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Economy and banking sector performance: Spillover effect of Uncertainty of Covid-19 on Non-performing loans of Turkish Agricultural sector

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ABSTRACT

This spillover index research paper tries to find connectedness between Non-performing loans (NPL) and Covid-19 global pandemic specifically in the Turkish agricultural sector. The research covers variables of NPL, Geopolitical risk index (GPR), Fishing, Agriculture, Non-performing loans to total assets (NPL_TCL), Return on assets (ROA), Return on equity (ROE). The data for this research includes a monthly time series dataset covering between Dec. 2004–April 2020. To perform the statistical analysis descriptive statistics, correlation matrix with its T-statistics and probabilities, and Dielbold and Yilmaz index were adopted to uncover the level of connectedness among the group. The descriptive statistics results of the group reveal that all variables understudy were contributing factors to the increase of NPL of the banking sector in general. Specifically, the agricultural sector's NPL has a significant effect on the banking sector's aggregate NPLs. The correlation analysis indicated that there is a higher correlation between NPL and agriculture, Fishing, Timber, and a moderate average correlation between NPL and Hunting. Similarly, a moderate high correlation amongst individual agricultural sectors i.e. Hunting, Fishing, Agriculture, Timber and as well as higher correlation between ROA and ROE that are under consideration. This shows that there is somehow acceptable interconnectedness among the group. The results of the spillover index effects through Dielbold and Yilmaz procedure revealed a total spillover effect 57.3%. Whereas, another unexplained effect in this study is 43.7% which might be as a result random noise in the dataset due to impact of Covid-19 pandemic. This research is significant as it is first of its kind on a proof of spillover from the empirical viewpoints as it related to Turkey on level of spillover and its impacts on the NPLs of the banking sector measuring the agricultural sector's contribution.

Keyword: Non-Performing Loans; Covid-19; VAR model; forecast error variance; Turkey

ABSTRAK

Penelitian indeks spillover ini mencoba untuk menemukan keterkaitan antara kredit macet (NPL) dan pandemi global Covid-19 khususnya di sektor pertanian Turki. Penelitian ini mencakup variabel NPL, Indeks risiko geopolitik (GPR), Perikanan, Pertanian, Kredit bermasalah terhadap total aset (NPL_TCL), Pengembalian aset (ROA), Pengembalian ekuitas (ROE). Data untuk penelitian ini mencakup dataset deret waktu bulanan yang mencakup antara Desember 2004-April 2020. Untuk melakukan analisis statistik deskriptif, matriks korelasi dengan T-statistik dan probabilitasnya, serta indeks Dielbold dan Yilmaz diadopsi untuk mengungkap tingkat keterkaitan di antara kelompok. Hasil statistik deskriptif dari kelompok tersebut menunjukkan bahwa semua variabel yang diteliti merupakan faktor yang berkontribusi terhadap peningkatan NPL sektor perbankan secara umum. Secara khusus, NPL sektor pertanian memiliki pengaruh yang signifikan terhadap NPL sektor perbankan secara keseluruhan. Analisis korelasi menunjukkan bahwa terdapat korelasi yang lebih tinggi antara NPL dengan sektor pertanian, Perikanan, Kayu, dan korelasi rata-rata yang moderat antara NPL

dengan Perburuan. Demikian pula, korelasi yang cukup tinggi di antara masing-masing sektor pertanian yaitu Perburuan, Perikanan, Pertanian, Kayu dan juga korelasi yang lebih tinggi antara ROA dan ROE yang sedang dipertimbangkan. Hal ini menunjukkan bahwa ada keterkaitan yang dapat diterima di antara kelompok tersebut. Hasil dari efek indeks spillover melalui prosedur Dielbold dan Yilmaz menunjukkan total efek spillover sebesar 57,3%. Sedangkan, efek lain yang tidak dapat dijelaskan dalam penelitian ini adalah 43,7% yang mungkin disebabkan oleh gangguan acak pada dataset akibat dampak pandemi Covid-19. Penelitian ini penting karena merupakan yang pertama dalam membuktikan spillover dari sudut pandang empiris yang berkaitan dengan Turki mengenai tingkat spillover dan dampaknya terhadap NPL sektor perbankan dengan mengukur kontribusi sektor pertanian.

Keyword: Kredit Bermasalah; Covid-19; model VAR; varians kesalahan prakiraan; Turki

1. Introduction

Since the outbreak of Coronaviruses (subsequently Covid-19) in China specifically from Wuhan province, two popular theories have emerged. First theory allude that it was deliberately released and a warhead against adversaries of the Chinese or the Western world. The second theory claims to be unintentionally released from Wuhan scientific research laboratory. Regardless of these two theories, the only reality is, its sporadic spread across the world from Rio to Johannesburg. The outcomes of its exponential spread is threats to all aspects of human life. This includes two major and fundamentals of human existence i.e. health and economic systems specifically financial systems. These said systems could be broken down into private and public systems which represent the governments. A vital question to raise at this point is what have stakeholders such as the United Nations (UN), World Health Organization (WHO), World Bank (WB) been doing to eradicate or minimize the impacts of Covid-19? Authorities have been rolling out different policies to prevent its spread at both national and international levels. Two popular measures instituted by many countries are quarantine and lockdown that have unintended negative consequences on economic activities of both private and public entities at national and global stages and as well as sub-sectors within these systems. Hence, trial and error policies have been floated frequently by governments through respective institutions to manage the ongoing crisis and its impacts as needed. According to the World Bank and IMF, the uncertainties particularly economic uncertainty arising from Covid-19 is a large scale proportion. Turkey is not exempted from this crisis. Therefore, governments across the globe through their respective central banks are compelled to adopt economic uncertainty 'trial and error' policies to fight consequences arising thereof.

One of the essential and major sectors affected by the current pandemic is the banking and agricultural sectors. Agricultural or food sustainability and eradication of hunger are two vital agenda of the national and international organizations such as UN, UNICIEF etc. Turkish government formed the Agricultural Loan Assessment System (TARDES) in 2014 in order to provide timely access to loans for the agricultural sector. Additionally, it even becomes more serious during Covid-19lockdown when new policies such as extension of grace period for a loan to become non-performing loan, reduction or elimination of interest i.e. (0%interest etc.) were rolled out to aid loan access and repayment for the agricultural sector. However, the modern agricultural system or sector cannot survive without absolute support of the financial system, specifically the banking sector. The banking sector advances loans to other sectors such as the agricultural sector for developmental purposes. In return, the sectors repay back the loans with interest which serves as revenues for the banking sector. Previous studies such as [1] have established the relationship between business cycle disruption and epidemics at private and public organizations and as well for individuals and government. Business cycle disruption means anything which prevents normal movement of goods and services such as Covid-19 comes with greater economic consequences and risk exposure in the financial system, specifically the banking sector in terms of non-performing loans and possibility of systematic risk. Precisely, [1] found a link between HIV/AIDS diagnostic and bank deposit depletion. Leoni found that an increase in withdrawal of cash deposits for payment of bills in the treatments of HIV/AIDS results in liquidity risk in the banking sector. Furthermore, [2] found a likelihood of rise in banking sector collapse in the developing countries due to large scale pandemic such as AIDS and malaria parasite infections. This includes large-scale cash withdrawal of deposits which led to liquidity risk and consequently default risk. Add to this, [3] and [4] have outlined results of large-scale withdrawal which led to banking crisis are decline in bank profitability, quality asset deterioration due to defaults risk arising out of failure to repay back the loans which in finance termed as non-performing loans.

Recently, measuring banking sector stability and profitability has gained the attention of researchers and policymakers. Non-performing loans (NPLs) are a vital index to measure the financial viability of the banking sector. In addition, macroeconomic variables, such as inflation, export, unemployment, and Gross Domestic Product (GDP) and as well as bank-specific issues such as managerial capability i.e. good or bad management have consequences on the NPLs. [5], [6], [7] and [8] identify other uncertainties that have direct influence on non-performing loans such as economic policy uncertainty (EPU). Like we pointed out in one of our previous paragraphs that currently global economic policy is on trial and error, thus, we did not consider EPU as a variable suitable to measure non-performing loans in current study. However, we found the geopolitical risk index (GPR) more appropriate based on Turkey's relationship with its neighboring countries. For example, Turkey's involvement in Syria and Libya, its ongoing dispute with Greece, and entangle between the US and Russia on the issue of air defense apparatus. To the best of our knowledge inclusion of GPR in our model makes it unique from previous studies.

The aim of this current study is to interpret the effect of spillover of the uncertainty which accompany Covid-19 on Turkish banking sector through the agricultural sector's non-performing loans. We apply Diebold and Yilmaz spillover indices method for measuring connectedness between aggregate banking sector's NPLs and agricultural sector NPLs which would allow for development of an adequate monitoring and oversight

The rest of the study is arranged as follows: Section 2 is the literature review on the non-performing loans and agriculture before and during Covid-19; Section 3 present the data and methods; Section 4 is the presentation and discussion of empirical results; and Section 5 is the conclusion and policy implications.

2. Literature Review

The soundness of the banking sector is a significant factor in the economic activities of a nation. Financial and global crises also encouraged scholars to focus on the determinants of NPLs of the banks. Among factors that affects NPLs as popularly stated in previous literature are macroeconomic factors [9; 10; 11; 12; 13; 14; 15; 16; 17] and bank-specific factors [18; 19; 20; 21; 22; 23; 24; 25]. Additionally, uncertainties such as policy uncertainty as well as financial and banking crises. The current novel Corona-virus (Covid-19) spillover effect on the banks and economy is a major source of uncertainty for the NPLs. The coronavirus pandemic crisis can be considered as a risk that will test the soundness of the banking sector to its limits.

In spite of difficulty in estimating exact or actual level of uncertainty, its influence on economic activities all around the world cannot be over emphasized [26]. One of the outcomes of rise in uncertainty is reduction in investment and output [27; 28; 29] in the economy. Similarly, its effect on the financial markets is via distinct links. Furthermore, increase in uncertainty reduces bank lending power [30; 31; 32; 6], reduces liquidity creation [33], lowers the stocks' returns [34; 35], exacerbate the volatility of the derivative markets [36], and has a negative influence on the investments due to rising financial costs of the firms [37].

Several direct and proxy measures of uncertainty have been proffered; previous literature indicates stock market volatility (VIX) [28], the forecast-based uncertainty index [38] and news-based economic uncertainty index (EPU index), developed by [28]. [37] developed the EPU index for the US, based on newspaper articles' frequency with one or more terms about "economics", "policy" and "uncertainty". Ever since its emancipation, several researchers such as [8; 7; 6; 5] have applied it in their studies on various aspects of economics policies at national, regional, and global levels respectively. Furthermore, moral hazard hypothesis arising from asymmetric information [18; 19; 23] in the light of bad management [18; 39] can lead to low efficiency, wherein bank managers tend to undertake riskier loan contracts

In our study, we use world uncertainty ındex (WUI) as the new index of uncertainty, constructed by [40]. WUI consists of a large set of both developed and emerging countries, reflecting the frequencies of the word "uncertain", "uncertainty", and "uncertainties" in the Economist Intelligence Unit (EIU) country reports. To the best of our knowledge, this is the first paper in the literature that investigates the effect of new uncertainty index (WUI) on NPLs in Turkey. We utilize WUI to capture worldwide economic uncertainty as a proxy of the spillover effect of the Covid-19 and to investigate the influence of uncertainty on the non-performing loans of the Turkish banking system. Figure 1 depicts character of the indicators understudy. We expect our result to mimic the outcome of the recent study of [41]. They investigate the impact of uncertainty on the level of domestic credits via using world uncertainty index (WUI), with the panel dataset of 139 countries, covering the period 1996 to 2017. As a result, they find that increasing uncertainty causes domestic credits to decrease.

3. Methods

3.1 Sources of Data

This paper relies on the DY to explore the interconnections between aggregate NPL of the banking sector (NPL) to Hunting which is a sector in the agricultural sector and how GPR index exacerbates the NPLs.

Similarly, connectedness between aggregate banking sector's NPLs and Fishing, agriculture (which is other than Hunting, Fishing, and Timber), Non-performing loans to Total cash loans (NPL_TCL), Return on assets (ROA), Return on equity (ROE), and Timber. We obtained data related to NPL, Hunting, Fishing, agriculture, NPL_TCL, ROA. ROE, and Timber from the Banking Regulatory and Supervisory Association. However, GPR data was acquired from the World uncertainty database. Table 1 provides a swift information of the data, abbreviation and the variables' sources under evaluation. Also Figure 1 shows the pattern of the variables under consideration.

Table 1. The data, abbreviation and the variables' sources under evaluation

Variables	Sources
Non-performing Loans (NPL)	Banking Regulatory and Supervisory Association
Hunting	Banking Regulatory and Supervisory Association
Geopolitical Index (GPR)	World Uncertainty database
Fishing	Banking Regulatory and Supervisory Association
Agriculture	Banking Regulatory and Supervisory Association
Non-performing Loans/Total Cash Loans (NPL_TCL)	Banking Regulatory and Supervisory Association
Return on Assets (ROA)	Banking Regulatory and Supervisory Association
Return on Equity (ROE)	Banking Regulatory and Supervisory Association
Timber	Banking Regulatory and Supervisory Association

Source: Authors collations

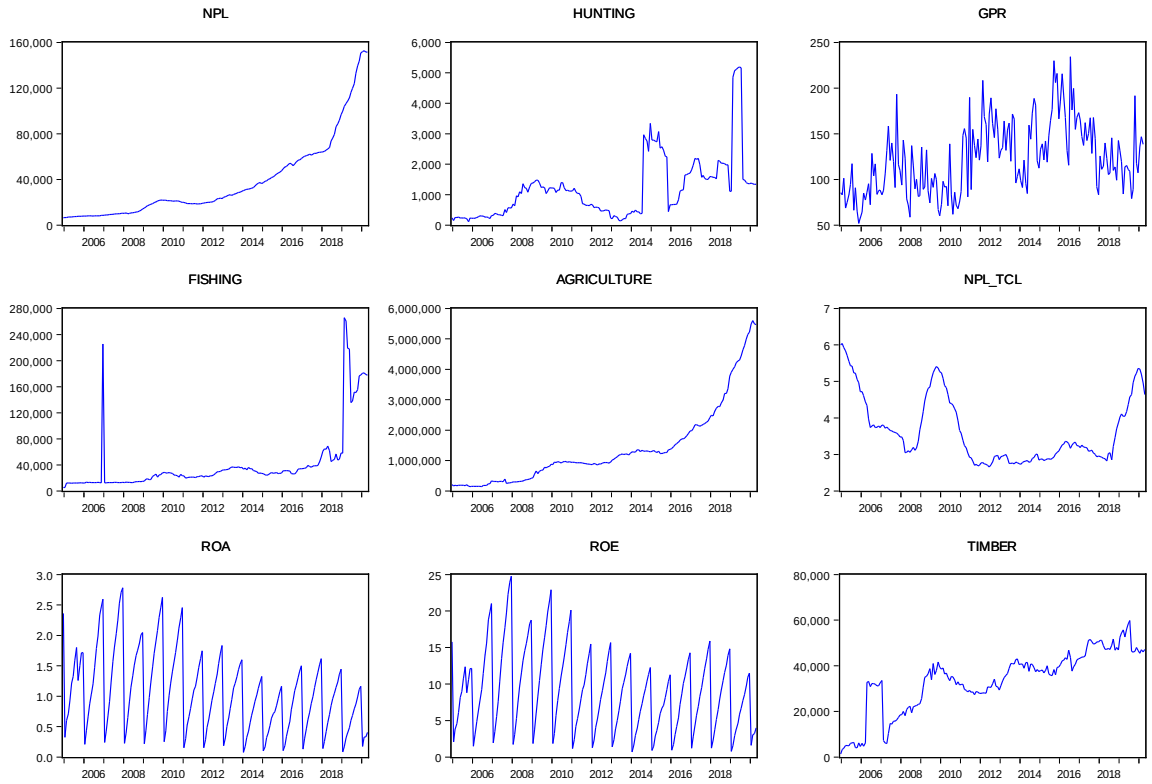


Figure 1. Visual display of the outlined indicators under review

Table 2 portrays the descriptive statistic of the dataset. In Table 2 NPL, Hunting, Fishing, Agriculture, and Timber demonstrates utmost unpredictability in relations to their maximum and minimum values. Likewise, they display similar higher standard deviation. Additionally, most of variables in the group statistics are positively skewed except Timber which is negatively skewed at (-0.7227).

Table 2. Descriptive Statistics

	NPL	HUNTING	GPR	FISHING	AGRICULTURE	NPL_TCL	ROA	ROE	TIMBER
Mean	37910.92	1183.568	122.8616	40054.70	1384703.	3.656851	1.057996	9.081227	33610.11
Median	21861.76	1095.000	119.2020	26619.00	957483.0	3.259477	0.988957	8.658338	36101.00
Maximum	152622.0	5195.000	234.2810	265713.0	5598098.	6.040672	2.783549	24.76648	59795.00
Minimum	6355.699	114.0000	51.78635	5297.000	141210.0	2.655535	0.078886	0.730145	1273.000
Std. Dev.	35125.21	1028.379	38.91646	48272.71	1286692.	0.904787	0.650065	5.546828	13438.35
Skewness	1.675524	1.915702	0.483555	2.946581	1.647167	0.921584	0.553105	0.518459	-0.722739
Kurtosis	5.327985	7.611784	2.648833	11.14976	5.216385	2.634642	2.648200	2.662020	2.933519
Jarque-Bera	128.3363	277.1007	8.116093	779.6820	121.5219	27.21622	10.38672	9.168531	16.13992
Probability	0.000000***	0.000000***	0.017283***	0.000000***	0.000000***	0.000001***	0.005553***	0.010211***	0.000313***
Observations	185	185	184	185	185	185	185	185	185

Note: value presented in the bracket is the p-value of J-B. The asterisk *, ** and *** indicate 10%, 5% and 1% significance level

Furthermore, in terms of maximum-minimum values GPR, ROE, and ROA have moderate acceptable values whereas NPL_TCL has the least figures. Nonetheless, the standard deviation of GPR is approximately 38.9165, this was followed by ROE, NPL_TCL, and ROA with approximately 5.5468, .9048, and .6501 respectively. The group were positively skewed. This shows that the dataset is almost symmetry from obvious uniformity of the group's means and the skewness. Table 3 would explore to what extent these variables correlate with one another. However, the Kurtosis which represents the peakness of the bell shape indicates approximately evenly peak at above 2.5 except the Kurtosis of Fishing, Hunting and NPL approximately 11.1498, 7.6118, and 5.3280 respectively. The group's Jargue-Bera statistics are positively significant at 1% indicating that all variables contribute to explain the direct impacts of Covid-19 and level of agricultural sector's NPL on the Turkish banking sector's NPL.

From Table 3, it appears that most of the variables in the group are averagely correlated. The T-statistics and its probability levels further shield light on their relationships. NPL, Hunting, GPR, Fishing, Agriculture, and Timber are highly positively correlated and positively significant at 1% among the group. Nevertheless, ROA and ROE are natively correlated to NPL at -0.3173 (t = -4.5145) significant at 1% and, -0.2217 (t = -3.0675) significant at 1% respectively. Moreover, among the variables obvious average correlations exist with Timber and Hunting correlated at 57% (t = 9.4599; Sig. 1%). Similar pattern of correlations was observed between Timber, GPR, Fishing, and Agriculture. Timber, ROA and NPL_TCL are negatively correlated but significant at 1%. However, Timber and ROE are negatively correlated, nonetheless, significant at 10%. As observed among the group NPL_TCL has the lower correlation to NPL at 6% (t = 0.8662; Sig. 0%), Fishing at 18% (t = 2.5471; Sig. 1%), and Agriculture at 5% (t = 0.6244; Sig. 0%). NPL_TCL also negatively correlated to Hunting at ∼-6% (t = -0.8223; Sig. 0%) and GPR at ∼-50% (t = -7.7069; Sig. 1%). This implies that NPL_TCL is the least contributor in the group.

Table 3. Correlation Matrix and T-Statistic Analysis

Variables	NPL	HUNTING	GPR	FISHING	AGRICULTURE	NPL_TCL	ROA	ROE	TIMBER
NPL	1.000000								
HUNTING	0.576121	1.000000							
	9.508986								
	0.0000***								
GPR	0.220394	0.106781	1.000000						
	3.048238	1.448838							
	0.0026***	0.1491							
FISHING	0.791003	0.549280	0.011585	1.000000					
	17.44199	8.867701	0.156305						
	0.0000***	0.0000***	0.8760						
AGRICULTURE	0.991051	0.572494	0.190434	0.808229	1.000000				
	100.1595	9.419777	2.616992	18.51623					
	0.0000***	0.0000***	0.0096***	0.0000***					
NPL_TCL	0.064075	-0.060841	-0.496035	0.185525	0.046231	1.000000			
	0.866204	-0.822315	-7.706856	2.547092	0.624354				
	0.3875	0.4120	0.0000***	0.0117***	0.5332				
ROA	-0.317338	-0.247997	-0.253212	-0.210268	-0.318643	0.168212	1.000000		
	-4.514470	-3.453556	-3.531086	-2.901531	-4.535118	2.302108			
	0.0000***	0.0007***	0.0005***	0.0042***	0.0000***	0.0225**			
ROE	-0.221717	-0.173705	-0.186869	-0.164479	-0.225647	0.090794	0.984553	1.000000	
	-3.067470	-2.379579	-2.566199	-2.249587	-3.124739	1.229964	75.86118		
	0.0025***	0.0184**	0.0111***	0.0257**	0.0021***	0.2203	0.0000***		
TIMBER	0.713732	0.574131	0.291417	0.519777	0.729710	-0.309113	-0.249122	-0.139130	1.000000
	13.74716	9.459940	4.109806	8.208084	14.39741	-4.384912	-3.470253	-1.895401	
	0.0000***	0.0000***	0.0001***	0.0000***	0.0000***	0.0000***	0.0006***	0.0596*	

Note: asterisk ***, **, and * denote 1%, 5%, and 10% significance level.

3.2 Method

In an attempt to further establish connectedness among the group Diebold and Yilmaz index of measuring interconnectedness which would allow for development of a proper monitoring system is instrumental. One of the uniqueness of the Diebold and Yilmaz approach is that it disregards order of variables' selection. Add to this, we prefer Diebold and Yilmaz procedure because it is a catalyst to various econometric issues such as autocorrelation, heteroscedasticity, and homoscedasticity. Diebold and Yilmaz's computational requirements are less difficult which accommodate and reflect characterization of several events and circumstances. Diebold and Yilmaz (2009, 2015) index is based on vector autoregressive (VAR) and variance decomposition techniques. Specifically, VAR is a stochastic operation to determine the linear interrelatedness among several time series. Variance decomposition, however, is used to interpret vector autoregressive models in multivariate time series. The Diebold and Yilmaz (2009) approach is subtle to the orientation order of the variables after Cholesky factorization. However, the Diebold and Yilmaz (2012) augmented versions enrich and advance the procedure, thus, eliminating the shortcomings of the 2009 version. In other words, it eliminates ordering of variables. Four spillover indices namely directional spillover, pairwise spillover, net spillover, and total spillover are among emphasis of the DY index. Thus, DY structure follows the VAR covariance stationary.

$$x_i = \Phi_0 + \sum_{i=0}^{n} \Phi_i x_{t-i} + \varepsilon_i$$

Wherein, $x_i = (x_{1t}, x_{2t}, \dots\dots\dots x_{nt})'$ is a vector of covariance stationary series Φ_i, $x_i i = 0, 1, 2, \dots\dots p, denote\ (n \times n)$ matrices of constraints ε_t is a $(n \times 1)$ vector of zero mean errors required to

be independent and identically (iid) distributed with covariance matrix $x_i \sum, \varepsilon_i \sim iid(0, \sum)$.[1] The image of the spillover effects by adopting Diebold and Yilmaz approach is shown in Table 4. In summary Table 4 elucidates that overlapping or interrelationship is present between the variables in the group.

4. Empirical Results Interpretation

We adopt the Diebold and Yilmaz pairwise spillover approach as shown in Table 4. As evident from Table 4 the spillover effect from ROE to ROA is the highest (58.9) it is imperative to assume a higher possibility for unconditional shock arising from uncertainty and other forms of unpredictability from the event such as Covid-19surrounding expected return on total capital invested i.e. ROA and expected or required returns of the shareholder i.e. ROE. Reasonably, when ROA is affected by the spillover shock it would definitely affect the ROE. It further elucidates on rigorousness of the bank decision making in advancing loans to customers and how every agent reacts at a period in time. Previous studies such as [42] results show significant cointegration between gas and oil prices in the U.K. Similarly, a significant interconnection was found by [43] between oil price shock on the gas market at several levels specifically before and after the revolution. In this paper, we establish a moderately strong significant cointegration between return on equity (ROE)and return on assets (ROA). However, a weak spillover effect was observed between Agriculture and NPL (33.3), NPL_TCL and NPL (30.6) and between Fishing and NPL (25.7). Similarly, the spillover effects from NPL to Timber, Hunting, ROA, ROE and GPR are 2.5, 5.4, 6.0, 5.5, and 4.0 respectively are too weak.

Table 4. Diebold and Yilmaz Spillover Connectedness Analysis

	NON_PERFORMING	TIMBER_	HUNTING_	AGRICULTURE_	FISHING_	ROA	ROE	GPR	NPL_TOTAL_CASH_L	From Other
Non_Performing_Loans	**70.5**	0.2	6.0	13.2	0.8	0.1	0.4	0.6	8.1	29.5
TIMBER_NPL_	2.5	**61.8**	1.4	1.8	9.8	4.5	12.6	2.0	3.6	38.2
HUNTING_NPL	5.4	8.2	**44.1**	18.5	5.5	2.2	3.1	7.4	5.4	55.9
AGRICULTURE_	33.3	5.1	19.8	**36.1**	0.4	2.9	0.4	0.2	1.8	63.9
FISHING_NPL	25.7	10.5	3.8	14.4	**23.8**	2.4	3.5	0.3	15.6	76.2
ROA	6.0	3.9	4.4	11.4	4.2	**58.1**	2.8	4.6	4.7	41.9
ROE	5.5	3.9	5.0	10.2	4.1	58.9	**2.4**	5.5	4.5	97.6
GPR	4.0	3.1	5.2	1.4	2.5	14.2	3.7	**63.2**	2.7	36.8
NPLTOTALCASH_LOA	30.6	2.1	2.9	19.8	0.5	0.4	8.5	11.1	**24.2**	75.8
Contribution to others	113.0	37.0	48.5	90.7	27.8	85.6	35.1	31.7	46.4	**515.8**
Contribution including own	183.5	98.8	92.6	126.8	51.6	143.7	37.5	94.9	70.6	**(TSI) 57.3%**

Note: Non-performing loans (NPL), Timber, Hunting, Agriculture, Fishing, Return on assets (ROA), Return on equity (ROE), Geopolitical risk index, and Non-performing loans to Total Cash loans.

Additionally, from our results as evident in Table 4. yield a substantial total spillover index (STI) of 57.3%. The spillover impact from the shock throughout the series i.e. from individual to others display in order as ROE (97.6), Fishing (76.2), NPL_TCL (75.8), Agriculture (63.9), Hunting (55.9), ROA (41.9), Timber (38.2) and GPR (36.8). This implies that required return on equity (ROE)by the investors is more affected whenever there is a shock in the Turkish banking sector. The shareholders bear the brunt in the sense that no are no return on their investment. Intuitively, the direct consequence of bad management theory falls on the shareholders i.e. the owners of the organization not the managers. Notwithstanding, this might not arise from the direct or deliberate actions of the managers rather by the unforeseen global pandemic of Covid-19 which is an exogenous effect and beyond the managers' control. There is always a level or percentage unexpected in business cycles, however, the rate of unpreparedness for Covid-19 would exacerbate NPL in the long-run. Thus, recovery from this shock would take a longer time than expected and a chunk of resources as well. Sadly, NPL_TCL spillover is very high indicating that the banking sector's NPL increases as a result of Covid-19 pandemic which reflect on all the NPLs of the four agricultural sectors understudy.

[1]- Full discussion on DY indices is beyond this article, thus for more on Diebold-Yilmaz kindly refer to Diebold and Yilmaz (2009; 2012; 2014).

Moreover, the spillover impact from Agriculture to others is (90.7). This was followed by spillover influence from ROA to others (85.6), Hunting to others (48.5), and NPL_TCL to others (46.8). From a technical viewpoint return on equity (ROE) is paramount to the survival of an organization. Thus, the fundamental aims of any financial manager is to maximize shareholders return. Therefore, it is not surprising that ROE which is a proxy for ROA determines the level of impact of non-performing loans in Turkish banking sector through the reactions of non-performing loans of the agricultural sector as a whole. This is in cognizance that major revenues of the banking sector come from interests paid on loans particularly by private and public organizations. It appears GPR has less effect on the NPL but national or Turkish political instability might have served as a proxy for GPR. Current internal eco-political systems might be hampering economic development and stability.

5. Conclusion and policy implications

We explore the level of connectedness between aggregate NPL of the Turkish banking sector and Agricultural sector such as Hunting, Fishing, Agriculture, Non-performing loans to total cash loans (NPL_TCL), Return on assets (ROA), Return on equity (ROE), and Timber and as well as Geopolitical risk index (GPR) in the presence of Covid-19 global pandemic. Monthly time series data from Dec., 2004 to April 2020 was obtained from 'Banking Regulatory and Supervisory Association'. Also GPR data was obtained for the World Uncertainty Index official website for the same period understudy. Through Diebold and Yilmaz procedure we established an averagely strong and significant interconnection with a total spillover index of57.3% among the group under investigation. However, 42.7% unexplained could be associated with the global pandemic unexpected shock. The GPR results show that external political i.e. geopolitical risk plays little and insignificant effect on the NPL in general and the agricultural sector specifically. Intuitively, internal or national political policies or systems might have an effect on NPL.

Axiomatically, economic and political policies are hardly being separated. There are economic policies that are motivated by political agenda. Similarly, there are political policies motivated by economic policies. For example, Covid-19 global pandemic simulates both scenarios. Many countries, including Turkey during this ongoing business instability, in an attempt to balance between their assets and liabilities at the IMF resolves to rigorous political and economic transformation. The US denied Turkey's advances on currency SWAPs based on political reasons while allowing such transactions with some selected developed and developing countries such as Germany, Japan, South Korea etc. Even from an economic viewpoint, the US also is going through some tough times which make the Federal reserve to develop several policies such low interest rate, financial stimulus etc. Likewise, many Americans are out of jobs. In Turkey's case, internal political stance or turmoil might not be attractive to investors from abroad. This would have a great consequence on the economy which heavily relied on foreign capital inflows. This is expected to be exacerbated during this Covid-19 global pandemic. As the world is striving to open up their economies, it is imperative for Turkey to strive and strike a balance and resolve its internal political discord among the political parties. At this critical time, one voice is needed for the economy to scale through the waves of this pandemic and attract foreign investors.

Although the Turkish's government is trying to make things right. It relaxes the lockdown in order to functionalize the economy and impose a mild policy to contain the spreading of Covid-19. Engaged in currency SWAPs dealings with both China and Qatar. But there is more to be done. The government has pointed out that the agricultural sector is vital. In this view, new policies that aid this sector have been implemented. Nevertheless, the agricultural sector cannot stand or operate in isolation of other economic agents. Economic agents such as current account reserves, exports etc. have a direct impact on the value of Turkish Lira. Currently, the Turkish lira is losing its value and external circumstances are not favourable as such. We recognize this is a global trend as Turkey is not alone in this dear economic condition. Other developing countries such as Nigeria, United Arab Emirates.

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