

Comparative Analysis of Risk Between Conventional Bonds and Sukuk Using Duration-Normal VaR

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Abstract

Purpose: Islamic finance and Sukuk have garnered so much interest in recent times that not just Islamic countries, but also Western countries have started trading in Sukuk. This research paper aims to assess whether Sukuk can bring benefits to investors in terms of reduced market risks when added to a portfolio of conventional bonds.

Methodology: The research employed the Duration-Normal Value-at-Risk (VaR) Model.

Findings: Using the Duration-Normal VaR model, it has been found that the market risk associated with the mixed portfolio through the addition of Sukuk to the conventional bond was significantly lower than that of a pure bond portfolio. This could be explained by the low correlation between the conventional bonds and Sukuk. The accuracy of the Duration-Normal VaR model has been confirmed by the Kupiec Proportion of Failure Test.

Originality: This paper provides a different view on applying the Value-at-Risk (VaR) approach for assessing the market risk associated with Islamic and conventional bonds and further applies a backtesting procedure to examine the accuracy of the model.

Keywords: Sukuk; Market Risk; Value-at-Risk; Duration-Normal Model, Back-testing Procedures

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تحليل مقارنة للمخاطر بين السندات التقليدية والصكوك باستخدام نموذج القيمة المعرضة للخطر الطبيعي القائم على المدة

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ملخص البحث

أهداف البحث: يهدف البحث إلى تقييم ما إذا كان إدراج الصكوك ضمن محفظة من السندات التقليدية يمكن أن يحقق فائدة للمستثمرين من حيث خفض مخاطر السوق.

منهجية البحث: اعتمد البحث نموذج القيمة المعرضة للخطر الطبيعي القائم على المدة.

النتائج: أظهرت النتائج، باستخدام نموذج القيمة المعرضة للخطر الطبيعي القائم على المدة، أن مخاطر السوق المرتبطة بالمحفظة المختلطة الناتجة من إضافة الصكوك إلى السندات التقليدية، كانت أقل بدرجة ملحوظة، مقارنة بمحفظة تتكون حصرياً من السندات التقليدية. ويمكن تفسير ذلك بانخفاض معامل الارتباط بين السندات التقليدية والصكوك. كما جرى التحقق من دقة نموذج القيمة المعرضة للخطر الطبيعي القائم على المدة من خلال اختبار نسبة الإخفاق لكوبيك (Kupiec Proportion of Failure Test).

أصالة البحث: يقدم هذا البحث منظوراً مختلفاً لتطبيق منهجية القيمة المعرضة للخطر (VaR) في تقييم مخاطر السوق المرتبطة بالسندات الإسلامية والتقليدية، ويطبق إجراء الاختبار الرجعي (Backtesting) للتحقق من دقة النموذج.

الكلمات المفتاحية: الصكوك، مخاطر السوق، القيمة المعرضة للخطر، نموذج المدة الطبيعي، إجراءات الاختبار الرجعي

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1. Introduction

The concept of Sharia-compliant financial transactions was laid by Prophet Muhammad ﷺ in his teachings of Islam fourteen centuries ago, and before that, financial practices formed part of what is referred to as social economics. The date of initiation of conventional and Islamic finance is that the former broadened its horizons around the 1950s, whereas the latter came to light in the 1970s when Islamic scholars and jurists met to discuss the aspects of Riba (interest) on contracts and removing its application in contracts and business financial transactions. As part of financial offerings, Islamic finance comprises Islamic Investment Funds, Takaful, Capital markets (Sukuk), and finally the main component, which is Islamic banking with USD 3.88 trillion worth of total assets.¹

Islamic finance soon gained such popularity that it was present as of 2020 in more than 75 countries, mainly from the Organization of Islamic Countries (OIC) and the Gulf Cooperation Council (GCC).² Even in academic research, Islamic banking became a topic of major interest.³ However, with such an expansion, the operations and products in Islamic finance also became more complex, thus requiring more regulations and operational standards. In view of aligning with the requirements of capital adequacy under the global banking standards, the Islamic Financial Services Board (IFSB) introduced the IFSB-23 standard. The value of the global Islamic Financial Services Industry (IFSI) reached USD 3.88 trillion in 2024, representing a year-on-year growth of 14.9%. Islamic banking witnessed a growth of 17.05%, driven by stronger capital positions and improved asset quality. Islamic insurance (Takaful) performed better than many conventional insurance markets by growing at 16.9%. Finally, a 25.6% increase in new issuances in the Sukuk (Islamic bond) market was recorded, which highlights solid sovereign interest and investor demand.⁴ Commenting on the impact of the 2008 global financial crisis, some researchers stressed the resilience of the Islamic banking system.⁵

Sukuk is the plural of the Arabic ‘*sakk*’, which means certificate or note. In other words, *sukuk* are Investment Certificates. The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) defines investment Sukuk under the Shariah standard 17 as “certificates of equal value representing common rights or shares in the underlying assets or their services and usufructs,”⁶ bearing similarity to that

1 IFSB - Islamic Financial Services Industry Stability Report 2025, “Navigating Shallow Waters: Addressing Structural Vulnerabilities and Shoring Up Resilience to Global Shocks.” Kuala Lumpur, 16 May 2025. <https://www.ifsb.org/wp-content/uploads/2025/05/IFSI-Stability-Report-2025.pdf>

2 A. Khan et al., “A Bibliometric Review of Takaful Literature,” *International Review of Economics and Finance*, vol. 69, (2020): 389-405.

3 M. Alshater, “Islamic Banking: Past, Present and Future,” *Journal of College of Sharia and Islamic Studies*, vol. 41, no. 1 (2023): 193-221.

4 IFSB, “Islamic Financial Services Industry Stability Report 2025.”

5 M. Hassa, et al., “A Review of Islamic Investment Literature,” *Economic Papers*, vol. 38, no. 1, (2018): 345-380.

6 AAOIFI, “Sharia Standard No 17: Investment Sukuk,” 473. <https://aaoifi.com/ss-17-investment-sukuk/?lang=en>

of the Islamic Financial Services Board 2 (IFSB).¹

Islamic bond contracts can be classified into agency-based, partnership/equity-based, lease-based, and sales-based.² Furthermore, mixed portfolio Sukuk can be regarded as a fifth category.³ The desired bond combinations would define the risk-return profile of this mixed portfolio.

Sukuk has been described as another way of raising funds to finance positive expected return investments, thus allowing access to the capital market,⁴ and it has been argued that Sukuk have some attributes of bonds and stocks designed in a way to abide by Islamic rules and guidelines.⁵

Moreover, based on Islamic financial contracts, Sukuk is a new instrument with a flexible structure, whereas a bond works on the same traditional concept of an interest-bearing loan. It has been argued that Sukuk is a financial instrument that is not interest-generating but rather encourages investing in economic activities, which in turn will yield a return derived from leasing or sharing ownership of assets.⁶

Furthermore, conventional bonds and Sukuk also differ with respect to the risk aspect in investment. Sukuk targets compliance risk from a Shariah-related perspective, related to the structure that emanates from Islamic finance contracts. In addition to that, Sukuk also faces risks such as market risk, commodity risk, liquidity risk, foreign exchange risk, business risk, and credit risk.⁷

Following the changes in the monetary policy, the global financial crisis of 2008 had a significant impact on the yields of corporate and government bonds as well as on treasury bills. For example, the 10-year treasury bond yield in the US dropped from 4.27% in June 2008 to 2.05% in December 2008,⁸ when the Federal Reserve decided to reduce interest rates to stimulate economic activity through consumer spending and financing mechanisms.⁹ The global crisis of 2008 prompted several researchers to analyse the Islamic

1 Sukuk is defined as per IFSB-2 (194) as certificates representing the bondholder's investment in a particular asset and whereby the holder reserves all obligations and rights to that asset. See, Islamic Financial Services Industry Stability Report 2025.

2 Agency-based (*wakāla bi-istithmār*), partnership (*muḍāraba* and *mushāraka*), lease-based (*ijāra*, *ijāra mawṣūfa fī al-dhimma*, *ijāra muntahiya bi-al-tamamlīk*) and sale-based (*istisna*, *muḍāraba*, *bay' bi-thamani al-ajil*, *salām*). See, A. Dusuki, *Islamic Financial System: Principles and Operations* (Kuala Lumpur: International Shari'ah Research Academy for Islamic Finance, 2012).

3 M. Ayub. *Understanding Islamic Finance* (West Sussex: Wiley, 2007).

4 M. Nagano, "Who Issues Sukuk and When? An Analysis of the Determinants of Islamic Bond Issuance," *Review of Financial Economics*, vol. 31, (2016): 45-55.

5 P. Klein and L. Weill, "Why Do Companies Issue Sukuk?" *Review of Financial Economics*, vol. 31, no.1 (2016): 26-33.

6 A. Badri, *Malaysian Sukuk Market Handbook: Your Guide to the Malaysian Islamic Capital Market* (Kuala Lumpur: RAM Rating Services, 2008).

7 A. Tariq, "Managing Financial Risks of Sukuk Structures," MSc diss. Loughborough University (2004), 43-54.

8 Bloomberg database, <https://www.bloomberg.com/quote/FEDMMINU:US>

9 Effective 16 December 2008, interest rate was cut to 0.25 by the Federal Open Market Committee (FOMC). <https://www.bloomberg.com/quote/FEDMMINU:US>

financial system.¹ It has also been argued that the global crisis had no impact on the Islamic financial market due to restrictions imposed by Shariah and the prohibitions of *gharar* (pointless fallacy) and *ribā* (Interest).²

The well-known Islamic economists, Ismath Bacha and Mirakhor, argue that most Muslim countries have had recourse to external debt to finance infrastructural developments.³ These governments approached international financial institutions or other foreign countries to borrow the required funds. However, these countries faced several challenges, including domestic currency fluctuations while borrowing is made in foreign currency, increasing fluctuating economy and leverage caused by the borrowing, and heavy dependence on commodity exports, exerting price vulnerability. The researchers advanced that the introduction of the Islamic bonds could help reduce foreign funding, fluctuating economy, and price vulnerability. For example, the first sukuk issuance was made by the Malaysian government in 2001 to fund its infrastructural development. Additionally, the unique characteristics of the Islamic bond caught the attention of Muslim as well as conventional investors at large.

Sukuk has been described as a major Islamic capital market instrument whereby the public at large helps raise long-term funds.⁴ Regarded as equal value certificates, Sukuk represent undivided shares in the ownership of special investment projects or in the ownership of tangible assets, usufructs, and services. For instance, with Sukuk and its unique profit and loss sharing characteristics, making any comparison between Sukuk and conventional bonds became difficult.⁵ In a nutshell, the main difference between Sukuk and conventional bonds is that with the former, based on the actual performance of the project at hand, investors share both the risk and profit of the investment, whereas with conventional bonds, investors agree on a fixed and guaranteed amount. More precisely, investing in conventional bonds guarantees the bondholder a return that is dependent on the claimed indebtedness for the borrowed money only, whereas with Sukuk, the return depends on several factors, such as trade transactions, underlying contracts, business venture

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- 1 A. Ajmi et al., "How Strong are the Causal Relationships Between Islamic Stock Markets and Conventional Financial Systems?" *Journal of International Financial Markets, Institutions and Money*, vol. 28 (2014): 213–27; S. Hammoudeh et al., "Dynamic Dependence of the Global Islamic Equity Index with Global Conventional Equity Market Indices and Risk Factors," *Pacific-Basin Finance Journal*, vol. 30, (2014): 189–206; and N. Naifar, "Do Global Risk Factors and Macroeconomic Conditions Affect Global Islamic Index Dynamics? A Quantile Regression Approach," *The Quarterly Review of Economics and Finance*, vol. 61 (2016): 29–39.
 - 2 E. Smolo and A. Mirakhor, "The Global Financial Crisis and its Implications for the Islamic Financial Industry," *International Journal of Islamic and Middle Eastern Finance and Management*, vol. 3, no. 4 (2010): 372–385.
 - 3 O. Ismath Bacha and A. Mirakhor, "Funding Development Infrastructure Without Leverage: A Risk-Sharing Alternative Using Innovative Sukuk Structures," *The World Economy*, vol. 41, no. 3 (2018): 752–762.
 - 4 T. Hussain and M. Khalil, "Shariah Issues in Islamic Capital Markets of Pakistan: A Case Study of Sukuk," *Journal of Islamic Thought and Civilization*, vol. 9, no. 1 (2019): 1–22.
 - 5 T. Al-Deehani, R. Karim and V. Murinde, "The Capital Structure of Islamic Banks Under the Contractual Obligation of Profit Sharing," *International Journal of Theoretical and Applied Finance*, vol. 2, no. 3 (1999): 243–283; and H. Mohamed, M. Masih and O. Bacha, "Why do Issuers Issue Sukuk or Conventional Bond? Evidence from Malaysian Listed Firms Using Partial Adjustment Models," *Pacific-Basin Finance Journal*, vol. 34, (2015): 233–252.

ownership, among others.¹

With yearly issuance consistently over \$150 billion, the global Sukuk market has expanded from roughly \$200 billion in 2015 to over \$700 billion in 2023.² Conventional bonds and Sukuk are increasingly held in the same portfolio by institutional investors, such as takaful operators, sovereign wealth funds, and conventional pension funds. A crucial point is brought up by this trend: Are the risks associated with Sukuk and conventional bonds the same, and if not, how can investors assess and contrast those risks?

The literature on Sukuk and traditional bonds is fundamentally in conflict. According to theoretical reasons, Sukuk should be less risky than conventional bonds because it is asset-backed and complies with Shariah, especially during interest rate shocks.³ However, empirical research has not been able to come to a consensus: some believe Sukuk is safer,⁴ others find no difference,⁵ and yet others speculate that Sukuk may have hidden hazards because there is less legal redress.⁶ For portfolio managers, regulators, and academics studying Islamic finance, this discrepancy poses a practical challenge because there is no widely accepted risk metric that equitably contrasts Sukuk and conventional bonds under various market circumstances. Therefore, the main study question is not whether Sukuk are *riskier* or *safer* in absolute terms, but rather, it depends on the paradigm of risk measuring that is used to compare these two asset classes with confidence, and what it reveals about portfolio diversification.

There are three reasons why fixing this issue is important. The first is safeguarding investors. By 2023, there were more than \$700 billion worth of Sukuk outstanding worldwide, held by ordinary investors, takaful operators, and pension funds, all of which lacked clear guidance on the true tail risk of Sukuk in comparison to bonds. Underestimating Sukuk, risk could result in either overallocation—exposing investors to unforeseen losses—or under allocation—missing diversification benefits. The second is regulatory capital. Under Basel III, banks that compute risk-weighted assets for Sukuk versus bonds using internal models are required to present comparisons that are supported by empirical evidence. The cost of Islamic finance may be distorted if banks are subject to arbitrary capital charges in the absence of a standardised risk metric. The third is the development of theory. For all fixed-income instruments, duration is assumed

1 R. Bhuiyan et al., “Financial Integration Between Sukuk and Bond Indices of Emerging Markets: Insights from Wavelet Coherence and Multivariate GARCH Analysis,” *Borsa Istanbul Review*, vol. 18, no. 3 (2018): 218-230.

2 IFSB, “Islamic Financial Services Industry Stability Report 2024: Maintaining Financial Stability in a Challenging Risk Environment.” <https://www.ifsb.org/wp-content/uploads/2024/09/IFSB-Stability-Report-2024-8.pdf>

3 A. Jobst, et al., “Islamic Bond Issuance: What Sovereign Debt Managers Need to Know,” *International Journal of Islamic and Middle Eastern Finance and Management*, vol. 1, no. 4 (2008): 330–344; and S. Azmat, M. Skully and K. Brown, “Issuer’s Choice of Islamic Bond Type,” *Pacific Basin Finance Journal*, vol. 28, (2014): 122-135.

4 N. Naifar and S. Mseddi, “Sukuk Spreads Determinants and Pricing Model Methodology,” *Afro-Asian Journal of Finance and Accounting*, vol. 3, no. 3 (2013): 241–257.

5 B. Saiti, O. Ismath Bacha and M. Masih, “The diversification Benefits from Islamic Investment During the Financial Turmoil: The case for the US-based Equity Investors,” *Borsa Istanbul Review*, vol 14, no. 4 (2014): 196–211.

6 C. Godlewski, R. Turk-Ariss and L. Weill, “Sukuk vs. Conventional Bonds: A Stock Market Perspective,” *Journal of Comparative Economics*, vol. 41, no. 3 (2013): 745-761.

to capture interest rate risk in the traditional finance literature. This premise is contested by Sukuk, as its returns are based on the performance of underlying assets rather than explicit interest. Examining the applicability of duration-normal VaR, a common bond risk model, to Sukuk challenges fixed-income theory and could highlight structural variations that existing models overlook.

Three unique contributions to the literature are made by this study. First, as a methodological contribution, this is the first study to compare Sukuk with traditional bonds using duration-normal VaR instead of raw returns or standard duration. A cleaner examination of structural risk differences is made possible by duration normalisation, which eliminates the confounding effect of varying maturities. Second, as an empirical contribution, this paper offers the first benchmark of Sukuk vs bond risk under conventional monetary policy, free from distortion by quantitative easing or zero-interest-rate policies, using a clean pre-COVID baseline period (2017–2019). Previous research included crisis and non-crisis times, making it hard to separate the inherent risk characteristics of Sukuk. Third, there is a practical contribution to this study as investors may build the right weighted portfolio of Sukuk and conventional bonds so as to reduce portfolio risk.

Based on the theoretical premise that Sukuk's asset-backed structure separates their returns from changes in pure interest rates, we make the following hypothesis: According to duration-normalized Value at Risk (VaR), adding Sukuk to a portfolio of conventional bonds considerably lowers portfolio risk.

2. Literature Review

Over the past decade, the Sukuk market has witnessed a remarkable and substantial growth, and in recent years, backed by a strong performance, Sukuk has attracted more attention globally.

Most initial research has attempted to study and analyse the mechanisms and structures of Sukuk as compared to those of conventional obligations, while a few researchers found it important to explore the risk-return profiles as well. For instance, the structures of Sukuk were compared to those of the conventional ones, and it was concluded that Sukuk was a better financial instrument for pooling of funds and managing liquidity, and the security they gave from their asset backing.¹

The prospects and practices of Sukuk in the Malaysian Islamic capital market have also been studied by analysing the conventional and Islamic financial instruments.² Additionally, the performance of the conventional bonds and Sukuk having comparable ratings and yields in terms of potential causality factors was examined, but the authors could not find any.³

The Shariah issues related to the structure of Sukuk were investigated, and findings showed parallels

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- 1 S. Vishwanath and S. Azmi, "An Overview of Islamic Sukuk Bonds," *The Journal of Structured Finance*, vol. 14, no. 4 (2009): 58-67.
 - 2 M. Zin et al., "The Effectiveness of Sukuk in Islamic Finance Market," *Australian Journal of Basic and Applied Sciences*, vol. 5, no. 12 (2011): 472-478.
 - 3 M. Ariff and M. Safari, "Are Sukuk Securities the Same as Conventional Bonds?" *Afro Eurasian Studies*, vol. 1, no. 1 (2012): 101-125.

between the conventional bonds and Sukuk in terms of trading of debt-based Sukuk, late-payment penalty, asset-based transaction ownership status, and purchase undertaking in equity-based structure.¹ From within the Indonesian bond market, the returns on the conventional bonds and Sukuk were assessed, and it was found that a significant difference in the yields.² It further added that the yields on conventional bonds were lower than those of Sukuk. The sensitivity of Sukuk traded in Malaysia was assessed and compared to corporate and government bonds in terms of duration and convexity. The researchers concluded that Islamic bonds generated higher yields as compared to government bonds, whereas conventional bonds had higher returns than Sukuk. Moreover, the authors added that Sukuk were relatively less risky than conventional bonds.³ The extension of ethical financial management and the establishment of Islamic finance risk management techniques were studied, based on empirical evidence.⁴ The researchers found that Sukuk risk profiles and structures are interrelated, thus concluding that Sukuk risks are Shariah-based.

By adopting the method of generalized autoregressive conditional heteroskedasticity (GARCH), the spreads associated with Sukuk were assessed.⁵ The researchers studied the factors impacting the spreads on Sukuk and their volatility, thereby contributing to the Islamic financial markets' empirical literature. The study shed light on the factors affecting the pricing of Sukuk and risk management. In addition, an assessment of the global financial crisis of 2008 on Sukuk spreads was made, following which the authors tried to anticipate the impact of any potential crisis on the Islamic financial market.

The reaction of Malaysian investors to Sukuk and conventional bonds has been examined.⁶ It was found that on one hand, there was a negative response from the stock market to the Sukuk issuance declaration, whereas on the other hand, a neutral response was noted when conventional bond issuance was announced.

Through the wavelet approach, which was previously used in Engineering sciences, the market links the price structure between global Sukuk have been examined.⁷ The degree of risk-shifting pattern between Islamic and conventional bonds has been assessed.⁸ This examination is regarded as extremely critical

1 A. Lahsasna and L. Lin, "Issues in Islamic Capital Markets: Islamic Bond/Sukuk," in Proceedings of the 3rd International Conference on Business and Economic Research 12-13 March 2012 (Bandung, 2012).

2 H. Fathurahman and R. Fitriati, "Comparative Analysis of Return on Sukuk and Conventional Bonds," American Journal of Economics, vol. 3, no. 3 (2013): 159-163.

3 R. Ramasamy, S. Munisamy and M. Helmi, "Relative Risk of Islamic Sukuk Over Government and Conventional Bonds," Global Journal of Management and Business Research, vol. 11, no. 6 (2011): 4-12.

4 M. Alswardan, A. Daynes and P. Pasgas, "Understanding and Evaluation of Risk in Sukuk Structures," Journal of Islamic Accounting and Business Research, vol. 8, no. 4 (2017): 389-405.

5 M. Rahman, M. Omar and S. Kassim, "An application of GARCH Modelling on the Malaysian Sukuk Spreads," Journal of Islamic Finance, vol. 2, no. 2 (2013): 26-37.

6 C. Godlewski, R. Turk-Ariss and L. Weill, "Sukuk vs. Conventional Bonds."

7 R. Bhuiyan, et al., "Does the Malaysian Sovereign Sukuk Market Offer Portfolio Diversification Opportunities for Global Fixed-Income Investors? Evidence from Wavelet Coherence and Multivariate-GARCH Analyses," The North American Journal of Economics and Finance, vol. 47 (2019a): 675-687.

8 S. Hamzah, et al., "Empirical Evidence of Risk Shifting in Bonds and Debt-Based Sukuk: The Case of Malaysian Corporations," Journal of Islamic Accounting and Business Research, vol. 9, no. 5 (2018): 687-700.

by scholars and economists who believe that one of the principal causes of the global financial crisis is risk-shifting. By adopting the methods of multivariate GARCH and wavelet coherence, the variances in developed and emerging countries have been explored, as well as the correlations of bond indices.¹

The Value-at-Risk (VaR) approach has been used by some researchers to analyse the risk profile of Islamic and conventional bonds.² The VaR methodology was applied to study the effect of Sukuk on the investment portfolio, both in terms of risk structure and cost.³ The authors compared Sukuk to Eurobonds issued by the same financial institution and found contrasting behaviours. However, another interesting fact is that the overall risk of the portfolio can be reduced when Sukuk are added to conventional bonds. Using the delta-normal VaR approach, Paltrinieri et al assessed the Value-at-Risk of conventional bonds and Sukuk and reached similar findings to those of Raei and Cakir. They found that a lower level of risk was associated with Sukuk, and a mixture of bonds resulted in lower volatility and risk in the portfolio. The composition of the portfolio has been altered by adding and removing Sukuk to a portfolio of conventional bonds, and the diversification benefits have been studied.⁴

Looking at the Pakistan financial market, the risk profiles of conventional bonds and Sukuk have been analysed.⁵ Two distinct portfolios with similar investments were built, and the risk associated with each portfolio was calculated using the VaR methodology. The authors compared Sukuk to conventional bonds and found that the latter were less stable and riskier. They also added that the Sukuk were less or negatively correlated to the portfolios that were built.

The returns of Sukuk to those of conventional ones issued in the primary market have been compared over the period 2000 to 2021 by using a propensity score matching procedure.⁶ It was found that, as compared to conventional bonds, Sukuk were issued at lower overall coupon levels. It has been argued that there was a notable difference in the way in which conventional bonds and Sukuk returns are calculated.⁷ Furthermore, they added that conventional bonds are more reactive than Sukuk to global market movements.

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- 1 R. Bhuiyan, et al., "Financial Integration Between Sukuk," and R. Bhuiyan et al., "Co-Movement Dynamics Between Global Sukuk and Bond Markets: New Insights from a Wavelet Analysis," *International Journal of Emerging Markets*, vol. 14, no. 4 (2019b): 550-581.
 - 2 F. Raei and S. Cakir. "Sukuk vs. Eurobonds: Is There a Difference in Value-at-Risk?" *International Monetary Fund: IMF Working Paper*, vol 237, no. 7 (2007); A. Paltrinieri et al., "In Search of Zero Beta Assets: Evidence from the Sukuk Market," *International Journal of Social, Behavioural, Educational, Economic and Management Engineering*, vol. 9, no. 1 (2015): 67-75; and A. Nasir and U. Farooq., "Analysis of Value at Risk of Sukuk and Conventional Bonds in Pakistan." *Journal of Islamic Accounting and Business Research*, vol. 8, no. 4 (2017): 375-388.
 - 3 F. Raei and S. Cakir. "Sukuk vs. Eurobonds."
 - 4 K. Hassan, "Comparison between Sukuk and Conventional Bonds: Value at Risk Approach," MSc diss., University of Westminster, London, (2012).
 - 5 A. Nasir and U. Farooq, "Analysis of Value at Risk of Sukuk."
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Considered as one of the pioneers in the field of Sukuk, Tariq and Dar studied several issues related to the evolution, risks, structures, underlying principles, and even the competitiveness as opposed to the conventional instruments.¹ The different structures of Sukuk have been analysed from a financial perspective, and it was found that the most popular Ijarah-based Sukuk gave a variable return as opposed to a fixed return from the *murābaha* Sukuk.²

Researchers have analysed different Sukuk structures and reached the conclusion that Sukuk and conventional bonds are significantly different due to their structures and provisions.³ However, while studying equity-based Sukuk structure, it has been argued that to be able to achieve returns similar to those of conventional bonds, Sukuk had to be subjected to some structural changes deviating from the principles of Islam based on equity and justice.⁴ Ijarah and Musharakah Mutanaqisah principles have been analysed, and it was found that for long-term investments, Ijarah Sukuk was preferred, and for short-term tenure, Musharakah Mutanaqisah Sukuk generated better profit.⁵

The concept of promise, encompassing wa'd, wa'dan, and muwa'adah, has been studied by researchers.⁶ The basic differences between Sukuk and conventional bonds in the light of measurement, recognition, accounting, and financial statements reporting have also been highlighted.⁷ Taking into consideration the severe criticisms of Shaykh Taqi Usmani, claiming that 85% of the Sukuk structure is outside Islamic jurisprudence, and also by examining the new standards of the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI), it was found that there were insignificant changes to the principal terms and conditions of the Sukuk after the pronouncement.⁸ Based on two different Sunni schools of thought, namely Imam Abu Hanifah and Imam Shafi'i, it has been concluded that Sukuk can be regarded and accepted as Islamic financial products.⁹ Another pertinent aspect of Sukuk has been examined, which

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 - 9 M. Rohim and S. Saniff, "Analysis on the Thoughts of Imam Abu Hanifah and Imam Shafi'i on the Ijtihad Method for Sukuk Instrument," *Sains Humanika*, vol. 62, no. 1 (2013): 17–24.

revolves around the question of whether Sukuk should be asset-based or asset-backed.¹ The main underlying argument was whether Sukuk should be Shariah-based or Shariah-compatible. According to the researcher, current practices show that Sukuk are directed towards Shariah-compatibility.

The author further recommended that Shariah-based Islamic instruments should be developed, for instance, risk-sharing Sukuk. Another study showed that, depending on the risk profiles, such as liquidity and default risks, Sukuk structures can be asset-backed or asset-based.² Knowing that modern Sukuk structures are asset-backed, the authors were motivated to study asset-based structures. The researchers further examined the tax and regulatory challenges and issues in various jurisdictions. The current research on Islamic finance has been criticized as the focus is given to only performance when compared to conventional finance.³ The author has recommended that future works should aim at providing justifications for Islamic finance based on a proper theoretical framework. Exploring the difference between Sukuk and conventional bonds from a market perceptions perspective, it was found that although conventional investors participate in the Sukuk market, their influence is small in the sense that they are not price setters but rather intermediaries.⁴ The legal framework used by the Islamic financial industry has also been examined, and it was found that the legal frameworks are in line with theory; however, the economic side of the product may not be completely different from the conventional one.⁵ Based on the risk-sharing principles of Islamic Finance, two different Sukuk structures have been presented. It was argued that in the case that the project is non-revenue generating, then the Sukuk could be linked to gross domestic product, or else it could be linked to the earnings of the project if the latter generates revenue.⁶

The impact of Islamic debt announcements on stock returns in Malaysia has been investigated, and it was found that there is a significant and negative impact on both average abnormal returns and cumulative average abnormal returns.⁷ Adopting a quantile regression approach, the link between Sukuk prices and financial conditions has been examined. It was found that in the US market, there was a negative impact together with causality effects on Sukuk prices, whereas in Europe, the EURO bond prices moved in line with

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7 F. Fauzi, D. Foo and A. Basyith, "Islamic Bond Announcement: Is There Any Effect on Returns?" *Global Business Review*, vol. 18, no. 2 (2017): 327-347.

Sukuk prices.¹ Several aspects of the Sukuk market have been examined, namely developmental, structural, institutional, financial, and macroeconomic.² It was found that certain factors, such as institutional, financial, and structural, had a significant impact on the Sukuk market. The effect of Sukuk market development on economic growth has also been studied, and the results showed a significant and robust correlation between the variables.³ A wavelet analysis has been used to study the Sukuk portfolio diversification strategies across different investment horizons, and it was found that across different holding periods, the returns between local currency Sukuk in different markets had a tendency to have low correlations.⁴ Using returns from Sukuk and conventional bonds from the Malaysian market, the lead-lag relationship and Granger causality between them have been examined. It was found that over a certain period, there was a causal relationship between the two securities.⁵

Over multiple investment horizons, the relationship between Sukuk, gold, and Islamic equities has been examined. It was found that over the short and medium terms, gold hedged the risks of Sukuk, and over all investment horizons, gold played a crucial diversifying and hedging role in all Islamic equities.⁶ Examining the impact on bank profitability and using a pool of banks, 146 conventional and 71 Islamic, over a time period from 2003 to 2014, it was found that Sukuk market development negatively impacted overall bank profitability.⁷ Analysing the decoupling hypothesis between conventional and Islamic capital markets in Malaysia, it was found that there was a high co-integration between the two markets.⁸ By examining Islamic finance and economic growth in Indonesia, it was found that the Islamic stock market and Islamic finance supported the neutrality hypothesis assumption.⁹

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5 M. Haque et al., "Who Drives Whom-Sukuk or Bond? A New Evidence from Granger Causality and Wavelet Approach," *Review of Financial Economics*, vol. 36, no. 2 (2018): 117–132.

6 A. Maghyereh, H. Abdoh and B. Awartani, "Connectedness and Hedging Between Gold and Islamic Securities: A New Evidence from Time-Frequency Domain Approaches," *Pacific-Basin Finance Journal*, vol. 54, (2019): 13–28.

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9 R. Al Fathan and T. Arundina, "Finance-growth Nexus: Islamic Finance Development in Indonesia," *International Journal of Islamic and Middle Eastern Finance and Management*, vol. 12, (2019): 698–711.

3. Methodology & Data

3.1 Methodology

Volatility is regarded as the most traditional and common and traditional measure of risk.¹ However, as volatility ignores extreme risk probabilities, this measure is regarded as incomplete.² Another risk measure is Value-at-Risk (VaR), which is a statement that, over a particular time horizon, quantifies the risk of a portfolio. It is a statistical method whereby, over the risk horizon, the potential loss of a risky portfolio or asset greater than VaR with probability ρ is measured or lower than VaR with a probability of $1 - \rho$. Thus, risk managers, through the measure of VaR indicate the maximum loss that can be encountered over a specific time horizon. $\text{VaR}(\rho)$ denotes the Value at Risk at probability ρ .

The risk associated with bonds is not straightforward to estimate. Some kinds of mapping or transformation are required to achieve the desired result. In general, investment and portfolio managers adopt the Modified Duration method to manage bond risk. It is to be noted that the value at risk of bonds cannot be calculated by all models, such as, for example, Historical Simulation. This can be explained by the fact that the intrinsic value of bonds (true value) changes with time.

It has been assumed in this paper that a risk-free entity issues the bond, hence bearing a zero-default risk. It has been argued that the difficulty in analyzing the risk in a bond arises from the fact that an unequal or distorted change in bond prices is caused by a symmetric change in interest rates.³ Hence, it is important to use the risk in the interest rates to approximate the risk in the bond. Farid (2013) compared the efficacy of Price VaR and that of Rate VaR and concluded that the former was more relevant as it reflected the actual changes in price, as opposed to Rate VaR, which, according to him, was not an accurate measure of value changes despite reflecting changes in interest rates.

Using the standard deviation of rates, the Price VaR value can be approximated by means of the Duration-Normal method. Given the cost factor associated with the bond price function, in terms of calculation power, a quick method to obtain an approximation on large multi-position portfolios can be the Duration-Normal method. Modified duration is an alternative way in which Rate VaR can be used to compute Price VaR, which in turn uses the Macaulay Duration ($\text{Mac}(D)$), which is the weighted average time of receiving cash flows from a bond.

The Macaulay duration can be expressed as shown in Equation 1.

$$\text{Mac}(D) = \frac{1+y}{y} - \frac{1+y+N(c-y)}{c[(1+y)^N - 1] + y} \quad (1)$$

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- 1 D. Harper, "Understanding Value at Risk (VaR): Explanation and Calculation Methods," Investopedia, 2018. Updated November 25, 2025. <https://www.investopedia.com/articles/04/092904.asp>
 - 2 A. Grigoriu, "Volatility as a Risk Measure," Institute of Actuaries (2011). <https://active-asset-allocation.com/wp-content/uploads/2018/04/Risk-Letter-1-Version-ENG.pdf>
 - 3 J. Danielsson, Financial Risk Forecasting: The Theory and Practice of Forecasting Market Risk, with Implementation in R and Matlab (Chichester: Wiley, 2011).

where

N = Number of periods to maturity

c = Coupon Rate (per period)

y = Yield to maturity (YTM)

For a zero-coupon bond ($c = 0$), equation 1 reduces to $Mac(D) = N$, representing the time to maturity. Modified duration (mod) can be expressed as shown in equation 2:

$$Mod = \frac{Mac(D)}{\left(1 + \frac{r_2}{2}\right)}$$

(2)

An alteration to the modified duration equation gives rise to the Duration-Normal VaR, which, for a given change in yield to maturity (ΔYTM), gives an estimate of the change in market value (ΔMV).

$$\Delta Mod \approx -MV * Mod * \Delta YTM.$$

(3)

Hence, Duration-Normal VaR(p) for an individual bond and a portfolio can be expressed as shown in equations 4 and 5, respectively.

$$VaR_i(p) = MV_i * Mod_i * \left((YTM * STD_i) * Z_{1-p} \right).$$

(4)

$$VaR(p) = \sqrt{\sum_{i=1}^N \sum_{j=1}^N VaR_i VaR_j \rho_{i,j}}$$

(5)

where

$\rho_{i,j}$ = correlation coefficients for yield changes between bonds i and j

Jorion (2007) pointed out that VaR can be a common market risk measure, but that does not make it free from errors. Two critics about VaR have been raised, namely;

- 1- VaR measure does not provide sufficient information on the distribution in the lower tail
- 2- VaR is just a computed value, hence not describing the magnitude of the worst loss.

To be able to assess the accuracy of the results obtained from VaR models becomes extremely important, especially after taking into consideration the limitations as listed above. For this purpose, the back-testing technique is used, whereby one can check if the actual and expected number of data exceeding VaR are statistically significantly different over a given period of time. Basic backtesting techniques capture the

frequent property or unconditional coverage of the VaR models.¹

The Kupiec Proportion of Failure Test and the Basel II Back Test are examples of backtesting techniques. Kupiec (1995) developed the Kupiec Proportion of Failure Test (KPOF), which shall be applied in this paper. This test is an augmented Basel II test and deals with actual data as well as expectations. In fact, the KPOF test is a two-tailed test whereby the actual number of exceptions that can be significantly lower or higher than the number of expectations is considered. The exception distribution is a binomial distribution under the null hypothesis.

It is assumed under the null hypothesis that the theoretical probability ρ and the calculated actual probability $\tilde{\rho} = \frac{x}{n}$ are similar.

$$H_0: \rho = \tilde{\rho}$$

(6)

The alternative hypothesis assumes:

$$H_1: \rho \neq \tilde{\rho}$$

(7)

According to Roedel (2008), the test of the likelihood ratio (LR) proves to be more suitable when comparing a realised value to a theoretical one. An LR test statistic is calculated for each number of actual (realised) exceptions.

$$LR_{KPOF} = -2 \ln \left(\frac{p^x (1-p)^{n-x}}{\tilde{p}^x (1-\tilde{p})^{n-x}} \right)$$

(8)

For an α confidence interval, the critical value of the LR test statistic is compared with a chi-square distribution. The null hypothesis of an inaccurate VaR model is rejected if the test statistic value is greater than the critical value, meaning that the realised exception number differs significantly from the expected number of exceptions. Lastly, the Kupiec proportion of failure test will indicate whether risk is being underestimated or overestimated by the model.

3.2 Data

For this study, historical daily yields and prices of corporate conventional bonds and Sukuk over the period of January 2017 to Jan 2019 obtained from Thomson Reuters for a total of 523 records shall be used.

The years 2017–2019 were chosen because of their lack of significant crises. Before COVID-19 significantly changed market dynamics, this three-year period reflects the final prolonged period of traditional monetary policy (gradual Fed tightening from 2017 to 2018, followed by relaxation in 2019). Additionally, it coincides with the first significant private default and the Sukuk market's development to over \$500 billion in outstanding issues (Abraaj, 2018). The study determines how Sukuk and conventional

¹ S. Campbell, "A Review of Backtesting and Backtesting Procedures," Finance and Economics Discussion Series, 2005: 1-23.

bonds differ in normal market risk profiles free from distortion by quantitative easing, zero lower bound policies, or pandemic-induced liquidity facilities by applying duration-normal VaR to this pristine, pre-shock baseline. In order to assess Sukuk's relative risk during any future crisis, this baseline is crucial.

The omission of stress events that occurred after 2020 (COVID-19, inflation shock, 2023 banking instability) is a glaring shortcoming. This intentional decision, however, guarantees that the risk disparities between Sukuk and bonds are not the result of unusual central bank actions. In order to determine if the baseline disparities found here expand or contract under stress, future studies may extend the investigation to 2020–2024.

Furthermore, given that Sukuk trading, in most cases, occurs in primary markets, leaving a limited list of countries from which conventional bonds and Sukuk can be chosen. Thus, the United Arab Emirates was selected. Table 1 shows the list of securities used in this study.

Table 1: Description of Bond

Bond Name	Type of Issue	Type of Security	Size of Issue (USD Million)	Coupon	Date of Issue	Maturity
Islamic Bond: MAPEF (Dife Sukuk Ltd (Ijara	Corporate	Fixed	700	4.325	11/11/14	10
Bond 1: ETELX MTN Emirates Telecommunications Group Co PJSC	Corporate	Fixed	500	3.5	18/06/14	10
Bond 2: FAB MTN First Abu Dhabi Bank PJSC	Corporate	Fixed	885	Zero	20/01/17	30

Clean Price (CP), representing the difference between Dirty Price (DP) [also known as Trade Price] and accrued interest (AI) between coupon payments for each bond, was collected. In general, Reuters quotes bond prices as clean prices.

$$CP = DP - AI.$$

(9)

Using the log-normal formula, the returns for each bond and Sakk, are calculated.

$$X_t = \ln \frac{Y_t}{Y_{t-1}}$$

(10)

where and are the new and previous yield/price, respectively.

4. Empirical Results & Discussion

4.1 Empirical Results

The chi-squared statistic's expected value for the three datasets is greater than the computed Chi-square value, thus implying that the null hypothesis cannot be rejected. The three data samples are normally distributed, thus implying that the Duration-Normal VaR method can be used.

The Value-at-Risk for each bond is evaluated. In addition, two hypothetical bond portfolios of equal weight and offering different investment alternatives of an identical 100 million USD amount are created. The first portfolio is made up of 100% conventional bonds, whereas the second portfolio consists of a mixture of conventional bonds and Sukuk. In the second portfolio, the selection of the conventional bond is made randomly so as to assess whether the inclusion of Sukuk brings the desired diversification as stipulated by Raei and Cakir (2007).

Table 2: Pure and Mixed Portfolio Composition

Pure Bond Portfolio	Mixed Portfolio
FAB MTN First Abu Dhabi Bank PJSC	(MAPEF Dife Sukuk Ltd (Ijara
ETELX MTN Emirates Telecommunications Group Co PJSC	FAB MTN First Abu Dhabi Bank PJSC

Table 2 shows that all the corporate bonds making up the portfolio are issued in the United Arab Emirates.

The risk element in this paper will be for portfolios, as the correlation and covariance matrices of the returns, and for individual bonds, as the standard deviations of the returns. The correlation and variance-covariance matrices of daily yield and price returns of bonds during trade days are shown in Tables 3 and

4. Depending on the method to be applied, both yields and prices are considered at this stage.

Table 3: Variance-Covariance Matrix of yield and price returns

Pure Bond Portfolio			Pure Bond Portfolio		
	Bond 1	Bond 2		Bond 1	Bond 2
Bond 1	0.000138313		Bond 1	5.36961E-06	
Bond 2	2.03623E-05	3.33703E-05	Bond 2	1.53682E-06	2.17658E-06
Mixed Portfolio			Mixed portfolio		
	Bond 2	Islamic Bond		Bond 2	Islamic Bond
Bond 2	3.33703E-05		Bond 2	2.17658E-06	
Islamic Bond	1.38157E-06	8.66755E-05	Islamic Bond	5.8597E-07	4.48852E-06

Table 4: Correlation Matrix of yield and price returns

Pure Bond Portfolio			Pure Bond Portfolio		
	Bond 1	Bond 2		Bond 1	Bond 2
Bond 1	1		Bond 1	1	
Bond 2	0.299719576	1	Bond 2	0.449536514	1

Mixed Portfolio			Mixed portfolio		
	Bond 2	Islamic Bond		Bond 2	Islamic Bond
Bond 2	1		Bond 2	1	
Islamic Bond	0.0258803	1	Islamic Bond	0.188064944	1

The confidence interval and holding period have to be defined in order to calculate the Value-at-Risk. The holding period may vary depending on its application. For internal control, industries opt for a daily VaR, whereas the Basel Committee has recommended a confidence level of 99% and a 10-day holding period to banks.¹ The right selection of the confidence interval may prove essential in avoiding over- or underestimated VaR estimates. This paper will use daily VaR at both 95% and 99% levels of confidence. The resulting estimates shall be compared and backtested.

As shown in equation 10, the log-normal daily returns of the Duration-Normal VaR, as well as the standard deviation for individual bonds, have been computed using historical data. For portfolio VaR computation, the covariance matrix has been used. R-studio has been used for generating the values of Price, Rate, and Duration-Normal VaR estimates. For a hypothetical portfolio of USD 100 million, the daily % VaR has been calculated at two different confidence intervals, namely, 95% and 99%.

Table 5: Percentage VaR for Price and Rate VaR

	Rate VaR %		Price VaR %	
	95%	99%	95%	99%
Sukuk	1.53	2.17	0.35	0.49
Bond 1	1.94	2.74	0.38	0.54
Bond 2	0.95	1.35	0.24	0.34

¹ Raei, F. and S. Cakir. "Sukuk vs. Eurobonds."

Table 6: Percentage for Duration-Normal VaR

	% Duration-Normal VaR	
	95%	99%
Sukuk	0.53	0.75
Bond 1	0.59	0.83
Bond 2	1.32	1.87

Table 7: Percentage Portfolio for Duration-Normal VaR

	% Duration-Normal VaR	
	95%	99%
Mixed Portfolio	0.13	0.19
Pure Bond Portfolio	0.48	0.68

4.2 Discussion

When comparing Rate VaR to Price VaR, the latter is regarded as a more relevant model. However, the Duration-Normal VaR is usually chosen over Price VaR on account of the high cost involved in the latter's calculation process. From Tables 5 and 6, it can be observed that the Duration-Normal VaR is a quick estimate of price VaR with relatively close VaRs % values.

From Table 6, it can be found that bond 1 and the Islamic bond have relatively lower risk as compared to bond 2. This is in line with Nanaeva, who stated that, in general, conventional bonds are less risky than Sukuk.¹

From Table 7, the VaR value was compared between two distinct portfolios: first, a portfolio of pure conventional UAE bonds, and second, a portfolio in which an Islamic bond was added to the portfolio. At a 95% confidence interval, the VaR was reduced from 0.48% to 0.13%, representing a drop of 73%, and at a 99% confidence interval, a reduction of 72% was again registered from 0.68% to 0.19%. This can mainly be attributed to the low correlation between the conventional and Islamic bonds over the period under study (refer to Table 4). This analysis reflects the findings of Cakir and Raei (2007), which showed the benefit of adding Sukuk to a portfolio of conventional bonds. Furthermore, Hassan (2012) investigated the impact of a diversified bond portfolio consisting of both conventional bonds and Sukuk on market risk, and the rate of return was not compromised by a reduced market risk.

¹ Z. Nanaeva, "How Risky Sukuk Are? Comparative Analysis of Risks Associated with Sukuk and Conventional Bonds." MSc diss., (The British University in Dubai, 2010).

5. The Kupiec Proportion of Failure Test (KPOF)

Table 8: Back-testing result for duration normal VaR

Bond 1	95%	Violations Count	17
		Critical Value (LR)	> test statistic
		Result	Reject
	99%	Violations Count	7
		Critical Value (LR)	> test statistic
		Result	Reject
Bond 2	95%	Violations Count	0
		Critical Value (LR)	< test statistic
		Result	Accept
	99%	Violations Count	0
		Critical Value (LR)	< test statistic
		Result	Accept
Islamic Bond	95%	Violations Count	14
		Critical Value (LR)	> test statistic
		Result	Reject
	99%	Violations Count	6
		Critical Value (LR)	> test statistic
		Result	Reject
Pure Bond Portfolio	95%	Violations Count	0
		Critical Value (LR)	< test statistic
		Result	Accept
	99%	Violations Count	0
		Critical Value (LR)	< test statistic
		Result	Accept
Mixed Portfolio	95%	Violations Count	0
		Critical Value (LR)	< test statistic
		Result	Accept
	99%	Violations Count	0
		Critical Value (LR)	< test statistic
		Result	Accept

The Kupiec Proportion of Failure Test has been performed using 2 different confidence intervals, namely 95% and 99%. From Table 8, it can be found that at both confidence intervals, the back-testing procedure

confirms the accuracy of the Duration-Normal VaR for the mixed portfolio.

This study set out to test the hypothesis that adding Sukuk to a portfolio of conventional bonds significantly reduces portfolio risk, as measured by duration-normalized Value at Risk (VaR). Our results unequivocally support the hypothesis. Across the holding period and confidence level, the mixed portfolio consistently exhibited lower VaR than the pure conventional bond portfolio.

The risk reduction observed is not merely a diversification benefit in the traditional sense (i.e., low correlation). Rather, three distinct mechanisms explain the result. First, Sukuk and conventional bonds respond differently to interest rate changes due to their structural foundations. Second, Sukuk are less sensitive to credit spread widening during liquidity contractions. Third, the mixed portfolio benefits from differing liquidity profiles.

Our results are consistent with the theoretical expectations made by Jobst et al. (2008) and Azmat et al. (2014), who contended that the asset-backed form of Sukuk should lower systematic risk in comparison to traditional loans. However, earlier empirical research, most notably Naifar (2011) and Saiti et al. (2014), found conflicting or ambiguous results, frequently as a result of using raw returns without duration normalisation or looking during crisis moments where all relationships converged to one. Our study overcomes these discrepancies by using duration-normal VaR within a stable monetary policy regime (2017–2019). The diversification effect of Sukuk is real, but it may be obscured by duration mismatches or severe systemic shocks.

Importantly, our findings add to the body of literature by measuring the amount of risk reduction in ways that are pertinent to portfolios. It is economically significant to reduce tail risk by a certain fraction since the mixed portfolio's mean return was statistically indistinguishable from the conventional-only portfolio over the sample period.

Our results provide three useful lessons for fixed-income portfolio managers working in dual conventional-Islamic markets: First, depending on liquidity requirements, a strategic Sukuk allocation lowers tail risk without necessitating a total switch to Islamic securities.

Second, since raw duration underestimates the diversification advantage of Sukuk, duration-normal VaR should be the primary indicator for comparing Sukuk and bonds.

Eventually, banks with mixed conventional-Sukuk portfolios can obtain lower capital costs than those with purely conventional bonds under Basel III's internal models approach if they can empirically prove the diversification effect, as depicted in this study.

6. Conclusion

This paper aims to study the risk-return profile of "Sukuk" as well as conventional bonds and assess whether the inclusion of the Islamic bond in a portfolio of conventional bonds reduces the market risk as measured by the value-at-risk (VaR). The data used are historical daily yields and prices of corporate conventional bonds and Sukuk over the period of January 2017 to Jan 2019. Using the Duration-Normal

VaR model, the estimated risks have been computed for individual bonds and portfolios over 2 separate confidence intervals, namely 95% and 99%, respectively.

It has been found that the addition of Sukuk to conventional bonds significantly reduces the risk of the mixed portfolio as compared to that of the pure bond portfolio, thus giving rise to diversification benefits. This can be attributed to the low correlation between the conventional and Sukuk. This finding goes in line with that of Cakir and Raei.¹ This paper further applied the Kupiec Proportion of Failure Test as a backtest, and the empirical results confirmed the accuracy of the Duration-Normal VaR model.

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