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MARMARA ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İŞLETME ANABİLİM DALI
MUHASEBE-FİNANSMAN (İNGİLİZCE) BİLİM DALI

**EFFECTS OF CREDIT DEFAULT SWAP SPREAD
ON THE REAL ECONOMY: THE CASE OF TURKEY**

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EMRE AYDOS

İSTANBUL, 2024

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Abstract

The Credit Default Swap (CDS) is a financial product that mitigates the risk of non-payment to an investor holding a bond or similar investment at the maturity date. While the CDS may be perceived as an insurance transaction, it is fundamentally a financial product. In other terms, it is a financial instrument that guarantees creditors' rights in case of a debtor company's insolvency or bankruptcy filing.

As concerns about the economy continue to grow, the CDS has emerged as an essential indicator that has an impact on significant measures and expenditures in the global economy. The time series model and causality are utilized to investigate the connection between CDS, the payment capacity and the financial strength of Turkish real sector companies. A total of 168 months is included in the time period that has been chosen, which begins in 2009 and continues until the end of 2022 or later. During the analysis, the following variables were utilized: CDS, bounced cheques, unemployment, consumer price index, non-performing loans, USD FX rate, Central Bank of Turkey (CBRT) interest rate and stock exchange. The findings of the study indicate that there was no statistically significant causation between CDS and the overall financial strength of Turkish enterprises.

This study analyses the correlation between Turkey's CDS and the financial robustness of enterprises in the real sector. Furthermore, the impact of CDS on macroeconomic data, influencing dynamics of the real sector, will be analysed. The relationship between CDS and variables will be analysed using time series. The primary objective of the study is to examine the impact of variances in specified premiums on the solvency of the real sector.

There are 4 motivations; the first is analysing the relation between CDS and economic key performance indicators (KPI). "Is CDS an indicator of Turkey's economic crisis?" question is the second motivation. Current Expected Credit Loss (CECL) serves as an attractive reason to examine the influence of CDS on companies in the real sector, as it improves financial institutions' capacity to evaluate, control, and disclose credit risk with efficiency. Finally, observing if there is a negative impact of CDS on Turkish real sector companies' solvency.

Keywords: CDS, Credit Risk, Current Expected Credit Loss, Time-Series Models, Causality

JEL Classification: C22, C53

Özet

Kredi Temerrüt Swapı (CDS), tahvil veya benzeri bir yatırımı elinde bulunduran yatırımcının vadesinde ödeme yapmama riskini azaltan bir finansal üründür. CDS her ne kadar bir sigorta işlemi gibi algılsa da temelde bir finansal üründür. Bir başka deyişle borçlu şirketin iflası veya iflas başvurusunda bulunması durumunda alacaklı firmanın haklarını garanti altına alan bir finansal araçtır.

Ekonomiye ilişkin endişeler artmaya devam ederken CDS, küresel ekonomide önemli tedbir ve harcamaları etkileyen önemli bir gösterge olarak ortaya çıktı. Reel sektörde faaliyet gösteren Türk işletmelerinin CDS primleri, ödeme kapasiteleri ve finansal güçleri arasındaki bağlantıyı araştırmak amacıyla zaman serisi modeli ve nedensellikten yararlanılmıştır. 2009 yılında başlayıp 2022 yılı sonuna veya sonrasına kadar devam eden seçilen zaman diliminde toplam 168 ay yer almaktadır. Analiz sırasında CDS, karşılıksız çek, işsizlik, tüketici fiyat endeksi, takipteki krediler, ABD Doları döviz kuru, Türkiye Cumhuriyet Merkez Bankası (TCMB) faiz oranı ve borsa değişkenlerinden yararlanılmıştır. Araştırmanın bulguları CDS ile Türk ticari işletmelerinin genel finansal gücü arasında istatistiksel olarak anlamlı bir nedenselliğin bulunmadığını göstermektedir.

Bu çalışma, Türkiye'deki CDS ile reel sektördeki işletmelerin finansal sağlamlığı arasındaki ilişkiyi analiz edecektir. Ayrıca CDS' nin reel sektörün dinamiklerini etkileyen makroekonomik veriler üzerindeki etkisi de analiz edilecektir. CDS primi ile değişkenler arasındaki ilişki zaman serisi kullanılarak analiz edilecektir. Çalışmanın temel amacı, belirlenen primlerdeki değişimlerin reel sektörün borç ödeme gücü üzerindeki etkisini incelemektir.

Çalışmanın 4 motivasyonu bulunmaktadır. İlki, CDS ile Türkiye'nin ekonomik göstergeleri arasındaki ilişkinin analiz edilmesidir. CDS fiyatlaması, Türkiye'nin ekonomik krizi için bir gösterge midir sorusu ikinci motivasyondur. Beklenen Mevcut Kredi Kaybı (CECL), finansal kuruluşların kredi riskini daha verimli bir şekilde değerlendirme, kontrol etme ve açıklama kapasitelerini artırdığı için CDS'in reel sektör şirketleri üzerindeki etkisini incelemek için çekici bir neden sunar. Son olarak, CDS'in Türk reel sektör şirketlerinin finansal gücüne olumsuz bir etkisi olup olmadığını gözlemlemektir.

Anahtar Kelimeler: Kredi Temerrüt Takas Primi, Kredi Riski, Beklenen Kredi Zararları, Zaman Serisi Modelleri, Nedensellik

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ABBREVIATIONS

AB-CDS	Asset-Backed Credit Default Swaps
ABS	Asset-Backed Securities
ABCP	Asset-Backed Commercial Paper
ADF	Augmented Dickey-Fuller
BIS	Bank for International Settlements
BIST	Borsa İstanbul Stock Exchange
CBRT	Central Bank of the Republic of Turkey
CCP	Central Counter Party
CDS	Credit Default Swap
CDO	Collateralized Debt Obligation
CECL	Current Expected Credit Loss
CFTC	Commodity Futures Trading Commission
CPI	Consumer Price Index
CRA	Credit Rating Agency
EBITDA	Earnings Before Interest Tax Depreciation Amortization
EBRD	European Bank for Reconstruction and Development
ECL	Expected Credit Loss
EPU	Economic Policy Uncertainty
FASB	Financial Accounting Standards Board
FTD-CDS	First to Default Credit Default Swap
GDP	Gross Domestic Product
GFC	Global Financial Crisis
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standards
ILO	International Labor Organization
IRS	Interest Rate Swaps
ISDA	International Swaps and Derivatives Association
KPI	Key Performance Indicators
LOB	Limit Order Book
MBS	Mortgage-Backed Securities
NPL	Non-Performing Loan
OTC	Over the Counter
PP	Phillips-Perron

RFQ	Request for Quotation
RMBS	Residential Mortgage-Backed Securities
SB	Securitized Bonds
SEF	Swap Execution Facility



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INTRODUCTION

The financial markets in the context of the modern global economy are distinguished by a wide range of instruments that have been created specifically to manage risk, improve liquidity, and stimulate investment. According to Pesaran et al. (2006), a substantial amount of research has been carried out in recent years on risk management in general and specifically on credit risk analysis. Credit risk is the principal source of risk that banks believe to be the most significant, and it is closely watched and contested in terms of regulatory monitoring and policy among banks.

It is necessary to have a strong understanding of CDS in order to comprehend the larger dynamics of financial markets, particularly in emerging economies. The economies in question, which are usually separated from developed economies by their distinct financial infrastructures and market behaviors, are confronted with a unique set of challenges and opportunities. In order to gain substantial knowledge, policymakers, financial analysts, and academicians who are interested in promoting economic stability and expansion should investigate the implications and repercussions of CDS in a variety of distinct scenarios. According to Eren and Başar (2016), CDS data include all economic and political risk indicators pertaining to the country in issue, and these alterations occur instantaneously. The investor prioritizing country risk will initially examine the country's CDS data. The investment decision is based on current facts, indicating that the impact of changes in CDS on the economy is evident in the short term rather than the long term.

CDS are vital in the global financial markets since they function as a type of insurance against the failure of debt instruments. A CDS contract offers a safeguard against the default of a specific debt instrument. The purchaser of the CDS remunerates the seller at regular intervals in exchange for the seller's commitment to indemnify the purchaser in the event of default on the underlying debt instrument. According to Kunt and Taş (2008), the term "credit risk" refers to the chance that a debtor would not fulfil their commitment to repay a debt or bank credit and will instead fail to do so as promised. It was highlighted that a default occurs when a debtor is unable to fulfil his fundamental commitments at the time of the default. Credit risk is the most major category of risk that every institution will, on occasion, be exposed to. Through the use of a financial instrument known as a credit derivative, an investor who is exposed to credit risk has the ability to transfer that risk to another investor who is willing to take it on. It is necessary to provide a highly detailed description of the credit event in order to determine the compensation that will be paid out for a credit derivative. A CDS may be subject to any of the following default events, as stated by the International Swaps and Derivatives Association (ISDA): bankruptcy, non-payment, obligation default or acceleration, repudiation or moratorium, and restructuring. According to Duffie (1999), a financial derivative known as a CDS offers a reduction in the likelihood that debt issuers, such as bonds and notes, will fail to make their principal and interest payments. By doing so, it guarantees that the issuer will fulfil its obligations to the investor who purchases the particular debt instrument. The classic credit swap can be compared to an insurance agreement in which the party insured pays an insurance premium in exchange for protection against a loss that may occur as a result of a credit event. In essence, the traditional credit swap is comparable to an insurance policy.

CDS are financial instruments that enable investors to mitigate or speculate on the credit risk associated with a borrower, such as a firm or a governmental organization. CDS offers a number of benefits, the most important of which are risk hedging and speculating. According to Bomfim (2022), CDS can be written on financial assets that are rated investment-grade (BBB or higher), speculative-grade (BB or lower), or unrated. On the other hand, the vast majority of the notional amounts that are now outstanding in the global CDS market are for contracts in which investment-grade assets are specified. Purchasing CDS allows investors to decrease risk by providing additional protection to bonds such as mortgage-backed securities, which helps to prevent payment defaults. A premium is then paid to a third party, who then takes on the risk in exchange for the premium. When investors speculate on CDS, they are placing bets on the creditworthiness of the reference firm or sovereign. As a second advantage, a CDS trader may be able to profit from the shifting market values of swaps due to the fact that swaps are traded in terms of speculation. Trading CDSs with one another allows investors to take advantage of the price differential. On top of that, CDS can be utilized to enter a position and exit it in order to profit from variations in price. For instance, a CDS seller might have assumed risk in exchange for getting regular payments from the CDS buyer. He will make a profit from the contract if the credit risk is eradicated throughout the term of the agreement or if the compensation received is larger than the probable payout.

There has been a significant amount of interest in the CDS market in Turkey, particularly as a result of economic fluctuations and geopolitical developments that have an effect on the financial stability of the country. There are a number of factors that have contributed to the tremendous volatility that the Turkish financial market has faced over the years. These factors include political instability, transitions in economic policy, and economic pressures from outside the country. As a consequence of this, the CDS market in Turkey has developed into an important indication of the perceived credit risk of the country.

The CDS spreads of Turkey could be influenced by a number of different factors. A number of economic factors, such as rates of inflation and interest, as well as non-performing loans (NPLs), have the potential to exert a considerable impact on CDS spreads. When it comes to obtaining loans, for instance, businesses can face increased costs if inflation and interest rates continue to climb. It is possible that this will lead the spreads on CDS to widen and hence increase the perceived risk of default. In accordance with what was mentioned before, the cost of purchasing CDS in order to take advantage of the benefits increases in direct proportion to the level of risk in various countries. In accordance with the findings of Özparlak and Yeşilyurt (2021), global credit rating firms usually recommend reducing investments in high-risk nations when both risk and CDS premiums increase. The consequence of this is that the nation obtains a lower amount of direct and indirect inflows of foreign capital. The current economic situation in the country is rendered significantly more difficult by this fact. In its most basic form, CDS instruments are one of the primary engines that contribute to the escalation of economic crises. Political and geopolitical developments have a significant impact on both the stability of the political system and the stability of geopolitical conflicts. There is the potential for major variations in CDS spreads to occur as a consequence of events like as elections, policy shifts, and international relations activities. Last but not least, the state of the global economy; the spreads on Turkey's CDS are influenced by international economic trends such as global financial crises, fluctuations in commodity prices, and swings in investor confidence.

As a result of Turkey's continuous geopolitical issues and the country's continued economic troubles, recent statistics and assessments indicate that there is a growing interest in focusing on Turkey's CDS

market. When the economy is in a state of uncertainty, there is often a visible increase in the spreads of CDS, which indicates that the market is getting more and more anxious about the possibility of defaults. The implications of these patterns could have significant repercussions for investors on a global scale as well as those on a local level. Widening CDS spreads can be seen as an indication of increased risk, which can have an effect on investment decisions and the overall costs of borrowing for Turkish firms. In addition, policymakers rely on CDS spreads as an essential measure of market confidence and financial stability, which helps them formulate economic and financial strategy.

Due to the fact that CDS premiums have become a major indicator for the economies of developing and rising countries, a great number of studies are being undertaken on this subject. Investors and multinational corporations pay close attention to these spreads because they are a reflection of the credit risk that is thought to be associated with a country. Spreads on CDS that are high suggest a larger perceived risk, which can have an impact on investment decisions, capital flows, and overall economic strategy for both domestic and international participants. On account of this, a great number of research papers have been written to investigate the connections between CDS and credit ratings, as well as their influence on the stock market and their connection to macroeconomic data.

CDS play a crucial role in both reflecting and exerting influence on the financial well-being and stability of Turkey. Gaining a comprehensive understanding of the intricacies of Turkey's economic landscape is of utmost importance for investors, policymakers, and financial experts, particularly when it comes to comprehending the mechanics of the CDS market. Through vigilant observation of CDS spreads and their fundamental components, stakeholders can more effectively evaluate risks and make well-informed decisions in a dynamic financial landscape.

One of the most significant contributions that this study makes to the existing body of research is that it takes a different perspective on the way in which CDS affects the operations of businesses that are in the real sector financially. Through the application of time series modelling, the objective is to ascertain the direction of the link that exists between the CDS premium and the variables that include the stock index, unemployment, FX rate, political interest rate, non-performing loans, inflation and bounced cheques. The most important purpose of the research is to investigate the relationship that exists between fluctuations in the CDS premium and the state of the financial health of businesses operating in the real estate industry. As a result of this study, it will be possible to determine whether or not companies operating in the real sector in Turkey, which is a developing nation, experience unfair competition from competitors in developed economies with regard to the consequences of CDS premiums on company balance sheets.

1. CREDIT DEFAULT SWAP

The phenomenon of globalization in the world economies, specifically the internationalization of financial markets in recent decades, has fundamentally broadened and varied investment options, resulting in a multitude of novel prospects, followed by novel risks. Hence, there has been an increasing eagerness to acquire accurate assessments of the investment risk associated with various countries. Various definitions have been suggested for country risk, which refers to the possibility that a country might fail to meet its commitments. The extant writing on the subject acknowledges the presence of both financial/economic and political aspects of country risk. Based on the level of emphasis placed on certain components, country risk is perceived either solely from the financial/economic standpoint or from both the financial/economic and political viewpoints (Alexe et al., 2003).

CDS is a derivative financial instrument that reduces the risk of default on the principal and interest payments of debt issuers, such as bonds and notes. It guarantees the debt of the issuer to the investor who purchases the said debt instrument. As mentioned by Chacko et al. (2006), over the years, numerous techniques and tools have been devised to manage credit risk. Undoubtedly, the most straightforward method to mitigate credit risk is to decline extending a loan. While this kind of credit improvement may be highly reliable, it completely precludes the potential for generating any form of profit. Alternative approaches are less radical. Certain initiatives entail modifying a company's operational procedures, such as requiring payment before the delivery of a service or product. This is more inherent for certain enterprises than others; well-known instances include subscriptions to magazines, memberships to health clubs, or tourism. Failure of the corporation to effectively handle this shift in cash flow may nevertheless lead to an increase in its credit exposure. For instance, the previously mentioned company, which now has a 30-day net payment policy, can easily modify the payment conditions to, for instance, 15 days. This approach can be used universally for all consumers or specifically for challenging clients with a track record of late or non-payment. Companies have the option to enrol in insurance products or request guarantees or letters of credit from their counterparts alternatively. Further sophisticated approaches include the use of financial instruments referred to as credit derivatives. Originally developed by entities in the financial industry, such as banks and insurance companies, these methodologies are now widely used by ordinary commercial enterprises as well. Financial instruments that fall under the category of credit derivatives include total return swaps, credit spread options, and credit-linked notes. Each of these instruments has the same fundamental objective: to assist firms and institutions in mitigating credit risk by isolating the credit risk component of an investment or asset and thereafter selling it.

One of the most significant initiatives that can be done to promote resilience in both emerging and developed countries is to acquire an entire understanding of all of the complex correlations that exist between CDS premiums and a wide range of economic variables. CDS spreads, in general, have developed into an important metric for both advanced economies and developing ones alike. When it comes to strategic planning for specific countries, they are an essential component for international investors and multinational firms to take into consideration. An illustration of the volatility that investors encounter when allocating capital to developing market economies can be found in the chart that follows, which illustrates how Turkey's one-year CDS premiums have changed from the beginning of 2009.

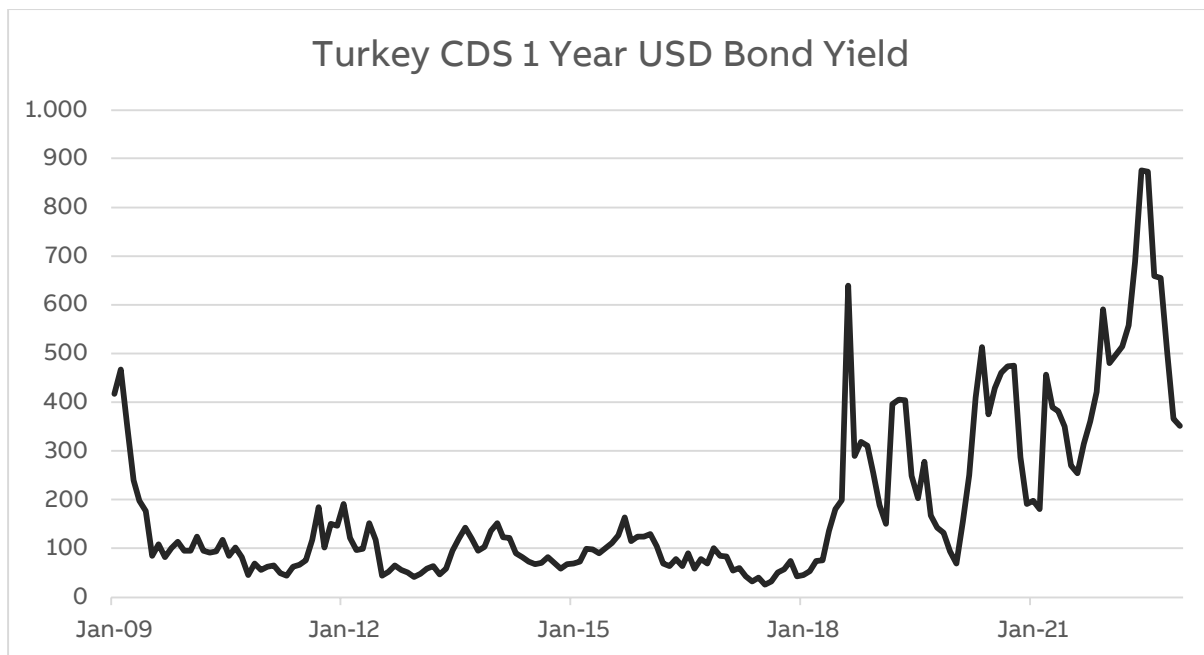


Figure 1: CDS Turkey Volatility

Between 2009 and 2010, the CDS yield started at a high level around 400-500 basis points but quickly dropped to below 100 basis points, indicating reduced perceived risk. It's observed a stable period starting from 2010 until 2017. The yield remained relatively stable, fluctuating between 100 and 200 basis points, reflecting a period of relative economic and political stability. High volatility period starting in 2018, the CDS yield became highly volatile, with sharp spikes indicating increased risk perception. Notable peaks occurred during periods of economic and political instability, such as the currency crisis of 2018 and global uncertainties. Between 2021 and 2022, the CDS yield spiked to unprecedented levels, nearing 1,000 basis points, reflecting heightened concerns about Turkey's economic challenges, including inflation and currency devaluation. Toward the end of the chart, there is a visible decrease in the CDS yield, suggesting a slight easing in risk perception. This graph highlights Turkey's evolving credit risk as perceived by investors in the international market. CDS spreads are a measure of credit risk. Higher volatility suggests uncertainty or sudden changes in investors' perceptions of Turkey's ability to repay its debt. Spikes often correlate with economic or political instability, signalling periods when investors demand higher compensation for the risk of lending to Turkey. The volatility of terms of trade, in particular, was found to have a statistically and economically significant effect on spreads, according to the findings of Hilscher and Nosbusch (2010). This is highly reliable when it comes to instrumenting terms of trade with a commodity price index that is specific to a country. Even when global variables and credit ratings are taken into account, their examinations of the foundations of the country have a significant capacity to explain the phenomenon. Sharp increases (spikes) in CDS yields often coincide with crises, such as currency devaluations, inflation surges, political instability, or global financial shocks. Decreases in yields, especially after high spikes, may indicate stabilization, improved investor confidence, or external support (e.g., IMF programs or bilateral agreements). Volatility may reflect both external factors (e.g., global market trends, U.S. interest rate changes) and internal factors (e.g., inflation, fiscal policy, geopolitical tensions). Frequent large swings suggest that investors are highly sensitive to developments in Turkey, indicating underlying instability or vulnerability. Stable periods, on the other hand, often reflect a calmer outlook or greater confidence in the country's economic

fundamentals. In essence, volatility is a key indicator of market uncertainty and risk perception, providing insight into how stable or unstable Turkey's economic and financial environment has been over time.

1.1. History of CDS

It has been suggested by Kaya et al. (2015) that the practice of giving credit ratings to institutions, organizations, businesses, and countries has been utilized for a considerable amount of time in order to determine creditworthiness. However, the reliability of this practice has recently been a topic of heated debate. As of late, CDS premiums have arisen as a tool that is commonly utilized for measuring the creditworthiness of organizations and nations. These premiums are increasingly recognized as a credible alternative to traditional credit ratings.

In essence, a CDS is an insurance policy against the possibility that a bond or loan may default. For the duration of the contract, the CDS seller receives yearly payments, but, in the case of a default, the buyer is entitled to compensation for bond value loss (Bodie et al., 2018).

When a bond or note investor becomes uncertain about the debtor's ability to repay the debt, i.e., a default, they can mitigate the risks of default by purchasing a CDS contract from another investor, thereby insuring their losses for a fee. According to the illustration provided by Coudert and Gex (2010) in Figure 2, CDSs are intended to cover the risk of default that is borne by creditors and transfer it to other agents. Under either of the two approaches, a buyer of CDS who possesses a bond with the same face value is, in theory, completely protected by the CDS against the risk of default. In the case of physical settlement, this is a fact that cannot be denied. This is also the case if there is a cash settlement and if the market for CDS is in sync with the market for bonds.

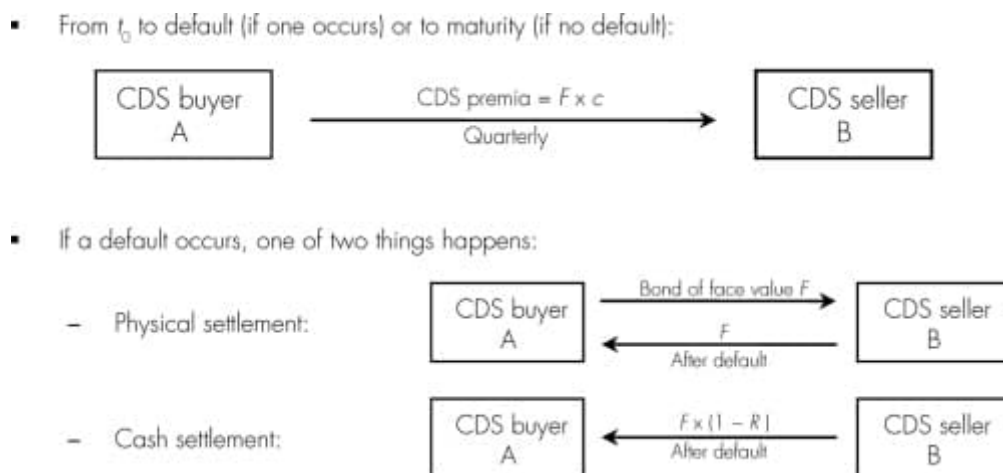


Figure 2: The Functioning of a CDS

Source: Coudert and Gex (2010)

Chaplin (2010) remarked that the investor is not simply purchasing an asset but also assuming the associated risk. A bond insurance policy that guarantees the par value of the bond in case the underlying name fails to meet its obligations. Purchasing an insurance policy entails acquiring the coverage, while

the policy writer has the role of selling the coverage. Conversely, the seller of protection assumes risk, much like the purchaser of the bond, while the buyer of protection likewise undertakes risk.

The initial sovereign CDS transactions emerged in the late 1990s, but their widespread adoption did not occur until the early 2000s. In 1997, the Republic of Italy was involved in one of the first recorded instances of a sovereign CDS transaction. It was reported that a CDS contract was utilized to mitigate the risk of default connected to Italian government bonds.

It is worth mentioning that the sovereign credit default swap markets were not widely developed until the early 2000s. The emergence of sovereign credit default swap markets occurred simultaneously with the growth of the overall CDS market and the rising adoption of financial derivatives for the aim of managing risk.

Sovereign CDS gained significance during times of financial turmoil or apprehensions regarding the creditworthiness of specific nations. They offered investors a means to mitigate the risk of sovereign government default or to speculate on fluctuations in their creditworthiness.

Although sovereign CDS have proven to be useful, they have also faced criticism, particularly during times of crisis, due to their propensity to increase market volatility and worsen sovereign debt issues. Thus, although sovereign CDS have become a fundamental aspect of the financial environment, their utilization and influence remain topics of discussion and examination.

In CDS, the underlying asset or reference obligation is the debt issued in the form of bonds or notes. CDS contracts are typically issued by banks and insurance companies and sold to creditors for municipal governments, developing countries' treasury bonds and notes, corporate bonds, and securities backed by real estate mortgages (Peery, 2012). J.P. Morgan created the CDS in 1994 as a brand-new method of bond insurance. The primary purpose of this initial CDS was to mitigate the credit risk arising from the bank's investment in Exxon, subsequent to the occurrence of the Exxon Valdez oil spill in 1989. The agreement was devised to shift the risk of Exxon's probable failure to repay to the European Bank for Reconstruction and Development (EBRD), enabling J.P. Morgan to release regulatory capital while still holding onto Exxon's debt.

A CDS, in its most basic form, offers protection against the failure to make principal and interest payments on a credit instrument. Imagine you made the decision to purchase a GE bond and wanted to protect yourself from any potential losses in the event that GE experienced issues. There are many places where you can get a CDS that offers this protection (Mishkin and Eakins, 2018).

The CDS market originated in the early 1990s. The development of the first CDS in 1994 is commonly attributed to J.P. Morgan. The instrument was originally developed as a means to mitigate credit risk and offer protection against default for bondholders and lenders. J.P. Morgan's innovative efforts consisted of developing a financial derivative that enabled investors to mitigate their vulnerability to credit risk linked to corporate bonds or other forms of debt instruments. The market for CDS experienced substantial growth during the late 1990s and early 2000s, establishing itself as a crucial element of the worldwide financial system (Augustin et al., 2016).

It is important to mention that although J.P. Morgan is commonly recognized as the creator of the contemporary CDS; the idea of transferring credit risk and insuring against default has historical roots that go back far longer, particularly in the insurance and reinsurance sectors. The contemporary CDS is a

highly advanced and extensively traded method of reducing credit risk. It originated in the financial markets during the 1990s.

Since the late 1990s, the rise of credit derivatives has been a significant trend in the derivatives markets. About \$800 billion in notional principal for active credit derivative contracts existed in 2000. This had increased to \$50 trillion by the time of the 2007 credit crisis (Hull, 2021).

1.2. CDS Use

Hedging risk and speculation are the two main benefits of credit default swaps. Investors purchase credit default swaps to add a layer of protection to a bond, such as mortgage-backed securities, to prevent it from defaulting on its payments in order to manage risk. A third party then takes on the risk in return for a premium. Usually, the regular payment or charge is stated in basis points per notional value of the agreement, and it is commonly referred to as a default swap premium or default swap spread. The charge is paid either every three months or every six months. The creditworthiness of the reference entity or sovereign is what investors wager on when they speculate on credit default swaps.

Since swaps are traded, a CDS trader might profit from their shifting market values in terms of speculation. Investors trade CDSs with one another in an effort to profit from the price discrepancy. Additionally, CDS can be utilized to enter a position and trade in and out of it to profit from price movements. For instance, a CDS seller may have assumed risk (in exchange for receiving regular payments from the CDS buyer); he will profit from the contract if the credit risk is avoided during the life of the agreement or if the compensation received exceeds the potential payout.

Using CDS, a risk to which the CDS buyer is exposed from another position can be neutralized or reduced. By itself, a credit default swap is a type of hedging. To protect itself from the possibility of the borrower defaulting, a bank might buy a CDS. To reduce credit risk, insurance firms, pension funds, and other holders of assets can buy CDSs.

According to Chan-Lau and Kim (2004), the primary participants in this market include banks, securities firms, hedge funds, and insurance organizations. Financial institutions are the primary purchasers and vendors of insurance. Banks are the primary sellers of protection, followed by insurance firms, securities houses, and hedge funds. Hedge funds frequently utilize CDS to either speculate on the future creditworthiness of a country or to exploit the difference in spreads between the CDS and the referenced bond through arbitrage. Pension funds and mutual funds specializing in emerging markets utilize CDS to effectively control their risk exposure to government bonds in emerging markets. In a similar manner, banks utilize CDS to effectively control their balance sheet risk associated with borrowers from emerging markets. Currently, credit derivatives are mostly utilized by advanced financial institutions and enterprises because of the intricate nature of managing event monitoring, counterparty exposure, and pricing the instruments.

Buying a security in one market and selling it in another is the general idea behind arbitrage. An investor can buy a bond in one market, then buy a CDS on the same reference entity in the CDS market. This is known as CDS arbitrage. Purchasing a CDS and engaging in an asset swap in which the fixed coupon payments of a bond are exchanged against a stream of variable payments is the classic CDS arbitrage transaction. Let's assume that we purchase a high-risk bond that offers a risk-free interest rate together with a consistent additional return. Additionally, let's consider purchasing a CDS for this high-risk bond

as a form of insurance in case of potential default. The outcome of this transaction would result in a return that is equivalent to the risk-free rate plus the difference between the CDS and bond spread, also known as the default swap basis. Nevertheless, as these two transactions are essentially the same as holding a risk-free bond, they should generate a return that is identical to the risk-free rate. Consequently, there should be no difference in the spread between CDS and bonds.

Since its establishment in the early 1990s, the corporate and sovereign CDS market has experienced significant growth. Over the past two decades, it has evolved into a prominent gauge for assessing the likelihood of an entity's default and has become the primary tool for hedging and trading credit risk. Initially, the CDS market was primarily centered on corporate default risk, as investors believed that the risk of default in developed economies was minimal. However, the financial crisis in the United States in 2007/08 and the escalating government debt levels in Europe led to a revaluation of risk perceptions in financial markets, especially concerning sovereign issuers (Vogel et al., 2013).

1.3. CDS Regulation Overview and Implications

Ramskogler (2015) asserts that the economic profession was astonished when a seemingly insignificant disturbance in a relatively obscure section of the US mortgage market escalated into a global financial and economic crisis from 2007 to 2008. The significant effects initiated by these events continue to be experienced today. Consequently, the crisis is expected to bring about significant paradigm shifts in economic policy-making and economic theory. Since the onset of the crisis, inquiries into its origins have predominated governmental and academic discourse, resulting in an abundance of articles examining the foundations of this significant occurrence.

In the past, the trading of swaps on a global scale was not consolidated, and there was a lack of transparency in the process. Despite this, the United States of America passed the "Dodd-Frank Act" in 2014, which mandated the use of centralized trading. According to Benos et al. (2018), a Swap Execution Facility (SEF) was required to be used for any and all transactions that involved a US counterparty in a highly liquid Interest Rate SWAP (IRS) contract. This requirement indicated that these transactions must take place. Trading platforms that are referred to as SEFs are those that are equipped with both open limit order books (LOBs) and request for quotation (RFQ) capabilities. Consumers are able to acquire quotations from multiple dealers and/or access an order book simultaneously through the use of these platforms. The introduction of SEFs introduced pre-trade openness to a market that had previously been very opaque. Additionally, the expenses that consumers incurred while searching for available money were reduced.

As part of the Wall Street Reform and Consumer Protection Act in the United States, the over-the-counter derivatives markets are the subject of a substantial provision. To be more specific, Title VII of the Act introduced a set of reforms with the intention of reducing counterparty risk and enhancing transparency in swaps markets before and after trades (Wang et al., 2023). Zhao et al. (2022) mentioned that these reforms were introduced in response to concerns that inadequate collateralization and a lack of transparency in these markets played a role in the systemic risk that occurred during the crisis. In accordance with the policy, the use of centralized clearing for qualifying contracts is mandated, rapid reporting and public dissemination of transactions are required, and eligible contracts are required to be traded on a SEF, which is a sort of electronic trading platform that enables several parties to trade

simultaneously. The level of pre-trade transparency for the swap contracts that are involved is greatly improved with the implementation of SEF trading.

The Dodd-Frank Wall Street Reform and Consumer Protection Act is a federal law in the United States that was passed as a direct response to the financial crisis of 2008. The main objective is to enhance regulation and supervision of the financial sector in order to avert future economic catastrophes. The Dodd-Frank Act exclusively addresses endogenous factors, such as the collapse of one or more significant institutions or markets, which could propagate to other entities and markets, ultimately threatening the entire financial system (Krainer, 2012). As a statute in the United States, its rules largely apply to financial institutions and businesses that operate within the country. Nevertheless, specific elements of Dodd-Frank, notably those pertaining to global financial transactions and multinational firms, can have ramifications that extend beyond the geographical boundaries of the United States. Financial institutions and banks that operate in the United States and have a presence in many countries are required to adhere to the requirements outlined in the Dodd-Frank Act. This encompasses international financial institutions that possess branches, agencies, or other significant operations within the borders of the United States. The Dodd-Frank legislation has provisions that impact cross-border derivatives trading. According to Loon & Zhong (2016), the over-the-counter swap market is changed in a number of basic ways as a result of the Dodd-Frank Act. To begin, it necessitates the production of real-time reports and the broadcasting of transactions to the general public. This represents a significant change in the formerly opaque market, which had little to no post-trade transparency. Second, it requires the clearing of qualified swaps by a central counterparty (CCP), because these swaps were typically traded in a bilateral context without the disciplining influence of clearing, which includes the posting of margins. Third, it establishes swap execution facilities, also known as SEFs, which are a novel kind of trading venue that allows numerous traders to execute swap transactions by simultaneously accepting bids and offers that have been posted by other traders. In addition, the Dodd-Frank Act distinguishes between swap dealers and significant swap participants, who are referred to as "end-users," and non-financial businesses and small financial institutions that utilize swaps to hedge or minimize commercial risk.

As an illustration, Title VII of Dodd-Frank, which governs the trading of over-the-counter (OTC) derivatives, is applicable to foreign organizations involved in derivative transactions with U.S. parties. Although Dodd-Frank is a piece of law specific to the United States, its regulatory framework has a significant influence on global financial markets and multinational corporations, resulting in a wider international impact. The compliance obligations for international firms that engage with the U.S. financial system essentially broaden the scope of Dodd-Frank beyond the borders of the United States.

Prior to the implementation of the Dodd-Frank Act in 2010, the CDS market had various prominent characteristics and problems. The CDS market functioned with limited regulatory supervision. The absence of regulation led to substantial systemic hazards. The CDS market being OTC allowed for private transactions that were not subject to the same level of scrutiny as conventional financial instruments. As mentioned by Benos et al. (2018), a fundamental component of the US Wall Street Reform and Consumer Protection Act (the "Dodd-Frank Act") pertains to OTC derivatives markets. Specifically, due to apprehensions that inadequate collateralization and lack of transparency in these markets exacerbated systemic risk during the crisis, Title VII of the Act instituted a series of reforms designed to reduce counterparty risk and enhance pre- and post-trade transparency in swaps markets. The market was extremely difficult to understand or see through. Market participants have a restricted

understanding of the extent of CDS risk throughout the banking system. The lack of transparency made it challenging to evaluate the risk profiles of organizations engaged in CDS trading. Due to the lack of standardization and central clearing of CDS transactions, there was a significant amount of counterparty risk involved. The 2008 fall of Lehman Brothers brought attention to this problem, as their bankruptcy had far-reaching consequences because of the CDS agreements they were involved in. The market experienced a significant level of leverage and speculation. Institutions frequently utilized CDS contracts not only to mitigate credit risk but also for speculative endeavours. This exacerbated the influence of market fluctuations and contributed to the fragility of the financial system. An incident of great significance was the almost complete failure of AIG, which had sold a large quantity of CDS contracts without adequate capital buffers. AIG's failure to fulfil its CDS obligations due to the deterioration of the underlying assets necessitated a substantial government rescue.

The CDS market posed a significant threat to the stability of the financial system. The interdependence of financial institutions via CDS contracts implied that the collapse of a significant participant could initiate a domino effect, jeopardizing the stability of the worldwide financial system. The market for CDS had a rapid and significant expansion in the years preceding the financial crisis of 2007-2008. The value of CDS contracts had a significant increase, causing the market to become one of the largest globally in terms of the total value of these contracts. The Dodd-Frank Act sought to tackle these problems by implementing extensive regulations to increase clarity, mitigate systemic risk, and promote the stability of the financial system. The key features encompassed the compulsory clearing of standardized CDS contracts via central counterparties, reporting obligations, and increased capital and margin requirements for market participants. The CFTC executed the Dodd-Frank trading mandate in two steps. Benos et al. (2018) stated that, on October 2, 2013, SEF trading was introduced for OTC derivatives on a voluntary basis. As of that day, newly authorized trading venues were required to adhere to several principles and stipulations. A primary criterion was the duty to maintain a LOB. In the second phase, particular contracts were mandated to be completed on SEFs.

Augustin et al. (2016) mentioned that the Dodd-Frank Act encompasses three regulatory components that will likely directly affect the CDS market: the Volcker Rule, which mandates the separation of proprietary trading from commercial banking activities; the central clearing of CDS indices; and the gradual elimination of uncleared single-name CDS. CDS have drawn a lot of criticism, in part because of their part in escalating losses during the most recent financial crisis. Critics contend that the Dodd-Frank Act has resulted in unforeseen outcomes, such as the consolidation of the banking sector, since bigger institutions are more capable of managing the expenses associated with regulatory compliance. According to their argument, this might potentially diminish competition and hinder innovation in the banking industry. Several critics argue that the Dodd-Frank Act has impeded economic growth by putting regulatory obligations on financial firms and generating market volatility. They contend that these laws have restricted lending and investment, thus impeding economic recovery and growth. Smaller financial institutions and credit unions have expressed their disapproval of the Dodd-Frank Act due to the burden of regulatory compliance expenses that unfairly impact them. They contend that the regulations imposed by the act, particularly those pertaining to mortgage lending and capital requirements, impose excessive pressure on smaller financial institutions, so restricting their capacity to serve their communities. Baily et al. (2017) contend that the law's intricacy imposed a significant regulatory burden, particularly on small and medium-sized financial institutions. These banks were compelled to

allocate substantial resources to compliance, which some argue drained funds from profitable activities such as lending. Conversely, the legislation also implemented provisions that augmented openness in financial markets, encompassing stricter reporting obligations for derivatives trading and increased regulation of credit rating organizations.

As a result, the Dodd-Frank Wall Street Reform and Consumer Protection Act has made reforming the CDS market one of its primary goals. The Dodd-Frank Act tries to do this by transferring a bigger amount of trades onto central clearinghouses with the purpose of lowering systemic risk. The Dodd-Frank Act, often known as the Wall Street Reform and Consumer Protection Act, is a major financial reform law enacted by the United States Congress and signed by President Barack Obama in July 2010. The legislation was passed in reaction to the financial crisis of 2007-2008, with the goal of averting future crises by establishing a range of regulatory measures.

According to Riggs et al. (2020), one of the goals of Title VII of the Dodd-Frank Act was to increase openness in the formerly opaque over-the-counter (OTC) derivatives markets, often known as swap markets. The Act's objective of enhancing openness in these marketplaces presumably reflected the importance of these sectors economically. According to the Bank for International Settlements (BIS), the notional outstanding amount in all OTC derivatives markets worldwide as of June 2017 was \$542 trillion. Mandatory real-time reporting of swap transactions, mandatory central clearing of standardized swaps, and, for a subset of liquid, standardized interest rate swaps (IRS) and CDS, a requirement that all trades must be executed on swap execution facilities (SEFs) are key implementation steps related to transparency in Title VII of Dodd-Frank.

At the end of December 2022, there were \$618.0 trillion worth of OTC derivatives outstanding globally, an increase of 3.3% from year-end 2021. IRD notional outstanding increased by 3.2% to \$490.6 trillion at the end of 2022 from \$475.3 trillion at the end of 2021, and notional outstanding in foreign exchange (FX) derivatives increased by 3.2% to \$107.6 trillion during the same time frame. The notional amounts of outstanding credit, equity, and commodities derivatives were \$9.9 trillion, \$6.9 trillion, and \$2.3 trillion, respectively (ISDA, 2023). Despite this, the credit default swap market is still modest in comparison to the entire global derivatives market: in 2022, credit default swap notional amounts represented for roughly 1.6 percent of the total notional amounts in the global derivatives market.

The Dodd-Frank Act represents a highly extensive restructuring of financial regulation in the United States, comparable in scope to the reforms implemented during the Great Depression. The issue continues to be a topic of discussion and has been the focus of efforts to either revoke or modify it since it was put into effect.

1.4. CDS Types and Maturities

The primary objective of CDS was to offer financial institutions an alternative to the process of transferring credit exposure; however, its scope has since extended to encompass active portfolio management. There are numerous variations of CDSs, each of which has its own set of characteristics and serves a variety of purposes for investors, hedgers, and speculators in the worldwide financial markets. The credit default swap market usually consists of three distinct sectors: corporate loans, bank loans, and developing market sovereigns. This market can be linked to a single credit or multiple credits, and it may additionally be separated into multiple sectors.

1.4.1. CDS Types

CDSs can be broken down into a number of different types, each of which is specially designed to meet a different set of objectives for risk management. Among the several types of CDS, the most common type is the single-name CDS. In addition to providing compensation in the event of a credit event such as default or bankruptcy, it gives protection against the failure of a single entity, such as a company or the government. CDSs can be classified as either single-name, which indicates that they provide insurance coverage for a single entity such as a firm or nation, or index, which indicates that they provide coverage for a group of distinct entities (Bø et al., 2020). Insurance against a group of reference entities, as opposed to just one particular entity, is provided by an index CDS. In most cases, these baskets are made up of companies that have equivalent credit criteria, such as belonging to the same industry or being located in the same geographic location. A higher level of diversification is provided by index CDS in comparison to single-name CDS. As an additional benefit, they are efficient in reducing the risks that are linked with the overall market. In the case of a single-name CDS, the risk of a reference entity or sovereign defaulting is transferred. A basket or CDS index will make a precise reference to a number of named entities or sovereigns, as well as reference obligations that are associated with those names. In general, the reference entities or sovereigns are not directly involved in a CDS transaction that is executed between two counterparties. Bomfim (2022) argues that there are essentially two sorts of CDS: A single reference entity, such as a company or a sovereign borrower, is named in single-name CDS contracts, whereas multi-name CDS refer to multiple borrowers. For instance, a multi-name contract might be created to cover defaults in a reference portfolio (like in the case of a basket CDS), or it could be based on an index of frequently negotiated single-name CDS, which has been more and more popular over the past few decades. The term "single-name CDS" is used to refer to a type of financial derivative that is linked to a particular borrower. The Index CDS is linked to a portfolio consisting of borrowers that are equally weighted. The cost of protection increases as the credit connection between borrowers increases.

A CDS deal is termed naked when the purchaser does not possess the underlying bonds. These kinds of purchases serve as a method to short the underlying bonds (Sambalaibat, 2018). One of the characteristics of a naked CDS is that the party that is acquiring protection does not have the underlying debt instrument of the company that is being referenced. This type of CDS is widely used for speculative purposes or as a method of minimizing risk connected with a particular credit without actually holding the debt that is being traded. Bø et al. (2020) stated that, typically, bondholders purchase CDS for the aim of hedging, namely to mitigate the credit risk associated with the bond. When an insurance buyer does not own bonds in the company for which they purchase the CDS, the CDS exposure is referred to as naked.

Derivatives that are linked to asset-backed securities (ABS), such as mortgage-backed securities (MBS) or collateralized debt obligations (CDOs), are referred to as asset-backed credit default swaps (AB-CDS). The underlying pool of assets is protected from defaults due to the safeguards that they provide. In accordance with the findings of Manconi et al. (2011), the definition of "securitized bonds" (SB) is utilized as an umbrella word for the terms ABSs, MBSs, and CDOs. Consequently, it is also meant to incorporate the well-known subtype of residential mortgage-backed securities (RMBS), in addition to the asset-backed commercial paper (ABCP), which is a more specific type of financial instrument. Despite the fact that, in theory, this can encompass assets that are not commercial or residential mortgages,

the vast majority of the connected securities were based on such assets prior to the crisis, and as a result, we will be concentrating solely on this particular element of the market. Structured finance instrument CDS refers to CDSs where the underlying asset is a structured finance security, such as an ABS or MBS. These types of CDSs are particularly associated with structured finance instruments, such as synthetic CDOs and other complex derivatives. Similar to other credit risk transfer mechanisms, such as credit default swaps or pass-through securitizations, structured finance instruments can facilitate the redistribution of credit risk among financial institutions and sectors (Fender & Mitchell, 2005).

The party who buys protection under a First-to-Default (FtD) CDS program will receive a payout in the event that any one of a predetermined group of reference firms fails to fulfill its financial obligations. There is a possibility that this method will be beneficial in reducing the danger of many defaults occurring within a portfolio. As stated by Chacko et al. (2006), the FtD CDS investor or protection seller releases a payment upon the occurrence of the initial default, whereas the second-to-default seller avoids paying until a minimum of two defaults happen concurrently.

Basket CDSs are similar to index CDSs, but they are typically tailored to contain a particular array of reference businesses that are specified by the parties that are interested in the transaction. Certain risk management criteria can be satisfied by customizing them to meet those requirements. The foremost portfolio transaction is likely the first-to-default swap basket. These contracts involve the sale of protection on a portfolio of credit default swaps. Payments cease at the occurrence of the initial credit event or after a predetermined duration (Chan-Lau & Kim, 2004).

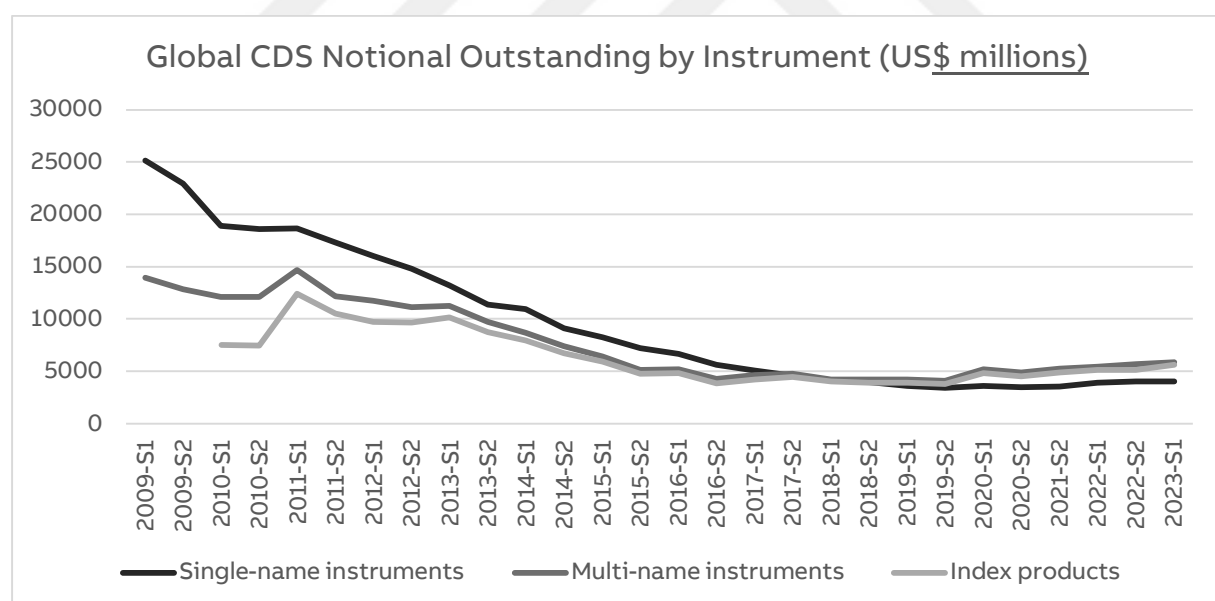


Figure 3: CDS by Instrument Graphic

A global notional outstanding amount of CDS is represented in the graph, broken down by instrument type, beginning with the first half of 2009 and continuing through the first half of 2023. Beginning in 2009 and continuing through 2023, there is a clear general trend toward a decrease in the notional outstanding amounts for all three categories of CDS instruments: single-name instruments, multi-name instruments, and index products. Single-name instruments began at their peak level in 2009, with notional quantities over 25,000 million USD, but they have witnessed a consistent fall throughout the time.

The notional outstanding sum will be much reduced by the year 2023, coming in at approximately 5,000 million USD. Also seeing decreases were multi-name instruments and index products; however, the paths that these two categories took were slightly different from one another. Initially, multi-name instruments had a more significant decline, but after that, they followed a negative pattern that was comparable to that of single-name instruments. Following an initial decrease, index products experienced a more steady decline and stabilization around the year 2016, which was then followed by a minor rise or stabilization beginning in 2018 and continuing onward. All types of instruments appear to have reached a point where the fall in notional outstanding amounts has reached an equilibrium beginning around the year 2018. Even minor increases have been observed in the most recent years, particularly beginning in the year 2020 and continuing ahead. A number of market trends and regulatory shifts that occurred in the wake of the financial crisis that occurred in 2007-2008 can be credited with the considerable fall that began in 2009 and continued ahead.

Following its establishment in the early 1990s, the CDS market experienced a consistent rise in volumes, culminating in a swift expansion leading up to the Global Financial Crisis (GFC) of 2007-2009. Since that time, the market has experienced a succession of significant transformations. Market players have diminished their risks and eradicated superfluous contracts (a process that commenced before the GFC but increased in its immediate aftermath). Aldasoro and Ehlers (2018) contend that, in the early aftermath of the GFC, this phenomenon was primarily propelled by the contraction of contracts and the diminishment of exposures. Following an over tenfold expansion preceding the GFC, the global CDS market has contracted nearly continuously since then. The market has had a persistent drop in notional amounts outstanding since reaching approximately \$61.2 trillion at the end of 2007.

There is a good chance that regulatory measures like the Dodd-Frank Act and Basel III, which are targeted at lowering systemic risk, contributed to the decrease in the number of CDSs. A more calm market environment may be attributable to the stabilization and minor growth that has occurred over the course of the past few years. Additionally, it is possible that a revived interest or utility has been discovered in CDSs as a result of the new regulatory frameworks. As a conclusion, the graph illustrates that the worldwide CDS market has experienced a significant decrease over the course of the last decade, with a tendency toward stabilization occurring in the most recent years. This is a reflection of broader shifts that have occurred in regulatory frameworks and financial markets since the financial crisis of 2008.

1.4.2. CDS Maturities

The maturity of CDS can range from one to ten years, with the five-year CDS being the most widely traded (Bomfim, 2022). The durations that are most commonly used are 1, 2, 3, 5, and 10 years. In general, the liquidity of sovereign CDSs is dependent on the liquidity of individual national bonds. It is therefore fairly straightforward to locate bid and ask price quotes for CDS in countries that have bond markets that are quite liquid, such as Mexico, Brazil, Colombia, and Venezuela (Pan & Singleton, 2008).

CDS can be categorized into three primary classifications based on their maturity: Short-term CDS often have a maturity period that spans from a few months to one year. CDS contracts provide insurance against credit events that may occur within a very brief period. Investors and institutions frequently utilize them to mitigate short-term credit risks in their portfolios or to speculate on short-term fluctuations in credit spreads. The medium-term CDS have maturities ranging from one to

five years. These contracts offer safeguards against credit occurrences within a moderate timeframe. Investors, corporations, and financial institutions often use them to mitigate credit risks linked to long-term bonds or loans. Long-term CDS have a maturity that usually surpasses five years and can reach up to 10 or even 30 years. Bomfim (2022) states that CDS maturities typically span from one to ten years, with the five-year maturity being notably prevalent. These CDS contracts provide extended protection against default situations. These institutions, such as insurance firms, pension funds, and holders of long-dated bonds, frequently utilize them to effectively handle and reduce their credit risk exposures over longer timeframes. In general, categorizing CDSs based on their maturity allows market players to customize their risk management methods based on the precise duration of their credit exposures and investment goals. Vogel et al. (2013) also note that, as OTC products, the size and maturity of CDSs are contingent upon the demands and requirements of both counterparties.

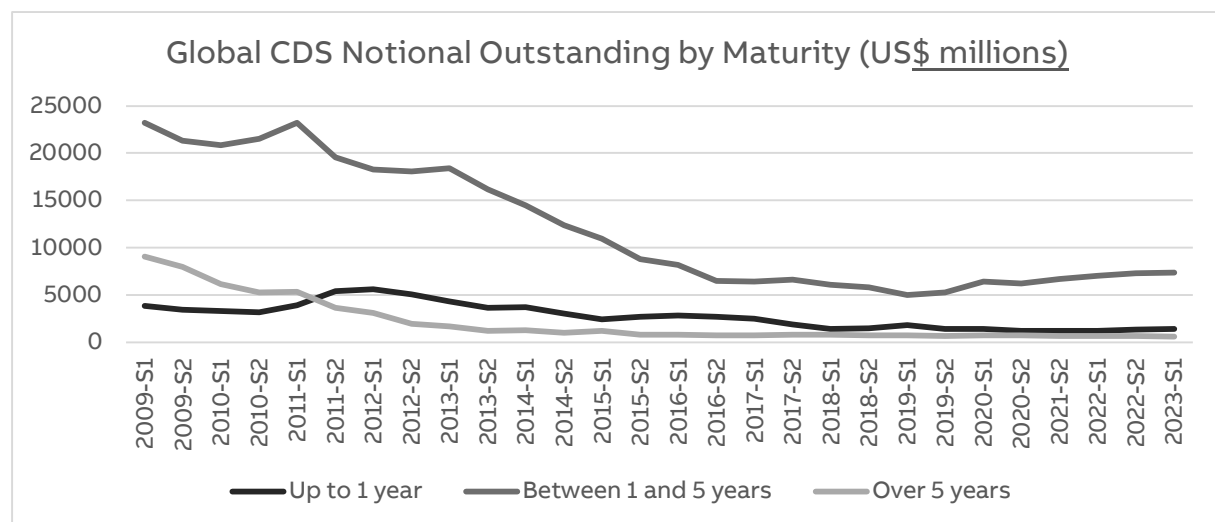


Figure 4: CDS by Maturity Graphic

Over the period of the first half of 2009 through the first half of 2023, the graph presents a visual representation of the global notional outstanding amounts of CDS that are grouped according to their maturity periods. In terms of maturity, there are three categories: "Up to 1 year," "Between 1 and 5 years," and "Over 5 years." Beginning in 2009 and continuing through 2023, there is a noticeable decline in the total notional outstanding amounts for all three maturity groups. This suggests that there was a significant decrease in the utilization of CDS during this time period. The notional amount for CDS with maturities of up to one year began at around 5,000 million USD in 2009 and gradually decreased over the years. Since about 2014, this category has maintained a relatively low and constant level, remaining below 2,000 million USD for the entire period. CDS between 1 and 5 years is the following category. This category begins with the highest notional amount in 2009, reaching a peak of approximately 24,000 million USD. Following thereafter, it exhibits a considerable and ongoing fall until the year 2016, after which it gradually stabilizes at approximately 5,000 million USD. Despite the general decrease, the category continues to constitute the most substantial share of the debt securities market. Beginning in 2009, the notional values for CDS with maturities of more than five years begin at about 8,000 million USD. This category had a significant fall until approximately 2014, after which it stabilized and began to see a minor gain beginning around 2018, culminating in a total of just under 5,000 million USD by the year 2023. All categories have shown indications of stabilization in their notional quantities beginning in 2014 and continuing ahead. It is worth noting that there has been a

minor increase in the "Over 5 years" category beginning around the year 2018, which may indicate a renewed interest in longer-term CDS or a strategic shift towards this type of CDS. CDS with maturities ranging from one to five years continue to be the most popular and liquid category in the CDS market, as evidenced by the fact that they continue to be the largest category in terms of notional amount over the entire time. Beginning in 2009 and continuing through 2016, the worldwide CDS market had a major decline, which was then followed by a period of stability beginning in 2016 and continuing onward. CDS with maturities ranging from one to five years continuously constitute the greatest percentage of the market. On the other hand, short-term CDS (with maturities of up to one year) and long-term CDS (with maturities of over five years) continue to maintain lower but rather constant levels following their initial reductions. It is possible that shifting market dynamics or strategies are the cause of the minor increase in the notional amounts for longer-term CDS that has occurred in recent years.

1.5. Impacting Factors

Financial institutions are ultimately vulnerable to macroeconomic swings in the global economy. Their portfolios are usually of a size that is large enough to diversify away idiosyncratic risk, resulting in exposure to systematic risk. Internationalizing one's exposure can yield diversification benefits if business cycles are not completely connected across countries and regions. If we need to list the most important factors affecting CDS premiums, credit ratings, political environments and macroeconomic figures are the ones that should be prioritized. Considering the points mentioned above, the primary factor that determines a country's CDS score is the stability in both financial and political aspects.

An increase in the premium of CDS results in increased external borrowing expenses for both the public and private sectors. Consequently, this decreases the inflow of foreign funds, poses challenges in meeting external debt obligations, and ultimately results in a decline in overall welfare. Hence, it is of crucial importance to determine the country-specific and global factors that impact the CDS premium. But on the other hand, as it's mentioned by Wilmott (1998), determining default risk is challenging, regardless of whether an example is examining time series data or employing fundamental analysis. Moreover, the findings of your analysis may not be relevant to the matter of cost. As an illustration, if you purchase a high-risk bond and intend to retain it for a year under the assumption that there is no possibility of default, the market's perception of the likelihood and timing of default will ultimately determine its value when you sell it, rather than any objective evaluation of default risk. In contrast, if you purchase a bond with the intention of retaining it until its maturity, your primary worry will be the potential for default, and the market's judgment will have less significance. Indeed, it is relevant to the matter of cost.

Longstaff et al. (2011) demonstrate that, compared to equity index returns for the same countries, sovereign credit risk tends to be significantly more connected across countries. Their findings imply that the dependency of sovereign credit spreads on a shared set of global market variables, risk premiums, and liquidity patterns is the cause of these increased correlations. The global macroeconomic factors that affect CDS spreads have a substantial relationship with both the risk premium and default risk components.

The study will focus on analysing ratings, the political environment, and macroeconomic numbers as the primary influencing factors.

1.5.1. Rating

Credit ratings provide an alternate measure of credit risk. Credit ratings assess the creditworthiness of the issuer and are determined by credit rating agencies (CRAs). The three primary worldwide credit rating agencies are Moody's, Standard & Poor's (S&P), and Fitch. Credit ratings are changed infrequently, usually coinciding with quarterly announcements, but CDS spreads are actively traded daily with real time price updates (Ericsson et al., 2009). Financial markets are faster at assessing and pricing risk compared to rating agencies. After the financial crisis in 2008, there have been debates on the dependability of credit ratings in general. Some have proposed that utilizing market-based indicators of sovereign risk may be more effective.

Since there is a lot of research seeking a relationship between CDS and credit ratings, it is necessary to first clarify the difference between them. Credit ratings undergo periodic updates, while CDS spreads are consistently adjusted in real-time through continuous trading, offering a current gauge of the market's perception of the risk associated with debt instruments.

Although credit ratings frequently exhibit signs of either delayed or premature conclusions, the CDS premium is a reflection of the rapid reaction of the market because it is decided based on supply and demand at any given moment. The credit rating, on the other hand, and the CDS premium are both capable of having an effect on one another. Existing literature indicates a strong correlation between CDS spreads and credit ratings. Specifically, if a credit rating accurately reflects the quality of a company or country, it should be inversely related to the CDS spread for the same underlying reference entity. In other words, a lower credit rating would result in a wider CDS spread. Nevertheless, there is substantial evidence indicating that credit ratings and the likelihood of default that is linked to them exhibit consistent variations in accordance with the business cycle. This has been demonstrated by studies such as Nickell et al. (2000) and Bangia et al. (2002).

The application and interpretation of credit ratings are not entirely clear in the literature. According to some interpretations, they are "cycle-neutral"; Carpenter et al. (2001) point to some of the ambiguities; that is, ratings are only assigned based on firm-specific information rather than systematic or macroeconomic information (Saunders & Allen, 2002; Catarineu-Rabell et al., 2005; Amato & Furfine, 2004). According to Pesaran et al. (2006), this opinion is largely supported by the rating agency's own explanation of their rating system.

It has been observed by Kiff et al. (2012) that the assessments provided by CRAs significantly influence the borrowing costs of sovereign issuers, hence making ratings a crucial factor in maintaining financial stability. While upgrades and downgrades in a broad sense may not exert a substantial influence on CDS spreads, it is worth noting that upgrades and downgrades specifically pertaining to transitions between investment grade classifications exhibit statistical significance.

Liu and Morley (2013) found that the little impact of credit ratings on CDS spreads suggests that, in assessing sovereign risk in recent years, the market has placed more importance on the macroeconomic fundamentals of a specific economy rather than relying heavily on credit ratings. There is little evidence to establish a correlation between credit ratings and sovereign CDS spreads. The primary factors influencing sovereign CDS spreads are macroeconomic fundamentals, which indicate the overall state of the economy.

According to the credit ratings that S&P has issued to Turkey, the country's long-term credit rating remained at the BB level from 2005 until 2017, and it was only raised to the BB+ level in 2013. Given the fact that the rating agency did not make any adjustments to the rating in response to the changes in the macroeconomic data, there is reason to be skeptical about the reliability of the review. It is primarily due to the fact that the majority of credit rating agencies originate from a single nation that they are subject to criticism regarding their independence. Oligopolistic structures are the primary reason for this criticism. The primary objective of the market is to find alternatives to credit rating agencies, with a considerable preference for CDS. CDS premiums, which are produced in open market environments, serve as a measure of the risk situations of countries, much like an independent institution would. This is because CDS premiums are produced in open market settings. According to Kutuk and Okur's (2020) research, this offers investors with framework that is more reliable.

In conclusion, credit ratings and CDS spreads are both used to evaluate credit risk; however, they differ in terms of timing and responsiveness. Ratings provided by organizations such as Moody's or S&P are updated on a quarterly basis, but CDS spreads move in real time and frequently more precisely reflect market sentiment. Concerns about the dependability of ratings emerged in the wake of the financial crisis of 2008, with research showing that CDS spreads would offer a more accurate measurement of risk since they are more closely aligned with economic realities. Because of this, there has been an increase in interest in CDS as a market-driven alternative. This is due to the fact that CDS is immune to the oligopolistic structure of credit rating agencies.

1.5.2. Political Environment

Political stability and policy uncertainty are significant factors that influence a country's economic power. Consequently, an increase in political risk leads to higher CDS spreads for a nation. Political risk has the potential to elevate volatility levels and limit investment activities within a given nation. Nations characterized by volatile political climates may encounter heightened economic instability, hence amplifying the likelihood of credit defaults. As a result, the demand for CDSs may surge in politically unstable regions as investors look to protect themselves against the heightened risk.

According to Hui and Chung (2011), the economic and political instability of a country, which is directly linked to the credit risk of that country, frequently results in the devaluation of its currency and an increase in the volatility of that currency. The sovereign CDS spread of a sovereign borrower should be adjusted to reflect any changes in the credit risk of the borrower that are anticipated by the financial markets. This spread is a direct measurement of the creditworthiness of the underlying issuer.

Policy uncertainty has been found to have a significant impact on stock market volatility, as well as a negative effect on investment and employment within sectors that are particularly vulnerable to policy changes, such as defence, healthcare, and infrastructure construction. At the macroeconomic level, the introduction of policy uncertainty innovations is indicative of forthcoming decreases in investment, output, and employment. Policy uncertainty, also known as regime uncertainty, refers to a category of economic risk characterized by an unknown trajectory of government policy. This uncertainty results in an increase in risk premia, causing businesses and individuals to postpone their spending and investment activities until the ambiguity around policy outcomes has been resolved (Baker et al., 2016).

Political determinations regarding economic policy, such as the implementation of fiscal stimulus packages or austerity measures, have the potential to significantly impact the general economic well-being of a nation. Consequently, this can influence the probability of credit defaults and thus have an effect on the pricing and trading of CDS. Both J. Liu and Zhong (2017) and X. Wang et al. (2018) concentrate their attention on the connection between political unpredictability and credit risk. These researchers, in contrast to Kaviani et al. (2017), who estimate credit risk by utilizing bond yield spreads, measure the credit risk of an individual company by utilizing credit default swap spreads. To the best of our knowledge, the only groups of researchers who have investigated the impact of political uncertainty on CDS spreads are J. Liu and Zhong (2017) and X. Wang et al. (2018). We are inspired by their findings to investigate the similar correlations in the bank credit default swap market. Furthermore, political determinations concerning the management and repayment tactics of government debt might impact the perceived creditworthiness of a nation. The decisions can have an impact on CDS prices because of changes in credit ratings or investor sentiment.

The actions taken by policymakers to decrease Turkey's 5-year CDS premium, which is responsible for the instability of the Borsa İstanbul Stock Exchange (BIST) 100 index, and to enhance trust in the real sector can be considered as measures that reduce the long-term instability of the BIST 100 index (Taştan & Güngör, 2019). The government's implementation of political decisions and policy reforms can have a significant impact on investor confidence and their perception of risk. Policy initiatives that encourage economic stability, transparency, and growth generally reduce the CDS premium, but political instability or uncertainty can raise it.

A stable political environment typically results in reduced CDS premiums, as it offers investors confidence in the consistent implementation of economic policies and governance. On the other hand, when there is political instability, frequent changes in leadership, or conflicts, it can create uncertainty and increase the perception of risk. This leads to higher premiums for CDS. Political events, such as elections, referendums, or geopolitical tensions, have the potential to influence the overall attitude of the market and the level of trust that investors have. J. Liu and Zhong (2017) found that elections generate an increase in CDS spreads. They did this by using national elections as a proxy for political uncertainty and by utilizing a sample of companies having single-name CDS from thirty different nations. When political issues are resolved in a positive way, it typically results in a fall in the CDS premium. This decline reflects an improvement in market confidence. In contrast, adverse occurrences can result in a rise in the premium as investors look for safeguarding against escalated risk. The Economic Policy Uncertainty (EPU) index developed by Baker and Bloom (2016) is utilized by X. Wang et al. (2018), who record evidence that rises in the uncertainty index lead to increases in the CDS spreads and that the implications can last for as long as eight quarters.

Turkey's CDS premium can be influenced by its diplomatic ties with other nations and international organizations. Political conflicts, trade disagreements, or alterations in international relations can affect how investors view Turkey's economic stability and credit risk, which in turn affects the CDS premium.

Political tensions, conflicts, or geopolitical events can exert substantial influence on financial markets and investor mood. These occurrences can raise the probability of credit defaults, resulting in alterations in CDS price. The presence or absence of political stability might impact how investors perceive the credit risk of a country. Investors may modify their CDS positions in response to their evaluation of political circumstances.

1.5.3. Macroeconomic Figures

As soon as the economy of a country reaches a state of equilibrium, there is an accompanying rise in the willingness of foreign investors to allocate their resources within the country, which ultimately results in an appreciation in the value of the domestic currency. The following will provide an outline of the key macroeconomic determinants that have an impact on the economic equilibrium of a nation.

There is a possibility that the current account deficit in developing countries like Turkey can be used as an indicator of economic growth. On the other hand, a growing current account deficit indicates that the government is becoming increasingly dependent on borrowing money, which in turn increases the risk that inflation may occur. It was discovered by Gruber and Kamin (2011) that the fiscal performance of the government has a considerable influence on the yields of long-term bonds. They suggested that there are a number of factors that help explain why higher government deficits can cause a widening in sovereign yields. These factors include crowding out, portfolio balance impacts, inflation expectations, and default risk. In industrialized nations, a surplus in the current account is found when the levels of output are higher than the levels of consumption. This surplus presents an opportunity for the economy to achieve expansion through the use of external financing.

Within a population's labour force, the unemployment rate is a statistic that quantifies the proportion of families that are actively seeking employment but are unable to get jobs. This proportion is quantified by the unemployment rate. There is a clear correlation between the rise in unemployment rates and the decrease in household income, which in turn leads to a subsequent decrease in overall consumption levels. The fall in demand causes a slowdown in production, which in turn leads to a reduction in the number of employees working within businesses. On the other hand, a reduction in the unemployment rate leads to an increase in the income of households, which in turn stimulates expenditure. A low unemployment rate acts as a drive for higher output, which in turn needs the recruitment of additional workers. This cycle continues until the need for additional staff is met. The occurrence of this phenomenon therefore makes a positive contribution to the promotion of economic progress. The statistics on unemployment serve as a trustworthy indicator of the state of the economy of the nation over a considerable amount of time. As a general rule, countries that have low unemployment rates tend to see an increase in the value of their currency, whereas countries that have high unemployment rates often see a decrease in the value of their currency. When it comes to determining the state of the economy as a whole, one of the most obvious indicators is the unemployment rate. The likelihood of downgrade transitions should be increased when unemployment is high, whereas the likelihood of upgrading from speculative to investment grade should be decreased when unemployment is high. The unemployment rate is a reflection of the overall health of the macroeconomy. A high rate of long-term unemployment may have a detrimental influence on the economic growth potential of a country (Figlewski et al., 2011), as well as on the country's budgetary position, because it would demand more transfer payments. Given that a higher unemployment rate would make the fiscal position and the macroeconomy as a whole more precarious, we would anticipate that there would be a positive association between the two variables.

The occurrence of inflation is a phenomenon that occurs when the total demand for goods and services is greater than the capacity of production that is already available. When there is a situation in which the quantity that is demanded is greater than the quantity that is supplied, there is a corresponding

increase in prices, which consequently contributes to the occurrence of inflation. It is possible for governments to cause sovereign economic crises by sharply increasing interest rates in order to boost their respective countries' currencies. High inflation rates are an indication of fundamental problems in the country's finances and may lead to such crises. If a nation is unable or unwilling to pay the present budgetary expenses, then it is in need of resorting to inflationary money financing in order to meet its financial obligations. Having a high inflation rate leads to a significant decrease in the purchasing power of consumers, which in turn leads to an increase in political unrest (Alexe et al., 2003). There is a correlation between an increase in the rate of inflation and a corresponding decrease in production efficiency, which ultimately results in a transfer of cash from production to intermediary firms. In the case that the rate of inflation falls below the level that is desired, it will eventually lead to a condition of stagnation within the commercial and financial sectors. The upkeep of ideal levels of inflation helps to cultivate a condition of equilibrium in production, which in turn facilitates an increase in the effectiveness of production processes and activities that are performed by intermediaries. Provided that the inflation rate remains within acceptable bounds, it serves to sustain robust domestic demand and effectively bolsters economic expansion. Nevertheless, it is important to note that elevated levels of inflation have the potential to exacerbate income disparity, exerting adverse effects on both economic growth and stability.

The Gross Domestic Product (GDP) is an essential metric used to assess the economic magnitude of a nation. GDP is a measure that quantifies the aggregate value of all the goods and services generated within the territorial boundaries of a nation within a designated timeframe. Fluctuations in GDP serve as indicators of either expansion or contraction within an economy. GDP is often assessed on an annual basis, and a rise in per capita GDP demonstrates a positive association with enhanced socioeconomic conditions inside an economy. An upward trend in the GDP of a nation suggests a corresponding improvement in the overall quality of life within that particular country. According to Mahadevan et al. (2011), that rising concern about debt-to-GDP ratios and fiscal deficits in the aftermath of the GFC (related in part to the economic downturn that followed the crisis and the high budgetary costs of repairing national financial systems) likely contributed to increased investor interest in CDS written on the sovereign debt of a much broader set of countries, including some advanced economies.

Interest rates play a pivotal role in influencing currency exchange rates, rendering them one of the most prominent determinants. Variations in interest rates among nations contribute to variations in currency exchange rates. The phenomenon of international capital flows is characterized by the movement of financial resources from nations with low interest rates to countries with high interest rates. Consequently, as a nation's interest rates rise, its currency experiences appreciation, whereas a decline in interest rates leads to depreciation. In addition to currency rate, as mentioned by Palazzo and Yamarthy (2020), monetary policy shocks directly influence credit risk; a contractionary monetary policy shock elevates credit risk via compensation for anticipated default and the risk premium component. The immediate impacts of monetary policy shocks are lessened by analysing a prolonged timeframe of CDS variations. Changes in monetary policy substantially influence credit risk. Moreover, we demonstrate that CDS significantly influence the sensitivity of monetary policy.

1.6. CDS Market Size

According to the most recent data provided by the Bank for International Settlements (BIS) on OTC derivatives statistics, there has been a notable rise in both the gross market value (the complete sum that the protection seller would be obligated to pay the protection buyer) and gross credit exposure (gross market value after netting) of OTC derivatives in the subsequent half of 2022 when compared to the corresponding period in 2021. The year-end 2022 witnessed a significant increase of 66.8% in the gross market value of OTC derivatives contracts in comparison to the concluding period of 2021. The gross credit exposure, which refers to the gross market value after netting, had a significant increase of 44.9%. The notional outstanding of global OTC derivatives experienced a 3.3% increase at the end of 2022 in comparison to the end of 2021. The global notional outstanding (complete value of the underlying reference obligation) of OTC derivatives reached \$618.0 trillion by the end of December 2022, reflecting a 3.3% increase in comparison to the previous year-end of 2021 and a 2.3% decrease when compared to the mid-year of 2021. A portion of this variation can be attributed to a recurring seasonal trend, whereby the estimated total amount of outstanding items typically rises during the initial six months of the year and subsequently declines during the latter half. The notional outstanding of interest rate derivatives (IRD) had a 3.2% increase, reaching \$490.6 trillion at the end of 2022, in comparison to \$475.3 trillion at the end of 2021. Similarly, the notional outstanding in foreign exchange (FX) derivatives also expanded by 3.2% during this period, amounting to \$107.6 trillion. The notional outstanding amounts for credit, equity, and commodity derivatives were \$9.9 trillion, \$6.9 trillion, and \$2.3 trillion, respectively (ISDA, 2023).

1.6.1. Global Market

CDS encompass various fundamental terminologies pertaining to the monetary values associated with the contractual agreements. The notional amount, alternatively referred to as the notional principal or face value, denotes the complete value of the underlying reference obligation that serves as the foundation for the CDS contract. The value in question does not accurately reflect the precise monetary sum that will be exchanged but rather serves as a basis for computing the payments in the occurrence of a credit event. The reference point serves as a basis for computing the payments exchanged between the buyer and seller of the CDS. In most cases, the fee or periodic payment is represented in basis points per notional value of the contract. The fee is typically referred to as a default swap premium or default swap spread among experts in the sector, and users can choose to pay the charge quarterly or semi-annually (Chan-Lau & Kim, 2004). In the case that a credit-related incident occurs, the assessment is helpful in determining the extent of the potential financial compensation that could be granted against creditors. The exposure amount pertains to the potential financial risk that a protection seller, who has issued a CDS, may encounter in the occurrence of a credit event, such as a default on the underlying reference obligation.

The calculation typically involves subtracting the recovery value from the market value of the reference obligation in the event of default. The exposure amount denotes the uppermost conceivable financial detriment that the protection seller may incur. In the context of CDS, the gross amount refers to the complete sum that the protection seller would be obligated to pay the protection buyer in the occurrence of a credit event. The value of the CDS is determined by multiplying the notional amount by the price, also known as the spread. The aforementioned quantity may be conceptualized as the nominal value of

the CDS agreement. A thorough understanding of this terminology is crucial for participants in the CDS market, as it allows them to assess risk, determine pricing, and manage exposure effectively. It is important to acknowledge that in a credit event, the actual payment is commonly determined by the exposure amount rather than the complete notional amount.

Based on the data provided by the BIS, the total value of CDS, encompassing both single-name and index CDS, experienced a notable increase of 10.6% to reach \$9.7 trillion by the conclusion of 2022 in comparison to the corresponding figure at the end of 2021. Furthermore, this value exhibited a growth of 4.4% when compared to the midpoint of 2022. The notional value of single-name CDS had a notable increase of 14.8% to reach \$4.1 trillion by the end of 2022, in comparison to \$3.5 trillion at the conclusion of 2021. Similarly, the notional value of multiple-name CDS witnessed a growth of 7.7% to reach \$5.7 trillion. The year-end 2022 witnessed a decline in the gross market value of CDS by 26.3%, amounting to \$146.3 billion, as compared to the previous year's value of \$198.5 billion. The gross market value of single-name CDS experienced a decline of 7.8% from \$78.4 billion at the conclusion of 2021 to \$72.3 billion at the conclusion of 2022. The gross market value of multiple-name CDS had a significant decrease of 38.4%, falling from \$120.1 billion at the end of 2021 to \$74.0 billion at the end of 2022.

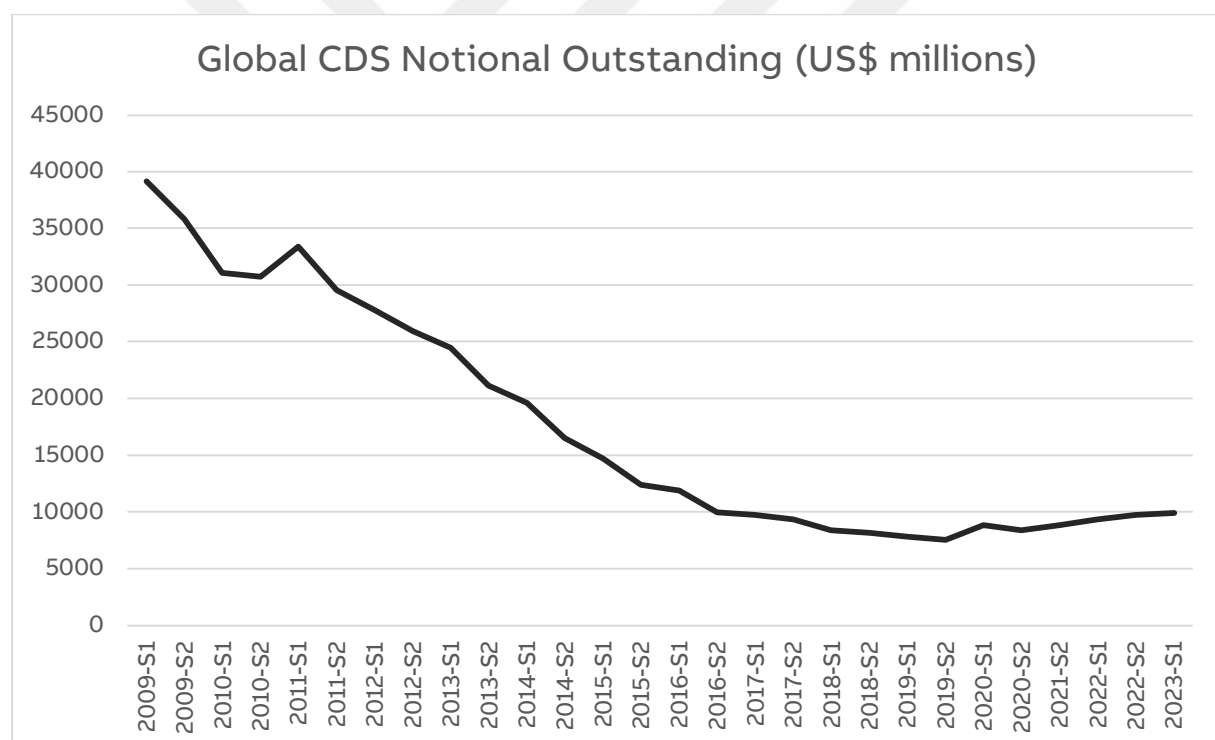


Figure 5: CDS by Outstanding Amount Graphic

The above data indicates the total value of CDS that are currently in existence for different time periods spanning from 2009 to 2023. From 2009 to 2013, there was a clear decline in the total value of CDS contracts, suggesting a fall in CDS activity during that time. The data indicates that the notional amount outstanding of CDS contracts remained relatively stable from 2013 to 2017, with modest swings but no major overall trend. Between 2017 and 2023, there is a little rise in the total value of CDS contracts, suggesting a revival or renewed attention to CDS activity over this period. In summary, the data indicates that the CDS market had a decrease in activity after the worldwide financial crisis in 2008,

followed by a period of stabilization and a potential slight improvement in succeeding years. Nevertheless, it is crucial to acknowledge that the total value of CDS contracts in circulation can be impacted by a range of factors, including alterations in regulations, market sentiment, and economic conditions.

The data below displays the total value of CDS outstanding, grouped by sector, for different time periods ranging from 2009 to 2023. The notional amounts outstanding for CDS contracts linked to sovereign entities exhibit temporal changes. As mentioned by Delatte et al. (2012), the magnitude of the CDS market relative to the volume of public debt instruments indicates disparate outcomes in the sovereign situation. Empirical studies on sovereign CDS have predominantly concentrated on emerging countries, as this was the initial market for CDS trading. In these markets, despite the comparative magnitude of the CDS and the aforementioned underlying bond market, evidence predominantly indicates a preexistence of the CDS market. There is an overall rise in the total value of sovereign CDS contracts from 2009 to 2011, with some fluctuations in the following years. Significantly, there has been a decline in the total value of sovereign CDS contracts throughout the latter periods (2020-S1 to 2023-S1), which could indicate shifts in market dynamics or altered views of risk related to government debt. The notional amounts outstanding for CDS contracts linked to financial firms display substantial volatility over time. There is a significant rise in the total value of financial CDS contracts throughout the initial time periods, namely in the first and second halves of 2011. Nevertheless, there is a notable decline in the total value of financial CDS contracts throughout the latter periods (2020-S1 to 2023-S1), potentially due to regulatory modifications or enhancements in the stability of the financial industry. The notional amounts outstanding for CDS contracts linked to non-financial companies also exhibit temporal changes. There has been a substantial rise in the total value of non-financial CDS contracts throughout the initial time periods, namely between 2010 and 2012. Non-financial CDS contracts experienced a decline in the total amount of money involved in the contracts throughout the latter periods (2020-S1 to 2023-S1), similar to sovereign and financial CDS contracts. This fall could be attributed to changes in market conditions or investor mood. The notional quantities outstanding for CDS contracts linked to securitized products are relatively small in comparison to other industries. The notional amounts exhibit temporal oscillations, with a discernible downward trend shown in the latter periods (2020-S1 to 2023-S1). The notional amounts outstanding for CDS contracts that cover numerous sectors are substantial, suggesting a diversified exposure across different businesses or asset classes. Like in other industries, the notional quantities experience variations throughout time, but the general pattern indicates a decline in the latter periods (2020-S1 to 2023-S1). In general, the data offers valuable information about the allocation of CDS activity among various industries over a period of time. It emphasizes patterns and variations in the total quantities of outstanding contracts for each sector.

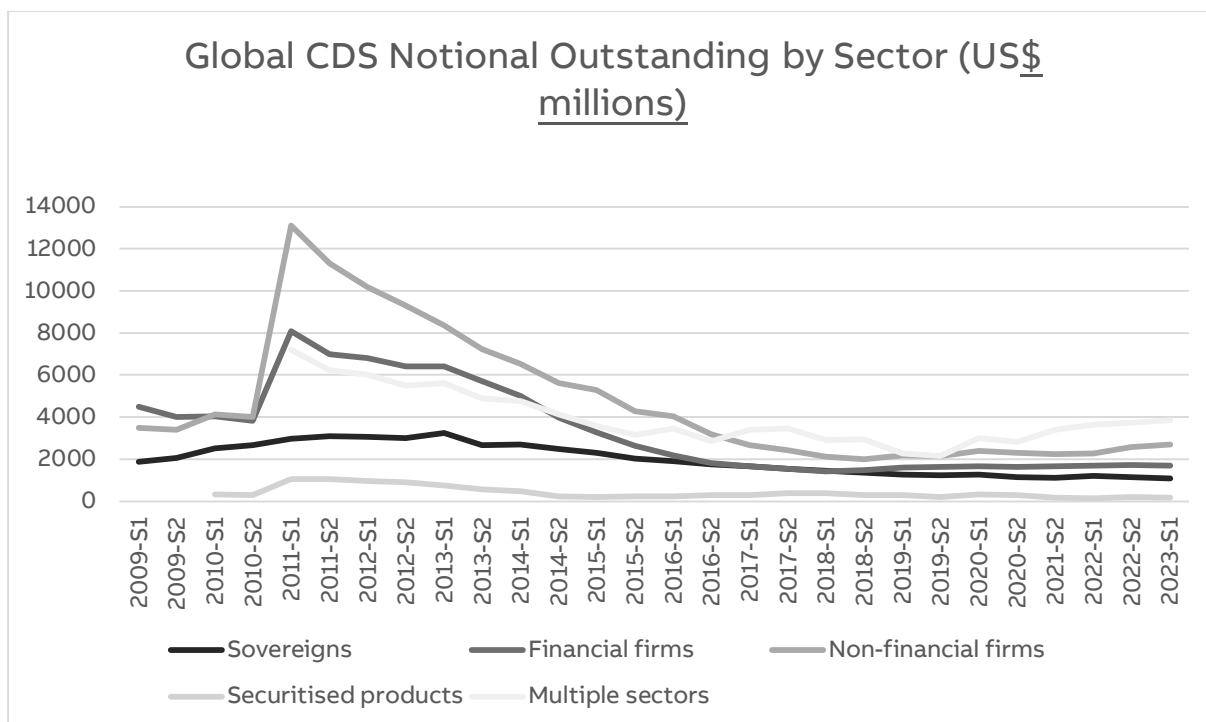


Figure 6: CDS by Sector Graphic

1.6.2. Turkey Case

Turkey's credit default swaps are active and extensively monitored in international financial markets. These products are used by foreign investors to hedge against or speculate on the possibility of default on Turkish government debt.

Among the 1,135 distinct reference entities exchanged during the 22 quarters from the first quarter of 2019 to the second quarter of 2024, 32 unique single-name reference entities persisted in the top 100 (Refer to Figure 7).

ARCELORMITTAL	REPUBLIC OF INDONESIA
BANCO SANTANDER, S.A.	REPUBLIC OF ITALY
BANK OF AMERICA CORPORATION	REPUBLIC OF KOREA
BARCLAYS BANK PLC	REPUBLIC OF SOUTH AFRICA
DEUTSCHE BANK AKTIENGESELLSCHAFT	REPUBLIC OF THE PHILIPPINES
FEDERATIVE REPUBLIC OF BRAZIL	REPUBLIC OF TURKEY
FRENCH REPUBLIC	RUSSIAN FEDERATION
GLENCORE INTERNATIONAL AG	SOCIETE GENERALE
INTESA SANPAOLO SPA	TELECOM ITALIA SPA
JPMORGAN CHASE & CO.	TELEFONICA, S.A.
KINGDOM OF SPAIN	THE GOLDMAN SACHS GROUP, INC.
MORGAN STANLEY	UNICREDIT, SOCIETA PER AZIONI
PEOPLE'S REPUBLIC OF CHINA	UNITED MEXICAN STATES
REPUBLIC OF COLOMBIA	

Figure 7: 27 Single-name CDS Reference Entities that Remained in the Top 100 Each Quarter

Source: <https://www.isda.org/a/JUPTE/Global-CDS-Market-Study.pdf>

The CDS rates of Turkey are significant indicators among developing markets. They mirror worldwide investor perception of Turkey's creditworthiness, shaped by political, economic, and geopolitical factors. The variations in Turkey's CDS spreads are intricately connected to overarching trends in emerging markets, rendering them crucial for traders and investors worldwide who are assessing risk exposure in this asset class.

As of December 2024, Turkey's CDS has declined to 248–250 basis points, the lowest in recent years, signifying enhanced investor confidence. This is a significant rebound from 2022, when the CDS surged over 700 basis points amid increased risk perception.

Turkey's CDS serves as a crucial indicator of its financial soundness in international markets and significantly affects borrowing rates and investment inflows.



2. HOW CDS EFFECTS REAL SECTOR

The CDS premium is the cost charged by an organization in exchange for agreeing to absorb the risk of non-payment of a debt that the creditor may face in exchange for a particular amount. When the premium is higher, the borrower's borrowing cost is also higher. This indicates that the borrower's borrowing cost will be higher if they choose to borrow money. As is the case with market exchange rates, the decision of CDS premiums is determined by the current supply and demand. If it exceeds 300 basis points, the economy is deemed highly risky. The cost of borrowing will increase in direct proportion to a country's or company's CDS premium. As a result of the interest rate necessarily reflecting this premium. It has been observed by Eğılmez (2020) that when the CDS premium is above the mark of 300 basis points, the economy is seen as being extremely fragile. As a consequence of this, the increase of the costs associated with borrowing money is directly proportional to the CDS premium of a country or company. As a result, this is reflected in the interest rate, which by definition incorporates this premium. A larger premium results in an increase in the borrower's borrowing costs, which means that the borrower will have to pay higher borrowing fees in order to receive a loan under the current circumstances. Just like market exchange rates, the present supply and demand dynamics are what set the premiums for CDS.

Real sector enterprises, who formulate business strategies taking into account the macroeconomic conditions of their operating country, may experience both direct and indirect impacts from CDS premiums in the form of financial expenses. This study aims to highlight indirect impacts by examining provisions allocated for credit risk, while direct effects are represented by an observed increase in financing costs.

2.1. Borrowing Cost

Capital is necessary for businesses to continue operating. The lending institutions, which include banks and other financial organizations, provide companies with the capital they need to operate. Nevertheless, there are additional elements that explain why businesses prefer to obtain financing, which may be good for the further development of the business. A loan transaction can have an impact on a firm's cash flow since it requires the company to make payments to providers before it receives payments from customers. It is necessary for a company to maintain a certain amount of liquid assets, which are referred to as working capital, in order to keep this activity going and avoid running out of money. Some businesses make use of business investment in order to facilitate growth and ensure that they are able to capitalize on new opportunities as they arise. In addition, this surplus of money might be utilized to cover expenses that might not have been anticipated. Bonds issued by corporations are an additional approach that can be taken in addition to funding obtained through financial institutions. Both the sovereign yield curve and the credit default swap spread of each country are taken into consideration when determining the prices of these instruments. There is a correlation between a rise in sovereign CDS spreads and an increase in the yields on corporate bonds. In the event that the country risk worsens, investors frequently want a sovereign ceiling or change corporate rates based on the sovereign CDS. This means that even if a firm has a good balance sheet, it may still be subject to higher borrowing costs. The sovereign CDS serves as a benchmark for the systemic risk in a country, which has a direct impact on the costs of corporate borrowing. Companies that are located in countries that have a higher

sovereign risk are required to pay a premium, regardless of how solid the company's creditworthiness may be.

As stated by Delatte et al. (2012), the interest rate that represents the premium also affects the borrowing costs for enterprises in the real sector. When the budget balance of a sovereign state worsens, there is an associated increase in risk. This increase in risk leads to higher bond spreads and insurance costs, which are reflected in the pricing of sovereign CDS premiums. The inquiry regarding the reciprocal influence between the derivative market and the underlying market arises due to the presence of an arbitrage relationship.

For the purpose of expanding and diversifying its resources, the financial industry borrows money. On the other hand, the real sector borrows money in order to carry out commercial operations, make investments, and acquire working capital. When a country or company's CDS premium is higher, the cost of borrowing money is also higher. The reason for this is that the interest rates naturally reflect the premium that is being paid.

According to Anderson and Cesa-Bianchi (2020), because of the widespread use of borrowing by companies as a means of funding investment, production, labor, and other real activities, it is of the utmost importance for policymakers and economic academics to get an understanding of the transmission of interest rate increases to corporations. However, the question of how interest rate shocks as a result of monetary policy affect corporate credit spreads remains a subject of extensive debate and research, even though economic theory predicts that financial institutions lend credit to corporations at a premium that compensates for default risk.

The syndicated bank loan market is an essential channel for enterprises to obtain funding. The effects of credit derivatives on credit markets are not completely understood, despite their increasing significance in recent years. The CDS premium contributes to the rise in interest costs for loans offered by banks, whether standalone or through syndication. Lenders take into account credit scores, payment history, and prevailing economic conditions to establish interest rates. A higher credit score typically results in lower estimated interest payments. When applied to countries borrowing, the CDS premium for that country is included in the cost. A lower CDS results in reduced borrowing costs for governments. Investments in the country, whether direct, indirect, domestic, or foreign, can be impacted positively or negatively by funding costs. When sovereign CDS spreads widen, it frequently results in increased borrowing costs for enterprises operating in the real sector. This is due to the fact that lenders factor in the higher sovereign risk into the interest rates that they make available to firms. This reflects the increased risk that is associated with lending in an environment that is economically unstable.

CDS spread fluctuations are increasingly influencing market risk perceptions, yet there is little agreement on the reliability of the information these instruments offer. Some experts view CDS as a crucial measure of credit quality. Some argue that the CDS market structure and price may inherently have some disadvantages, and the signals provided by CDS should be carefully considered. CDS instruments in emerging markets exhibit more unfavourable traits such as liquidity, concentration, and depth, necessitating extra care when interpreting CDS spread changes (Mihai & Neagu, 2011). It is certain that the correlation between corporate interest expenses and sovereign CDS is based on the reliance of corporate borrowing costs on the perceived risk associated with the country of operation.

As a consequence of this, sovereign CDS spreads significantly impact the way in which international investors approach companies. Therefore, investors typically demand higher returns on corporate debt in order to compensate for the possibility of contagion risks when there is a higher level of sovereign risk. When sovereign CDS spreads are higher, foreign investment in corporate bonds and stock can decrease, which can lead to a reduction in liquidity and an increase in the cost of borrowing for companies. In the event that the country risk worsens, investors frequently want a sovereign restriction or change corporate rates based on the sovereign CDS. This means that even if a firm has a good balance sheet, it may still be subject to higher borrowing costs.

2.2. Expected Credit Loss Provision

After the recent financial crisis, numerous organizations, financial institutions, and market participants demanded evaluations of the accounting regulations. Both the FASB and the IASB adopted new standards for probable credit losses in response. The International Accounting Standards Board (IASB) released IFRS 9, a new standard on expected credit losses, in July 2014. Similarly, the Financial Accounting Standards Board (FASB) issued CECL in June 2016. The CECL and the IFRS 9 exhibit differences across multiple dimensions. IFRS 9 and CECL differ in their approach to accounting for expected credit losses. Under IFRS 9, only a portion of the loan portfolio needs to hold lifetime expected credit losses, with performing assets required to carry only 12 months of expected credit losses. On the other hand, CECL requires lifetime expected credit losses to be held for all loans. The CECL standard necessitates a proactive approach that permits the accumulation of losses in anticipation of projected losses, occurring earlier than under the incurred loss standard. Consequently, CECL is expected to exhibit less cyclicalality. However, the process of assessing anticipated losses necessitates risk managers to make subjective conjectures on future circumstances, which may impede the capacity to compare losses among different banks and over time for market participants. One of the assumptions that risk managers must make is to establish expectations for future economic conditions that impact loan losses (Chae et al., 2018).

Financial assets are subject to review for expected credit losses (ECLs) over the contractual term of the asset. It is necessary to review even non-due financial assets, as they might not result in collection. Companies must use the expected credit loss model to calculate the impairment of financial assets, including trade receivables, in accordance with International Financial Reporting Standards (IFRS) 9 Financial Instruments. As a result, companies must account for what they anticipate the loss to be on the day they raise the invoice, and they must update that estimate up until the day they get payment. Companies deduct an allowance for credit losses from the gross amount of the financial asset to present the net amount expected for collection. The current expected credit losses must be reassessed at least quarterly. The concept of expected credit losses requires companies to take into account the potential impact of past, present, and future economic conditions on the size of the loss. Policy uncertainty can encompass various forms of uncertainty, such as ambiguity surrounding monetary or fiscal policy, the tax or regulatory framework, or uncertainty regarding electoral outcomes that may shape political leadership.

Financial sector companies are not the only ones who face the challenge of credit losses, and it is anticipated that the current state of the economy will have an impact on a diverse range of receivables. It is necessary for businesses to adjust their provision models in order to take into consideration credit losses

that are brought on by economic uncertainty. According to Chae et al. (2018), the purpose of the new credit loss provisioning standard, CECL, is to encourage proactive provisioning by allowing loan loss reserves to be based on predictions of the economic cycle. The implementation of CECL may introduce challenges in comparing provisions between different banks and over time.

It is possible that there will be challenges in terms of comparability even when looking at the programs that are used within banks. The process of standardizing the provisions that businesses in the real sector industry establish for their receivables is, in my opinion, exceedingly difficult, particularly with regard to the comparability of the provisions. Given this situation, it is imperative to scrutinize the financial health of real sector businesses, especially those listed on public markets, in relation to CECL. It is possible that the introduction of CECL may result in a rise in the provision for receivables and other current assets that are subject to evaluation, which will ultimately lead to a reduction in the current ratio. Let's assume that a financial guarantee results in the recognition or amplification of an obligation that was already there for off-balance-sheet credit exposure. When this ratio is calculated using the total liabilities, it has the ability to increase the perceived leverage of the organization. This is especially true when applying the ratio to the total liabilities. There is a possibility that recognizing potential credit losses in a more timely manner may result in increased expenses, which will have an effect on a number of measures on the income statement, including operational profit, Earnings before interest, tax, depreciation and amortization (EBITDA), profit before taxes, net income, and earnings per share.

In the months that followed the GFC, those who were in charge of developing accounting standards instructed that financial institutions and other businesses make provisions against loans and trade receivables according to the amount of credit losses that were anticipated to occur. The previous accounting model for reporting credit losses is typically referred to as an "incurred loss model." This is due to the fact that it necessitates the recording of credit losses that have already been incurred as of the date of the balance sheet. This is because it is necessary for such losses to be reported rather than losses that are anticipated to take place in more distant times. These criteria have been superseded by the new "expected credit loss" criteria, which take a more forward-looking approach and place an emphasis on shifts in the probability of future credit losses, even if no such triggering events have yet occurred (Cohen & Edwards, 2017).

When measuring ECLs using the simplified approach, IFRS 9 allows the use of practical expedients, such as a provision matrix. It is not permitted to record allowances that are not supported by appropriate analysis. A corporation that uses a provision matrix may use segmentation to account for the drastically variable past credit loss experience of different client segments. However, segmentation must be reviewed on a regular basis to reflect the various ways in which economic concerns affect different categories of clients. According to Fidan (2019), when figuring out the provision matrix for trade receivables, other things that can be thought about are the types of customers who owe money, their creditworthiness, where they are located, whether the receivables are secured, and whether they are insured. These criteria complement the previously mentioned conditions. In addition, the provision matrix may be organized according to the period of time that receivables have been outstanding or a combination of these criteria.

IFRS 9 mandates that organizations must acknowledge anticipated credit losses for all financial assets held at amortized cost or at fair value through other comprehensive income, which includes balances of accounts receivable. The primary objective of the standard is to substitute the 'incurred loss' model

mandated by International Accounting Standards (IAS) 39 with an 'expected loss' model. This entails transitioning from a system of setting aside provisions solely after a loss has transpired to one that incorporates forward-looking data to estimate projected credit losses, irrespective of the presence of an impairment trigger. To compute the loss ratios necessary for a provision matrix, it is probable that a two-stage method will be employed. The initial phase involves evaluating the historical record of losses that have been suffered, specifically referring to outstanding accounts receivable sums that have not been recovered. The next step is to analyse the future and determine if the historical experience is expected to continue or if additional factors should be considered to modify the recognized degrees of impairment. The second step in the development of a provision matrix is assessing the extent to which past events accurately predict future outcomes. This includes evaluating whether adjustments to provision levels or default rates are necessary, taking into account various aspects in the broader economic landscape. These changes could be as straightforward as fluctuations in the unemployment rate, interest rates, or economic growth and how they are anticipated to impact provisioning elements. Management must conduct an evaluation, drawing on its past experience, industry knowledge, and awareness of its customer base, to identify the key elements that will most likely affect its levels of uncollected accounts receivable. Typically, management should customize the forward-looking information included in the model to focus on the elements that have the most impact on its client base. These may encompass broad patterns and shifts in the economy, such as fluctuations in inflation and growth rates, levels of unemployment, interest rates, or foreign exchange values. Furthermore, there may exist additional signs that are specific to certain industries or geographical regions, which could greatly influence the ability to predict future default rates. The indicators may vary for each group of assets, depending on the industry and region of those particular categories (PricewaterhouseCoopers LLP, 2018).

Provision matrices are based on prior loss experience, but they must be updated to reflect current economic conditions as well as realistic and supportable estimates of future economic conditions. Certain economic risks may result in a significantly different loss rate for trade receivables than in previous times. The rates for the general allowance for expected credit losses are calculated as the historic loss rates for defined aging groups adjusted for the Country Credit Risk Adjustment. Companies must assess how the timing and amount of cash flows provided by existing trade receivables may be altered and adjust loss rates as needed.

ECL approaches should consider several possibilities and not rely on subjective, prejudiced, or unduly optimistic judgments. Companies or banks should create and document a procedure for producing relevant scenarios for inclusion in ECL estimates. In this situation, it is possible to evaluate the consistency of the companies' evaluations using market indicators of future performance, such as CDS spreads. Changes in the CDS spread directly impact the country credit risk adjustment. The company's financial statements treat the provision for credit losses as an expense. They represent anticipated losses from past-due, problematic debt or other credit that are probably going to default or become unrecoverable.

3. EMPIRICAL RESEARCH

This study aims to give a comprehensive analysis of the interrelationships between a wide range of variables and the impact those variables have on the real sector market and financial markets. Through the incorporation of these multiple elements, it makes an effort to provide insights into the dynamic nature of the economic environment in Turkey.

3.1. Previous Researches

In the studies carried out to date, especially the changes in stock values of the publicly traded companies, CDS and ratings given to the countries by rating agencies have been analysed. Although it is seen that the relations between the financial sector and these premiums have been examined in many studies, it has been ignored to what extent the real sector, namely companies engaged in production and trade, is affected in terms of solvency. In addition, while the factors affecting premiums have been investigated, analysing how premiums, which are indicators of country risk, affect companies in the local market will be a specific point for this study.

As a critical indication for the economy of both wealthy and emerging countries, CDS spreads have emerged as a significant factor. This is the primary criterion that international investors and multinational corporations use to evaluate the strategies of individual countries. The macro-level impact of CDS premiums on countries has been the subject of a great number of research studies; nevertheless, there is a dearth of comprehensive studies on the connectivity between CDS premiums and real sector companies and the ramifications that these premiums have for these businesses beyond their association with stock prices and CDS.

Chan-Lau and Kim (2004) examine the relationship between bond, stock, and CDS markets for emerging market sovereign issuers, focusing on equilibrium price connections and price discovery. The results suggested that, despite various market pressures, there is a convergence between CDS and bond spreads. The majority of nations exhibit an equilibrium price relationship between the bond, CDS, and stock markets. The equilibrium pricing relationships and price discovery in the CDS, bond, and stock markets are examined for the following eight developing market nations: Brazil, Bulgaria, Colombia, Mexico, the Philippines, Russia, Turkey, and Venezuela. Furthermore, this study aimed to utilize Merton's theory of the firm in the context of sovereign issuers.

Byström (2005) found evidence suggesting that firm-specific information is reflected in stock prices before it is reflected in CDS spreads. Furthermore, a significant link was found between the volatility of stock prices and the spreads of CDS, indicating that the spreads increase or decrease in sync with stock price volatilities. Ultimately, it has been discovered that the iTraxx market exhibits a significant positive autocorrelation. His research focused on examining the correlation between iTraxx market volatility and CDS spreads as well as equity prices.

Ismailescu and Kazemi (2010) discovered that positive events have a more pronounced effect on CDS spreads compared to negative occurrences. Additionally, they discover that good events have a higher probability of spreading to other developing economies. Positive occurrences exert a more significant influence on CDS markets over the two-day period around the event and have a higher probability of

affecting other emerging countries. On the other hand, CDS markets predict unfavourable events, and past fluctuations in CDS premiums can be utilized to gauge the likelihood of a negative credit event. The transmission mechanisms for positive events are primarily the shared creditor and competition in trade markets.

In their study, Hassan et al. (2015) examined how the level of financial integration in emerging economies affects the way prices are determined in sovereign CDS and bond markets. The major objective was to analyse the long-term equilibrium price relationship and short-term dynamic connections between sovereign bond spreads and the CDS premium. Additionally, the study aimed to investigate the dynamics of price discovery between the two spreads and the influence of each country's level of financial integration. A stable equilibrium exists over an extended period of time between the bond market and CDS. Bond markets and sovereign CDS are closely interconnected. There is a significant positive correlation between the dissemination of bond market information and the level of financial integration. Although the effects particular to countries individually are insignificant, the shared global determinants have a significant influence on the fluctuations in sovereign credit risk and bond yields.

Bekkour et al. (2015) discovered that an escalation in the CDS spreads, which signifies deteriorating credit conditions, has a favourable effect on the volatility of the exchange rate. Nevertheless, the outcomes for skewness (Skew) and kurtosis (Kurt) are generally inconsequential. By dividing the era into a subprime crisis period and a sovereign debt crisis period, we may identify notable variations across time. When examining the time period of the subprime crisis, our calculations indicate that there is no statistical significance. The analysis suggests that the credit risk of Euro-area member countries, as indicated by their CDS spreads, does not impact the stability of the Euro. This stability is determined by the skewness and kurtosis of the risk-neutral distribution of the Dollar-Euro exchange rate, along with the risk-neutral volatility.

Akkaya's (2017) study aimed to identify the internal factors that influenced the credit risk premiums of Turkish bonds during the 2008 global crisis. According to the research, the price of gold and the return index of the Istanbul Stock Exchange are external factors that affect Turkey's USD 5-year-term bond CDS. The dependent variable is influenced by the past values of these variables. In his study, Akkaya utilized the Granger causality test to examine the immediate correlation between variables. Regression analysis establishes the correlation between independent and dependent variables, but it does not provide evidence of causation. Put simply, the presence of a connection between variables does not indicate the specific direction of impact or causation between them. The VAR Granger causality/Block Exogeneity Wald Test was conducted on the monthly fluctuations in Turkey's 5-Year USD Bond CDS premium, the unemployment rate and the consumer price index (CPI). The results indicated that the model was not statistically significant at the 5% level.

In their study, Ulusoy and Yılmaz (2017) examined the credit ratings of emerging countries and the associated CDS premiums during certain time periods. Their aim was to provide a rationale for the criticisms directed towards rating agencies. An argument can be made that CDS premiums possess a more advantageous framework compared to credit ratings, as they exhibit greater impartiality and reliability in assessing national markets. They are superior to credit rating companies in terms of their ability to accurately reflect the shifting perception of risk and their ability to react more rapidly to socio-economical conditions.

The analysis conducted by Buz (2021) revealed that, in the long term, the exchange rate has a favourable influence on CDS premiums, whereas the growth rate and stock market index have adverse effects. Research findings indicate that there is no direct cause-and-effect connection between CDS premiums and the exchange rate or inflation rate. However, there is a unidirectional causal association between CDS premiums and the GDP, as well as the stock market index and interest rate. The exchange rate was found to have a favourable influence on long-term effects on CDS premiums, while the growth rate and stock market index had a negative influence.

The study conducted by Köse and Atik (2021) examined the correlation between the primary sector index values, which serve as significant indicators of a country's economy, and the CDS premium value, which reflects Turkey's borrowing cost as a nation. A correlation was found between the sector index values analysed and the CDS score values, indicating a reciprocal causation link. This demonstrates that the increased CDS premiums in the country have an adverse effect on the expenses of resources for companies involved in all sectors that produce goods and services in the country. In addition, it is generally accepted that alterations to the manufacturing sector of the nation have a major impact on both the CDS score and the credit ratings of the nation.

For the purpose of predicting the stationary conditions of the CDS and exchange rate variables, Güriş and İçen (2021) employed a VAR model within their research. In the following step, they utilized this model to conduct a causality analysis. Based on the results of the causality tests, it was determined that there was no evidence of a causal connection between the CDS factors and the exchange rate variables. A cause-and-effect relationship that is mutually beneficial occurs between the interest rate and the CDS.

During the process of causality analysis, Küçükkocaoğlu and Buz (2023) recommended the Toda-Yamamoto causality analysis over the Granger causality tests. Granger causality tests are based on the premise that the series is stationary. In the long run, the research revealed that there is a causal connection between the series. Granger causality was found to exist in a unidirectional manner between the stock market index and interest rate on the one hand and CDS on the other side, as determined by the evaluations. In addition to this, a Granger causation that worked in just one direction was shown to exist between the CDS and the balance of payments account as well as GDP. When looking at the relationship between the exchange rate and the inflation rate, however, there was no Granger causality correlation found.

3.2. Data

The data that was utilized for this study covers a period of 168 months, beginning in 2009 and ending in 2022. The inclusion of data on bounced cheques from 2009, which is regarded to be necessary for the study, is the primary reason that the decision was made to begin the data collection process in 2009. As an additional point of interest, the global economic crisis that occurred in 2008 had a huge impact on the CDS market, which further supports the reasoning behind adopting 2009 as the starting year. The numbers presented in the study provide a dynamic view of the progression of the data over time by illustrating the percentage change from the previous month.

CDS premium rates, the BIST index, USD exchange rates, and NPLs are tracked and updated on a monthly basis by Refinitiv Eikon, which is owned and operated by Thomson Reuters. 168 months of data are covered by these reports. The gathering of such a vast amount of financial data is absolutely

necessary in order to investigate market patterns and economic circumstances. The Risk Center of The Banks Association of Turkey, which offers detailed insights into the frequency and patterns of cheque defaults, was the source of the information that was obtained regarding cheques that were returned as unpaid. The data on the political interest rate was collected from the official website of the CBRT, which ensured that the numbers used for the analysis of monetary policy were correct and trustworthy. On top of that, the data on the unemployment rate and the inflation rate among consumers were obtained from the official website of the Turkish Statistical Institute. In addition to enhancing the financial statistics, these data offer significant socio-economic indicators that provide a full perspective of Turkey's economic status over the duration of the study period.

3.3. Variables

It is vital for both investors and policymakers to have a good understanding of the dynamic link that exists between the many different economic indicators and financial instruments in order to understand the complex environment of the financial markets. This understanding is essential since the financial markets are not straight forward. It is the intention of this study to analyse a variety of significant elements that have an effect on the real estate and financial sectors, with a specific focus on the relationships that exist between these factors and the consequences that they have. Some of the factors that are included in this category are the CDS, stock prices on the BIST, bounced cheques, interest rates that are established by the central bank, NPLs, unemployment rate, exchange rate for the United States Dollar, and the CPI.

3.3.1. CDS

One type of financial derivative is known as a CDS, which gives investors the opportunity to exchange or compensate for the credit risk associated with another investment against their own. The relationship between sovereign CDS spreads and the financial strength of real-sector enterprises in emerging economies is complex and interdependent. An increase in sovereign risk can lead to an increase in borrowing costs, a decrease in investor confidence, tighter credit conditions, and broader economic issues, all of which can have a negative impact on the financial position of businesses that operate in the real sector. It is essential for policymakers and investors to have a solid understanding of this relationship and the ability to manage it in order for them to be successful in achieving their objectives of stabilizing and supporting economic growth in developing countries.

The vast majority of CDSs have maturities that range from one to ten years. Typically, the amount of time that passes before reaching maturity is five years. In light of the fact that the purpose of this investigation is to ascertain the nature of the relationship that exists between real sector effects in the short term, CDSs with a maturity of one year have been incorporated into the analysis.

3.3.2. BIST

When investors have a high level of confidence in the economy, stock exchanges reflect that confidence. In general, rising stock prices are indicative of positive investor sentiment and economic confidence, whereas dropping stock prices are indicative of pessimism and economic concerns. The sovereign CDS spreads, which are used to determine the cost of insuring against a country's default, are susceptible to being influenced by fluctuations in opinion. The stock market is also affected by macroeconomic factors

that have an additional influence on sovereign credit risk. These factors include the growth of the GDP, the unemployment rate, and the fiscal deficit rates. There is a decreased likelihood of a government defaulting on its debt as a result of the positive economic performance, which is evidenced by the increasing stock markets. A consequence of this is that the spreads on CDS become narrower. When the economy is performing poorly, it leads to a decline in stock markets, which in turn increases the perception of default risk and causes the spreads of credit default swaps to widen.

Investors in stocks are able to engage in buying and selling of business stocks by utilizing a stock exchange. Only those stocks that are listed on an exchange are considered to be eligible for buying or selling when it comes to the stock market. This makes it a central location for the buying and selling of stocks, which is why it is so important. According to Mustafa et al. (2015), when there is a lot of volatility in the market, investors have a tendency to look for assets that are less volatile. The movement of investors' money into safe-haven assets, such as government bonds, may occur when the stock markets experience a decline. This phenomenon, which is referred to as "flight to quality," has the potential to bring about a reduction in the spreads on sovereign CDS if the sovereign is perceived as a safe haven. However, if the decline in the stock market is brought on by concerns regarding the economic or political stability of the nation, then this could lead to an increase in the spreads of CDS because investors will be pricing in a greater amount of sovereign risk. Fears of widespread defaults led to an increase in the spreads of CDS during the financial crisis that occurred in 2008, for example. This rise in spreads occurred concurrently with the decline in stock markets.

The rate of inflation impacts the stock market, which in turn has consequences for the earnings and valuations of corporations. In the event that inflation leads to higher interest rates and costs associated with borrowing cash, enterprises that have a significant amount of debt may see an increase in the CDS spreads offered by their insurance companies. On the other hand, companies that are able to impose higher prices on their customers may experience a lesser degree of negatively impacted businesses. One of the most significant indicators of the financial strength of a company is the stock price of the company. This is one of the most important indicators. Since the market price of the companies is a crucial factor to compare with CDS prices, BIST is also regarded as a variable. This is because CDS prices tend to be more volatile than market prices.

3.3.3. CHEQUE

The relationship between bounced cheques and sovereign CDS is primarily indirect, although it may be significant in understanding a nation's overall economic and financial health.

Business transactions frequently use cheques as a form of payment. The acceptance of cheques is dependent on the mutual trust that exists between the parties involved. People often create cheques with a future date and then present them to the other party involved in the commercial relationship. Regrettably, there are some people who take advantage of this situation by postponing payment while simultaneously profiting from the goods and services that they acquired in exchange for it. It is not possible to honor the cheque on the day of payment if there are not enough funds available. In light of this, the bank will record the cheque as having "bounced." In the event that there are insufficient funds in the bank account of the issuer at the time that the cheque is presented, the cheque is considered to be bounced and cannot be cashed. Both the legal legitimacy of the cheque and the holder's ability to receive payment are compromised as a result of this circumstance. As a result of the detrimental effects that

bounced cheques have on the economy, policymakers have enacted stringent rules against them. In order to safeguard the people who are the recipients of fraudulent cheques, these regulations provide specific procedures for the collection of cheques that have bounced, additional claims that go beyond the amount of the cheque, and severe penalties for those offenders.

When there is a substantial incidence of bounced cheques within a nation, it may be an indication of underlying economic troubles. These difficulties may include problems with accessible finances, inadequate financial administration, or periods of economic downturn. There is a possibility that this situation will have a detrimental effect on the financial well-being of both individuals and businesses, which suggests that there will be a greater prevalence of economic vulnerabilities. When a significant number of cheques are returned as unpaid, it is a signal that both consumers and businesses are having trouble meeting their financial obligations. This is the case when there is a high incidence of cheques that are returned as unpaid. Because of this circumstance, there is a possibility that the level of risk that is perceived in relation to the general economic stability and fiscal health of the country may increase. This may be viewed by investors as an indication of an increased likelihood of economic troubles, which may result in wider sovereign CDS spreads as investors seek to hedge against the possibility of defaults by sovereign governments. Consequently, this may cause investors to seek to hedge against more sovereign defaults. Indirectly putting a burden on the government's resources could be the result of a large number of cheques that are returned without sufficient payment. There is a likelihood that tax revenues will decline while businesses and individuals are suffering financial difficulties. On the other hand, there will be an increase in the demand for social assistance and support. This could potentially negatively impact the government's budgetary position, making it more difficult to service sovereign debt. Additionally, it could lead to an increase in CDS spreads due to the general perception of increased risk. Consequently, the variable of bounced cheques was incorporated into the research, and the objective of the study was to determine whether or not the volatility of CDS premiums had a link with the bounced cheque rate. We conducted the research to analyse this relationship.

3.3.4. INTEREST

If there is a demand for loans from financial institutions, the central bank will make them available. Additionally, financial institutions have the ability to deposit with the central bank any excess cash that they have. The central bank determines the appropriate interest rate for these transactions. Modifying this rate gives it the ability to exert control over the policy of the monetary system. Interest rates will be increased by the central bank in order to bring inflation under control whenever there is a possibility of it happening. Therefore, to drive inflation down, it is attempting to cut aggregate demand as a consequence of this. In order to combat inflation, central banks such as the Federal Reserve frequently employ the technique of raising interest rates as a strategy. A rise in interest rates can lead to an increase in the costs involved with borrowing money as well as an increase in the financial strain that debt issuers are under, both of which have the potential to contribute to an increase in the spreads on CDSs.

This is the key reason why the interest rate that is released by the central bank is one of the variables that are being evaluated in this study. A slowdown in the economy might have a detrimental influence on the ability of businesses operating in the real sector to make payments, which is why this study is having this variable taken into consideration.

Conversely, real sector enterprises face challenges when interest rates rise and there is a high inflationary economic climate. They may encounter difficulties in meeting their bank loan obligations due to increased financial expenses and declining economic growth. During a period of high inflation and increasing interest rates, enterprises in the real sector may encounter substantial difficulties. These factors can have an impact on them in the following two ways. The first one is rising financial costs; as interest rates grow, the expense of borrowing goes up. Companies that have outstanding debt will experience an increase in their interest payments, resulting in increased financial expenses. This might exert pressure on the cash flow and profitability, rendering it more challenging to fulfil obligations on current debts or acquire further debt. The second one is diminished economic growth, as elevated inflation and escalating interest rates frequently result in a deceleration of economic growth, since both consumer spending and companies' investments may decline. For enterprises in the real sector, this might result in decreased sales, diminished revenue, and narrower profit margins, all of which can affect their capacity to repay loans. Inflation gradually diminishes the ability of both individuals and businesses to purchase goods and services, resulting in a decline in their purchasing power. For businesses, this might result in increased expenses for both raw goods and labour, putting additional pressure on profit margins. Occasionally, firms may encounter difficulties in transferring these escalated expenses to consumers, resulting in additional financial burden. Credit tightening refers to a situation when banks exercise greater caution in lending, leading to stricter credit restrictions. This hinders firms' ability to obtain finance, whether it be for day-to-day operations or future growth, hence worsening the financial difficulties they have. In summary, the confluence of elevated interest rates, escalating inflation, and decelerating economic expansion might engender a formidable milieu for enterprises in the real sector, rendering it arduous for them to effectively handle their debt and uphold financial equilibrium.

3.3.5. NPL

NPL is used to describe a loan that has fallen into default because the borrower has failed to make the required payments for a period of time that has been established in advance. The phrase "no payment" is commonly believed to signify that there have been no payments made toward either the principal or the interest on a loan, despite the fact that the particulars of a loan's nonperforming status may vary depending on the terms of the loan.

It is feasible to make the observation that the financial strength of enterprises is degrading if the ratio of non-performing loans reaches a higher level within the framework of the macroeconomic environment. It is possible that high levels of NPLs will undermine the trust of investors in the nation's ability to be able to preserve its financial stability. The spreads on sovereign CDSs have increased as a result of this lack of trust. Investors are seeking higher premiums to compensate for the increased risk of default, which has led to the current situation. The health of the banking industry intricately ties to the risk of the government defaulting on its obligations. A high number of NPLs in the banking sector could force the government to intervene or provide bailouts. This would result in an increase in the government's financial liabilities. Due to the heightened perception of the government's ability to service its debt, the potential increase in the financial burden on the government could lead to a widening of the spreads on sovereign CDSs. It is possible for problems within the banking industry to have a detrimental effect on the economy as a whole, which in turn can have an effect on the government's ability to borrow money. For example, if banks are unable to provide loans due to a rise in NPLs, it could lead to a slowdown in economic development. This, in turn, could worsen the financial situation of the federal

government and potentially increase CDS spreads. As a result, the research incorporates NPLs to explore the relationship between CDS and the phenomenon under study.

3.3.6. UNEMPLOYMENT

There is a general correlation between high unemployment rates and economic distress. When unemployment is high, it is a reflection of underlying difficulties, such as decreased consumer spending, decreased production, and stagnation in the economy. Increasing the perceived credit risk and leading to wider CDS spreads are two outcomes that can result from these situations, which can have a negative impact on the fiscal health of both corporations and sovereign entities. High unemployment can put a burden on the government's budget by increasing the amount of money spent on social welfare programs and reducing the amount of money collected in taxes. High sovereign CDS spreads can be the result of concerns regarding a country's capacity to service its debt, which can be caused by government fiscal pressure. Within these kinds of circumstances, there is a perception that the likelihood of default or restructuring is increased. For the purpose of stimulating the economy, governments may choose to implement expansionary fiscal policies in response to high unemployment rates. These policies may include greater public spending and tax cuts. The implementation of these policies has the potential to stimulate economic activity; nevertheless, in the near term, they may also result in an increase in public debt, which might potentially lead to greater sovereign CDS spreads if investors become concerned about the fiscal sustainability of the government.

The unemployment rate is calculated by taking the total number of people who are currently employed and dividing that number by the number of persons who are currently without jobs. When it comes to calculating and displaying the unemployment rate, different countries use very diverse approaches. In order to determine the unemployment rate in Turkey, the Turkish Statistical Institute uses the same methodologies as are recognized by the International Labor Organization (ILO).

The percentage of the labor force that is comprised of individuals who are not employed, are actively looking for work, and are available for work is referred to as the unemployment rate. The unemployment rate is taken into consideration as a variable in order to evaluate the employment power of businesses. We base this on the previously mentioned reasoning.

Despite the lack of a direct causal relationship, the underlying economic conditions influence both unemployment and CDS spreads. Elevated levels of unemployment frequently indicate economic challenges, which can amplify the likelihood of credit risk for both businesses and governments, resulting in wider spreads for CDS. The link highlights the interdependence of economic indicators and the significance of monitoring many elements to appropriately evaluate credit risk.

3.3.7. USD

Economic factors, investor perceptions of credit risk, and market sentiment all play a role in the interrelationship between currency exchange rates and CDS spreads. In the process of reevaluating risk and adjusting their portfolios in accordance with the new information, fluctuations in one might frequently result in modifications in the other. Investors frequently use CDS as a hedging tool or for speculative purposes. Geopolitical events, economic data releases, or shifts in monetary policy can cause changes in market sentiment, which can simultaneously impact CDS spreads and currency exchange rates. For instance, political instability in a country can lead to both an increase in CDS spreads (which indicates

a higher default risk) and a depreciation of the country's currency as investors move funds to safer assets.

Changes in CDS spreads have the potential to impact capital flows. For example, a rise in the spreads on CDS can result in the outflow of capital, which in turn puts downward pressure on the currency. On the other hand, a reduction in the spreads of CDS might be an indication of improved credit conditions and attract capital inflows, which can strengthen the currency.

The central bank is primarily responsible for managing monetary and exchange rate policies in countries, as well as ensuring the circulation of banknotes. The Central Bank shares this responsibility with the central banks of other countries worldwide. A decrease in exchange rates and an increase in the value of the Turkish lira often occur whenever the Central Bank raises the policy rate.

The exchange rate has always been a crucial indicator for the real sector in Turkey, given the country's deficit in international trade. After adding the monthly change in USD to the list of variables, one of the purposes of this study is to investigate the impact that fluctuations in currency rates have on the day-to-day operations of businesses in the real sector in terms of CDS fluctuations.

3.3.8. CPI

To effectively manage investment risks and returns, it is crucial to have an excellent understanding of the relationship between CDS and inflation, particularly during periods of economic instability. Grasping this relationship is especially important. It is common practice for investors to employ a range of methods, such as diversification and hedging with inflation-protected securities, in order to effectively navigate these hurdles.

There is a possibility that periods of inflation will have an effect on the creditworthiness of issuers. When there is an increase in inflation, the cost of borrowing cash goes up, which may result in an increase in the risk of defaulting on the loan. The rising credit risk may therefore result in an increase in the cost of debt insurance through CDS, which is a reflection of the credit risk.

The CPI is the best-known indicator of inflation. It is a computation that determines the percentage change in the cost of a selection of products and services that are frequently utilized by families. The selection includes a number of these products and services. It is possible to view the CPI, which is a monthly statistic, on the website of the Turkish Statistical Institute. The term "inflationary risk" refers to the chance that inflation would lower the purchasing power of an investment, which will in turn limit the profits that can be made from that investment. This study incorporated monthly changes in the CPI as a variable in the analysis with the goal of establishing whether or not the CPI and inflation move in tandem when it comes to inflation.

3.4. Model

Studies of time series are conducted with the purpose of determining the overall pattern of the variables and making predictions about the future. When doing an examination of a time series, it is of the utmost importance to determine whether or not it is stationary, meaning that it does not vary around a certain number. When modelling, it is common practice to make the assumption that the series is stationary.

Generally speaking, the anticipated values of non-stationary and moving series will change throughout the course of time.

For the purpose of conducting the analysis of the time series of the data that had been provided, the Eviews-11 package program was utilized. To begin, the unit root method was utilized in order to accomplish the analysis of the stationarity tests of the time series. As part of the analysis using the ADF method, the graphs of the series were analysed. The Phillips-Perron (PP) test is employed as a subsequent step, analogous to the ADF test.

Finally, the Granger causality test is used to determine whether a causal relationship exists between two distinct sets of data. To prevent erroneous results, the relationship between CDS and other factors was examined individually.

3.4.1. Modelling Time Series Analysis and Stationarity

Whenever a researcher makes an effort to model and forecast financial variables by relying simply on the information that is included in the variables' own historical values, as well as possibly the current and historical values of an error term, they are engaging in a class of specifications that is known as time-series models. The objective of structured models, on the other hand, is to explain changes in a variable by referring to the movements in the current or previous values of other variables that are used as explanations. Complex in nature, structured models attempt to explain fluctuations in a variable. We can draw a comparison between this strategy and structural models (Brooks, 2019).

The stationarity of the time series is essential for developing statistical conclusions from the investigated time series. If the series lacks stationarity, we should draw conclusions only after achieving some form of stability. We presume the data in empirical investigations involving time series to be stationary. A significant proportion of time series, on the other hand, are not stationary. Additionally, in order for the relationships between the variables to make sense, the time series that we use must demonstrate characteristics of stationarity. Despite the fact that there is no connection between the two variables, it could appear as though there is a connection between them. Even if there is no connection between these series, when we construct a relationship model using them, it is still possible to achieve a high R^2 value that is satisfactory. In such a scenario, the problem of spurious regression will manifest itself. The reason for this issue is that if both time series have a strong trend, the reason for the high R^2 that is observed between them is not the linear relationship between the two variables in question; rather, the reason for the high R^2 is the strong trend relationship. Therefore, when analysed with non-stationary series, traditional t and F tests, as well as R^2 values, produce results that are misleading (Baumohl & Lyocsa, 2009).

A number of activities, such as the prediction of future values, the discovery of anomalies, and the grasp of the fundamental dynamics of a system over time, are all examples of activities that might benefit from the utilization of time series analysis, as stated by Çakmur Yıldirtan (2017). The determination of whether or not the values of the series are influenced by a certain amount of time is one of the goals that will be accomplished. In the event that the series that is being researched for the goal of creating a prediction or a subject of interest displays a constant shift over the course of time, the significance of the study that is being conducted on the series will decrease. As a result, the first and most crucial step is to ascertain whether the time series displays systematic changes. In the event that they do this, the series needs to be freed from the influence of this particular factor. When a time series does not show

any kind of systematic change throughout the course of time, it is said that the time series is stationary. This is because the average of the time series does not demonstrate any form of change.

For an extended period of time, a series will be subjected to a great deal of shocks. If the series is able to withstand shocks, then it will be regarded as stationary. If the influence of these shocks is only temporary, then it is considered to be stationary. On the other hand, if the impact of shocks is permanent, then it is determined that it is non-stationary, which means that it has a unit root. For example, if there is no significant change in the average and variance of the series over a lengthy period of time following the occurrence of any shock, then the series will be considered to be stationary (Mert & Çağlar, 2019).

An often-used statistical test to determine whether a particular time series is stationary or not is the Augmented Dickey Fuller Test (ADF Test). It is one of the most frequently applied statistical tests when examining the stationarity of a series. The ADF test belongs to the 'Unit Root Test' category of tests, which is the correct approach for checking the stationarity of a time series. Given that the null hypothesis presupposes the existence of a unit root, specifically $=1$, we should produce a p-value that is smaller than the significance level (e.g., 0.05) to reject the null hypothesis.

Mert and Çağlar (2019) proposed that the most suitable approach to ascertain whether or not a time series is stationary is to employ the 'Unit Root Test' collection of tests, which include the ADF test. This is the most appropriate method for determining whether a time series is stationary. In order to reject the null hypothesis, the p-value that is generated must be lower than the significance level, which is commonly set at 0.05. This is necessary in order to achieve the desired statistical outcome. This is because the null hypothesis assumes the existence of a unit root, specifically one that is equal to 1.

The model that is used in the ADF test does not have a trend term contained within it; however, it does have an intercept, which is also known as a constant. When there is simply an intercept and no trend present, the ADF test can be expressed using the equation that is presented below:

$$\Delta y_t = \alpha + \gamma y_{t-1} + \sum_{i=1}^p \delta_i \Delta y_{t-i} + \epsilon_t$$

- Δy_t : The first difference of the series y_t
- α : The intercept (constant term)
- γy_{t-1} : The coefficient of the lagged level of the series y_{t-1}
- $\sum_{i=1}^p \delta_i \Delta y_{t-i}$: Represents the sum of the lagged differences up to lag p
- ϵ_t : The error term (white noise)

Phillips and Perron have developed a more comprehensive theory regarding the existence of unit root non-stationarity. For the purpose of determining whether or not time series data contain a unit root, the Phillips-Perron (PP) test is utilized in a manner that is comparable to the ADF test. For the purpose of determining whether or not the series in question is stationary or non-stationary, this test is utilized. The tests are comparable to ADF tests; however, they incorporate an automatic DF process correction in order to take into account residuals that are autocorrelated. There are a number of significant flaws with

the ADF tests, and the tests frequently arrive at the same conclusions (Brooks, 2019). A time series that contains a unit root is not stationary, and the movements of the series are not possible to predict. In order to determine whether or not a time series is stationary, the unit root test is used to determine whether or not the time series has a unit root. For the purpose of determining whether or not a time series contains a unit root, the PP test is utilized. A comparison can be made between this test and the ADF test; however, in order to take into account autocorrelation and heteroskedasticity in the error terms, it uses a different approach. The ADF test and the method that Phillips and Perron have proposed were compared and contrasted by Brooks (2019) in the context of unit root non-stationarity. Brooks (2019) looked at the similarities and differences between the two methods. Through the utilization of the deep learning process, this method incorporates an automatic correction for residuals that are auto-correlated into the equation. As stated by Brooks (2019), the ADF test consistently arrives at conclusions that are comparable to one another, despite the fact that it has a number of serious deficiencies. The movements of a time series that has a unit root are not predictable, and the series does not continue in a stationary behaviour. The unit root test is a method that can be utilized to ascertain whether or not a time series meets the criteria for being stationary. In order to determine whether or not the series contains a unit root, this test will be performed. The equation that follows is the only one that includes a constant, which is referred to as an intercept:

$$\Delta y_t = \alpha + \gamma y_{t-1} + \epsilon_t$$

Δy_t : The first difference of the series y_t

α : The intercept (constant term)

γy_{t-1} : The coefficient of the lagged level of the series y_{t-1}

ϵ_t : The error term (white noise)

3.4.2. Modelling Granger Causality

A statistical hypothesis test is known as the Granger causality test, and it is used to determine whether or not one time series is helpful in predicting another time series. When time series X Granger-causes time series Y, the patterns that are found in time series X are similar to those that are found in time series Y after a certain amount of time has passed. Consequently, it is possible to make predictions about the future values of Y by using the values of X from the past.

In the field of statistics, the concept of Granger causality is utilized to evaluate the ability of one time series to predict the behaviour of another time series. The hypothesis is a theory that was developed by Clive Granger, an economist who is credited with its formulation.

When conducting a causal analysis, it is common practice to consider the cause to be the first factor to be considered before the consequence. The chronological order of the events that took place, on the other hand, is not sufficient to determine the direction of causality in many situations that take place in the real world. This is because it is difficult to determine the direction of causality. Granger causality is applicable to this scenario because of the context in which it is discussed. A mechanism is provided for

determining whether or not there is a causal connection between two time series. This mechanism is provided by analysing the accuracy of their forecasts.

The Granger causality test is utilized in order to ascertain whether or not there is a causal connection between two different sets of variables. In order to avoid drawing erroneous conclusions, the relationship between CDS and other variables was taken into consideration one at a time. This is because a genuine relationship can occur when three or more variables are required.

Researchers can assess the predictive power of one time series on another by employing Granger causality, a statistical concept pioneered by economist Clive Granger in 1969. This methodology clarifies the extent to which one variable might forecast alterations in another within the discipline of econometrics. In the unrestricted regression, we perform a regression analysis where we use the previous values of both Y_t and X_t to predict Y_t :

$$Y_t = \alpha_0 + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{j=1}^q \beta_j X_{t-j} + \epsilon_t$$

Y_t : The value of the dependent variable at time t

α_0 : The intercept term

α_i : The coefficients for the lagged values of Y_t

X_{t-j} : The lagged values of the other time series X_t

β_j : The coefficients for the lagged values of X_t

ϵ_t : The error term.

3.5. Interpretation and Discussion of The Findings

To ascertain whether or not the ADF statistic is statistically significant, the p-value is utilized. A p-value that is lower indicates that there is more evidence that contradicts the null hypothesis. The ADF statistics are strongly negative for all variables (CDS, BIST, CHEQUE, INFLATION, INTEREST, NPL, UNEMPLOYMENT, USD), which indicates that there is substantial evidence against the presence of a unit root. The fact that all of the p-values are remarkably near to zero (0.00000) provides more evidence that the null hypothesis should be rejected. This suggests that these time series are most likely stationary. It is essential for the p-value that is obtained to be lower than the significance threshold (for example, 0.05), and the t-statistics must be lower than the crucial values to reject the null hypothesis. As a result, we can conclude that the series is stationary. Taking into consideration the outcomes of the ADF test, it would appear that the variables shown in Table 1 demonstrate stationarity, which is a characteristic that is frequently desired in time series research. Considering that this is the case, we are able to draw the conclusion that the series is stationary.

The PP statistics for all the variables (CDS, BIST, CHEQUE, INFLATION, INTEREST, NPL, UNEMPLOYMENT, USD) are negative, indicating the presence of evidence that contradicts the presence of a unit root. All of the p-values are exactly zero, indicating a substantial amount of evidence

challenging the null hypothesis. This suggests that these time series are most likely stationary. In conclusion, upon examination of the outcomes of the Phillips-Perron test, the variables presented in Table 1 demonstrate stationarity. This finding is in alignment with the outcomes of the ADF test. Time series analysis frequently seeks stationarity as a feature. The results of the PP tests also demonstrate beyond a shadow of a doubt that all series are stationary. This is because the null hypothesis was rejected, which means that the results of the tests are presented. Additionally, there are no unit roots in any of the series because they are all stationary. As a result of the rejection of the null hypothesis, the results of the PP tests also demonstrate that all series are stationary and they do not have any unit roots.

Table 1 : Unit Root Test Results

Variable	ADF	PP
CDS	-13,65848	-13,69528
	0,00000	0,00000
BIST	-11,50117	-11,49743
	0,00000	0,00000
CHEQUE	-17,43965	-18,39353
	0,00000	0,00000
INFLATION (CPI?)	-3,758348	-6,071801
	0,00410	0,00000
INTEREST	-4,724446	-10,66907
	0,00010	0,00000
NPL	-4,232714	-7,738459
	0,00080	0,00000
UNEMPLOYMENT	-12,013370	-11,98951
	0,00000	0,00000
USD	-11,575870	-11,53161
	0,00000	0,00000

In the course of the graphic-based testing, it was decided that either a constant or a trend would be utilized. Additionally, the results of the tests are presented in Annex-1, and the summary information is

presented in Table 1 above. This allows us to reject the null hypothesis and make the assumption that the series is stationary. This is due to the fact that the p-value is significantly lower than the significance level of 0.05 for all variables. A further illustration of the stationarity of the variables can be seen in the graphics that are presented in Figure 7 below. Because of this, we are able to draw the conclusion that the series is stationary with respect to the CDS variable. After conducting an in-depth analysis of the differenced CDS series, it becomes obvious that the variable exhibits a stationary behaviour in relation to the mean. The defining characteristic of this trend is the presence of constant mean reversion. It varies between 0 and 1. When a trend line is drawn with a value of 0.01, it will be drawn in a horizontal direction.



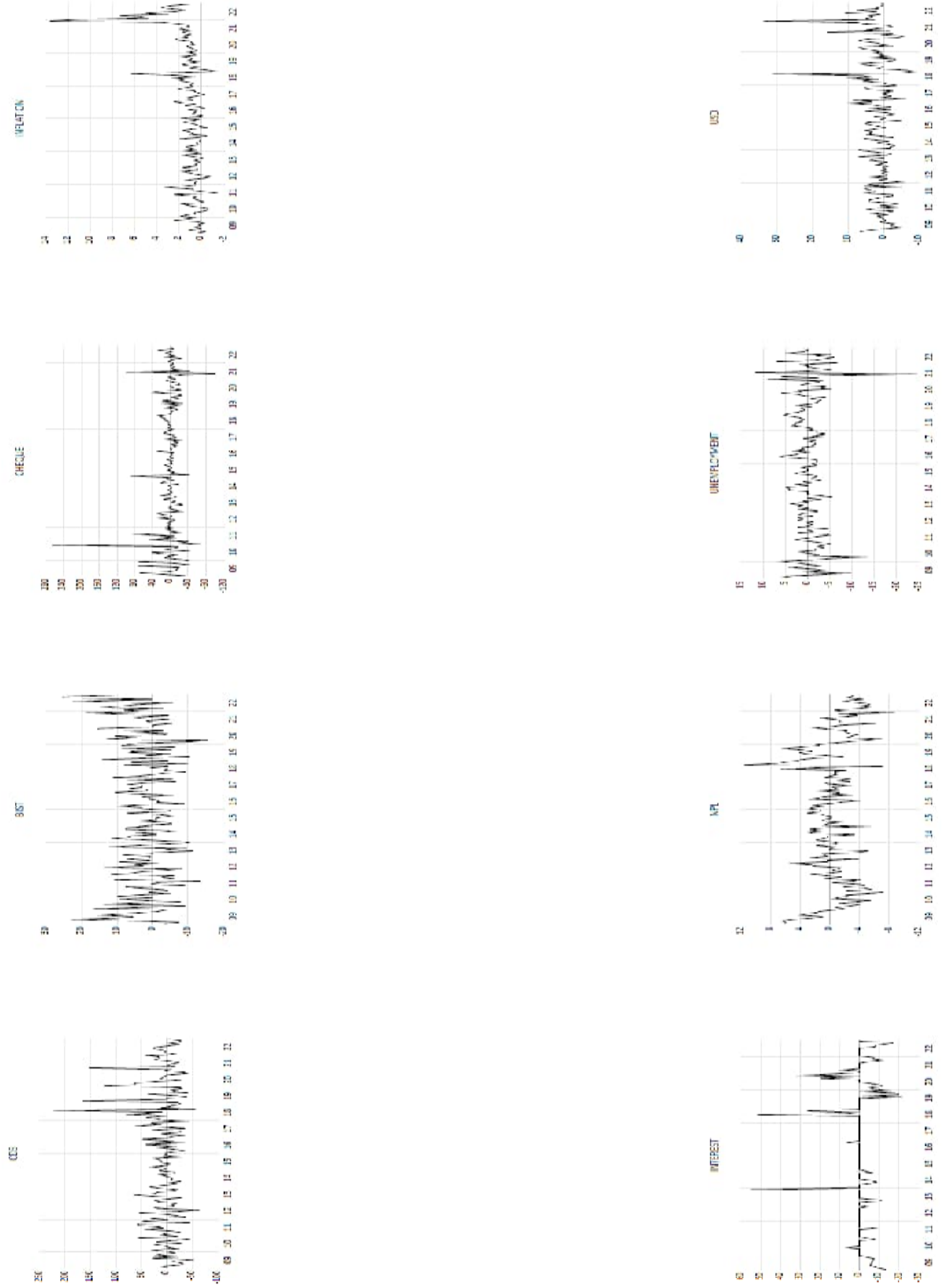


Figure 8: Stationarity Graphics

"CDS does not Granger cause CEK" was the initial hypothesis to begin discovering causality. A causality model has been developed to analyse the relationship between CDS and bounced cheques:

$$CHEQUE_t = \alpha_0 + \sum_{i=1}^2 \alpha_i CHEQUE_{t-i} + \sum_{j=1}^2 \beta_j CDS_{t-j} + \epsilon_t$$

$$CDS_t = \alpha_0 + \sum_{i=1}^2 \alpha_i CDS_{t-i} + \sum_{j=1}^2 \beta_j CHEQUE_{t-j} + \epsilon_t$$

Given that "F=0.03168" and the probability value for this statistic are both "P=0.9688>0.05", the null hypothesis is accepted in this case. Therefore, it can be said that CDS is not a temporary cause of a bounced cheque. The phrase "Bounced Cheque is not Granger cause of CDS" appears in the statement "CEK does not Granger cause CDS," forming the second hypothesis. Since "F=0.03060" and the probability value of this statistic is "P=0.9699>0.05", the null hypothesis that there is no causality is accepted in this instance as well. It can be claimed that a bounced cheque is not a temporary cause of CDS in other words. As an indicator of payment performance in financial markets, cheques, which are also considered to be collateral in the real and financial sectors of Turkey, have an unquestionably significant relevance. This is because cheques are also considered to be a sort of collateral. In addition to being a payment instrument that has been around for a very long time, cheques are also considered to be part of the payment instrument category. Accordingly, the magnitude of the association between the bounced cheque variable and CDS was essential in terms of the primary purpose of the study, and, as was to be predicted, the conclusion that there were no statistically significant impacts between them was reached. The analysis findings of cheque payment performance, which are the basis of this study from a research standpoint, indicate that there is no relationship between CDS and the payment performance of the real sector. The study's most notable contribution to the literature is its originality, as no prior research has been undertaken on this topic.

Table 2 : Granger Causality Test Results

Variables	F Statistics	P Value	Causality
CDS-CHEQUE	0.03168	0.9688	No
CHEQUE-CDS	0.03060	0.9699	No
CDS-BIST	0.10807	0.8976	No
BIST-CDS	4.29719	0.0152	Yes
CDS-CPI	4.01196	0.0199	Yes
CPI-CDS	0.22385	0.7997	No
CDS-INT	3.41461	0.0353	Yes
INT-CDS	1.62711	0.1997	No
CDS-NPL	8.17454	0.0004	Yes
NPL-CDS	0.67954	0.5083	No
CDS-UNEMP	1.40027	0.2495	No
UNEMP-CDS	1.73820	0.1791	No
CDS-USD	0.13668	0.8723	No
USD-CDS	0.33709	0.7143	No

To test the causality between CDS and the Borsa Istanbul Stock Exchange, the model shown below has been established:

$$BIST_t = \alpha_0 + \sum_{i=1}^2 \alpha_i BIST_{t-i} + \sum_{j=1}^2 \beta_j CDS_{t-j} + \epsilon_t$$

$$CDS_t = \alpha_0 + \sum_{i=1}^2 \alpha_i CDS_{t-i} + \sum_{j=1}^2 \beta_j BIST_{t-j} + \epsilon_t$$

Both the F-statistics and the P-value for the CDS-BIST are 0.8976 and 0.10807, respectively. According to these findings, Granger causality exists between BIST and CDS. This means that the values of BIST in the past can be used to create predictions about the values of CDS in the future. Therefore, the data suggest that Granger causality exists between BIST and CDS. Given that the p-value of 0.8976 is higher than 0.05, the evidence implies that the Granger causality between CDS and BIST is not significant. This is demonstrated by the fact that the p-value is more than 0.05. According to the BIST-CDS, on the other hand, the F-statistic is 4.29719, and the P-value is 0.0152. Given that the p-value for 0.0152 is lower than 0.05, it is highly probable that Granger causality from BIST to CDS is present. The historical values of BIST significantly improve the accuracy of the CDS prediction, going beyond what the lagged values of CDS itself are able to take into consideration. There is a correlation between this topic and the research that was carried out by Akkaya (2017) and Buz (2023).

The model below has been developed to test the causal relationship between CDS and CPI:

$$CPI_t = \alpha_0 + \sum_{i=1}^2 \alpha_i CPI_{t-i} + \sum_{j=1}^2 \beta_j CDS_{t-j} + \epsilon_t$$

$$CDS_t = \alpha_0 + \sum_{i=1}^2 \alpha_i CDS_{t-i} + \sum_{j=1}^2 \beta_j CPI_{t-j} + \epsilon_t$$

The CDS-CPI has an F-statistic of 4.01196, and its P-value is about 0.0199. As was the case in the previous scenario, the p-value of 0.0199 is lower than 0.05, which indicates that there is a significant Granger causal relationship between CDS and CPI. The historical values of the CDS can be used to make a significant number of predictions regarding the CPI. The F-statistic for the CPI-CDS is 0.22385, and the p-value for 0.7997 suggests that there may not be a Granger causal relationship between the CPI and the CDS. As a consequence of an increase in interest expenses, which is brought about by an increase in CDS, the CPI is negatively influenced. As a result of these financial charges, real sector companies are compelled to borrow money at higher interest rates, which is reflected in the pricing of their products and services. Within the framework of the macroeconomic environment, this, in turn, has an impact on the CPI.

A model has been created to examine the causation between CDS and interest rate:

$$INT_t = \alpha_0 + \sum_{i=1}^2 \alpha_i INT_{t-i} + \sum_{j=1}^2 \beta_j CDS_{t-j} + \epsilon_t$$

$$CDS_t = \alpha_0 + \sum_{i=1}^2 \alpha_i CDS_{t-i} + \sum_{j=1}^2 \beta_j INT_{t-j} + \epsilon_t$$

While the F-statistic for the CDS-INT is 3.41461, the P-value for this test is 0.0353. At a p-value of 0.0353, which is lower than the threshold of 0.05, the Granger causality from CDS to INT is found to be statistically significant. There is a significant amount of predictive power in CDS's historical values for INT. According to the INT-CDS, the F-statistic is 1.62711, and the P-value is 0.1997. The fact that the p-value of 0.1997 is greater than 0.05 suggests that there is a possibility that there is no significant Granger causality between INT and CDS. One of the most important factors to consider when it comes to economies that are based on the real sector is credit risk. When there is an increase in the credit risk, the cost of borrowing money will also increase, which means that the interest rate will also increase. This is due to the increased cost of borrowing money.

To test the causality between CDS and NPL, the model shown below has been established:

$$NPL_t = \alpha_0 + \sum_{i=1}^2 \alpha_i NPL_{t-i} + \sum_{j=1}^2 \beta_j CDS_{t-j} + \epsilon_t$$

$$CDS_t = \alpha_0 + \sum_{i=1}^2 \alpha_i CDS_{t-i} + \sum_{j=1}^2 \beta_j NPL_{t-j} + \epsilon_t$$

The F-statistic for CDS-NPL is 8.17454, and the P-value is 0.0004; both of these values are significant. The Granger causality from CDS to NPL is substantial, as demonstrated by the p-value of 0.0004, which is lower than 0.05. This indicates that Granger causality is significant. The CDS historical values significantly improve the accuracy of the NPL prediction. F-statistics for NPL-CDS, on the other hand, are 0.67954 and 0.5083, respectively. The p-value of 0.5083 is more than 0.05, which indicates that it is conceivable that there is no significant Granger causation between NPL and CDS. In light of the findings, which seem to show that there is a Granger causality link that only travels in one direction, it is possible that changes in CDS values could be interpreted as leading indicators for future changes in NPL. According to the p-value that has been provided, the inverse link, in which changes in NPL values predict future changes in CDS, does not fulfil the threshold for statistical significance. This may imply that swings in CDS values could be used to anticipate or predict patterns in non-performing loans, thus providing substantial information for risk management or financial analysis. This possibility arises when viewed from a more pragmatic standpoint.

The model below has been developed to test the causal relationship between CDS and unemployment:

$$UNEMP_t = \alpha_0 + \sum_{i=1}^2 \alpha_i UNEMP_{t-i} + \sum_{j=1}^2 \beta_j CDS_{t-j} + \epsilon_t$$

$$CDS_t = \alpha_0 + \sum_{i=1}^2 \alpha_i CDS_{t-i} + \sum_{j=1}^2 \beta_j UNEMP_{t-j} + \epsilon_t$$

1.40027 is the value of the F-statistic for the CDS-UNEMP variables, and 0.2495 is the value of the P-value. Due to the fact that the p-value of 0.2495 is higher than 0.05, it can be concluded that neither CDS nor UNEMP demonstrate any discernible Granger causality, and not the other way around. It has been determined that the F-statistics and P-value for UNEMP-CDS are respectively, 1.73820 and 0.1791. It is also true that the p-value of 0.1791, which is more than 0.05 and demonstrates that there is no significant Granger causation between UNEMP and CDS, is similar to the previous statement. Understanding unemployment, which is one of the most important macroeconomic key performance indicators of a country, is also necessary for real sector firms in order to acquire a better understanding of their current and future financial picture. This is because unemployment is one of the most important indications of a country's overall economic performance.

Finally, the model below has been developed to test the causal relationship between CDS and USD:

$$USD_t = \alpha_0 + \sum_{i=1}^2 \alpha_i USD_{t-i} + \sum_{j=1}^2 \beta_j CDS_{t-j} + \epsilon_t$$

$$CDS_t = \alpha_0 + \sum_{i=1}^2 \alpha_i CDS_{t-i} + \sum_{j=1}^2 \beta_j USD_{t-j} + \epsilon_t$$

The CDS-USD has a p-value of 0.8723 and an F-statistic of 0.13668. The fact that the p-value of 0.8723 is higher than 0.05 indicates that there is no substantial Granger causation that can be found between CDS and USD. The F-statistic for USD-CDS is 0.33709, and the p-value for this statistic is 0.7143. Similar to the previous case in point, the p-value of 0.7143 is higher than 0.05, which indicates that there is no substantial Granger causality between USD and CDS. In terms of the overall economic intents, it is remarkable that there is no causal relationship between CDS and foreign currency rates in Turkey. Due to speculative positions of Turkey's CDS, the gap between spreads and foreign currency rate relation is not predictable. It's possible that one of the primary reasons for this disparity is the high volatility of both bond and currency exchange rates.

To summarize the overall findings based on the provided test results, there is significant proof indicating a causal relationship between CDS and BIST, CDS and CPI, CDS and INT, and CDS and NPL. There is no substantial evidence of Granger causality for the remaining pairs. Küçükşaraç and Duran (2016) also discovered the existence of the CDS and CPI relationship. They found that GDP growth, inflation, debt to GDP, net international investment position to GDP, political risk, and inflation volatility are statistically significant in explaining the CDS spreads.

Conclusion

It has been investigated if there is a relationship between the volatility of the CDS and the financial strengths of enterprises operating in the real sector in Turkey. This section provides a concise overview of the study, including the empirical research findings, limitations identified, and recommendations for future research. The main aim is to analyse the relationship between CDS and the financial stability of firms in the Turkish real sector.

When it comes to a nation's operations regarding external borrowing, CDS is an extremely important indicator. This insurance policy, which is intended to reduce the risk of debt not being repaid, has the potential to influence a variety of factors, including fluctuations in credit costs, credit ratings, and risk appetite within international financial markets. In light of this, it is essential for a nation's macroeconomic policies to incorporate the continuing existence of a CDS rate that is defined by low volatility and premium in order to effectively express trustworthiness in international financial markets. As a consequence of this, businesses operating in the real sector can find opportunities to receive loans at interest rates that are relatively low, and they might also face fewer challenges when it comes to obtaining financing.

There is a causal relationship between CDS and macroeconomic data, as can be shown from the findings of the research; nevertheless, there is no negative relation that has an impact on the payment capabilities of businesses that are operating in the real sector. According to the findings of the study, real sector businesses are confronted with a number of issues, including provisions for receivables, rising interest rates, and losses in stock values. However, from the perspective of balance sheets, these conditions appear unfair when compared to those of global competitors.

A thorough examination of the causal connections that exist between the many different economic and financial aspects demonstrates that the Turkish market has undergone considerable shifts. As an illustration of the connection between the performance of the stock market and perceptions of credit risk in Turkey, the BIST index has a considerable impact on the pricing of CDS. According to the findings of this study, fluctuations in the BIST index have the potential to serve as a reliable indicator of changes in the CDS, which are crucial for determining the level of financial stability in the country. According to the findings of the investigation, CDS has an impact not only on the link between BIST and CDS but also on inflation, interest rates, and loans that are considered to be non-performing. CDS and cheque payments, CDS and unemployment, and CDS and USD FX rate were the three combinations that were examined, and none of them were found to have any significant causal relationship between the two variables. The most recent four relations, namely the stock market index to CDS, inflation to CDS, interest to CDS, and non-performing loans to CDS, do not demonstrate a causal link that is unidirectional. The findings of this study indicate that these factors function independently of one another within the parameters of the investigation.

This study investigated the relationship between CDS, bounced cheques, stock index, interest, inflation, non-performing loans, the US dollar foreign exchange rate, and unemployment. Previous studies have made this investigation more straightforward to carry out because they have not been able to establish a direct connection between CDS premiums and the financial management or payment habits of companies operating in the real estate industry. There is no doubt that CDS premiums have an effect on the

amount of money that a country borrows, and they also have a comparable influence on entities that are part of the real sector, such as financial institutions. With the help of statistics, the purpose of the study was to determine how significant it is for companies operating in the real sector that CDS premiums have an indirect impact on a variety of factors, including bounced cheques, the stock index, interest rates, inflation, non-performing loans, the USD FX rate, and unemployment. The relationship between the bounced cheques, stock index, interest, inflation, non-performing loans, USD FX rate, and unemployment suggests that CDS should not have an indirect impact on real sector businesses. We reached this conclusion after examining the relationship between these factors. In practice, the CDS premium has a negative impact on businesses that are engaged in export or import activities, regardless of the financial structure of the business, particularly with regard to ECL provisions and interest expenses. The Financial Accounting Standards Board can formally implement the decision to exclude the effects of CDS premium volatility altogether in the context of CECL calculations. The decision would represent a significant step forward in the direction of achieving financial equality for businesses operating in the real sector that are located in developing countries.

Additionally, it is stipulated that sales transactions with businesses that are operating in countries where CDS premiums are higher than a certain threshold must be conducted on a cash basis or secured by a bank guarantee. Numerous multinational corporations have issued these directives to their local legal entities. Certain companies are confronted with an unfair competitive environment as a result of the evaluation of national credit risk, which has an impact on the financial circumstances of businesses that are operating within that nation.

This study intends to demonstrate the impact that CDS volatility has on companies operating in the real sector. In the course of the investigation, this was one of the primary goals. The work that has been done has made it accessible to future research to investigate the effects that changes in CDS premiums have on the financial statements of publicly traded companies, particularly from the CECL point of view. In order to accomplish this goal, it is possible to examine the independent audit reports of these multinational corporations.

These findings not only contribute to the advancement of the conversation regarding the connection between financial instruments, economic stability, and the behaviour of the real sector, but they also offer significant insights to policymakers, financial analysts, and academics. These findings highlight the significance of having a comprehensive understanding of the complicated interrelationships that exist within the field of finance, particularly with regard to developing countries, whose vulnerabilities may be different from those that are present in developed financial markets.

The analysis highlights the significant influence that the stock market has on credit risk while also indicating that variables such as unemployment and cheque volume do not have a definitive causal association with CDS in the context of Turkey. It is possible for policymakers and investors to successfully navigate the complexities of the financial landscape with the assistance of this understanding, which enables them to make decisions that are informed and based on established interconnections.

In conclusion, the Turkish real sector market may potentially contain a certain degree of resilience or independence from the fluctuations in CDS. These findings contribute to the ongoing conversation on the relation between macroeconomic KPIs, financial instruments, and real-sector financial characteristics. They offer valuable insights for policymakers, analysts and academics analysing the financial

sector. The findings of the study highlight the relevance of understanding the complex interconnections that are involved in CDS, particularly in the context of developing economies such as Turkey, whose vulnerabilities differ from those that are present in sophisticated markets.



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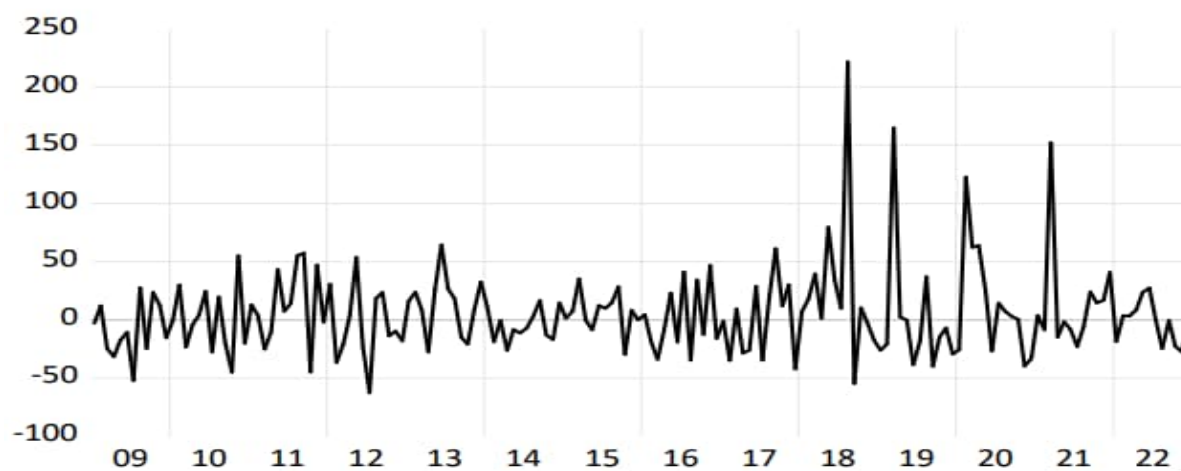
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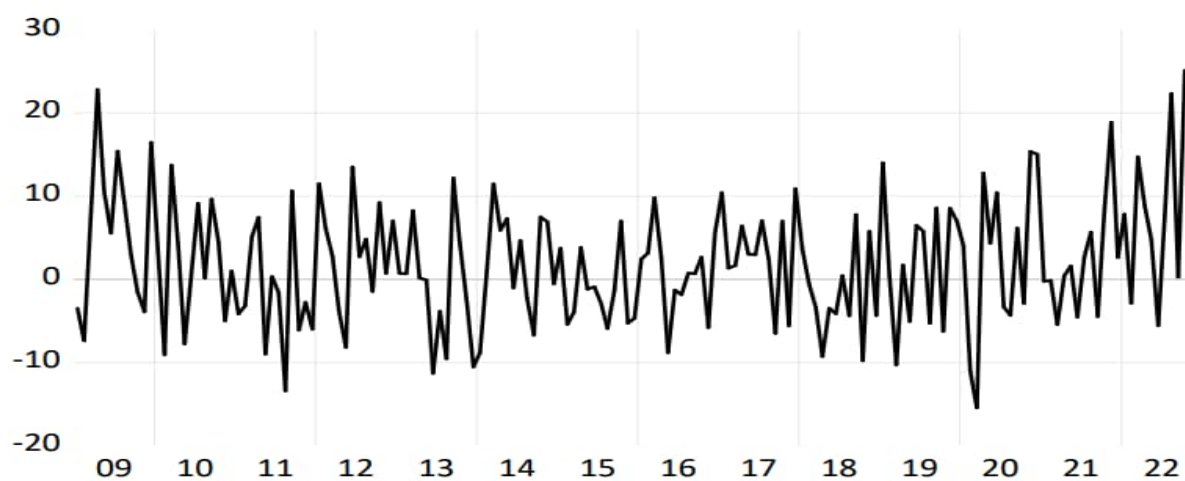
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Annex-1 Stationarity Graphics

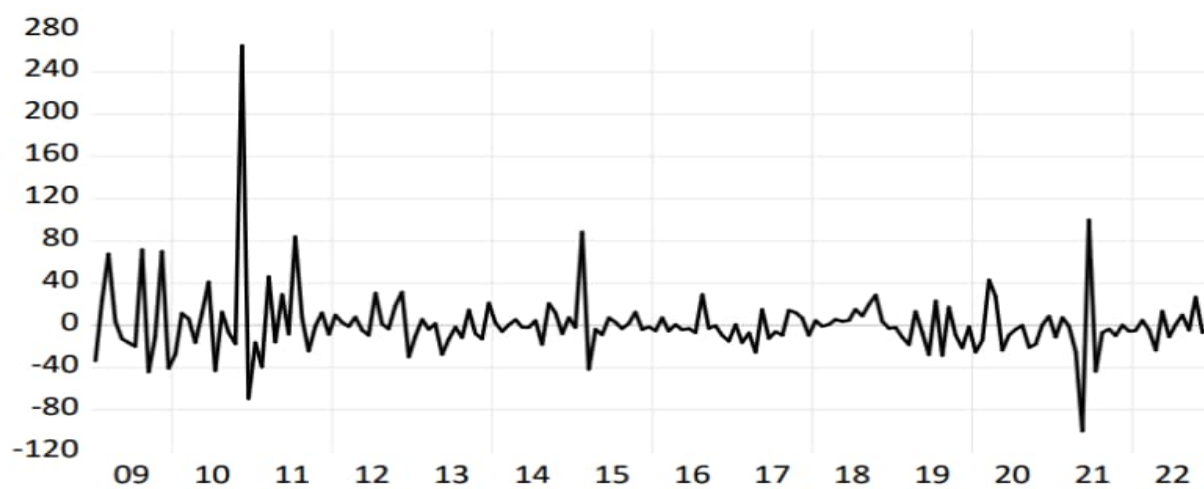
CDS



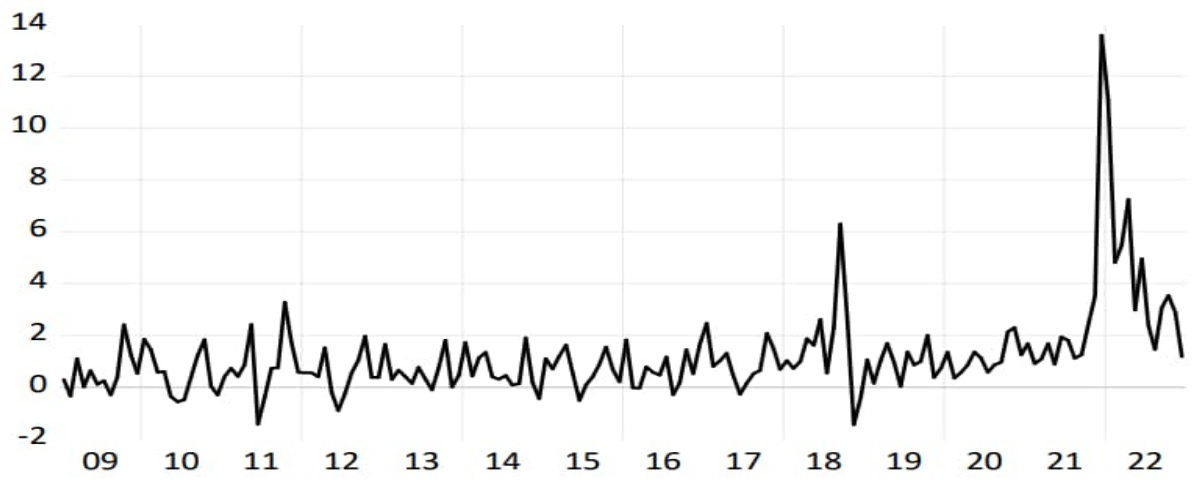
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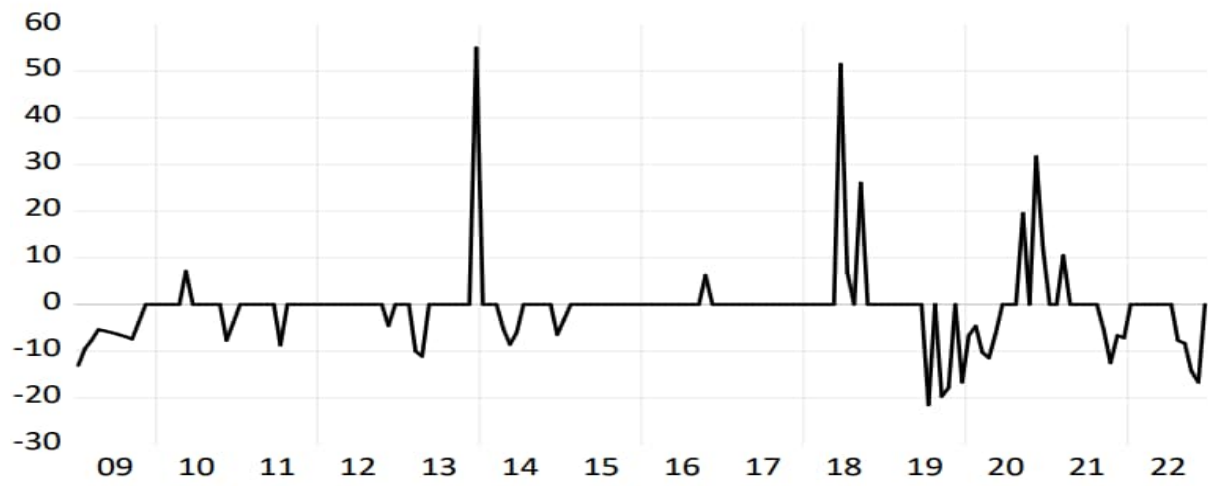
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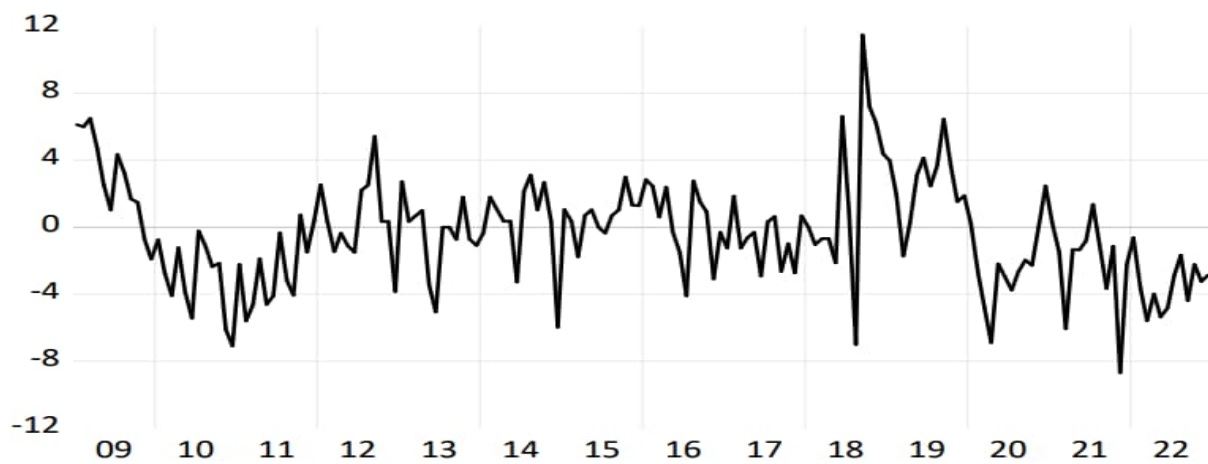
INFLATION



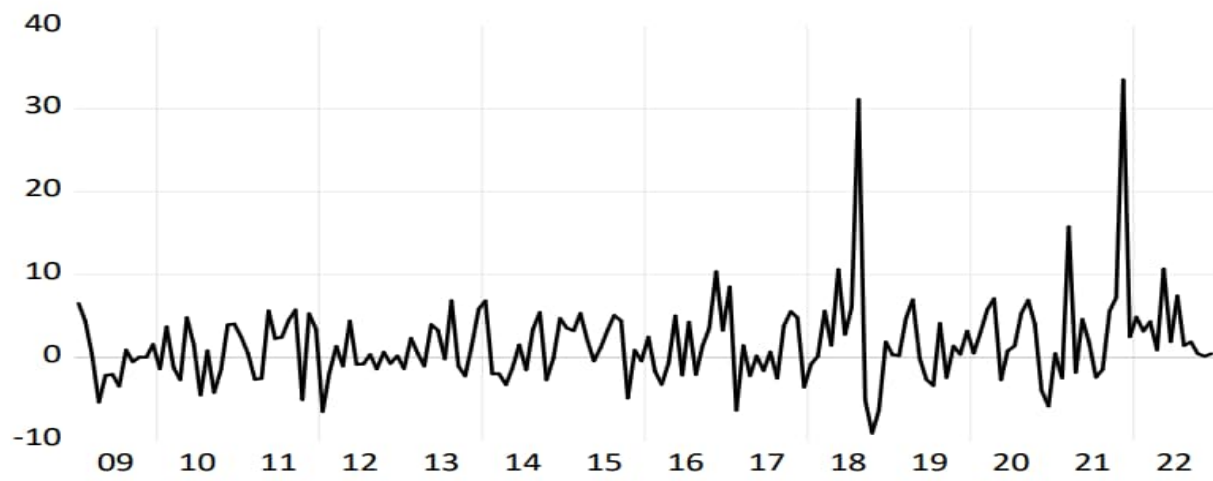
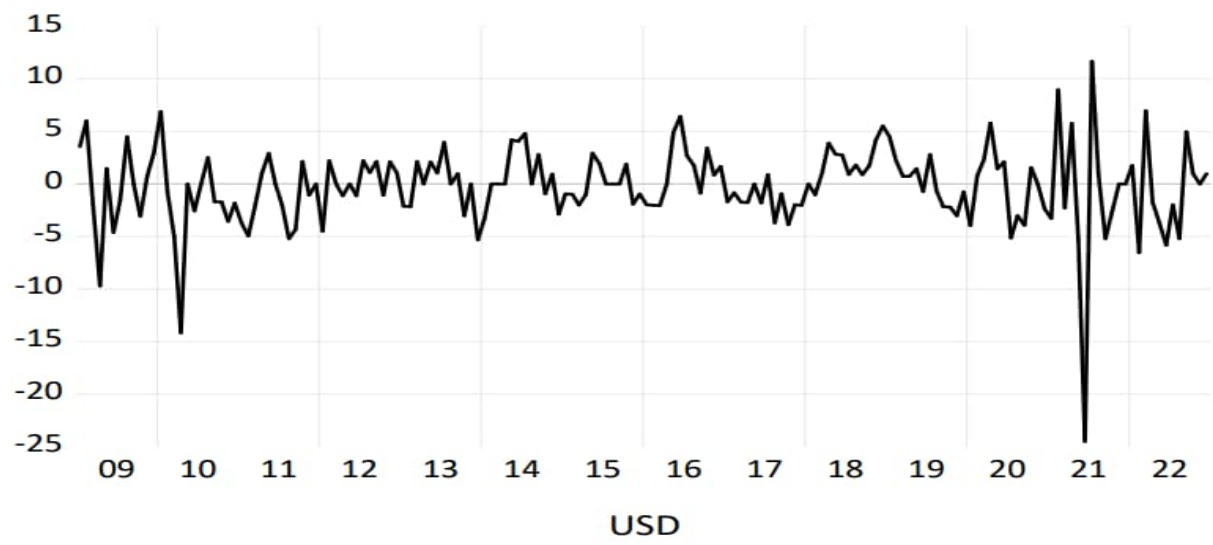
INTEREST



NPL



UNEMPLOYMENT



Annex-2 ADF Test Results

Augmented Dickey-Fuller Unit Root Test on CDS

Null Hypothesis: CDS has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on SIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-13.65848	0.0000
Test critical values:			1% level	-3.469691
			5% level	-2.878723
			10% level	-2.576010
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation Dependent Variable: D(CDS) Method: Least Squares Date: 04/01/23 Time: 01:29 Sample (adjusted): 2009M02 2022M12 Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CDS(-1)	-1.061343	0.077706	-13.65848	0.0000
C	5.444054	2.898870	1.877992	0.0621
R-squared	0.530656	Mean dependent var		-0.005150
Adjusted R-squared	0.527811	S.D. dependent var		53.99786
S.E. of regression	37.10517	Akaike info criterion		10.07729
Sum squared resid	227171.0	Schwarz criterion		10.11463
Log likelihood	-839.4540	Hannan-Quinn criter.		10.09245
F-statistic	186.5542	Durbin-Watson stat		1.995101
Prob(F-statistic)	0.000000			

Augmented Dickey-Fuller Unit Root Test on BIST

Null Hypothesis: BIST has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on SIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-11.50117	0.0000
Test critical values:			1% level	-3.469691
			5% level	-2.878723
			10% level	-2.576010
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation Dependent Variable: D(BIST) Method: Least Squares Date: 04/01/23 Time: 01:58 Sample (adjusted): 2009M02 2022M12 Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
BIST(-1)	-0.892188	0.077574	-11.50117	0.0000
C	1.903612	0.606779	3.137241	0.0020
R-squared	0.444962	Mean dependent var		0.084671
Adjusted R-squared	0.441598	S.D. dependent var		10.13067
S.E. of regression	7.570279	Akaike info criterion		6.898241
Sum squared resid	9456.006	Schwarz criterion		6.935582
Log likelihood	-574.0031	Hannan-Quinn criter.		6.913397
F-statistic	132.2768	Durbin-Watson stat		1.998688
Prob(F-statistic)	0.000000			

Augmented Dickey-Fuller Unit Root Test on CHEQUE

Null Hypothesis: CHEQUE has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on SIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-17.43965	0.0000
Test critical values:			1% level	-3.469691
			5% level	-2.878723
			10% level	-2.576010
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation Dependent Variable: D(CHEQUE) Method: Least Squares Date: 04/01/23 Time: 01:35 Sample (adjusted): 2009M02 2022M12 Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHEQUE(-1)	-1.293046	0.074144	-17.43965	0.0000
C	1.703106	2.358100	0.722237	0.4712
R-squared	0.648294	Mean dependent var		0.185210
Adjusted R-squared	0.646162	S.D. dependent var		51.19437
S.E. of regression	30.45260	Akaike info criterion		9.682124
Sum squared resid	153014.6	Schwarz criterion		9.719465
Log likelihood	-806.4573	Hannan-Quinn criter.		9.697280
F-statistic	304.1413	Durbin-Watson stat		2.088940
Prob(F-statistic)	0.000000			

Augmented Dickey-Fuller Unit Root Test on INFLATION

Null Hypothesis: INFLATION has a unit root				
Exogenous: Constant				
Lag Length: 2 (Automatic - based on SIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.758348	0.0041
Test critical values:			1% level	-3.470179
			5% level	-2.878937
			10% level	-2.576124
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INFLATION)				
Method: Least Squares				
Date: 04/01/23 Time: 02:20				
Sample (adjusted): 2009M04 2022M12				
Included observations: 165 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.266502	0.070909	-3.758348	0.0002
D(INFLATION(-1))	-0.079442	0.080108	-0.991689	0.3228
D(INFLATION(-2))	-0.297239	0.075576	-3.932977	0.0001
C	0.326384	0.131722	2.477822	0.0143
R-squared	0.257038	Mean dependent var		0.000485
Adjusted R-squared	0.243194	S.D. dependent var		1.505843
S.E. of regression	1.310001	Akaike info criterion		3.401877
Sum squared resid	276.2927	Schwarz criterion		3.477173
Log likelihood	-276.6549	Hannan-Quinn criter.		3.432442
F-statistic	18.56677	Durbin-Watson stat		1.915454
Prob(F-statistic)	0.000000			

Augmented Dickey-Fuller Unit Root Test on INTEREST

Null Hypothesis: INTEREST has a unit root				
Exogenous: Constant				
Lag Length: 2 (Automatic - based on SIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.724446	0.0001
Test critical values:			1% level	-3.470179
			5% level	-2.878937
			10% level	-2.576124
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INTEREST)				
Method: Least Squares				
Date: 04/01/23 Time: 02:16				
Sample (adjusted): 2009M04 2022M12				
Included observations: 165 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTEREST(-1)	-0.504740	0.106836	-4.724446	0.0000
D(INTEREST(-1))	-0.352652	0.099321	-3.550644	0.0005
D(INTEREST(-2))	-0.223135	0.077519	-2.878440	0.0045
C	-0.253051	0.622376	-0.406589	0.6848
R-squared	0.437201	Mean dependent var		0.046606
Adjusted R-squared	0.426714	S.D. dependent var		10.51500
S.E. of regression	7.961501	Akaike info criterion		7.011056
Sum squared resid	10205.07	Schwarz criterion		7.086352
Log likelihood	-574.4121	Hannan-Quinn criter.		7.041621
F-statistic	41.69004	Durbin-Watson stat		1.967593
Prob(F-statistic)	0.000000			

Augmented Dickey-Fuller Unit Root Test on NPL

Null Hypothesis: NPL has a unit root				
Exogenous: Constant				
Lag Length: 2 (Automatic - based on SIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.232714	0.0008
Test critical values:			1% level	-3.470179
			5% level	-2.878937
			10% level	-2.576124
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(NPL)				
Method: Least Squares				
Date: 04/01/23 Time: 02:04				
Sample (adjusted): 2009M04 2022M12				
Included observations: 165 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPL(-1)	-0.338051	0.079866	-4.232714	0.0000
D(NPL(-1))	-0.302785	0.085016	-3.561491	0.0005
D(NPL(-2))	-0.260749	0.074549	-3.497659	0.0006
C	-0.238178	0.202599	-1.175613	0.2415
R-squared	0.334966	Mean dependent var		-0.056727
Adjusted R-squared	0.322574	S.D. dependent var		3.121798
S.E. of regression	2.569423	Akaike info criterion		4.749183
Sum squared resid	1062.911	Schwarz criterion		4.824479
Log likelihood	-387.8076	Hannan-Quinn criter.		4.779748
F-statistic	27.03100	Durbin-Watson stat		1.982890
Prob(F-statistic)	0.000000			

Augmented Dickey-Fuller Unit Root Test on UNEMPLOYMENT

Null Hypothesis: UNEMPLOYMENT has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-12.01337	0.0000
Test critical values:			1% level	-3.469691
			5% level	-2.878723
			10% level	-2.576010
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(UNEMPLOYMENT)				
Method: Least Squares				
Date: 04/01/23 Time: 02:13				
Sample (adjusted): 2009M02 2022M12				
Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLOYMENT(-1)	-0.930446	0.077451	-12.01337	0.0000
C	-0.240205	0.294447	-0.815783	0.4158
R-squared	0.466574	Mean dependent var		-0.015449
Adjusted R-squared	0.463341	S.D. dependent var		5.183673
S.E. of regression	3.797405	Akaike info criterion		5.518417
Sum squared resid	2379.347	Schwarz criterion		5.555758
Log likelihood	-458.7878	Hannan-Quinn criter.		5.533573
F-statistic	144.3210	Durbin-Watson stat		2.001382
Prob(F-statistic)	0.000000			

Augmented Dickey-Fuller Unit Root Test on USD

Null Hypothesis: USD has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-11.57587	0.0000
Test critical values:			1% level	-3.469691
			5% level	-2.878723
			10% level	-2.576010
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(USD)				
Method: Least Squares				
Date: 04/01/23 Time: 02:07				
Sample (adjusted): 2009M02 2022M12				
Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
USD(-1)	-0.893674	0.077201	-11.57587	0.0000
C	1.420074	0.410674	3.457909	0.0007
R-squared	0.448162	Mean dependent var		-0.036347
Adjusted R-squared	0.444817	S.D. dependent var		6.780099
S.E. of regression	5.051890	Akaike info criterion		6.089306
Sum squared resid	4211.063	Schwarz criterion		6.126647
Log likelihood	-506.4570	Hannan-Quinn criter.		6.104462
F-statistic	134.0007	Durbin-Watson stat		2.007211
Prob(F-statistic)	0.000000			

Annex-3 PP Test Results

Phillips-Perron Unit Root Test on CDS

Null Hypothesis: CDS has a unit root Exogenous: Constant Bandwidth: 6 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-13.69528	0.0000
Test critical values:	1% level		-3.469691	
	5% level		-2.878723	
	10% level		-2.576010	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				1360.305
HAC corrected variance (Bartlett kernel)				1264.605
Phillips-Perron Test Equation Dependent Variable: D(CDS) Method: Least Squares Date: 04/01/23 Time: 01:30 Sample (adjusted): 2009M02 2022M12 Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CDS(-1)	-1.061343	0.077706	-13.65848	0.0000
C	5.444054	2.898870	1.877992	0.0621
R-squared	0.530656	Mean dependent var		-0.005150
Adjusted R-squared	0.527811	S.D. dependent var		53.99786
S.E. of regression	37.10517	Akaike info criterion		10.07729
Sum squared resid	227171.0	Schwarz criterion		10.11463
Log likelihood	-839.4540	Hannan-Quinn criter.		10.09245
F-statistic	186.5542	Durbin-Watson stat		1.995101
Prob(F-statistic)	0.000000			

Phillips-Perron Unit Root Test on BIST

Null Hypothesis: BIST has a unit root Exogenous: Constant Bandwidth: 1 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-11.49743	0.0000
Test critical values:	1% level		-3.469691	
	5% level		-2.878723	
	10% level		-2.576010	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				56.62279
HAC corrected variance (Bartlett kernel)				56.31295
Phillips-Perron Test Equation Dependent Variable: D(BIST) Method: Least Squares Date: 04/01/23 Time: 01:57 Sample (adjusted): 2009M02 2022M12 Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
BIST(-1)	-0.892188	0.077574	-11.50117	0.0000
C	1.903612	0.606779	3.137241	0.0020
R-squared	0.444962	Mean dependent var		0.084671
Adjusted R-squared	0.441598	S.D. dependent var		10.13067
S.E. of regression	7.570279	Akaike info criterion		6.898241
Sum squared resid	9456.006	Schwarz criterion		6.935582
Log likelihood	-574.0031	Hannan-Quinn criter.		6.913397
F-statistic	132.2768	Durbin-Watson stat		1.998688
Prob(F-statistic)	0.000000			

Phillips-Perron Unit Root Test on CHEQUE

Null Hypothesis: CHEQUE has a unit root Exogenous: Constant Bandwidth: 5 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-18.39353	0.0000
Test critical values:	1% level		-3.469691	
	5% level		-2.878723	
	10% level		-2.576010	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				916.2550
HAC corrected variance (Bartlett kernel)				681.4596
Phillips-Perron Test Equation Dependent Variable: D(CHEQUE) Method: Least Squares Date: 04/01/23 Time: 01:35 Sample (adjusted): 2009M02 2022M12 Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHEQUE(-1)	-1.293046	0.074144	-17.43965	0.0000
C	1.703106	2.358100	0.722237	0.4712
R-squared	0.648294	Mean dependent var		0.185210
Adjusted R-squared	0.646162	S.D. dependent var		51.19437
S.E. of regression	30.45260	Akaike info criterion		9.682124
Sum squared resid	153014.6	Schwarz criterion		9.719465
Log likelihood	-806.4573	Hannan-Quinn criter.		9.697280
F-statistic	304.1413	Durbin-Watson stat		2.088940
Prob(F-statistic)	0.000000			

Phillips-Perron Unit Root Test on INFLATION

Null Hypothesis: INFLATION has a unit root Exogenous: Constant Bandwidth: 4 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-6.071801	0.0000
Test critical values:			1% level	-3.469691
			5% level	-2.878723
			10% level	-2.576010
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				1.824905
HAC corrected variance (Bartlett kernel)				1.763088
Phillips-Perron Test Equation Dependent Variable: D(INFLATION) Method: Least Squares Date: 04/01/23 Time: 02:20 Sample (adjusted): 2009M02 2022M12 Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION(-1)	-0.370988	0.060441	-6.138006	0.0000
C	0.443273	0.127086	3.487983	0.0006
R-squared	0.185889	Mean dependent var		0.005329
Adjusted R-squared	0.180955	S.D. dependent var		1.501698
S.E. of regression	1.359053	Akaike info criterion		3.463357
Sum squared resid	304.7591	Schwarz criterion		3.500698
Log likelihood	-287.1903	Hannan-Quinn criter.		3.478513
F-statistic	37.67512	Durbin-Watson stat		1.962387
Prob(F-statistic)	0.000000			

Phillips-Perron Unit Root Test on INTEREST

Null Hypothesis: INTEREST has a unit root Exogenous: Constant Bandwidth: 6 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-10.66907	0.0000
Test critical values:			1% level	-3.469691
			5% level	-2.878723
			10% level	-2.576010
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				66.51366
HAC corrected variance (Bartlett kernel)				89.17147
Phillips-Perron Test Equation Dependent Variable: D(INTEREST) Method: Least Squares Date: 04/01/23 Time: 02:17 Sample (adjusted): 2009M02 2022M12 Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTEREST(-1)	-0.769361	0.075234	-10.22621	0.0000
C	-0.451578	0.637021	-0.708890	0.4794
R-squared	0.387926	Mean dependent var		0.078084
Adjusted R-squared	0.384217	S.D. dependent var		10.45581
S.E. of regression	8.204870	Akaike info criterion		7.059237
Sum squared resid	11107.78	Schwarz criterion		7.096578
Log likelihood	-587.4463	Hannan-Quinn criter.		7.074393
F-statistic	104.5753	Durbin-Watson stat		2.086813
Prob(F-statistic)	0.000000			

Phillips-Perron Unit Root Test on NPL

Null Hypothesis: NPL has a unit root Exogenous: Constant Bandwidth: 6 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-7.738459	0.0000
Test critical values:			1% level	-3.469691
			5% level	-2.878723
			10% level	-2.576010
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				7.171502
HAC corrected variance (Bartlett kernel)				8.416931
Phillips-Perron Test Equation Dependent Variable: D(NPL) Method: Least Squares Date: 04/01/23 Time: 02:05 Sample (adjusted): 2009M02 2022M12 Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPL(-1)	-0.490466	0.065991	-7.432339	0.0000
C	-0.235039	0.209901	-1.119762	0.2644
R-squared	0.250816	Mean dependent var		-0.053772
Adjusted R-squared	0.246276	S.D. dependent var		3.103238
S.E. of regression	2.694147	Akaike info criterion		4.831944
Sum squared resid	1197.641	Schwarz criterion		4.869286
Log likelihood	-401.4674	Hannan-Quinn criter.		4.847100
F-statistic	55.23967	Durbin-Watson stat		2.186653
Prob(F-statistic)	0.000000			

Phillips-Perron Unit Root Test on UNEMPLOYMENT

Null Hypothesis: UNEMPLOYMENT has a unit root				
Exogenous: Constant				
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-11.98951	0.0000
Test critical values:	1% level		-3.469691	
	5% level		-2.878723	
	10% level		-2.576010	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)			14.24759	
HAC corrected variance (Bartlett kernel)			13.17129	
Phillips-Perron Test Equation				
Dependent Variable: D(UNEMPLOYMENT)				
Method: Least Squares				
Date: 04/01/23 Time: 02:14				
Sample (adjusted): 2009M02 2022M12				
Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLOYMENT(-1)	-0.930446	0.077451	-12.01337	0.0000
C	-0.240205	0.294447	-0.815783	0.4158
R-squared	0.466574	Mean dependent var	-0.015449	
Adjusted R-squared	0.463341	S.D. dependent var	5.183673	
S.E. of regression	3.797405	Akaike info criterion	5.518417	
Sum squared resid	2379.347	Schwarz criterion	5.555758	
Log likelihood	-458.7878	Hannan-Quinn criter.	5.533573	
F-statistic	144.3210	Durbin-Watson stat	2.001382	
Prob(F-statistic)	0.000000			

Phillips-Perron Unit Root Test on USD

Null Hypothesis: USD has a unit root				
Exogenous: Constant				
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-11.53161	0.0000
Test critical values:	1% level		-3.469691	
	5% level		-2.878723	
	10% level		-2.576010	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)			25.21595	
HAC corrected variance (Bartlett kernel)			23.03362	
Phillips-Perron Test Equation				
Dependent Variable: D(USD)				
Method: Least Squares				
Date: 04/01/23 Time: 02:08				
Sample (adjusted): 2009M02 2022M12				
Included observations: 167 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
USD(-1)	-0.893674	0.077201	-11.57587	0.0000
C	1.420074	0.410674	3.457909	0.0007
R-squared	0.448162	Mean dependent var	-0.036347	
Adjusted R-squared	0.444817	S.D. dependent var	6.780099	
S.E. of regression	5.051890	Akaike info criterion	6.089306	
Sum squared resid	4211.063	Schwarz criterion	6.126647	
Log likelihood	-506.4570	Hannan-Quinn criter.	6.104462	
F-statistic	134.0007	Durbin-Watson stat	2.007211	
Prob(F-statistic)	0.000000			

Annex-4 Granger Causality Test Results

Pairwise Granger Causality Tests Date: 05/04/23 Time: 23:06 Sample: 2009M01 2022M12 Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
CDS does not Granger Cause CEK	166	0.03168	0.9688
CEK does not Granger Cause CDS		0.03060	0.9699

Pairwise Granger Causality Tests Date: 05/06/23 Time: 15:58 Sample: 2009M01 2022M12 Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
CDS does not Granger Cause BIST	166	0.10807	0.8976
BIST does not Granger Cause CDS		4.29719	0.0152

Pairwise Granger Causality Tests Date: 05/06/23 Time: 16:18 Sample: 2009M01 2022M12 Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
CDS does not Granger Cause CPI	166	4.01196	0.0199
CPI does not Granger Cause CDS		0.22385	0.7997

Pairwise Granger Causality Tests Date: 05/06/23 Time: 16:27 Sample: 2009M01 2022M12 Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
CDS does not Granger Cause INT	166	3.41461	0.0353
INT does not Granger Cause CDS		1.62711	0.1997

Pairwise Granger Causality Tests Date: 05/06/23 Time: 15:41 Sample: 2009M01 2022M12 Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
CDS does not Granger Cause NPL	166	8.17454	0.0004
NPL does not Granger Cause CDS		0.67954	0.5083

Pairwise Granger Causality Tests Date: 05/06/23 Time: 17:32 Sample: 2009M01 2022M12 Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
CDS does not Granger Cause UNEMP	166	1.40027	0.2495
UNEMP does not Granger Cause CDS		1.73820	0.1791

Pairwise Granger Causality Tests Date: 05/06/23 Time: 15:50 Sample: 2009M01 2022M12 Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
CDS does not Granger Cause USD	166	0.13668	0.8723
USD does not Granger Cause CDS		0.33709	0.7143