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UNCOVERING DIVERSIFICATION BENEFITS: RETURN SPILLOVERS IN USA ESG AND NON-ESG ORIENTED BANKS

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Abstract

The balance sheet is a source of interconnectedness among financial products and affect the overall system of economics. Due to interest of investors in the market's connectedness, our study identifies the dynamics of spillover and their effects on ESG and non-ESG oriented banks of USA. This study comprises the dataset of 2319 observations for the duration of January 1, 2015, to November 22, 2023. The spillover index of Diebold and Yilmaz (2012) was employed to perform the analysis of ESG and non-ESG-oriented banks in USA. This study revealed a difference of

interconnectedness between the ESG and non-ESG-oriented banks, specifically during normal and COVID-19 pandemic periods. ESG-oriented banks are highly interconnected with the momentous spillover among each other, indicating a need to manage risk by cross-market diversification. Contrary, non-ESG-oriented banks exhibited minimum interconnectedness and spillover impact. The benefits of diversification were highlighted in this study between ESG and non-ESG-oriented banks. This study summed up that diversification has significant benefits of risk reduction. Results suggested that banks include both the ESG and non-ESG-oriented investments in their portfolio to mitigate the risk. The adoption of banks-only ESG standards leads to investing in fewer projects and fabricated ESG constraints of portfolio optimization. By this way, investments in ESG constrain and restrict the diversification benefits of the portfolio, which maximizes the risk and fragility.

Keywords:
Spillover Index, Contagion, Diversification, USA, ESG, Non-ESG Oriented Banks

1. Introduction

A debate has already started on whether a company should invest in ESG. Still, there is a massive contradiction about the investment in ESG. Friedman (1970) stated that an organization's investment in ESG activities has finite financial benefits because the shareholders pay the cost of these activities. In this way, organizations can maximize human capital, and efficiently use their resources (Giese, Lee, Melas, Nagy, & Nishikawa, 2019), which also leads to minimizing operational costs (Neitzert & Petras, 2022). Neoclassical theorists preferred not to spend company resources on social initiatives as they decrease shareholder values (Shakil, Mahmood, Tasnia, & Munim, 2019). This also leads to the misappropriation and misallocation of the company's valuable resources (Friedman, 1970), which negatively impacts profitability and competitive advantage (El Khoury, Nasrallah, & Alareeni, 2023).

Financial entities are usually connected through several financial products that interconnect banks' balance sheets in several dimensions (Smaga, 2014). A growing interest in sustainable portfolios highlights the necessity for deeper exploration into the interconnectedness of green and conventional assets. Currently, banks' decisions are linked to the inclusion of ESG factors in policies (Miralles & Redondo 2019). ESG standards adoption by banks linked with investing in fewer projects related to carbon emission, reducing pollution, increasing staff wages,

and engaging in the activities of communities through donation and sponsorship (Yuen, Ngo, Le, & Ho, 2022). Such an investment strategy focusing more on sustainable projects leads to constraints of ESG portfolio optimization. By this way, investments in ESG bound and constrains the portfolios diversification, which maximize risk and contagion. There is a gap in requirements and what investors do in sustainability (Iqbal, Naeem, & Suleman, 2022). Our study filled this gap by selecting ESG and non-ESG-oriented banks and estimating their spillover return to determine the financial contagion between them.

As per (Rodríguez & Peña, 2013), risk in the financial system can be raised by malfunctioning multiple mechanisms like contagions, correlated exposure, and information disruptions. Such a contagion behavior was witnessed during GFC and Sovereign Debt Crisis in Europe. Studies (Saeed, Bouri, & Alsulami, 2021; Lundgren, Milicevic, Uddin, & Kang, 2018; Le, Abakah, & Tiwari, 2021) identified the connection between risk and return regarding sustainability and traditional investment. Therefore, there is less focus on examining connectedness between non-ESG and ESG-oriented banks. For that, we have selected the top four banks in the US economy involved in ESG activities and those non-ESG-oriented to determine the return spillover between them. The reason behind selection of USA banks linked In the USA, 18% of total mutual funds are invested in sustainable investments (Pástor & Vorsatz, 2020). It is essential to understand the behavior of banks in stressful and calm periods by investigating their return spillover and the association of ESG and non-ESG oriented banks.

We used the (Diebold, & Yilmaz, 2012) spillover index to perform an analysis of ESG and non-ESG-oriented banks in the USA. The return spillover index of ESG-oriented banks indicates a high average spillover of 68.6% among the top four ESG-oriented banks during the sample period. A notable increase in return spillover was observed among ESG-oriented banks in the first quarter of the COVID-19 pandemic, suggesting heightened interconnectedness among these banks. Conversely, there was a lower average return spillover of 1.9% among the top four non-ESG-oriented banks, with a less pronounced increase in spillover during the same period compared to ESG-oriented banks. This asymmetry in spillover highlights the lesser connectedness of non-ESG-oriented banks compared to ESG-oriented ones. The presence of significant interconnectedness among ESG banks emphasizes the need of cross-market diversification to optimize portfolio performance in ESG banking sectors.

The contribution of the present study to the literature is the following: There are many studies related to green and traditional stock prices. However, this paper is a pioneer in shedding light on return spillover between ESG and non-ESG-oriented banks. Our study contributions towards the literature are linked with return spillover and contagion between ESG and non-ESG-oriented banks in the USA. Financial institutions can utilize these results to make informed investment decisions. ESG investments exclude sin stocks from their portfolios, which increases their return spillover among each other. Our findings are crucial for financial institutions to understand the portfolio diversification benefits between ESG and non-ESG investments.

The remaining paper is divided into sections, such as section 2 describes a literature review. After that, section 3 describes methodology. Section 4 explains the results empirically related to ESG and non-ESG-oriented banks. Section 5 describes the conclusion.

2. Literature Review

Recently, there has been a notable shift in financing from traditional to sustainable assets (Iqbal et al., 2022; Pástor & Vorsatz, 2020). It becomes costly and challenging to secure financing for environmentally harmful projects. Financial stakeholders are inclined to invest only in sustainable assets. These investments are also becoming a reason for financial contagion and exerting pressure on corporations to consider sustainable projects only (D'Orazio, & Popoyan, 2019; Dikau, & Volz, 2021). Investors are anxious about the interconnection and contagion of these factors (Iqbal et al., 2022; Mazzarisi, Zaoli, Campajola, & Lillo, 2020). All researchers (Mazzarisi et al., 2020; Umar, Aharon, Esparcia, & AlWahedi, 2022; Dikau, & Volz, 2021; Naeem, Adekoya, & Oliyide, 2021; Arif, Hasan, Alawi, & Naeem, 2021; Dutta et al., 2020; Shahzad, Naeem, Peng, & Bouri, 2021; D'Orazio, & Popoyan, 2019; Jin, Han, Wu, & Zeng, 2020; Koutmos, 2018; Iqbal, Umar, Ruman, & Jiang, 2024; Bouri, Cepni, Gabauer, & Gupta, 2021; Asl, Adekoya, & Oliyide, 2022; Andrieș, Ihnatov, & Tiwari, 2014) agreed upon that connectedness increases volatility spillover.

Certain studies (Nofsinger, Sulaeman, & Varma, 2019; Leite, & Uysal, 2023) find the underperformance of ESG during the market boom. During a pandemic, ESG indices demonstrated positive returns (Broadstock, Chan, Cheng, & Wang, 2021; Cagli, Mandaci, & Taşkın, 2023). Additionally, the COVID-19 pandemic stated that investment in ESG protected against downside risk. During the pandemic, Chinese firms with high CSR ratings suffered minimum losses and

recovered quickly (Huang et al., 2020). Research is limited to examining the impact of COVID-19 on stock return, particularly in the banking sector (Demir, & Danisman, 2021). For extension in literature, we included ESG and non-ESG-oriented banks and their return spillover in the standard and crash (COVID-19) period.

Cornett, Erhemjamts, & Tehranian (2016) found an association between return on equity and ESG. Bouslah, Kryzanowski, & M'zali (2018) stated that CSR is a risk mitigation tool during adverse economic conditions, supporting the risk management perspective. In studies, prior literature (Ramelli & Wagner, 2020; Albuquerque, Koskinen, Yang, & Zhang, 2020; Demers et al., 2021) determined that cash and debt levels are also crucial for the preservance of stock prices at time of market decline and pandemic. Liu, Nemoto, & Lu (2023) found positive association of stock return and ESG performance at time of COVID-19.

Studies have investigated the association of ESG with Islamic equities (Umar et al., 2022; Asl et al., 2022; Umar et al., 2017; Karim, Naeem, & Abaji, 2022), conventional bonds (Inderst & Stewart, 2018), conventional equities (Arif et al., 2021), green bonds (Umar et al., 2021; (Zaremba, Aharon, Demir, Kizys, & Zawadka, 2021; Zaremba et al. 2022; Umar et al., 2022). Pham, Adrian, Garg, Phang, & Truong (2021) illustrated that conventional bond market transfers its vulnerability towards the green bond market. However, there has been less focus on examining the association between ESG and non-ESG-oriented banks relationship between ESG investments and non-ESG investments at the bank level. Iqbal et al., 2024 stated that ESG investment is linked with lower social, environmental, and governance risk than non-ESG-oriented stocks. The previous study focused on the interconnectedness between sustainability and other investments. This paper identified the return spillover of ESG and non-ESG-oriented banks in the USA. Our findings contribute to understanding ESG and non-ESG investment dynamics in financial markets.

3. Methodology

Analytical tools enabled researchers to better understand and analyze the dynamic nature of spillover and contagion between interconnected market spillover index by Diebold and Yilmaz in 2009 (Qarni & Gulzar, 2021). In this study, we jointly apply Diebold and Yilmaz (2012) spillover index to analyze the dynamics of return spillover among ESG and non-ESG-oriented banks of the USA.

3.1 Spillover Index

For estimation of return, spillover of each bank *t* shares are summed by forecast error variance that is because of shock of bank *j*, for each $^{j \neq i}$, for that reason, t=1….N are summed. By applying generalized model of VAR by Koop, Pesaran, & Potter 1996, Pesaran & Shin 1996, and Diebold and Yilmaz (2012) we estimated the results of spillover index independently on ordering of variables. Following is the methodology, below is the N-variable VAR (P) covariance stationary equation.

$$\xi_{\tau} = \sum_{\iota=1}^{\pi} \Psi_{\iota} \xi_{\tau-\iota} + \varepsilon_{\tau} \qquad (1)$$

In equation (1) $\xi_t = \xi_{1,t}, \xi_{2,t}$and Ψ is 2×2 parameter matrix. ξ is denoted as a vector of volatilities for each selected bank. Independent and identical vector of error term is distributed and represented by ε_t .

$$\xi_{\tau} = \sum_{\iota=0}^{\infty} \mathrm{X}_{\iota} \varepsilon_{\tau-\iota} \qquad (2)$$

In Equation (2) moving average was estimated by $N \times N$ coefficient matrices which follow the recursion$X_t = \theta_1 X_{t-1} + \theta_2 X_{t-2} + \cdots \theta_p X_{t-p}$ are depicted by $X_t . X_0$ is the identity matrix with $X_t = 0$ for < 0 . In ξ_i ahead of H-step predict Error variance because of shock ξ_i to ξ_t for $t = 1,2 \ldots . N$ own spillover is estimated and in X_t ahead of H-step predict error variance because of shock to$t, j = 1,2, \ldots N$, for that $j \neq t$ is estimated as spillover of cross bank.

To achieve orthogonality, Cholesky factorization was employing to make resulting variance decomposition that depended on ordering of variables. To solve this issue Diebold and Yilmaz (2012) method was used by applying Koop (1996) and Pesaran and Shin (1998), therefore, KPPS, generalized VAR method. The KPPS H-step ahead forecast error variance (Pesaran & Shin 1996; Koop et al., 1996) is computed as,

$$\gamma_{\iota\varphi}^{\gamma}\left(\mathrm{H}\right)=\frac{\sigma_{\iota\iota}^{-1}\sum_{\eta=0}^{\mathrm{H}-1}\left(\varepsilon_{\iota}^{\mathfrak{z}}\mathrm{X}_{\eta}\Theta\varepsilon_{\iota}\right)^{2}}{\sum_{\eta=0}^{\mathrm{H}-1}\left(\varepsilon_{\iota}^{\mathfrak{z}}\mathrm{X}_{\eta}\Theta\mathrm{X}_{\eta}^{\mathfrak{z}}\varepsilon_{\iota}\right)} \qquad (3)$$

Whereas matrix of ε is presented by Θ, σ_{ii} represented the error term standard deviation for equation *i.* ℓ_i Indicated that shock to every variable is not orthogonalized, sum of row variance decomposition is not equal to 1.

$$\sum_{\varphi=1}^{\mathrm{N}}\gamma_{\iota\varphi}^{\gamma}\left(\mathrm{H}\right)\neq 1 \quad (4)$$

For validity of spillover index validity, the diagonal element presents the volatility of own market contributions towards spillover. Volatility spillover contribution from other to bank represented the spillover index of volatility by row elements of off-diagonal. On the other side, off-diagonal elements of matrix of volatility spillover index denoted the contribution of the volatility spillover to other from a specific bank. We normalize the each element of variance decomposition matrix by taking sum of columns and rows to estimate the spillover index as:

$$\gamma_{\iota\varphi}^{\sim\gamma}=\frac{\gamma_{\iota\varphi}^{\gamma}\left(\mathrm{H}\right)}{\sum_{\varphi=1}^{\mathrm{N}}\gamma_{\iota\varphi}^{\gamma}\left(\mathrm{H}\right)} \qquad (5)$$

$$\sum_{\varphi=1}^{\mathrm{N}}\gamma_{\iota\varphi}^{\sim\gamma}\left(\mathrm{H}\right)=1$$

As per estimation and

$$\sum_{\iota.\varphi=1}^{\mathrm{N}}\gamma_{\iota\varphi}^{\sim\gamma}\left(\mathrm{H}\right)=\mathrm{N}$$

The total volatility spillover is estimated as follows:

$$\Sigma^{\gamma}\left(\mathrm{H}\right)=\frac{\sum_{\substack{\iota.\varphi=1\\ \iota\neq\varphi}}^{\mathrm{N}}\gamma_{\iota\varphi}^{\sim\gamma}\left(\mathrm{H}\right)}{\sum_{\iota.\varphi=1}^{\mathrm{N}}\gamma_{\iota\varphi}^{\sim\gamma}\left(\mathrm{H}\right)}\times 100=\frac{\sum_{\substack{\iota.\varphi=1\\ \iota\neq\varphi}}^{\mathrm{N}}\gamma_{\iota\varphi}^{\sim\gamma}\left(\mathrm{H}\right)}{\mathrm{N}}\times 100 \qquad (6)$$

4. Data and Descriptive Statistics

A data set consisting of 2319 observations from January 1, 2015, to November 22, 2023, was analyzed. Below table provides descriptive statistics for the stock markets' returns of eight ESG and non-ESG-oriented banks. UWHR exhibits the highest mean return and volatility at the sample period.

Table 1: *Return—Descriptive Statistics*

	JPM	BAC	WFC	UC	UBCP	UBOH	FUSB	UWHR
Mean	0.000536	0.000413	0.0000869	0.000137	0.000382	0.000356	0.000278	0.00122
Median	0	0	0	0	0	0	0	0
Minimum	-0.14965	-0.15397	-0.15868	-0.19299	-0.19083	-0.17662	-0.22043	-0.27117
Maximum	0.180125	0.177962	0.145347	0.179843	0.299166	0.181518	0.161784	1.023565
Std. Dev.	0.017293	0.01979	0.019671	0.020783	0.022155	0.023714	0.02307	0.033629
Skewness	0.361217	0.297142	0.009622	0.013692	1.086475	0.065415	0.243394	12.62062
Kurtosis	17.06401	13.21003	11.94379	16.29135	24.61429	10.83484	13.2701	379.2857
Jarque-Bera	19162.5	10106.77	7729.194	17069.84	45597.25	5932.954	10214.41	13742784
Probability	0	0	0	0	0	0	0	0
Sum	1.242118	0.957679	0.201427	0.318299	0.885857	0.826426	0.645539	2.828547
Sum Sq. Dev.	0.693167	0.907875	0.89697	1.001222	1.137738	1.303532	1.233676	2.621501
Observations	2319	2319	2319	2319	2319	2319	2319	2319

Note: The indices analyzed are JPM (JP Morgan Chase & co), BAC (Bank of America), WFC (Wells Fargo Co), UC (Citi Group), UBCP (USCB financial holdings), UBOH (United Bancshares), FUSB (First US Bancshares) and UWHR (U Wharrie capital).

5. Discussion of Results

5.1 Index of Return Spillover

5.1.1 ESG-Return Spillover

Table 2*: Returns the Spillover Index, which Captures the Spillover Effect of ESG-Oriented Banks.*

	JPM	**BAC**	**WFC**	**UC**	**From Others**
JPM	30.81	25.17	20.64	23.39	69.20
BAC	24.95	30.32	21.20	23.53	69.68
WFC	22.22	23.09	33.11	21.58	66.89
UC	23.95	24.26	20.49	31.30	68.70
Contribution to others	71.12	72.52	62.33	68.50	274.47
Contribution including own	101.93	102.84	95.44	99.80	68.60%

Figure 1*: Average Return spillover of ESG-oriented banks.*

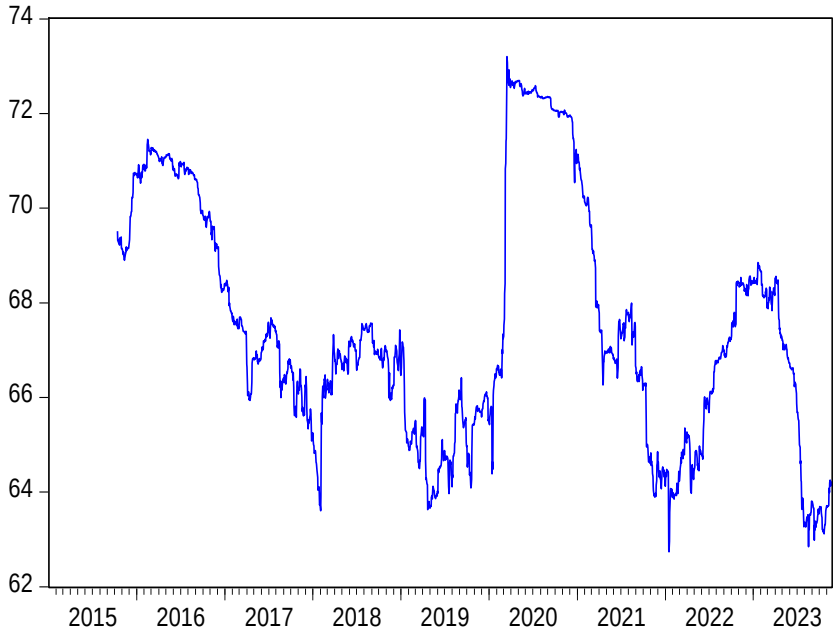

Table 2 presents the return spillover index of ESG-oriented banks in the USA. This table indicated that average return spillover among the top four ESG-oriented banks of the USA is 68.6% . The own market highest return spillover was contributed by WFC (33.10%), with 66.89% contributions from others to its returns. The BAC is the highest return spillover recipient from others (69.682%). This table shows the positive return spillover among ESG-oriented banks in the USA. These results align with existing literature confirming the positive return during the pandemic (Liu, Nemoto, & Lu, 2023; Albuquerque et al., 2020).

The return spillover index indicated that BAC obtained highest spillover (69.68) from others and transmitted highest spillover (72.52) to others. Meanwhile, WFC get the lowest spillover from others (66.89) and transferred lowest spillover (62.33) to others. Rolling window analysis revealed (Fig 1) a sharp increase in spillover among ESG-oriented banks at time of pandemic in first quarter. This peak is greater than the peak of non-ESG-oriented banks. This peak indicated that ESG-oriented banks are highly interconnected to each other. Any positive and negative event in a bank has a high spillover towards other banks. A gradual decrease in spillover was observed from the 2nd quarter of 2020 due to globally stabilization of economy from pandemic. As per Andrieș, Ihnatov, & Tiwari, 2014, ESG portfolios have some unique

characteristics, such as excluding sin stock, which becomes a reason for diversification costs and changes the risk-return portfolio. (Auer, 2016) found that the weaker performance of ESG in the early stages was due to lower diversification and the exclusion of some sin stocks.

5.1.2 Non-ESG – Return Spillover

Table 3*: Return Spillover Index Captures the Spillover Effect of Non-ESG-Oriented Banks.*

	UBCP	UBOH	FUSB	UWHR	From Others
UBCP	97.99	1.18	0.60	0.23	2.01
UBOH	0.75	98.31	0.56	0.37	1.69
FUSB	0.33	1.44	97.94	0.28	2.06
UWHR	0.14	0.42	1.36	98.08	1.92
Contribution to others	1.22	3.04	2.52	0.89	7.67
Contribution including own	99.21	101.35	100.46	98.971	1.9%

Note: *The indices analyzed are UBCP (USCB* financial holdings), UBOH (United Bancshares), FUSB (First US Bancshares), and UWHR (U Warrie Capital).

Figure 2: *Average Return spillover of non-ESG-oriented banks*

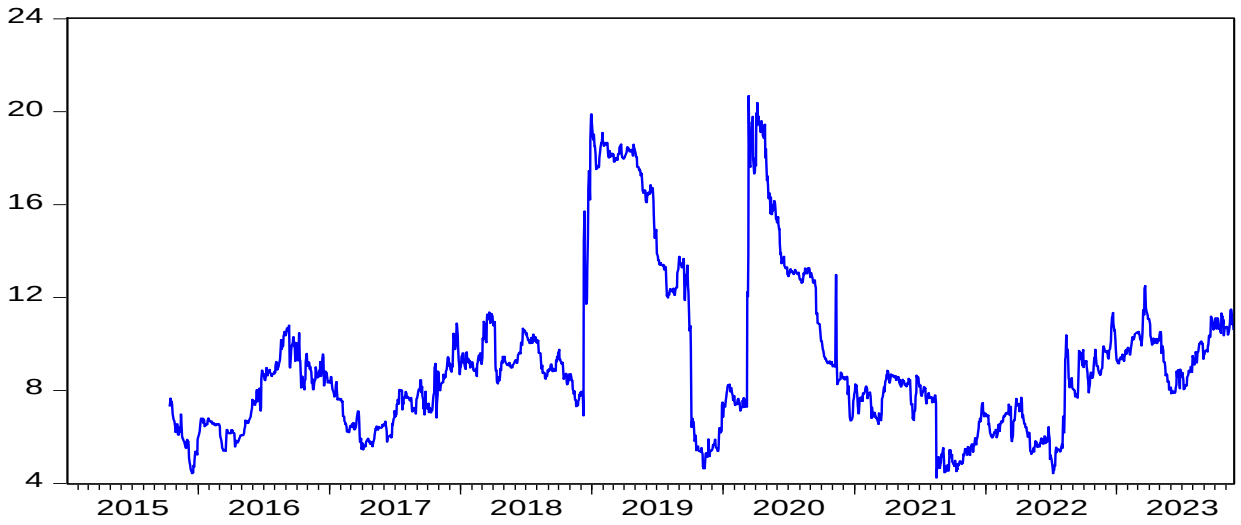

Table 3 indicated that the average return spillover between the top four non-ESG-oriented banks of the USA is 1.9%. The maximum return spillover on market contribution is shown by UBOH (98.31%), with 1.69% contributions from others to its returns. The spillover from the FUSB to other markers ranges from 0.56% to 1.36%, indicating the lower influence of FUSB on other markets. This table shows the positive return spillover among non-ESG-oriented banks in the USA. A plausible confirmation in the literature is that spillover decreases when ESG stocks are replaced with traditional stocks. It indicates less interconnection between non-ESG-oriented stocks.

The return spillover index indicated that FUSB obtained highest spillover (2.06%) from others, and UBOH transmitted the highest spillover (3.04%) to others. Rolling window analysis revealed (Fig 2) a sharp increase in spillover between non-ESG-oriented banks at time of pandemic in 1st quarter of 2020. This peak is less than the peak of ESG-oriented banks. This peak indicated that non-ESG-oriented banks are less interconnected than ESG-oriented banks. Any positive and negative event in a bank has less spillover towards other banks. A gradual decrease in spillover was observed from the 2nd quarter of 2020 due to the stabilization of the economy from the COVID-19 pandemic. An explanation found in the literature that collapse in February 2020, investors started to prefer lower risk fund of ESG. A peak observed at the start of 2019 is due to China's demand and supply. This affects the non-ESG-oriented banks but has no impact on the ESG-oriented banks.

5.1.3. Combined (ESG & Non-ESG oriented banks) – Return Spillover

Table 4*: Returns the Spillover Index and Captures the Spillover Effect of ESG and Non-ESG-Oriented Banks.*

	JPM	BAC	WFC	UC	UBCP	UBOH	FUSB	UWHR	From Others
JPM	30.2	24.7	20.3	22.9	0.1	0.5	1.4	0.0	69.8
BAC	24.4	29.7	20.7	23.0	0.2	0.6	1.3	0.1	70.3
WFC	21.8	22.6	32.4	21.1	0.4	0.5	1.2	0.1	67.6
UC	23.4	23.7	20.0	30.5	0.2	0.7	1.4	0.1	69.5
UBCP	1.4	1.5	1.6	1.9	92.2	0.9	0.5	0.2	7.8
UBOH	2.5	2.8	2.3	2.8	0.6	88.4	0.4	0.2	11.6
FUSB	3.9	4.0	3.7	4.0	0.2	1.1	82.9	0.2	17.1
UWHR	2.2	1.8	1.5	1.2	0.1	0.3	1.2	91.7	8.3
Contribution to others	79.6	81.0	70.1	76.9	1.8	4.4	7.4	0.9	322.1
Contribution including own	109.8	110.7	102.5	107.4	94.0	92.8	90.4	92.6	0.4

Note: The indices analyzed are JPM (JP Morgan Chase & co), BAC (Bank of America), WFC (wells Fargo co), UC (Citi Group), UBCP (USCB financial holdings), UBOH (United Bancshares), FUSB (First US Bancshares) and UWHR (U Wharrie capital).

Figure 3: *Average Return spillover of ESG and non-ESG-oriented banks.*

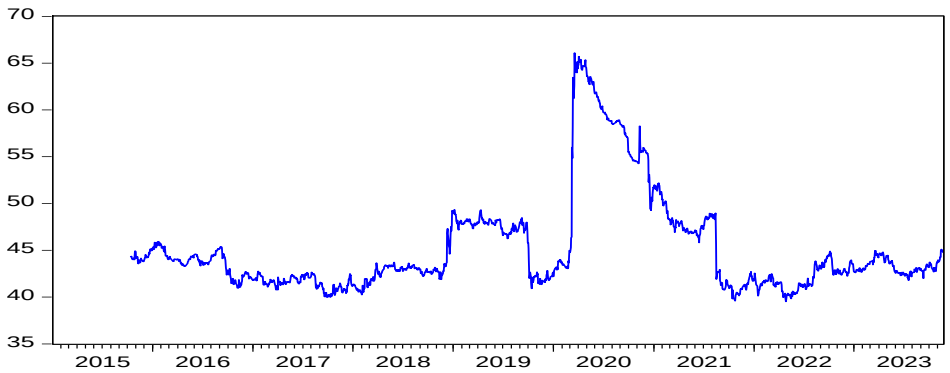

Table 4 returns spillover index captures the average spillover between ESG and non-ESG-oriented banks. Indicated average spillover is minimum as compare to total spillover of ESG-oriented banks but higher than non-ESG-oriented banks. These findings highlight the presence of asymmetry in the spillover between related banks. Table 4 indicates that the BAC received the highest spillover (80.98) to others. UBCP received a lower spillover from others and transmitted a 1.79 spillover to others, whereas UWHR transmitted a lower spillover to others. The own market maximum spillover is indentified by UBCP (92.16), whereas the minimum market itself spillover is shown by BAC (29.68). The time-varying pattern depicted in Figure (3). Rolling window analysis (Fig 3) reveals an increase in spillover at COVID-19 crisis. That is a reason for a sharp increase in return spillover in the first quarter of 2020. A gradual decrease in spillover was observed from the second quarter of 2020 due to globally stabilization of global economy.

These results showed less connectedness of non-ESG-oriented banks towards ESG-oriented banks. The minimum influences of non-ESG-oriented banks towards ESG-oriented banks provide them with the portfolio diversification abilities for ESG-oriented banks. These show that the intra-ESG-oriented banks return spillover and have little influence on others. The presence of high intra-ESG oriented banks returns spillover, which provides the necessity of cross-market diversification among ESG and non-ESG oriented banks to achieve the benefits of an optimally diversified portfolio. ESG-oriented banks showed a higher financial contagion. Our results aligned with Arif (2021), whose Sample showed a weakly connected network of return spillover between conventional and green investments. As per Oliveira, Jegu, & Santos, 2020 and Jin, Han, Wu, & Zeng, 2020, sustainability indices provide diversification opportunities to traditional assets.

6. Conclusion

The study has provided compelling evidence on the dynamics of return spillover within and among ESG and non-ESG-oriented banks of the USA. The findings have revealed the presence of significant spillover among the USA ESG-oriented banks, with the return spillover among the ESG-oriented banks being higher than that of non-ESG-oriented banks in the USA. The analysis revealed differences between ESG-oriented and non-ESG-oriented banks regarding their interconnectedness and spillover effects, particularly during pandemic. Due to maximum interconnectedness among ESG-oriented banks, we suggested a cross market diversification to

optimize portfolio performance. Non-ESG-oriented banks identified less connectivity and influence towards ESG-oriented banks, potentially providing diversification opportunities for ESG-focused portfolios. The incorporation of sustainability measures may initially limit diversification opportunities. However, the study emphasizes that diversification remains crucial for minimizing volatility and optimizing portfolio performance in ESG and non-ESG sectors. This underscores the banks practical implication, the need to include ESG and non-ESG investments in banking portfolios to enhance portfolio diversification benefits.

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