INVESTIGATION OF THE EFFECT OF CDS PREMIUMS ON HOUSING PRICES

28th ANNUAL CONFERENCE OF THE EUROPEAN REAL ESTATE SOCIETY

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CONTENTS

PURPOSE OF THE STUDY

1. To determine the factors affecting Turkey ‘s CDS premium.

2. How Turkey's CDS Premium affects the housing prices

3. How much the increase in CDS will affect the housing prices.

CDS

- "Credit Default Swaps" briefly CDSs in its most basic terms, is the securitization of insurance contracts that protect the investor against the risk of non-payment of the loan.
- In return for this insurance, a portion of the expected return on the investment is paid as a premium.
- CDS contracts can be created for debt securities of both companies and countries. The greater the default risk of the borrower, the higher the CDS premiums.
- CDSs cover risks such as bankruptcy, credit downgrade, and default.
- While CDS maturities are between 1 and 10 years, the most frequently traded CDSs is 5 years. (Schönbucher 2003, s.15-17)

LITERATURE REVIEW

Author	Method	Variables	Conclusions
Branford, C. -J. Holmberg. (2010). Determinants of Sovereign Credit Default Swap Spreads for PIIGS.	Regression Analysis	GDP growth rate, inflation rate, unemployment rate, gross debt stock.	• Variable with the **greatest effect on CDS** was the **unemployment rate**, and the variable with **the least effect** was the **inflation rate.** • Examined countries; Portugal, Italy, Ireland, Greece, Spain.
Kılcı (2017). Evaluation of the relationship between CDS premiums and a country's credit risk; Turkey example.	Stationarity levels of time series, ADF, PP, and ZA Unit-Root Tests. Toda-Yamamoto Causality Test.	inflation, unemployment rate, growth rate, real exchange rate, banking sector capital adequacy ratio and BIST 30 variables from financial indicators. (2010–2016).	• The relationship between Turkey's 5-year CDS premiums and macroeconomic indicators such as growth, inflation, unemployment, and current account **deficit is weak.** • **Long-term relationships** were found between the **real effective exchange rate** and financial indicators such as **banking sector capital adequacy, non-performing loans/total loans, BIST 30 values, and CDS premiums**. • It was observed that the **banking sector** was **especially effective** in the change in Turkey's CDS premiums.
Koy(2014). An Empirical Study on Credit Default Swaps' Spreads and Bond Spreads.	Unit Root Test and Granger causality analysis.	Credit Default Swap, Euro-bond premiums. (Jan 2009-Nov 2012)	• The change in CDS premiums directs the change in Eurobond premiums. It has been concluded that the two data are in mutual interaction.

Local variables:

- Growth rates
- Real effective exchange rate
- Stocks market
- Inflation
- Bond yields
- Risk appetite
- Interest rates
- External debt balance.

Global variables:

- VIX
- S&P 500
- US bond market.
- NASDAQ
- Gold

LITERATURE REVIEW

Author	Method	Variables	Conclusions
Fontana-Schleicher (2016). An analysis of euro area sovereign CDS and their relation with government bonds.	Regression Analysis, time series	Bonds with a ten year maturity, CDS premiums and risk-free interest rate, risk perception of investors, external debt and iTraxx index. (2006-2010)	• The risk appetites of the investors have a strong effect on the borrowing costs of the countries. • The decreasing risk appetite caused significant increases in CDS premiums. • Examined countries; Austria, Belgium, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain.
Longstaff vd. (2011). "How Sovereign is Sovereign Credit Risk?"	Regression Analysis	S&P500, NASDAQ, US bond markets. (2000-2010)	• A **country's CDS premiums** are more **closely related to the US stock market** and high-yielding markets, as well as the volatility risk premium expressed by the **VIX index,** than local economic indicators.
Zhu, Haibin. 2006). An Empirical Comparison of Credit Spreads between the Bond Market and the Credit Default Swap Market.	Panel Data and VECM	US bond market and CDS	• CDS premiums and bonds act together in the long term, • Concluded that some deviations occurred in the short run.

LITERATURE REVIEW

These studies examining the relationship between house prices and CDS premiums.

Study/Authors	Method	Variables	Conclusion
The housing market and the credit default swap premium in the UK banking sector: A VAR approach, Res. Int. Business Finance. (2018). Benbouzid N, Mallick S, Pilbeam K	VAR approach	house prices, the yield spread, the UK TED spread and the FTSE 100 index. (2004-2011)	The results of the study showed that a positive shock to the **CDS premium significantly reduced housing demand and housing prices.**
Spillovers Between Turkish House Pricing, Stock Exchanges, Gold, CDS and Exchange Rate (2019, Master Thesis). Şentürk, E	VAR approach	BITS100, CDS, SP500, HPE house prices, exchange rates, gold prices, stock exchange rates, credit default swaps. (2003-2018)	The results of the study showed that **gold is the most effective variable for house price index** in the long run in Turkey when it is compared with other financial instruments.

VARIABLES

Variables	Definition	Explanation
HPE	House Price Index	Turkey's house price index
CDS	Credit Default Swaps	5 Years Turkey's credit default swaps
CPI	Consumer Price Index	Turkey's consumer price index
CGOLD	Republican Gold	It is a type of gold that is heavier than gold.
INT	House Interest Rate	Fixed rate house loans
BIST	Borsa Istanbul 100	The index is used as the main index for Borsa Istanbul Equity Market
USD	USD Currency Sales	USD-TRY Currency Sales
FTSE100	The Financial Times Stock Exchange 100 Index	A share index of the 100 companies listed on the London Stock Exchange with the highest market capitalisation.
ABD5	ABD 5 Years Bond Yield	ABD 5 Years Bond Yield
NASDAQ	National Association of Securities Dealers Automated Quotients Exchange	The Nasdaq Stock Market is an American stock exchange based in New York City. An electronic exchange system
VIX	CBOE Volatility Index	A popular measure of the stock market's expectation of volatility based on S&P 500 index options.
DJI	Dow Jones Index	A price-weighted measurement stock market index of 30 prominent companies listed on stock exchanges in the United States
GOLD	Gold	Gold

The data period is June 2010- March 2022. Monthly.

Local variables:

- House price index
- Real effective exchange rate
- BIST 100
- CPI
- Interest rates
- CDS
- Republican Gold

Global variables:

- VIX
- S&P 500
- US 5 years bonds
- NASDAQ
- FTSE 100
- Down Jones Industry
- Gold

Descriptive Statistics

Date: 06/07/22 Time: 13:52
Sample: 2010M01 2022M03

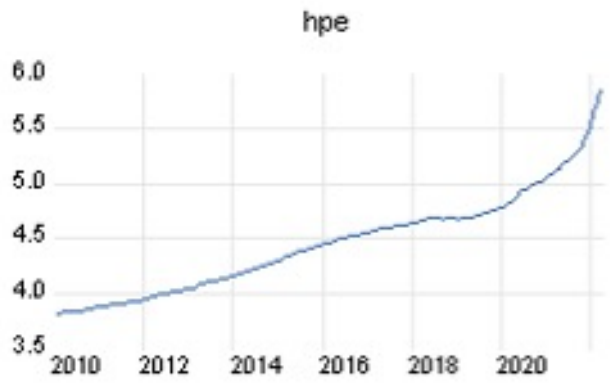
	ABD5	BIST	CDS	CGOLD	CPI	DJI	FTSE100	GOLD	HPE	INT	NASDAQ	SP500	USD	VIX
Mean	0.260	6.763	5.526	6.904	5.687	9.844	8.780	9.7863	4.454720	2.574859	4.022987	7.666410	1.175796	2.868441
Median	0.401	6.721	5.480	6.622	5.614	9.788	8.798	9.8965	4.461300	2.526368	4.127134	7.648200	1.075636	2.818995
Maximum	1.091	7.711	6.370	8.751	6.737	10.50	8.955	10.689	5.850765	3.365484	5.347155	8.469300	2.680463	3.980429
Minimum	-1.564	6.208	4.780	5.870	5.159	9.187	8.500	8.3238	3.815512	2.115954	2.878074	6.938000	0.354382	2.252344
Std. Dev.	0.560	0.304	0.400	0.701	0.381	0.356	0.109	0.6311	0.452852	0.248542	0.683747	0.398548	0.608601	0.324469
Skewness	-1.060	0.652	0.458	0.801	0.573	0.047	-0.411	0.9281	0.596052	1.000131	0.053871	0.090418	0.512357	0.730627
Kurtosis	3.886	3.255	2.331	2.606	2.464	1.959	2.184	3.2768	3.002275	3.993279	1.918500	2.167257	2.168943	3.401305
Jarque-Bera	32.376	10.840	7.885	16.699	9.826	6.686	8.223	21.574	8.704328	30.54935	7.235167	4.447750	10.66175	14.06490
Probability	0.0000	0.0044	0.019	0.0002	0.007	0.035	0.016	0.0000	0.012879	0.000000	0.026847	0.108189	0.004840	0.000883

correlation

Covariance Analysis: Ordinary
Date: 06/07/22 Time: 16:41
Sample: 2010M01 2022M03
Included observations: 147

Correlation Probability	CDS	HPE	CPI	CGOLD	BIST	INT	USD	SP500	VIX	NASDAQ	GOLD	FTSE100	DJI	ABD5
CDS	1.000000 -----													
HPE	0.768277 0.0000	1.000000 -----												
CPI	0.804506 0.0000	0.986091 0.0000	1.000000 -----											
CGOLD	0.832163 0.0000	0.950203 0.0000	0.976551 0.0000	1.000000 -----										
BIST	0.574147 0.0000	0.943421 0.0000	0.931908 0.0000	0.896513 0.0000	1.000000 -----									
INT	0.604712 0.0000	0.581895 0.0000	0.616998 0.0000	0.598516 0.0000	0.486169 0.0000	1.000000 -----								
USD	0.835678 0.0000	0.978959 0.0000	0.994151 0.0000	0.976005 0.0000	0.907330 0.0000	0.643155 0.0000	1.000000 -----							
SP500	0.721941 0.0000	0.973555 0.0000	0.971635 0.0000	0.922985 0.0000	0.936218 0.0000	0.577333 0.0000	0.962547 0.0000	1.000000 -----						
VIX	0.363869 0.0000	0.057539 0.4888	0.102610 0.2162	0.211641 0.0101	-0.019600 0.8137	0.063260 0.4465	0.121303 0.1433	-0.062206 0.4542	1.000000 -----					
NASDAQ	0.753614 0.0000	0.973988 0.0000	0.968227 0.0000	0.920962 0.0000	0.910027 0.0000	0.583648 0.0000	0.967549 0.0000	0.987627 0.0000	-0.016572 0.8421	1.000000 -----				
GOLD	0.576244 0.0000	0.821610 0.0000	0.817903 0.0000	0.776292 0.0000	0.806162 0.0000	0.373606 0.0000	0.784883 0.0000	0.869085 0.0000	-0.096598 0.2445	0.829920 0.0000	1.000000 -----			
FTSE100	0.255345 0.0018	0.637070 0.0000	0.614182 0.0000	0.488659 0.0000	0.667837 0.0000	0.392412 0.0000	0.596508 0.0000	0.727006 0.0000	-0.588008 0.0000	0.694219 0.0000	0.624996 0.0000	1.000000 -----		
DJI	0.712799 0.0000	0.960375 0.0000	0.967898 0.0000	0.920972 0.0000	0.929344 0.0000	0.604923 0.0000	0.961003 0.0000	0.994825 0.0000	-0.083155 0.3167	0.981899 0.0000	0.856368 0.0000	0.750247 0.0000	1.000000 -----	
ABD5	-0.275139 0.0007	-0.137126 0.0977	-0.166965 0.0433	-0.299494 0.0002	-0.113791 0.1700	0.181473 0.0278	-0.154016 0.0625	-0.107790 0.1938	-0.448309 0.0000	-0.106987 0.1971	-0.337435 0.0000	0.415356 0.0000	-0.073564 0.3759	1.000000 -----

PLOTS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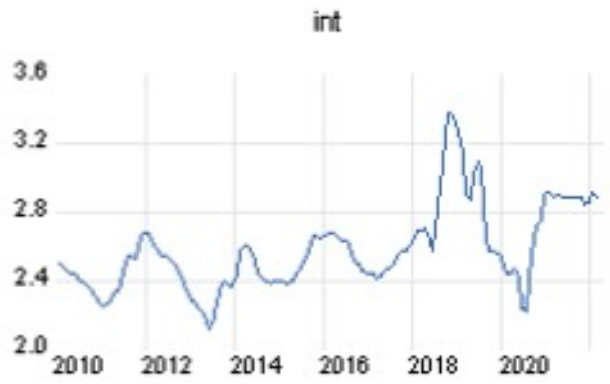
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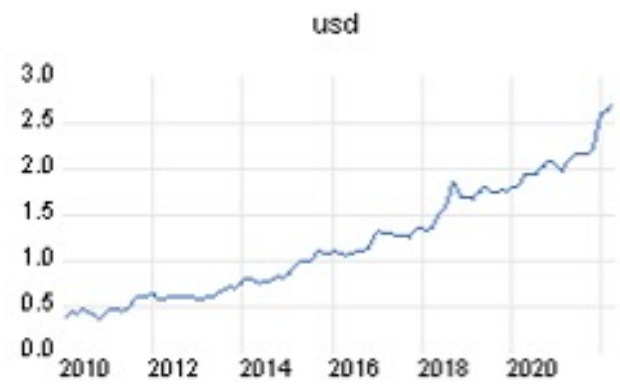
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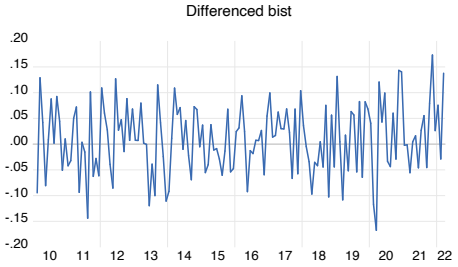
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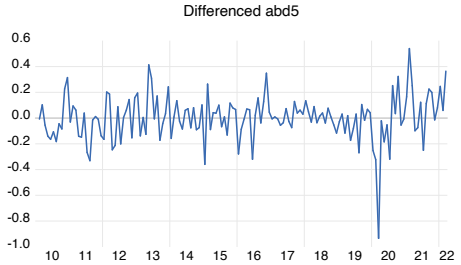
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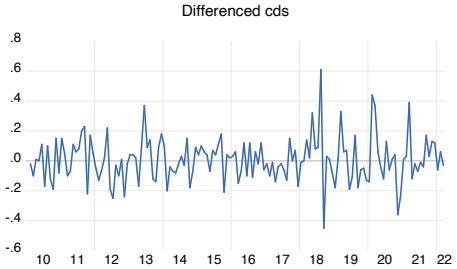
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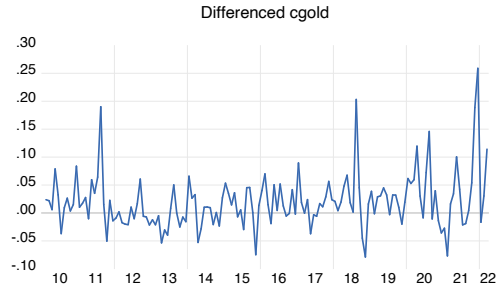
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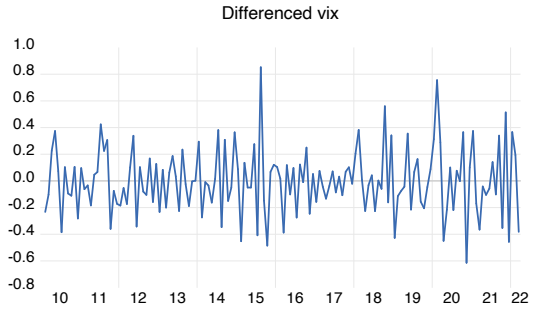
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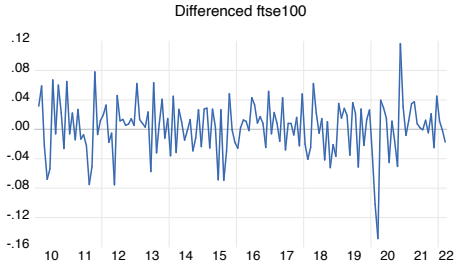
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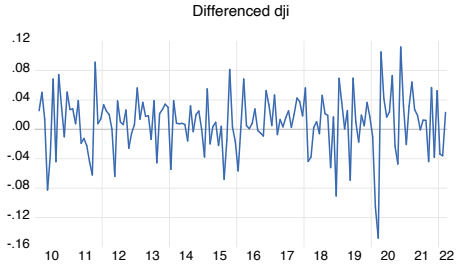
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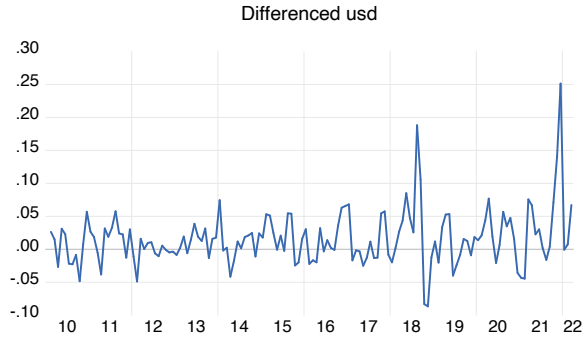
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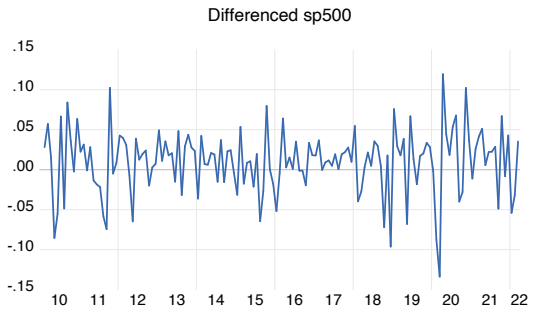
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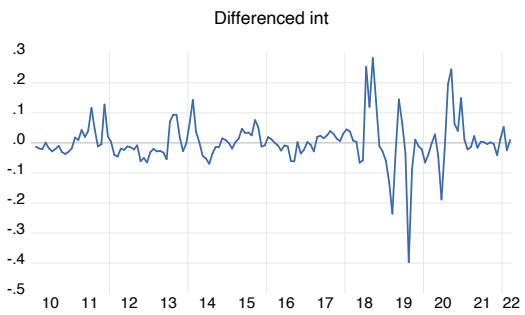
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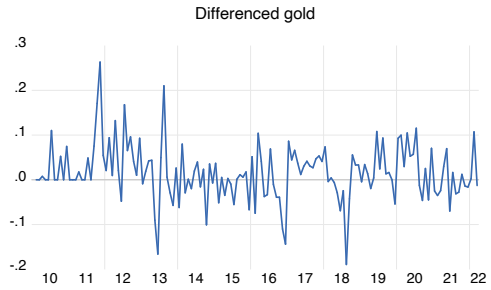
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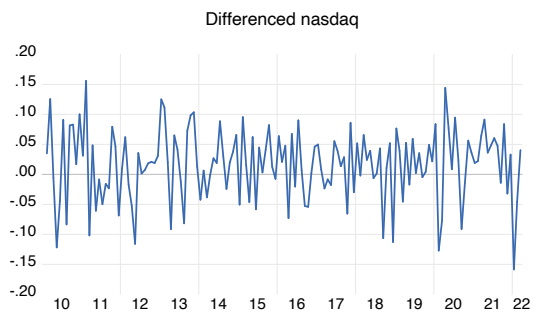
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Optimum Lag Length- VAR Analysis

VAR Lag Order Selection Criteria
Endogenous variables: DCDS DHPE DGOLD DDJI DCPI DCGOLD DBIST DABD DI...
Exogenous variables: C
Date: 06/07/22 Time: 19:09
Sample: 2010M01 2022M03
Included observations: 138

Lag	LogL	LR	FPE	AIC	SC	HQ
0	3388.609	NA	3.20e-39	-48.90737	-48.61040*	-48.78669
1	3749.665	643.6231	2.96e-40	-51.29950	-46.84498	-49.48929*
2	3919.361	268.0696*	4.68e-40	-50.91827	-42.30621	-47.41854
3	4079.210	220.0821	9.77e-40	-50.39435	-37.62473	-45.20509
4	4254.040	205.2356	2.05e-39	-50.08754	-33.16038	-43.20876
5	4486.695	225.9106	2.65e-39	-50.61876	-29.53405	-42.05046
6	4781.841	226.7065	2.42e-39	-52.05566	-26.81340	-41.79783
7	5160.028	213.7580	1.73e-39	-54.69606	-25.29625	-42.74870
8	5790.852	228.5593	2.10e-40*	-60.99785*	-27.44049	-47.36097

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table shows the SIC and AIC criteria used to determine the lag length of the VAR model.

The optimum lag length is the lag with the lowest of these values.

The 1. lag showing the lowest value in the AIC and SIC criteria was chosen as the most appropriate lag length for the VAR model.

VAR ANALYSIS

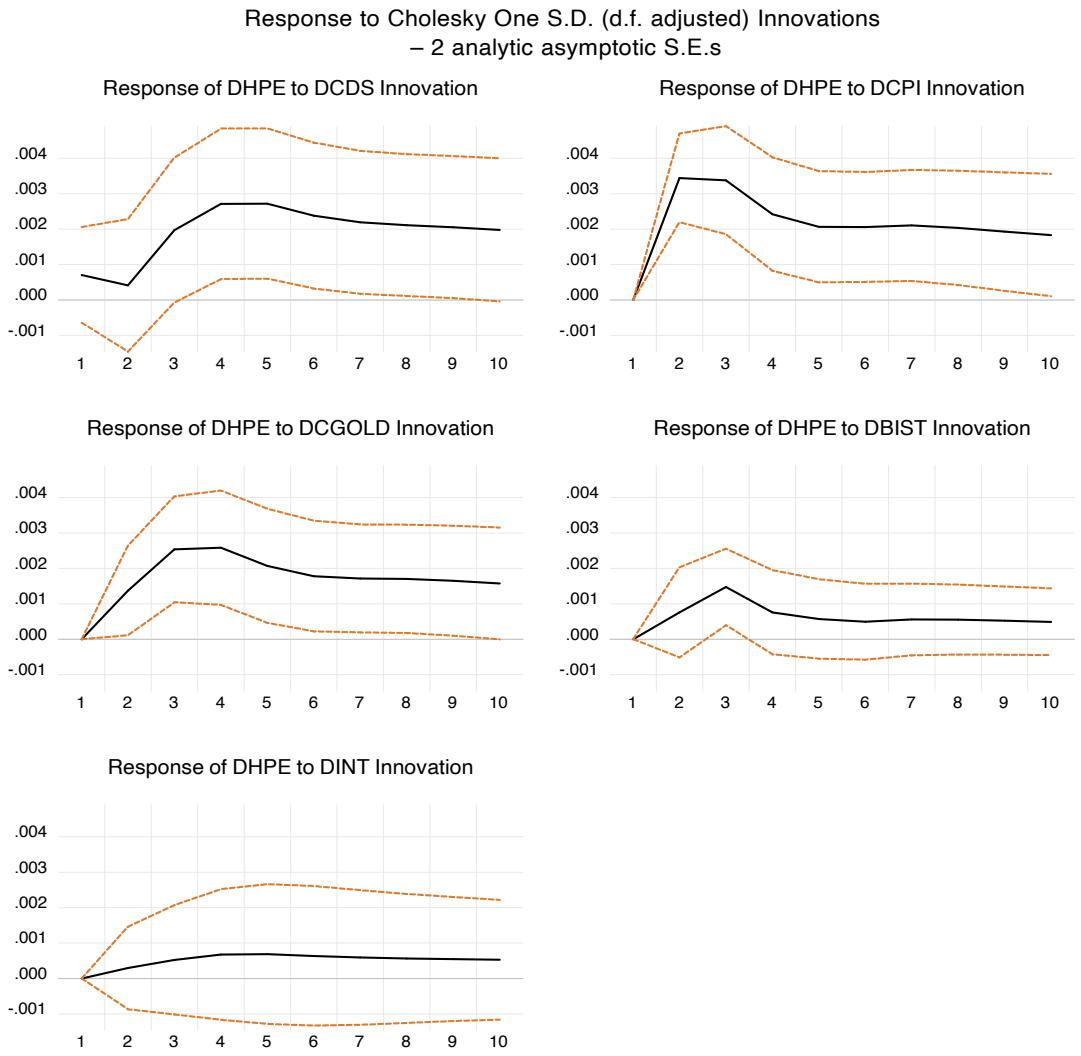
Variance Decomposition of DCDS:

Period	S.E.	DCDS	DHPE	DGOLD	DDJI	DCPI	DCGOLD	DBIST	DABD	DINT	DNASDAQ	DSP	DSTSE	DUSD	DVIX
1	0.143033	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.153851	86.54563	0.515515	0.250144	0.036026	0.541542	2.260684	4.709625	0.045038	1.494854	0.102578	0.013983	0.336609	0.092244	3.055529
3	0.162372	77.75504	0.468715	2.506517	0.191074	0.631542	2.060643	4.660686	0.057907	3.540198	1.786407	2.494991	0.613029	0.347504	2.885749
4	0.164620	75.70451	0.772744	2.600688	0.218157	0.787248	2.064414	4.538708	0.261616	4.011024	2.027054	2.427797	0.881409	0.751447	2.953185
5	0.166343	74.93192	1.125641	2.547130	0.231142	1.027446	2.025966	4.708550	0.257126	3.928405	2.177713	2.379965	0.890522	0.741993	3.026476
6	0.166940	74.41640	1.168816	2.701017	0.337161	1.020308	2.083649	4.676625	0.257515	3.902155	2.168100	2.385072	0.902162	0.756723	3.224298
7	0.167277	74.11782	1.211845	2.771557	0.453709	1.016337	2.088878	4.684152	0.274690	3.887176	2.175575	2.426840	0.899485	0.753685	3.238246
8	0.167342	74.06137	1.221408	2.791738	0.455289	1.015758	2.089773	4.680978	0.275468	3.885752	2.175733	2.427977	0.911555	0.753111	3.254093
9	0.167411	74.00125	1.249593	2.791138	0.463820	1.014930	2.111859	4.681516	0.277366	3.886777	2.173960	2.426683	0.911090	0.752621	3.257395
10	0.167448	73.97445	1.263909	2.790037	0.464545	1.021603	2.121203	4.682449	0.277886	3.885327	2.173560	2.425748	0.910789	0.752290	3.256208

Variance Decomposition of DHPE:

Period	S.E.	DCDS	DHPE	DGOLD	DDJI	DCPI	DCGOLD	DBIST	DABD	DINT	DNASDAQ	DSP	DSTSE	DUSD	DVIX
1	0.007892	0.154961	99.84504	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.010771	0.085510	81.64622	0.264545	1.131006	14.90860	0.078065	0.187569	0.351251	0.468733	0.086692	0.000201	0.791101	1.64E-05	0.000493
3	0.013121	1.897405	76.34774	0.393982	1.260500	14.32089	1.798037	1.217965	0.266126	0.764841	0.378615	0.322363	0.596907	0.424308	0.010318
4	0.015279	2.657025	77.53920	0.368815	1.041050	11.37431	2.152182	1.222223	0.358800	1.309454	0.309045	0.645613	0.649407	0.345563	0.027311
5	0.016899	2.775614	78.45198	0.464045	0.863728	10.34317	1.892997	1.028306	0.355550	1.432294	0.273248	1.003038	0.750841	0.322818	0.042371
6	0.018506	2.821351	78.86830	0.660316	0.753926	9.997371	1.671799	0.933971	0.305709	1.300724	0.328087	1.272466	0.747940	0.270691	0.067352
7	0.020189	2.723239	79.49962	0.791050	0.643886	9.616413	1.611322	0.868292	0.273043	1.181944	0.370931	1.382869	0.732724	0.242948	0.061718
8	0.021848	2.619377	80.08361	0.838321	0.569252	9.210259	1.615777	0.823899	0.261841	1.142812	0.374869	1.470639	0.717504	0.219140	0.052697
9	0.023438	2.599175	80.56361	0.837395	0.539335	8.843898	1.580621	0.785488	0.248773	1.131639	0.379697	1.532452	0.718793	0.193315	0.045807
10	0.024990	2.595849	80.94474	0.834585	0.518014	8.585287	1.520390	0.740223	0.236381	1.115506	0.388991	1.576431	0.729897	0.171069	0.042637

Impulse –Response HPE



- The response of the HPE variable to a shock in the CDS premium. Accordingly, it was observed that the HPE variable gave a downward response to a shock in the CDS premium in the first month.
- From the 2nd to the 5th month, it was observed that it gave an increased response.
- The HPE variable had a very specific response to a shock in the CPI variable in the first month, the response between the 2nd and 3rd months remained stable and decreased between the 3rd and 5th months.

GRANGER CAUSALITY

Granger causality analysis is used to determine the direction of the relationship between variables in time series analysis.

$$Y_t = \alpha_1 + \sum_{i=1}^{n} \beta_i X_{t-i} + \sum_{j=1}^{m} \delta_j Y_{t-j} + e_{yt} \quad (1)$$

$$X_t = \alpha_2 + \sum_{i=1}^{n} \theta_i X_{t-i} + \sum_{j=1}^{m} \gamma_j Y_{t-j} + e_{xt} \quad (2)$$

In the analysis of causality, the significance of the H0 and H1 hypotheses is checked. Rejecting the H0 hypothesis means that there is a Granger causality relationship between the variables.

Rejecting the H0 hypothesis means that there is a Granger causality relationship between the variables.

Pairwise Granger Causality Tests
Date: 06/07/22 Time: 18:56
Sample: 2010M01 2022M03
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
HPE does not Granger Cause CDS	145	5.01703	0.0079
CDS does not Granger Cause HPE		0.34408	0.7095
CPI does not Granger Cause CDS	145	6.03722	0.0031
CDS does not Granger Cause CPI		4.74071	0.0102
CGOLD does not Granger Cause CDS	145	5.92795	0.0034
CDS does not Granger Cause CGOLD		3.14255	0.0462
BIST does not Granger Cause CDS	145	9.61350	0.0001
CDS does not Granger Cause BIST		4.84686	0.0092
INT does not Granger Cause CDS	145	0.40888	0.6652
CDS does not Granger Cause INT		11.4030	3.E-05
USD does not Granger Cause CDS	145	5.94336	0.0033
CDS does not Granger Cause USD		14.8812	1.E-06
SP500 does not Granger Cause CDS	145	5.20947	0.0066
CDS does not Granger Cause SP500		1.52857	0.2204
VIX does not Granger Cause CDS	145	0.74957	0.4745
CDS does not Granger Cause VIX		1.03896	0.3565
NASDAQ does not Granger Cause CDS	145	6.55338	0.0019
CDS does not Granger Cause NASDAQ		0.27624	0.7590
GOLD does not Granger Cause CDS	145	1.78727	0.1712
CDS does not Granger Cause GOLD		4.74813	0.0101
FTSE100 does not Granger Cause CDS	145	2.82675	0.0626
CDS does not Granger Cause FTSE100		1.49995	0.2267

CONCLUSION

- In this study, with the VAR model approach, the exchange rate, BIST 100, CPI, housing interest rates, republic gold, VIX, S&P 500, US 5-year bond market, Down Jones Industrial Index, Gold, FTSE100, and NASDAQ variables of Turkey CDS premiums were analyzed statistically. relationships and whether CDS premiums affect housing prices are examined.

- Variables were included in the analysis on a monthly basis between 2010 January 2022 March.

- According to the variance decomposition results, it was observed that the CDS variable was completely affected by its own shocks in the first month, and the BIST100 variable (5%) was the most affected in the second month, followed by the VIX variable by 3%.

CONCLUSION

- The most important factors determining Turkey CDS premiums between January 2010 and March 2022 are BIST 100 index, CBOE Volatility Index and housing interest rates.
- Housing price index variable is mostly affected by the inflation rate, housing interest rate, and republic gold prices.
- HPE variable was affected by its own shocks at a rate of 99.85% in the 1st month, while it was affected by CDS premiums in the remaining part.
- From the second month onwards, it was observed that it was affected by the CPI variable by 15% and gradually decreasing.
- As a result, it has been seen that the factors that most affect Turkey's 5-year CDS premiums are BIST 100 index, CBOE Volatility Index and housing interest rates. It has been observed that the housing price index is mostly affected by the inflation rate.

THANK YOU FOR LISTENING.

Q&A

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