and intent to adopt cryptocurrencies are negatively yet significantly correlated.

Thus, if the risks of using cryptocurrency are high, then individuals will shy away from using cryptocurrency in their daily business. This result confirms that of Khan et al. (2017), Mendoza-Tello et al. (2018), Jariyapan et al. (2022), and Illia et al. (2023).

PERI negatively affects ATTI. This means that as individuals perceive the risk to be high, they will have a negative attitude toward the adoption of technology (Almajali et al., 2022; Shazaad et al., 2024). On the contrary, PEUS and PEOU were found to positively affect ATTI (see, Nadeem et al., 2021; Jariyapan et al., 2022). Consequently, the positive effect of ATTI on BIUC confirms that individuals who are confident about cryptocurrency as a medium of exchange are likely to utilize it. Investors adopt the use of cryptocurrency because they expect some short-term returns like improved standards of living and goals. The subjective norms' impact on behavior intent to use cryptocurrency confirms that references from friends and family significantly affect BIUC. An individual's social surroundings will influence his decision to adopt cryptocurrency use. The bond an individual has with his/her family and friends will lead to them following their suggestions and investment strategies (Nadeem et al., 2021; Jariyapan et al., 2022; Illia et al., 2023).

Conversely, the minimal connection between enabling conditions and behavior intent to use cryptocurrency shows that with technological advancement, cryptocurrency use is easily facilitated by devices like a smartphone, computers, laptops, and tablets with proximity to the internet (Merhi et al., 2019; Almajali et al. 2022). According to the Communications Authority of Kenya (2023) smartphone penetration stood at 61 percent in 2023. Remarkably, we can conclude that at least all our respondents' owned smartphones and were capable of using either a laptop, tablet, or smartphone. This finding contradicts that of Hussain et al. (2023) which emphasizes the importance of facilitating conditions for cryptocurrency acceptance.

The mediatory role of attitude towards perceived usefulness, perceived usability, and behavior intent to utilize cryptocurrency were found to be notable. This infers that as individuals' attitude toward utilization of cryptocurrency increases due to improved perceived usability and perceived utility then cryptocurrency adoption will significantly rise. This resonates with Nadeem et al. (2021), and Jariyapan et al. (2022). Furthermore, our results show that attitude plays an important mediatory role between perceived risk and behavioral intent to adopt cryptocurrency. Therefore, as risk perception decreases then the attitude toward using cryptocurrency in electronic transactions will improve leading to high demand for cryptocurrency (see, Aloosh & Ouzan, 2020; Nadeem et al., 2021; Almajali, 2022; Jariyapan et al., 2022).

Finally, being the first empirical research on determinants of cryptocurrency adoption in Kenya, the outcome of this research is based on the sample size and the sample collected which provides a robust insight on factors that determine cryptocurrency adoption in Kenya.

5. CONCLUSION AND IMPLICATIONS

Existing empirical literature on cryptocurrency adoption in Sub-Saharan Africa is still scant despite Kenya, Ghana, Nigeria, and South Africa featuring in the list of fast-growing countries in the world that are adopting cryptocurrency use. Consequently, existing studies in Africa provide inconclusive results regarding cryptocurrency use. Most studies concentrate on specific models of technology adoption. Therefore, this research merged the theory of reasoned action and some aspects of the technological acceptance model to explain the determinants of electronic currency adoption in Kenya. There is no empirical study in Kenya that has examined factors influencing the utilization of cryptocurrency despite its increased adoption. A regression model was developed and its reliability and validity were tested before estimation was done.

The study outcome confirmed that if Kenyans are persuaded that implementing a technology innovation will improve their capabilities and skills (perceived usefulness) and at the same time reduce their anxiety because of literacy in technology use (perceived ease of use), then their behavioral intention to use cryptocurrency will increase (see Chen et al., 2021; Shafique et al., 2022; Jariyapan et al., 2022; Illia et al., 2023). Further, if they perceive the risks to be high, then individuals will stop using cryptocurrency in their daily transactions. Therefore, confidence in cryptocurrency as a medium of exchange that will bring short-term returns will also influence its uptake (Albayati, 2020; Nadeem et al., 2021; Almajali, 2022). Equally important, is the influence people have from friends, family, and trusted individuals which impacts their behavioral intent to use cryptocurrency.

Facilitating condition was however found to be insignificant in influencing the adoption of cryptocurrency because of technological evolution which has ensured more than 60% of Kenyans at least own a phone, laptop, or tablet, which facilitates e-commerce (Shaw and Sergueeva, 2019; Merhi et al., 2019; Shafique et al., 2022, Jariyapan et al., 2022; Illia et al., 2023). Our results also confirm that the aspirations of individuals can also play a mediatory role between perceived usefulness, perceived ease of use, perceived risk, and behavior intent to adopt cryptocurrency use (Aloosh and Ouzan, 2020; Albayati, 2020; Nadeem et al., 2021; Almajali, 2022). In light with these findings, this study has established that the variables that constitute the theory of reasoned action and technological acceptance model are useful in forecasting behavioral intent to use cryptocurrency in Kenya. Our outcomes are in line with other existing empirical literature like that of Shafique et al. (2022), Jariyapan et al. (2022), and Illia et al. (2023).

Based on our findings, we suggest the following practical implications. First, the government and financial institutions can use these findings to redesign and introduce policies and frameworks that would ensure some regulations guide blockchain technologies to ensure security in Kenya. These frameworks should include factors such as perceived risks, ease of use, and usefulness to ensure robustness. Second, there should be mass social awareness through conferences, workshops, and mass media on the benefits and shortcomings of adopting cryptocurrency use. This will change the attitude and perception of individuals regarding cryptocurrency usage and at the same time assist policymakers to formulate policies that regulate the cryptocurrency market both in the immediate as well as distant future. Third, companies that deal with cryptocurrency in Kenya should create trusted platforms and educate the population on how to buy and transact using cryptocurrency. Additionally, customer-friendly interaction between investors and users should be indoctrinated to improve subjective norms toward cryptocurrency adoption. Lastly, the regulator can launch an e-cash system built on a platform that would easily transact cryptocurrency with the Kenyan shilling to ensure easy regulation and monitoring of blockchain institutions.

Constraints of this inquiry are grounded on the fact that the sample size was minimum and the familiarity of interviewees with cryptocurrency was not established. This could lead to individuals who are familiar with cryptocurrency placing more emphasis on certain factors as opposed to those with no idea about cryptocurrency. Therefore, forthcoming studies should distinguish the respondents in terms of their acquaintance with cryptocurrency to improve the model's descriptive power. Another constraint stems from the impact of certain constructs like attitude and behavioral intent to use cryptocurrency which can be effectively measured over some time. However, our measure of these constructs was cross-sectional. Further, this study did not factor in psychological, social, and hedonic factors which also assumes a significant part in determining cryptocurrency adoption. Finally, the classification of risks into operational, financial risk, etc. would also shed more light on which risks significantly affect behavior intent to use cryptocurrency.

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THE CONTENT ANALYSIS OF THE COMPANY VALUATION REPORTS IN TURKIYE

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ABSTRACT

Purpose- This study marks a pioneering effort in researching the scope of valuation reports prepared before initial public offerings in Türkiye. There is a scarcity of literature on the extent of analyst reports in the international arena. The primary objective is to address this significant gap in the existing body of literature. It serves as a valuable resource for academic researchers while also offering highly beneficial insights for brokerage firms and investors. Furthermore, the study has yielded crucial findings relating to regulatory authority regulations and the advancement of capital markets.
Methodology- A total of 116 valuation reports prepared prior to 116 initial public offerings in Türkiye from 2013 to 2021 underwent manual text analysis. A Yes/No algorithm was used to calculate scores for 97 variables under the sections CP, CCI, CFA, CSA, and CVA. The cumulative score across all sections represented the VRCI.
Findings- The average IPO valuation report covers 31 out of 97 variables. The CP indicator has consistently increased, particularly after 2019. The average scores generated from the CCI indicator in valuation reports are relatively low. The CSA indicator scores are notably low. The score for the CVA 1 indicator is also low. The average score of the CVA 3 varies each year, while the CVA 4 indicator shows an increase after 2018.
Conclusion- The valuation reports have significant deficiencies in terms of content. The findings indicate that brokerage firms should mitigate information asymmetry by furnishing comprehensive information in valuation reports. The evidence suggests a need for further development in the capital markets. Despite adherence to international valuation standards and widely accepted valuation principles, the limited coverage in valuation reports contributes to investor information asymmetry.

Keywords: Initial public offerings, valuation, valuation report, content analysis
JEL Codes: G14, G24, G28

1. INTRODUCTION

The efficient market hypothesis states that stock prices incorporate all available information and that stocks are always traded at their fair value. Regulatory authorities also aim to enhance market efficiency through regulations. However, these regulations may elevate the cost of accessing information, potentially leading to decreased information efficiency for investors.

During an initial public offering (IPO), investors participating in the public offering have limited access to information about the company. In preparation for the IPO, brokerage firms create reports about the company, which will be offered to the public for the first time. These reports are then published on the Public Disclosure Platform (PDP) in adherence to the principle of public disclosure, thereby contributing to the information available to investors. Before an IPO, three distinct groups are involved: the company owners, the brokerage firms authorized to conduct the IPO, and the investors participating in the IPO. There is substantial evidence in the literature indicating the presence of information asymmetry between these groups before an IPO, given that company owners and brokerage firms possess insider information.

Four essential reports are related to the IPO process: prospectus, company valuation report which called price determination report on PDP (shortly, we use the term "valuation report"), analyst report, and evaluation report. The Capital Markets Board (CMB) has established regulations governing the issuance of these reports. The prospectus is a comprehensive document providing details about the financial status, prospects, and operations of companies offered to the public for the first time. It also outlines the risks faced by potential investors, as well as their rights and obligations (CMB, 2013). Valuation reports determine the value of the company (VII-128.1 Communiqué on Shares, 2013). Analysis

reports review the information, valuation, and share prices presented in the valuation report from other brokerage firms (VII-128.1 Communiqué on Shares, 2013). Evaluation reports are kind of self-assessments prepared by brokerage firms conducting public offerings after the IPO, explaining the realization or non-realization of expectations addressed in the valuation reports (VII-128.1 Communiqué on Shares, 2013). This study conducts content analysis of the valuation reports issued before the IPO to assess the level of information provided for IPO investors. Valuation reports aligning with valuation approaches will help reduce information asymmetry, promote efficient pricing, and contribute to the development of capital markets.

The study provides valuable contributions to the existing literature. Firstly, there is a notable absence of research in the Turkish literature regarding the scope of valuation reports. While a few international studies have demonstrated the impact of the writing tone and content of reports prepared prior to initial public offerings on price performance and post-offering volatility, this study represents a pioneering effort in Türkiye. Secondly, it underscores the crucial role that pre-initial public offering reports play in the decision-making processes of investors participating in such offerings. The limited scope of valuation reports can significantly influence investor behaviour. Finally, reports prepared before initial public offerings play a critical role in the development of capital markets. The study has yielded insightful results that can guide investors, professionals, and regulatory authorities in the capital markets.

The first section of the study provides general information, while the second section presents existing literature. The third section covers the collected data and methodology. The fourth section presents the results, followed by an academic discussion. Lastly, the study evaluates the results and provides recommendations for investors, professionals, and regulatory institutions in the capital markets.

2. RELATED LITERATURE

Determining a company's value (share price) is a crucial step for investors participating in the IPO. In financial markets, the information prioritized by regulatory authorities and the information valued by investors is differs. While the prospectus takes precedence for the regulatory authority, investors place greater importance on factors such as the public offering price, company valuation, and the company's future expectations (Sırma, 2016). Therefore, while the prospectus is prioritized for regulatory authority, investors emphasize the valuation report more. Consequently, the production and interpretation of the valuation report play a significant role in enabling investors to make more informed decisions (Cowan & Salotti, 2020). Critics argue that financial analysts exhibit bias in their forecasts, set unrealistic targets, and fail to track market trends actively. Despite these criticisms, investors' consideration of analyst reports persists (Cervera, 2016). When uncertainty surrounds a company's value, owners and brokerage firms tend to set a conservative share price. High uncertainty leads to more detailed sectoral information in valuation reports, positively impacting the share price set before an IPO and the IPO's demand level. Nevertheless, even if comprehensive company information is included in the valuation report, there is a phenomenon of under-pricing in IPO. This under-pricing serves as an incentive for IPO participants (Crain et al., 2021). Analyst reports facilitate IPO investor predictions, with various factors enhancing or reducing the report's informativeness. These factors include volatility, trading volume, ownership dispersion, growth prospects, company size, and price/earnings ratios, all elevating report's information level. Conversely, increased the number of institutional investors and analysts who prepare the report contribute to the report's decreased quality. Furthermore, the quality of analyst reports for multi-sector companies are lower (Frankel et al., 2006).

Analysts' reports have two significant impacts from a practical standpoint. The analysts showcasing considerable content competence. However, there is room for improvement concerning their awareness of language use and target audience. On average, the reports contain 7 unexplained abbreviations and 12 unexplained expert terms, leading to issues with comprehensibility. While communication levels are generally satisfactory, some reports need more depth in critical areas such as market position, management, sectoral development, and trends (Whitehouse-Furrer & Perrin, 2015).

Valuations in Türkiye must adhere to International Valuation Standards (IVS) (III-62.1 Communiqué on Valuation Standards in Capital Markets, 2017). These standards have been established to ensure transparent and consistent valuation practices aligned with generally accepted concepts and principles. Adherence to the standards by the valuer implies compliance with all standards (IVS, 2017). Before an IPO, Borsa Istanbul (BIST) and CMB assess various aspects of the company, including its legal status, service/production activities, raw material supply, production process and facilities, sales, ongoing and planned investments, organizational status, relationships with group companies, subsidiaries, and affiliates, as well as positive/negative information about the company such as ongoing litigation processes. They also review license information, know-how agreements, general company, and sector information, permits to be obtained, patents, real estate information, and the company's financials (Borsa Istanbul, 2024). While there is no legal regulation stipulating the form and content of the valuation report, a comprehensive report is expected to comprise five sections: Principles, Company Information, Sector Analysis, Financial Analysis, and Valuation.

The valuation reports necessitate those evaluating and reviewing the reports in an unbiased and competent manner, with sufficient knowledge, qualifications, ability, and experience. The individuals or entities performing the valuation must also be appropriately licensed (IVS, 2017). Analysts are held responsible for confirming the information acquired by investors (Cervera, 2016), especially in the context of brokerage firm analyst recommendations, which are taken into consideration by individual investors (Malmendier & Shanthikumar, 2014). Studies have indicated the significant role played by analysts in researching and disseminating information (Frankel et al., 2006; Dambra et al., 2018). Furthermore, evidence supports the positive correlation between analysts' professional experience and forecast accuracy, the influence of brokerage firms and company owners on analyst behaviour, and the positive effect of regulatory rules on analyst forecast accuracy (Ramnath et al., 2008).

It is important to note that each company's valuation should be determined based on its life cycle and specific fields of activity (Damodaran, 2021). With young companies, uncertainties about future expectations and limited operating history can diminish the quality of reports prepared prior to the IPO (Jin et al., 2024). The process of company review should encompass various factors, such as ownership structure, assets, relationship of facilities and equipment with company activities, past and future cash flows, financial situation, past and possible future events, stocks, production/service facilities, legal form, nature of activities, nature of R&D activities, location of facilities, the nature of sales, the currency of sales, information about suppliers, applicable tax legislation, and other legal regulations, all of which are crucial in terms of valuation (IVS, 2017).

The Financials section includes essential financial statements such as income statement, balance sheet, and cash flow statement, along with details about the company's sales, profitability, income, expenses, and debts. Assessing the company's value on a specific date can provide insight into its prospects. Additionally, analysing the company's historical financial data can help make future predictions. Therefore, it is crucial to consider the company's previous financial performance during valuation (IVS, 2017). Financial information empowers investors participating in an IPO to conduct a subjective valuation based on their predictions. The regulatory authority imposes restrictions related to financial information, including paid-up capital, total assets, sales, receivables, and legal reserves, in the context of an IPO (CMB, 2013). Before the IPO, a thorough examination of the company's financial statements, footnotes, and critical ratios is undertaken (Borsa Istanbul, 2024).

When assessing a company's value, it is crucial to consider historical data, current information, and future industry expectations. Regulatory authorities scrutinize the depth of industry knowledge during their investigations (Borsa Istanbul, 2024). Analysts must be well-versed in industry-specific trends for accurate valuation. Macroeconomic and political factors can impact sectors differently. Sector-specific knowledge is crucial when selecting comparable companies in relative valuation and making predictions using the income approach (IVS, 2017). Collaborative efforts between company management and analysts when determining sector forecasts enhance report accuracy (Dambra et al., 2018). Furthermore, the post-public offering price performance of IPOs varies by sector (Ünlü & Ersoy, 2008). Thus, failure to address sector developments and trends in reports should be seen as incomplete coverage (Whitehouse-Furrer & Perrin, 2015).

The valuation section is the primary focus of valuation reports. More than just mathematical calculations are required to arrive at a valuation, which aims to determine the closest value to the company's true worth (Sayılgan, 2024). The total value is calculated using the company's assets and resources. Although various approaches are used for company valuation, they can generally be categorized into three main approaches: cost approach, market approach, and income approach (IVS, 2017). The cost approach is based on the principle that investors will not pay more for a company than they would for another company that would provide similar benefits (IVS, 2017). The income approach links the company's value to four fundamental factors: the ability to generate cash flows, the expected growth rate of cash flows, the time needed to achieve stable growth, and the cost of capital (Damodaran, 2014). The market approach involves determining an approximate value for the company by analysing how similar companies are valued (IVS, 2017). Analysts may use one or more valuation approaches for company valuation (IVS, 2017).

3. METHODOLOGY AND DATA

In this study, we examine the scope of valuation reports prepared before an IPO. Each valuation report for 116 IPO activities between 2013 and 2021 was obtained from the PDP website. A unique valuation report was prepared for each IPO during this period, and these reports varied in their preparation based on the brokerage firms, analysts, companies, sectors, and valuation approach. Due to the absence of specific standards, the scope of the valuation reports was determined through content analysis.

Valuation reports typically follow a structure that includes principles, company information, financial analysis, sector analysis, and valuation. This study conducted content analysis on 97 variables (Annex) across these headings, guided by

relevant literature, international valuation standards, and related legislation. Each variable was coded as either 1 or 0 using a "Yes/No" algorithm. The principles section comprises 4 variables, company analysis comprises 21 variables, financial analysis comprises 9 variables, sector analysis comprises 9 variables, and valuation comprises 54 variables. Valuation analysis differs from the other sections, with some companies using one valuation approach while others use multiple approaches simultaneously. Therefore, valuation analysis is further broken down into four sub-headings such as information that should be included in all valuation reports, cost approach, market approach, and income approach. Consequently, content analyses were conducted for principles (CP), company information (CCI), financial analysis (CFA), sector analysis (CSA), and valuation analysis (CVA: CVA 1, CVA 2, CVA 3, CVA 4). The total score across all sections comprises the Valuation Report Content Indicator (VRCI).

The data obtained from the VRCI underwent internal consistency testing. In any research involving measurement, it is essential to test the reliability of the measurement. The reliability coefficient indicates whether the variables measured by the researcher, who designed the model with specific items, are interpretable (Cronbach, 1951). Cronbach's Alpha and Kuder-Richardson 20 tests are the most commonly used methods for reliability testing. Using a specific equation, Kuder and Richardson calculated the reliability coefficient of the data obtained from a single trial (1/0 statements such as true/false or yes/no). The equation

$$KR20 = \frac{K}{K-1}\left(1 - \sum \frac{p_i q_i}{\sigma_t^2}\right) \tag{1}$$

is used to calculate the reliability coefficient, where K represents the number of variables, p_i represents the probability of success, q_i represents the probability of failure and σ_t^2 represents the variance of the total scores. However, this equation has limitations and should be used as a more general formula. A more general calculation formula is proposed as

$$\alpha = \frac{K}{K-1}\left(1 - \sum \frac{\sigma_i^2}{\sigma_t^2}\right) \tag{2}$$

where K represents the number of variables, σ_i^2 represents the variance of the scores for each variable, and σ_t^2 represents the variance of the total scores. This new equation gives the same result as Kuder-Richardson's equation in calculating the reliability coefficient of the data obtained from a single trial (Cronbach, 1951).

According to Cronbach (1951), both Kruder-Richardson's KR20 and Cronbach's Alpha tests produce equivalent results when calculating the reliability coefficient of collected data. Consequently, the KR20 test was employed to assess the data's reliability. The calculations yielded a K value of 97, a $p_i q_i$ value of 13.48, and an σ_t^2 value of 90.01. Consequently, the KR20 was computed as follows:

$$KR20 = \frac{97}{96}\left(1 - \sum \frac{13.48}{90.01}\right) = 85.9 \tag{3}$$

Literature suggests that the reliability coefficient obtained using the KR20 equation should exceed 80 (70 in some studies). Thus, the measurement demonstrates internal consistency.

In the relevant section, each variable carries equal weight. However, companies utilize the cost approach, market approach, income approach, or a combination of these for company valuation in their reports. Including variables from all approaches in the CVA section for companies that do not use all approaches can introduce bias in the analyses. Thus, in the CVA section, companies are assigned different weights based on the valuation approach used in their reports. For instance, in valuations using only the cost approach, the variables created within this approach and the expected number of variables across all valuation reports are the denominators in calculating the valuation analysis indicator. Likewise, if multiple valuation approaches are used, the total number of sub-variables across the approaches constitutes the denominator in the valuation analysis indicator.

In the process of assigning weights, the variables such as CP, CCI, CFA, CSA, and variables that should be included in all valuation reports (CVA 1) are all given a weight of 1. Regarding the weighting process related to the approaches used, the number of variables generated for each approach is weighted based on the total number of variables created for all approaches. As a result of this weighting process, each company is assigned a VRCI score out of a total of 100 points.

Following all the processes, 6 indicators were established, which comprise the principles indicator (CP), company information indicator (CCI), financial analysis indicator (CFA), sector analysis indicator (CSA), valuation analysis indicator (CVA), and valuation report content indicator (VRCI). The "VRCI" is then calculated for each company, with a maximum

value of 100 and a minimum value of 0 per the model described above. The following equation represents a company's Valuation Report Content Indicator

$$VRCI = CP + CCI + CFA + CSA + CVA \qquad (4)$$

After calculating the VRCI for each company, the values were normalized to an average of 50. Subsequently, each valuation report was categorized into 4 groups based on the indicator value: 0-25 as low-scoring (Group 1), 25-50 as mid-low-scoring (Group 2), 50-75 as mid-high-scoring (Group 3), and 75-100 as high-scoring (Group 4) in terms of content.

4. EMPIRICAL RESULTS

Between 2013 and 2021, 116 valuation reports were conducted in Türkiye. Figure 1 illustrates the number of IPOs by year.

Figure 1 The Number of IPOs Between 2013 and 2021
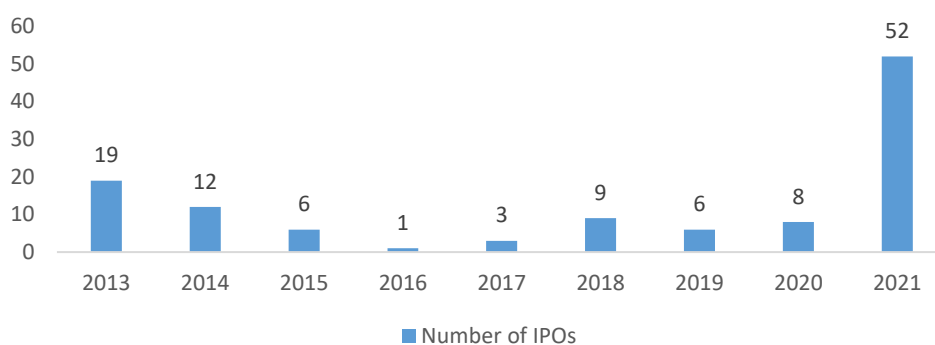
Regarding the sectoral distribution of the IPOs, the manufacturing, financial institutions, electricity, gas and water, and technology sectors saw the highest number of IPOs. The sectors of the IPOs are outlined in Table 1.
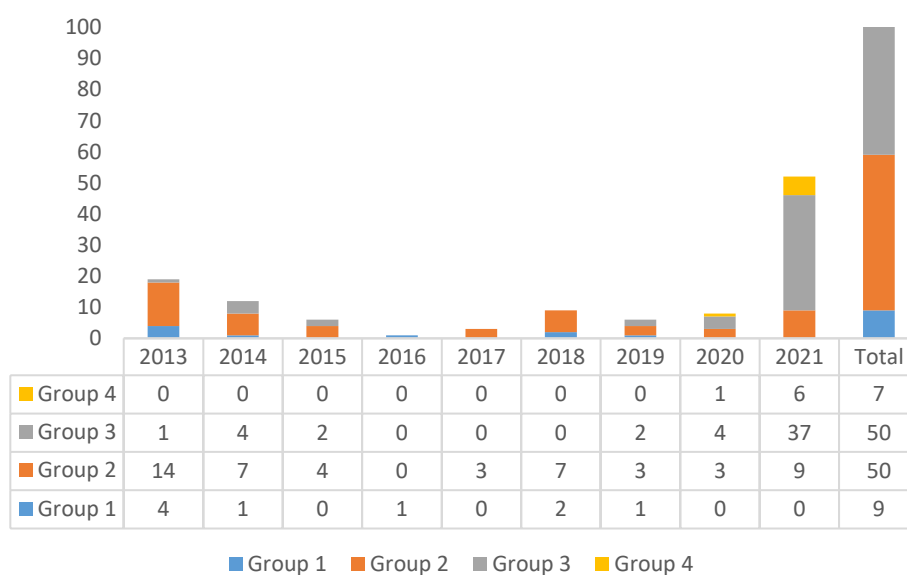
Table 1: The Sectors of the IPO's

Year	Information and Communication	Education, Health, Sports and Entertainment	Electricity Gas and Water	Administrative and Support Service	Manufacturing	Construction	Paper and Paper Products	Financial Institutions	Professional, Scientific and Technical Activities	Agriculture, Forestry and Fishing	Technology	Textile	Wholesale and Retail Trade	Transportation and Storage
2013		1	1		6	2	1	5		1			1	1
2014		1			6			3				1	1	
2015				1	3			2						
2016					1									
2017								1			1		1	
2018		1	1		2			2			1		1	1
2019			1	1	1			1			2			
2020			1		4				1		1		1	
2021	1	1	8	1	17	2		9	2		8		2	1
Total	1	3	13	3	40	4	1	23	3	1	13	1	7	3

The year 2021 initial public offerings (IPOs) saw a peak, with notable activity in the electricity, gas and water, and technology sectors. Meanwhile, the information and communication, paper and paper products, agriculture, forestry, fishing, and textile sectors each had only one IPO during this period. The content information of the valuation reports is outlined in Table 2.

Table 2: The Valuation Report Content Index (VRCI) of Valuation Reports

| Year	VRCI (Avg) (N)	VRCI (Avg) (W)	VRCI (Max) (N)	VRCI (Max) (W)	VRCI (Min) (N)	VRCI (Min) (W)
2013	36.1	22.7	67.0	42.1	17.1	10.7
2014	42.6	26.7	55.7	35.0	21.6	13.6
2015	43.6	27.4	63.6	40.0	25.4	15.9
2016	24.7	15.5	24.7	15.5	24.7	15.5
2017	42.2	26.5	45.8	28.8	35.6	22.4
2018	34.4	21.6	42.7	26.8	20.2	12.7
2019	47.7	29.9	73.4	46.1	24.7	15.5
2020	56.6	35.5	78.0	49.0	32.7	20.6
2021	60.4	38.0	94.4	59.3	30.0	18.8
Total	**50.0**	**31.4**	**94.4**	**59.3**	**17.1**	**10.7**

The average IPO valuation report covers 31 out of 97 variables. Weighted scores (W) and also normalized scores (N) have generally increased over the years, reaching 60.4 (Normalized: 38.0) in 2021. While VRCI scores vary by valuation report, the overall content of valuation reports prepared for IPO in Türkiye is usually limited. The findings indicate a high information asymmetry between brokerage firms/company owners and investors before the IPO. Figure 2 illustrates the scores obtained by different groups.

Figure 2: Distribution of VRCI Scores by Groups

	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
■ Group 4	0	0	0	0	0	0	0	1	6	7
■ Group 3	1	4	2	0	0	0	2	4	37	50
■ Group 2	14	7	4	0	3	7	3	3	9	50
■ Group 1	4	1	0	1	0	2	1	0	0	9

■ Group 1 ■ Group 2 ■ Group 3 ■ Group 4

Out of 116 valuation reports, 9 received low scores (Group 1), 50 received mid-low scores (Group 2), 50 received mid-high scores (Group 3), and 7 received high scores (Group 4). The content of valuation reports prepared before 2019 is generally insufficient. Only 7 out of 50 valuation reports prepared before 2019 were considered above average in content. All valuation reports with high information levels were prepared in 2020 and 2021, with no low-scoring reports.

The figures below represent the scores obtained from the CP (Figure 3), CCI (Figure 4), CFA (Figure 5), and CSA (Figure 6). Each section of the CVA, including information that should be included in all valuation reports (CVA 1) (Figure 7), cost approach (CVA 2) (Figure 8), market approach (CVA 3) (Figure 9), and income approach (CVA 4) (Figure 10) variables, is depicted in separate figures. The horizontal axis represents the scores obtained from each variable, while the vertical axis represents the number of valuation reports that received scores from the variables.

Figure 3: Scores of CP Indicator
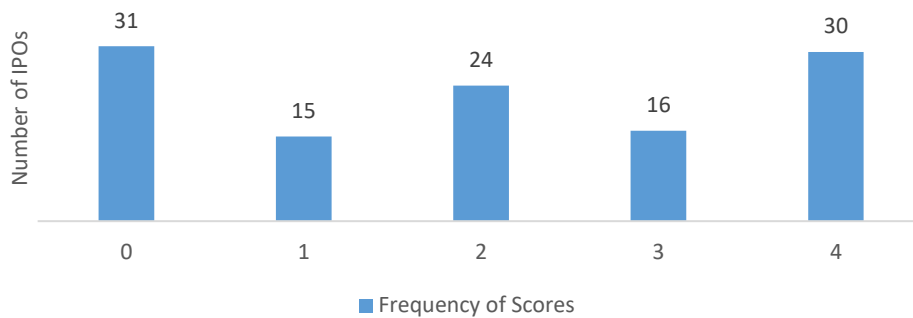
Concerning the CP indicator, 31 valuation reports lack information on the four variables. In comparison, 15 reports provide information on just one variable, 24 contain information on two variables, 16 have information on three variables, and 30 cover all variables.

Figure 4: Scores of CCI Indicator
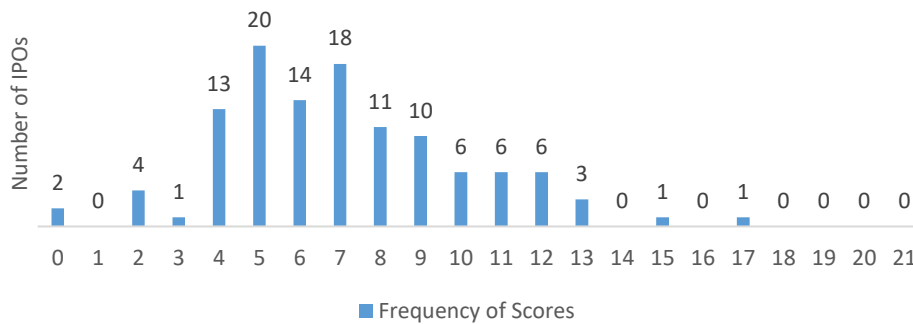
For the CCI indicator, 2 valuation reports do not include any information on the company being valued. Additionally, 4 reports contain information on only two variables. Among the 21 variables created for company information analysis, data ranges from 4 to 12 variables. Two reports provide information on 14 or more variables (one with 15 and the other with 17 variables).

Figure 5: Scores of CFA Indicator
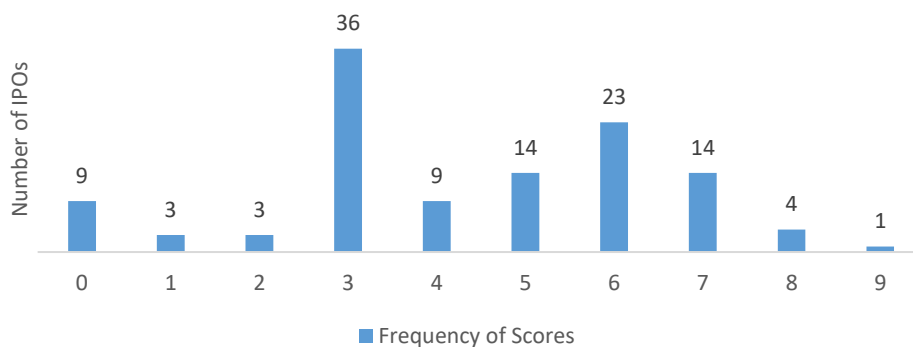
During the examination of the CFA, it was evident that brokerage firms commonly include financial statements in valuation reports, leading to a high number of reports receiving 3 points. It is noteworthy that 9 reports lack any financial information, while 9 reports provide information on 4 variables, 14 reports contain information on five variables, 23 reports include information on six variables, 14 reports cover seven variables, 4 reports contain information on eight

variables, and 1 report has all variables. Excluding reports that lack information, there is a strong tendency to include financial analysis information in valuation reports.

Figure 6: Scores of CSA Indicator
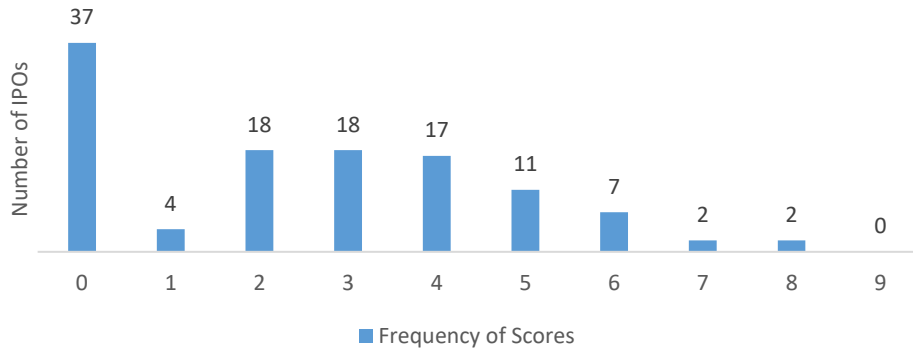
Varied opinions from brokerage firms are evident in the sectoral information provided in their valuation reports. The sectoral analysis is absent in all 37 valuation reports. Upon excluding these reports, it becomes apparent that information about sectoral analysis is mainly present in 2 to 6 out of the nine variables. Notably, only a few reports encompass information on all variables.

Figure 7: Scores of Information That Should Be Included in All Valuation Reports (CVA 1)
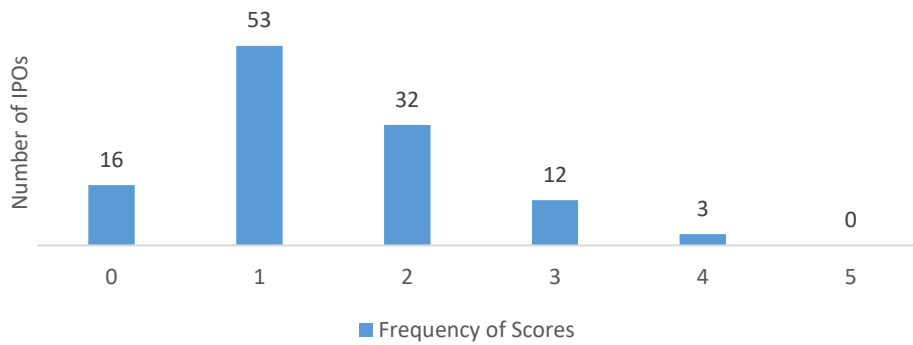
The distribution of information levels related to the CVA 1 indicator closely resembles a normal distribution. Out of 116 valuation reports, 16 do not include any information on the CVA 1 indicator. Of the remaining reports, 53 provide information on one variable, 32 provide information on two variables, 12 provide information on three, and 3 provide information on four variables. None of the reports provide information on all variables. Typically, brokerage firms specify the valuation date and share value range. However, only a few valuation reports include details about sensitivity analysis and discount rates.

Figure 8: Scores of Cost Approach (CVA 2)
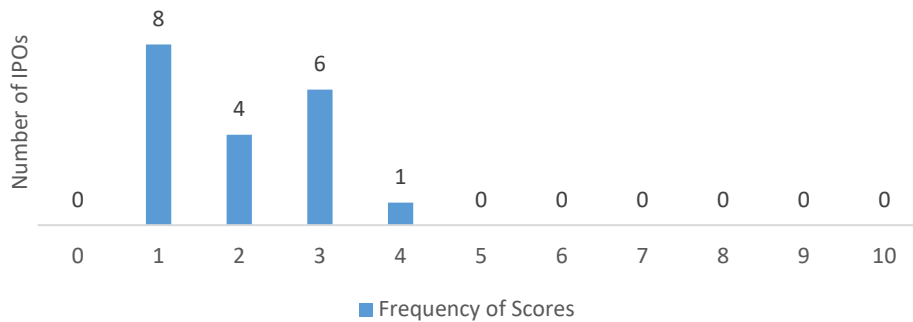
The prevalence of including information in valuation reports using the cost approach is relatively low. International valuation standards generally discourage using the cost approach in company valuation, except in specific cases. Valuation reports utilizing the cost approach typically express the liabilities or the book value as the company's worth without providing information about other variables. Such valuations usually cover a maximum of 4 out of 10 variables.

Figure 9: Scores of Market Approach (CVA 3)
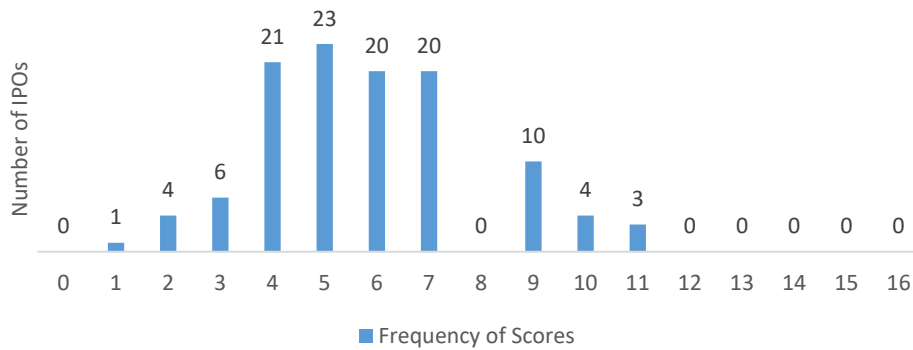
The inclination to include information in valuation reports using the market approach is moderate. When employing the market approach, brokerage firms tend to avoid complex mathematical operations such as similarity tests, ratios, and data corrections. While non-calculated variables receive a high information disclosure level, the disclosure level for calculated variables is minimal. However, information is typically provided about one or more commonly used ratios, such as Price to Earnings (P/E), Enterprise Value to Sales (EV/S), Enterprise Value to EBITDA (EV/EBITDA), Price to Book (P/B), and Price to Net Asset Value (P/NAV), in valuations using the market approach. These valuations primarily present information about 2 to 11 out of 16 variables.

Figure 10: Scores of Income Approach (CVA 4)
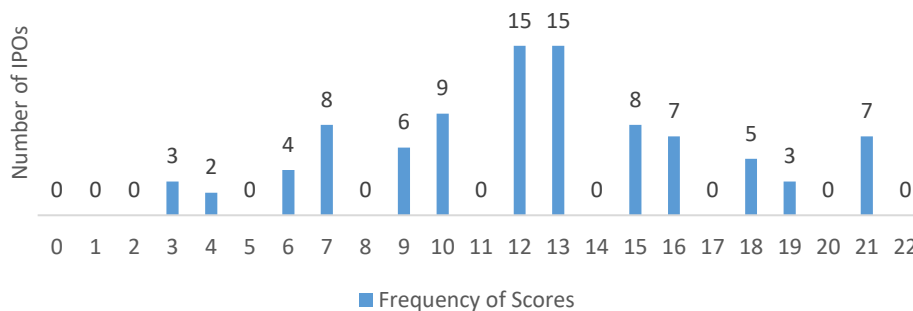
The valuation reports utilizing the income approach show a strong tendency to include information related to this method. Seven of the examined reports included data on 21 variables. Almost all reports provided details on all the necessary variables to compute cash flows. However, more information on variables about dividend policy needs to be provided. Additionally, most brokerage firms refrained from calculating the beta coefficient, often assuming it to be 1, implying that share prices will sync with the market following the IPO. Table 3 represents the average scores of the content indicators by the year.

Table 3: Average Scores of the Content Indicators by The Year

Year	CP (Avg) (W)	CCI (Avg) (W)	CFA (Avg) (W)	CSA (Avg) (W)	CVA 1 (Avg) (W)	CVA 2 (Avg) (W)	CVA 3 (Avg) (W)	CVA 4 (Avg) (W)	VRCI (Avg) (W)
2013	0.3	6.3	2.4	0.8	1.2	1.6	4.7	7.1	22.7
2014	1.0	7.3	3.1	2.9	1.8	2.9	3.9	9.0	26.7
2015	1.3	7.2	4.3	4.0	1.3	0.9	3.6	10.7	27.4
2016	0.0	5.0	3.0	0.0	1.0	2.0	6.5	8.3	15.5
2017	0.3	6.3	3.0	2.7	2.7	2.3	3.7	8.5	26.5
2018	0.4	5.3	2.7	2.0	1.7	1.5	5.5	10.3	21.6
2019	2.3	6.2	5.0	1.3	0.7	1.8	5.9	12.3	29.9
2020	2.6	7.9	4.5	2.5	1.0	1.8	5.9	12.7	35.5
2021	3.2	7.7	5.6	3.1	1.5	1.6	5.8	10.8	38.0
Total	2.0	7.1	4.3	2.5	1.4	2.9	5.3	7.1	31.4
Number of Variable	4	21	9	9	5	10	16	22	97

The table displays the weighted average scores for each indicator by year. The CVA 1 column presents the indicator score that represents the variables to be included in all valuation reports. The CVA 2 column shows the score of valuation reports using the cost approach, the CVA 3 column shows the score of valuation reports using the market approach, and the CVA 3 column shows the score of valuation reports using the income approach. The CP indicator has consistently increased, particularly after 2019, because the CMB decided to prepare valuation reports in accordance with international valuation standards, in 2019. Notably, brokerage firms issuing valuation reports with low scores tend to omit analyst information. The average scores generated from the CCI indicator in valuation reports are generally relatively low. In 2013, several brokerage firms omitted company-related information from their valuation reports. The CCI indicator has an average score of 30% annually. Until 2019, the CFA indicator scores only reached an average of 30%. When considering the total indicator scores, they average at 50%. It's concerning that financial statements of IPOs are omitted in valuation reports for some years.

Furthermore, 37 IPO's valuation report needs more sector analysis. The CSA indicator scores, totalling 27%, are notably low. The score for the CVA 1 indicator, amounting to 28%, is also low. Of the 19 valuation reports utilizing the cost approach, 4 used the book value method, while 15 used the net asset value method. Astonishingly, almost none of this approach's valuation reports performed debt, receivables, or stock valuations. In some reports, only the total book or liabilities value was stated as the company value. The average score in valuation reports using the market approach falls below 50%. The average score of the CVA 3 varies each year, while the CVA 4 indicator shows an increase after 2018.

5. CONCLUSION

Studies conducted across various markets and time periods have proved the phenomenon of under-pricing in initial public offerings (IPOs). While the exact reasons for under-pricing remain a topic of debate, recent research suggests that factors such as the level of information provided to investors, its accuracy and reliability, and the behaviour of IPO participants can significantly impact post-IPO price performance and volatility.

Valuation reports should align with the principle of public disclosure and provide relevant information without leading to noise trading. Brokerage firms are responsible for furnishing comprehensive information about the IPO to investors, who, armed with this knowledge, should carefully weigh the potential benefits and risks before making investment decisions. While regulatory rules and market practices may vary across countries, company valuation aligns with universally accepted principles and International Valuation Standards (IVS) worldwide. Preparing valuation reports that possess strong informational content, adhere to valuation principles, and uphold principles of public disclosure can help mitigate information asymmetry between IPO issuers and investors, thus promoting the formation of effective prices.

The valuation reports have significant deficiencies in terms of content. Brokerage firms tend to prepare valuation reports with a narrower scope, as they were not exposed to negative reactions from the market and regulatory authorities. The

content of valuation reports, especially those prepared before 2019, is insufficient. Most valuation reports do not include any information about the brokerage firm and analyst, which is a significant limitation according to IVS (2017). The competence, knowledge, and experience of the analyst performing the evaluation are crucial aspects emphasized in numerous articles. Additionally, demonstrating the competence of analysts in the capital markets through licenses and documents further underscores the importance of the analyst and brokerage firm. Therefore, it is crucial to include information about the analyst and brokerage firm in each valuation report.

It is essential to have comprehensive company information for accurate valuation. However, many valuation reports need more essential details about the company, such as past significant events and future expectations, which can directly impact its value. Two valuation reports reviewed did not provide public information about the company. Brokerage firms typically omit details about the company's investment policies, research, and development (R&D) policies, foreign trade, and exchange rate risk. Studies have shown that company information significantly influences pricing, investor behaviour, and investor communication (Hanley & Hoberg, 2010; Whitehouse-Furrer & Perrin, 2015; Frankel et al., 2006; Cervera, 2016; Damodaran, 2021; Jin et al., 2024). The valuation report's absence of crucial information, such as establishment date, ownership structure, company activities, capacity, planned and ongoing investments, and foreign trade activities, are crucial deficiencies in terms of content.

Financial statements and financial analysis form the foundation of the valuation process (Mariani et al., 2023). Alongside the financial statements, a comprehensive valuation report should encompass financial analysis, footnotes, and financial ratios (IVS, 2017). It is common for brokerage firms to incorporate financial statements into their valuation reports, often demonstrating a high level of expertise in financial analysis. Profound financial analysis knowledge empowers investors to conduct their subjective valuations and compute a unique company value. This approach reduces the potential criticism of analysts' overly optimistic forecasts. The integration of financials and valuation signifies that investors with strong financial knowledge can be just as successful as analysts in interpreting information. However, it is concerning that 9 out of the valuation reports do not contain any financial information, leading to a significant gap in coverage.

The tendency to provide of sectoral information in valuation reports varies across to brokerage firms. While 37 reports omit sectoral analysis, those that do provide sectoral information typically offer a substantial level of detail. It is also common for brokerage firms to provide a high level of sectoral information or none. Reports tend to avoid discussing future expectations for the foreign sector and the company's market share in the domestic sector. These findings align with the observations of Whitehouse-Furrer & Perrin (2015), who view the absence of sectoral trends in valuation reports as a shortcoming in coverage. Similarly, they are consistent with the research of Crain et al. (2021), who highlight that brokerage firms are more inclined to provide sectoral information when there is high uncertainty in company value. They note a positive correlation between the level of sectoral information and the demand for initial public offerings.

Brokerage firms typically provide limited information about valuation analysis. Regardless of the valuation approach used, only a few required variables for the valuation process are disclosed. Brokerage firms generally refrain from providing information about variables that involve mathematical calculations. Specifically, valuations using the cost approach tend only to present the company's book value or net asset value. The International Valuation Standards (IVS, 2017) recommends using the cost approach under certain conditions. While some essential variables, such as the valuation date and share value range, are usually disclosed, the absence of sensitivity analysis and discount rate information is a notable gap. When it comes to valuations using the market approach, there is a tendency to share information other than the variables that involve mathematical calculations. In contrast, valuations using the income approach generally provide more information than other approaches. Regardless of the valuation approach, brokerage firms avoid calculating the beta coefficient, often assuming a value of 1 under the assumption that the company will move with the market after the IPO. However, this assumption does not align with market realities.

Valuation reports prepared prior to IPOs in Türkiye exhibit notable shortcomings in content. The findings indicate that brokerage firms should mitigate information asymmetry by furnishing comprehensive information in valuation reports. The evidence suggests a need for further development in the capital markets. Despite adherence to international valuation standards and widely accepted valuation principles, the limited coverage in valuation reports contributes to investor information asymmetry.

This study which does not require ethics committee approval and/or legal/specific permission complies with the research and publication ethics. There are no potential conflicts of interest in this study. This article, based on a portion of the doctoral thesis (Öztürk, 2024) of the corresponding author.

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APPENDICES

CP Sub-Variables

Name	Type
Restrictions on IPO	Yes/No
Information About the Brokerage Firms	Yes/No
Information About the Analyst	Yes/No
Ethical Principles	Yes/No

CCI Sub-Variables

Name	Type
Foundation Date	Yes/No
Partnership Structure	Yes/No
Important Events from Foundation to IPO	Yes/No
Information About Company Activities	Yes/No
Production/Service Facilities Capacity Information	Yes/No
Production/Service Facilities Ongoing Investment Information	Yes/No
Production/Service Facilities Ongoing Investment Contracts Information	Yes/No
Production/Service Facilities Ongoing Investment Completion Date Information	Yes/No
Production/Service Facilities Planned Investment Information	Yes/No
Production/Service Facilities Planned Investment Contracts Information	Yes/No
Production/Service Facilities Planned Investment Start/End Date Information	Yes/No
Information on Raw Material Supply Processes	Yes/No
Information on Raw Material Supply Prices	Yes/No
Ongoing R&D Investment Information	Yes/No
Planned R&D Investment Information	Yes/No
Information About Documents Received (Patent etc.)	Yes/No
Information About Documents Planned to be Received (Patent etc.)	Yes/No
Important Information That Will Affect the Value of the Company (Possible Penalty, etc.)	Yes/No
Information About Exchange Rate Risk	Yes/No
Import Activity Information	Yes/No
Export Activity Information	Yes/No

CFA Sub-Variables

Name	Type
Financial Statements for Previous Periods	Yes/No
Income Statement	Yes/No
Income Statement Analysis	Yes/No
Balance Sheet	Yes/No
Balance Sheet Analysis	Yes/No
Cash Flow Statement	Yes/No
Cash Flow Statement Analysis	Yes/No
Ratio Analysis	Yes/No
Borrowing Cost Analysis	Yes/No

CSA Sub-Variables

Name	Type
Market Share of the Company in the Sector	Yes/No
Market Share of the Domestic Sector in the International Sector	Yes/No
Expected Future Market Share Within the Sector	Yes/No
Domestic Sector Growth Rate	Yes/No
SWOT Analysis of the Domestic Sector	Yes/No
Future Growth Expectation of the Domestic Sector	Yes/No
International Sector Growth Rate	Yes/No

SWOT Analysis for the International Sector	Yes/No
Future Growth Expectation of the International Sector	Yes/No

CVA Sub-Variables

Variables That Should Be Included in All Valuation Reports – CVA 1	
Name	**Type**
Valuation Date	Yes/No
Whether Sensitivity Analysis Has Been Performed	Yes/No
Information on Weighting of Values Reached by Different Methods	Yes/No
Whether the Share Value Reached is a Single Value or an Interval of Values	Single:1 Interval:0
Information About Discount Rate	Yes/No
Cost Approach Variables – CVA 2	
Name	**Type**
Book Value Method	Yes/No
Net Asset Value Method	Yes/No
Information About Valuation Approach	Yes/No
Whether Receivable Valuation Has Been Done	Yes/No
Whether Debt Valuation Has Been Done	Yes/No
Whether Stock Valuation Has Been Done	Yes/No
Whether Fixed Asset Valuation Has Been Done	Yes/No
Whether Fixed Asset Valuation is Made by Persons Approved by CMB	Yes/No
Whether Intangible Asset Valuation Has Been Done	Yes/No
Whether Intangible Asset Valuation is Made by Persons Approved by CMB	Yes/No
Market Approach Variables – CVA 3	
Name	**Type**
Comparison of Domestic Similar Companies	Yes/No
Comparison of Foreign Similar Companies	Yes/No
Mixed (Domestic + Foreign) Comparison of Similar Companies	Yes/No
Information About Valuation Approach	Yes/No
Information About Selection of Domestic Similar Companies	Yes/No
Information About Selection of Foreign Similar Company	Yes/No
Whether Similarity Testing Has Been Performed	Yes/No
Whether a Correction Has Been Made in the Selected Similar Company Data	Yes/No
Information About the Ratios Used	Yes/No
Price Earnings (P/E) Ratio	Yes/No
Firm Value Sales (FV/S) Ratio	Yes/No
Company Value EBITDA (FV/EBITDA) Ratio	Yes/No
Market Value Book Value (MV/BV) Ratio	Yes/No
Market Value Net Asset Value (MV/NAV) Ratio	Yes/No
Other Ratio	Yes/No
Choosing the Ratios Used with Equal/Different Weights	Equal:1 Different:0
Income Approach Variables – CVA 4	
Name	**Type**
Discounted Cash Flows Method	Yes/No
Discounted Dividends Method	Yes/No
Information About Valuation Approach	Yes/No
Macroeconomic Expectations	Yes/No
Tax Rate	Yes/No
How is the WACC Rate Determined	Yes/No
WACC Rate Same/Different for Year by Year	Same:1 Different:0
Is There an Additional Risk Premium in the WACC	Yes/No

By Which Method Was the Additional Risk Premium Calculated	Yes/No
Information About the Beta Used	Yes/No
By Which Method Is Beta Calculated	Yes/No
Information About Sales Growth Rate	Yes/No
Information About EBITDA Growth Rate	Yes/No
Information About Net Working Capital Growth Rate	Yes/No
Information About Risk-Free Interest Rate	Yes/No
Information About Terminal Sales Growth Rate	Yes/No
Information About Terminal EBITDA Growth Rate	Yes/No
Information About Terminal Growth Rate	Yes/No
Information About Dividend Distribution	Yes/No
Information About Previous Dividend Distribution Policy	Yes/No
Information About Future Dividend Distribution Policy	Yes/No
Information About Dividend Discount Rate	Yes/No
Other Methods	Yes/No