جامعة الموصل
كلية الإدارة والاقتصاد

المخاطر المالية المتطرفة وتأثير انتشارها في القطاع المالي: دراسة تحليلية في مجلس التعاون الخليجي

اطروحة دكتوراه

العلوم المالية والمصرفية

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المستخلص

تسعى الدراسة الحالية الى تحليل المخاطر الحدية والنظامية في القطاع المالي لدول مجلس التعاون الخليجي، مع تسليط الضوء على ديناميكيات انتشار المخاطر المتطرفة في الظروف الاستثنائية. تأتي أهمية الدراسة في ضوء الحاجة إلى معالجة القصور في الأطر التقليدية لإدارة المخاطر، التي تعجز عن التمييز الفعّال بين المخاطر الطبيعية والمتطرفة، ولا توفر تحليلاً دقيقاً لسلوك العوائد في الظروف الاستثنائية. من جانب اخر، تتبع مشكلة الدراسة من حقيقة أن النماذج التقليدية تستند إلى افتراضات مثل التوزيع الطبيعي، الذي لا يعكس بدقة السلوك المالي في أوقات الأزمات، مما يحد من قدرة النماذج على التكيف مع الحوادث المتطرفة ويجعل إدارة المخاطر تفاعلية بدلاً من استباقية.

يعتمد الجانب الأول من الدراسة على تحليل المخاطر الحدية لعوائد المؤسسات المالية باستخدام نظرية القيمة المتطرفة (Extreme Value Theory) وتوزيع باريتو العام (Generalized Pareto Distribution)، مما يوفر تقديرًا أكثر دقة للسلوك الحدّي للعوائد. أما الجانب الثاني، فيتناول نمذجة انتشار المخاطر النظامية عبر تطبيق نموذج الانحدار الكمي (Quantile Regression) واستخراج الفرق في القيمة المعرضة للخطر المشروطة (ΔCoVaR)، لتحديد مساهمة كل مؤسسة في انتشار المخاطر النظامية.

اعتمدت الدراسة على بيانات يومية لعوائد أسعار إغلاق أسهم ٨٠ مؤسسة مالية موزعة على الدول الأعضاء في مجلس التعاون الخليجي (السعودية، قطر، الإمارات، الكويت، عمان، البحرين) للفترة الممتدة بين ٢٠٠٤ و٢٠٢٣، بمجموع مشاهدات بلغ ٣٣٢٣٦٧ مشاهدة. تضمنت المنهجية معالجة الفجوات السعرية في البيانات لضمان دقة التحليل. كما تم تطوير الخوارزميات باستخدام لغة بايثون (Python) عبر بيئة عمل Jupyter Notebook لتطبيق النماذج الكمية.

أظهرت النتائج أن عوائد المؤسسات المالية لا تتبع التوزيع الطبيعي، بل تميل إلى التطرف، مع اختلاف واضح في مؤشر التطرف (ξ) بين الدول والقطاعات الفرعية، مما يؤكد على كفاءة توزيع باريتو العام في قياس المخاطر مقارنةً بالنماذج التقليدية. كما أظهرت القيم الناتجة عن مؤشر التطرف أن المؤسسات المالية ذات المخاطر الحدية المتطرفة في الظروف الطبيعية تظل محافظة على نفس السلوك في الظروف الاستثنائية، مع تزايد ملحوظ في تأثير المخاطر على القطاع المصرفي مقارنةً بالقطاعات الأخرى.

وعند تحليل المخاطر النظامية، تبين أن تأثير المؤسسات المالية في الظروف الاستثنائية أكبر مقارنة بالظروف الطبيعية، مما يعكس حساسيتها العالية للتقلبات. كما أظهرت نتائج ΔCoVaR أن انتشار المخاطر النظامية يختلف بين المؤسسات، مع تباينات ملحوظة حسب الدولة والقطاع. وكشفت النتائج أن المؤسسات ذات

الموجودات الكبيرة (أكثر من ٣٥ مليار دولار) أكثر عرضة لانتشار المخاطر النظامية مقارنة بالمؤسسات الصغيرة والمتوسطة، مع تأكيد أهمية القطاع المصرفي كأكثر القطاعات تأثراً.

وفي ضوء الاستنتاجات التي توصلت إليها الدراسة، فإنها تقترح التركيز على الجوانب الآتية:

- تدعو الدراسة إلى اعتماد نماذج تُركز على تحليل السلوك الحدّي لعوائد الأصول المالية بدلاً من الاعتماد على الافتراضات الطبيعية.
- توصي الدراسة بتبني سياسات تراعي التوزيعات المتطرفة المشتركة بين المؤسسات، لتحسين فعالية إدارة المخاطر النظامية.
- تشدد الدراسة على أهمية استخدام بيانات الأزمات لاختبار فعالية النماذج وتقييم استجابتها للظروف الاستثنائية.
- تقترح الدراسة نموذجين لتخصيص احتياطات الطوارئ؛ الأول يعتمد على إجمالي المساهمة في المخاطر النظامية، والثاني يأخذ في الاعتبار حجم المؤسسة والقطاع، مما يتيح استجابة أكثر دقة للتحديات الطارئة.

الكلمات المفتاحية: الخطر الحدي– نظرية القيمة المتطرفة – توزيع باريتو العام– المخاطر النظامية – القيمة المعرضة للخطر المشروطة – الإنحدار الكمي.

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HIGHLITS	GRAPHICAL ABSTRACT
- Extreme tail risks in GCC financial institutions deviate from normal distribution, with larger banks (>$35B assets) most exposed. The Generalized Pareto Distribution outperforms traditional models in capturing crisis-driven risks. - Systemic risk spillovers are strongest in banking, with large institutions driving contagion. ΔCoVaR effectively measures crisis impacts (except COVID-19), showing markets shock institutions more than vice versa. **Keywords:** Tail Risk Extreme Value Theory Generalized Pareto Distribution Systemic Risk CoVaR Quantile Regression	**ABSTRACT** The research focuses on studying tail risk and systemic risk, as well as the impact of their spread in the financial sector of the Gulf Cooperation Council (GCC) countries. The emphasis on tail and extreme risks is considered a fundamental pillar for estimating systemic risk and its spread within this sector. The first aspect of the study is concerned with identifying tail risk behaviour by using the Tail index characteristic of the return distributions of financial institutions, relying on Extreme Value Theory and Generalized Pareto Distribution. Conversely, the second aspect of the research addresses the potential spread of extreme risks among financial institutions through modelling and measuring tail dependence and estimating the probabilities of their occurrence by applying Quantile Regression and extracting the difference in conditional Value-at-Risk (ΔCoVaR). This approach helps to determine each financial institution's contribution to the systemic risk, assessing the sensitivity of the financial sector in the GCC countries to emerging risks while considering the varying behaviour of these risks in normal and extreme conditions. The application of the proposed models is based on daily returns of closing prices from 80 financial institutions across the GCC countries over the period between (2004-2023), with an average of 4155 observations per financial institution and a total of 332367 observations for all institutions in the research sample. The daily closing price observations of the sampled banks included several price gaps due to the unavailability of closing prices on certain days, which were addressed by determining the price average before and after the day a price gap appeared. The research concluded that the returns of the studied financial institutions tend to exhibit extremity and do not adhere to a normal distribution. Furthermore, the extremity index values (ξ) showed significant variability across countries and sub-sectors, reflecting the heterogeneity in the behaviour of the distribution's tails during the study period. This underscores the importance of the Generalized Pareto Distribution as a superior model for measuring tail behaviour compared to normal distribution models, as the tail index demonstrated a greater capacity to identify risks at high confidence levels. The results revealed a significant difference in the Tail index values of the Generalized Pareto Distribution during all systemic crises in the testing period compared to normal conditions, thereby reinforcing the validity of the Tail index in indicating risks at the institutional level. Additionally, a positive correlation emerged between the average Tail index in normal conditions as an independent variable and exceptional conditions as a dependent variable, indicating that financial institutions with low/high tail risk maintaining the same level during systemic crises. In this context, banks were found to be the most exposed to extreme tail risk compared to institutions in other financial sub-sectors. Moreover, an inverse relationship was observed between the size of large financial institutions and the average Tail index in extreme conditions, indicating that institutions with total assets exceeding $35 billion are exposed to higher extreme risk levels in exceptional circumstances compared to medium and small-sized institutions. A comparison between the Tail index model by financial sub-sector and the model by size indicates the importance of classifying financial institutions based on their size, contributing to the explanation of their extreme tail risk behaviour in extreme conditions, while reaffirming the stability of this behaviour in normal conditions. By examining systemic risk and the spillover effects, the research results have reflected the challenges faced by financial institutions in GCC countries. The application of Quantile Regression and the estimation of tail beta coefficient values revealed a noticeable difference in the influence of financial institutions on the overall market index in extreme conditions compared to normal conditions. The results indicated that financial institutions exhibit a greater influence during periods of high volatility, providing a deeper understanding of their role under various market conditions. The study's findings also highlighted the contribution of financial institutions in systemic risk through delta conditional Value-at-Risk (ΔCoVaR). The results showed that systemic risk spillover effects among financial institutions are heterogeneous, with significant variability based on country and financial sub-sector. When comparing

	delta conditional Value-at-Risk (ΔCoVaR) and the Exposure spillover effect, it was found that financial institutions across all GCC countries contribute to the level of systemic risk spillover effects, with their average impact being less than the Exposure spillover effect impact, indicating a greater shock towards financial institutions, from the system (main market indices), when transitioning from stability to instability. Regarding the impact of size and sectoral affiliation on the behaviour of systemic risk spillover effects in extreme conditions, the results have indicated a significant positive relationship between the size of large financial institutions and the average delta conditional Value-at-Risk in those conditions. Large financial institutions, with total assets exceeding $35 billion, showed a marked increase in their contribution to the spread of systemic risk compared to medium and small-sized institutions. Additionally, it was found that the sectoral affiliation of banking institutions has the most significant impact on systemic risk spillover effects compared to other financial sub-sectors such as insurance and investment. Furthermore, the results of the permutations test of the means differences in delta conditional Value-at-Risk measure rejected the null hypothesis at a significant level of 1% during the studied crises, except for the COVID-19 pandemic crisis. This indicates the effectiveness of the conditional Value-at-Risk difference measure in responding to extreme conditions, regardless of the financial institution or sector to which it belongs. **2025 PhD Thesis @Univ. of Mosul, College of Administration & Economics , Financial & Banking science Dept. (https://www.uomosul.edu.iq/).**

Abstract

The research focuses on studying tail risk and systemic risk, as well as the impact of their spread in the financial sector of the Gulf Cooperation Council (GCC) countries. The emphasis on tail and extreme risks is considered a fundamental pillar for estimating systemic risk and its spread within this sector. The first aspect of the study is concerned with identifying tail risk behaviour by using the Tail index characteristic of the return distributions of financial institutions, relying on Extreme Value Theory and Generalized Pareto Distribution. Conversely, the second aspect of the research addresses the potential spread of extreme risks among financial institutions through modelling and measuring tail dependence and estimating the probabilities of their occurrence by applying Quantile Regression and extracting the difference in conditional Value-at-Risk (ΔCoVaR). This approach helps to determine each financial institution's contribution to the systemic risk, assessing the sensitivity of the financial sector in the GCC countries to emerging risks while considering the varying behaviour of these risks in normal and extreme conditions.

The application of the proposed models is based on daily returns of closing prices from 80 financial institutions across the GCC countries over the period between (2004-2023), with an average of 4155 observations per financial institution and a total of 332367 observations for all institutions in the research sample. The daily closing price observations of the sampled banks included several price gaps due to the unavailability of closing prices on certain days, which were addressed by determining the price average before and after the day a price gap appeared.

The research concluded that the returns of the studied financial institutions tend to exhibit extremity and do not adhere to a normal distribution. Furthermore, the extremity index values (ξ) showed significant variability across countries and sub-sectors, reflecting the heterogeneity in the behaviour of the distributions tails during the study period. This underscores the importance of the Generalized Pareto Distribution as a superior model for measuring tail behaviour compared to normal distribution models, as the tail index demonstrated a greater capacity to identify risks at high confidence levels.

The results revealed a significant difference in the Tail index values of the Generalized Pareto Distribution during all systemic crises in the testing period compared to normal conditions, thereby reinforcing the validity of the Tail index in indicating risks at the institutional level. Additionally, a positive correlation emerged between the average Tail index in normal conditions as an independent variable and exceptional conditions as a dependent variable, indicating that financial institutions with low/high tail risk maintain the same level during systemic crises. In this context, banks were found to be the most exposed to extreme tail risk compared to institutions in other financial sub-sectors.

Moreover, an inverse relationship was observed between the size of large financial institutions and the average Tail index in extreme conditions, indicating that institutions with total assets exceeding $35 billion are exposed to higher extreme risk levels in exceptional circumstances compared to medium and small-sized institutions. A comparison between the Tail index model by financial sub-sector and the model by size indicates the importance of classifying financial institutions based on their size, contributing to the explanation of their extreme tail risk behaviour in extreme conditions, while reaffirming the stability of this behaviour in normal conditions.

By examining systemic risk and the spillover effects, the research results have reflected the challenges faced by financial institutions in GCC countries. The application of Quantile Regression and the estimation of tail beta coefficient values revealed a noticeable difference in the influence of financial institutions on the overall market index in extreme conditions compared to normal conditions. The results indicated that financial institutions exhibit a greater influence during periods of high volatility, providing a deeper understanding of their role under various market conditions.

The study's findings also highlighted the contribution of financial institutions in systemic risk through delta conditional Value-at-Risk (ΔCoVaR). The results showed that systemic risk spillover effects among financial institutions is heterogeneous, with significant variability based on country and financial sub-sector. When comparing delta conditional Value-at-Risk (ΔCoVaR) and the Exposure spillover effect, it was found that financial institutions across all GCC

countries contribute to the level of systemic risk spillover effects, with their average impact being less than the Exposure spillover effect impact, indicating a greater shock towards financial institutions, from the system (main market indices), when transitioning from stability to instability.

Regarding the impact of size and sectoral affiliation on the behaviour of systemic risk spillover effects in the extreme conditions, the results has indicated a significant positive relationship between the size of large financial institutions and the average delta conditional Value-at-Risk in those conditions. Large financial institutions, with total assets exceeding $35 billion, showed a marked increase in their contribution to the spread of systemic risk compared to medium and small-sized institutions. Additionally, it was found that the sectoral affiliation of banking institutions has the most significant impact on systemic risk spillover effects compared to other financial sub-sectors such as insurance and investment.

Furthermore, the results of the permutations test of the means differences in delta conditional Value-at-Risk measure rejected the null hypothesis at a significance level of 1% during the studied crises, except for the COVID-19 pandemic crisis. This indicates the effectiveness of the conditional Value-at-Risk difference measure in responding to extreme conditions, regardless of the financial institution or sector to which it belongs.

Keywords: Tail Risk - Extreme Value Theory - Generalized Pareto Distribution - Systemic Risk - CoVaR - Quantile Regression

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