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PORTFOLIO THEORY METRICS AS PROXIES FOR BUSINESS SUSTAINABILITY: EVIDENCE OF STRATEGIC RESILIENCE DURING THE COVID-19 CRISIS

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ABSTRACT

Large-scale social emergencies act as 'stress tests' that reveal the strategic resilience and real sustainability of business models. This study analyzes this capacity across the S&P 500 economic sectors, utilizing risk-adjusted financial performance as a quantitative measure. Through an Ex-Ante (2015-2020) and Ex-Post (2020-2023) comparative analysis of sector Exchange Traded Funds, Portfolio Theory metrics are applied, including the Sharpe Ratio, Treynor Ratio, and Jensen's Alpha. The findings demonstrate a significant divergence in resilience: sectors such as Energy and Healthcare capitalized on the crisis by improving their risk-adjusted performance, while others, such as Consumer Discretionary and Communication Services, exhibited marked vulnerability. This study concludes that business sustainability, as evidenced by its critical social role and robust value chains, is a fundamental predictor of financial resilience, providing an empirical framework for validating key concepts in strategic management.
Keywords: Business sustainability, strategic resilience, crisis management, Portfolio Theory, COVID-19, S&P 500.

Métricas de la Teoría de Portafolio como indicadores de la sostenibilidad empresarial: Evidencia de resiliencia estratégica durante la crisis de la COVID-19

RESUMEN

Las emergencias sociales de gran escala actúan como 'pruebas de estrés' que revelan la resiliencia estratégica y la sostenibilidad real de los modelos de negocio. Este estudio analiza dicha capacidad en los sectores económicos del S&P 500, proponiendo el desempeño financiero ajustado al riesgo como un proxy cuantitativo para medirla. Mediante un análisis comparativo Ex-Ante (2015-2020) y Ex-Post (2020-2023) de los fondos cotizados en bolsa sectoriales, se aplican las métricas de la Teoría de Portafolio: índice de Sharpe, índice de Treynor y Alpha de Jensen. Los hallazgos demuestran una divergencia significativa en la resiliencia: sectores como Energía y Salud capitalizaron la crisis mejorando su desempeño ajustado al riesgo, mientras que otros como Consumo Discrecional y Comunicación exhibieron una marcada vulnerabilidad. Este estudio concluye que la sostenibilidad empresarial, manifestada en un rol social crítico y cadenas de valor robustas, es un predictor fundamental de la resiliencia financiera, ofreciendo un marco empírico para validar conceptos clave de la gestión estratégica.
Palabras clave: Sostenibilidad empresarial, resiliencia estratégica, gestión de crisis, Teoría de Portafolio, COVID-19, S&P 500.

Introduction

Social, economic, or health crises pose a fundamental dilemma for companies: the need for immediate survival versus the imperative of long-term sustainability (Bachtiar et al., 2023). Historically, the response has been reactive, but recent scientific literature shows that companies that proactively integrate sustainability into their strategy not only survive but also develop greater resilience to crises (DesJardine et al., 2019; Miceli et al., 2021; Ortiz-de-Mandojana & Bansal, 2016; Settembre-Blundo et al., 2021). This highlights the need to recognize resilience as a fundamental pillar for innovation and growth in an increasingly volatile landscape (Linnenluecke et al., 2012).

Faced with enormous global challenges such as the 2007-2008 financial crisis and the COVID-19 pandemic, companies have become increasingly interested in recognizing resilience as a fundamental strategic initiative (Bachtiar et al., 2023). These crises have exposed the vulnerabilities of traditional business models and highlight the need for a proactive approach to crisis management (Linnenluecke et al., 2012; Miceli et al., 2021; Settembre-Blundo et al., 2021). In fact, companies that integrate resilience into their core operations are not only better prepared to deal with crises, but also position themselves as sustainable leaders, contributing to long-term business success in changing environments (DesJardine et al., 2019; Ortiz-de-Mandojana & Bansal, 2016; Settembre-Blundo et al., 2021).

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Recently, during the COVID-19 pandemic, characterized by unprecedented global disruption that transcended public health to become a profound social emergency, the vulnerabilities of production systems worldwide were exposed (Fleming, 2022). This systemic crisis forced organizations to reevaluate their operating models, highlighting the importance of strategic resilience and business sustainability as fundamental pillars not only for survival but also for prosperity in uncertain environments (Corrales-Estrada et al., 2021; Koronis & Ponis, 2018). Recent literature emphasizes that a company's ability to anticipate, respond, and adapt to crises is intrinsically linked to its organizational culture, agility, and commitment to sustainability principles (Miceli et al., 2021).

Strategic resilience, defined as an organization's ability to "not only withstand adversity, but also to adapt and seize opportunities in uncertain environments" (Bachtiar et al., 2023, p. 1), has become imperative. Scientific evidence shows that companies with strong sustainability performance exhibit greater financial and operational resilience during crises (DesJardine et al., 2019; Lu et al., 2022; Miceli et al., 2021; Ortiz-de-Mandojana & Bansal, 2016). This suggests that sustainability is more of an investment than an expense, functioning as an "insurance policy" against economic downturns for companies.

Despite this conceptual consensus, there remains a significant methodological gap, the empirical and large-scale measurement of strategic resilience. In order to address this gap, this study makes a distinctive contribution by proposing and validating a quantitative research framework for assessing sectoral resilience, using the social emergency of 2020 as a natural laboratory. This demonstrates that the indicators of Portfolio Theory (Markowitz, 1952), traditionally used in the financial field, can be reinterpreted as powerful *proxies* for adaptive capacity and strategic sustainability. Given the need for more integrative evaluation frameworks required by scientific literature (Giancotti & Mauro, 2020; Linnenluecke et al., 2012), we not only offer an overview of resilient and vulnerable sectors, but also instrumentalize financial models as a tool for analyzing business strategy in times of crisis.

Methodology

The research uses a quantitative, longitudinal, and comparative research design to analyze the impact of the crisis generated by the COVID-19 social emergency on the financial resilience of the main economic sectors in the US, using the financial performance of the S&P 500 index sectors as a *proxy* indicator.

Context of the study. The rationale for investing in the financial market is based on maximizing returns on excess liquidity in financial assets while minimizing risk. Precisely, maximizing returns and minimizing risk is the main objective of any investor, as introduced by Markowitz (1952) in his Mean-Variance Optimization (MVO) model, which focuses on the modern use of the calculation of the return on financial assets, the approach to investment analysis, financial risk management, hypotheses on the profitability of capital investments, and investment decisions under the assumption of uncertainty.

Among the investment alternatives, financial markets offer various opportunities for investment, one of which is equity assets. These assets are usually an investment option that generates promising returns above the financial market average with high risks but can be diversified and are traded on stock exchanges worldwide. Equity assets include Exchange Traded Funds (ETFs), which are investment funds that are listed on the stock exchange in the same way as shares, allowing them to be bought and sold during a trading session on electronic markets at the current price.

In fact, ETFs may behave non-uniformly as they are susceptible to asset-specific idiosyncratic factors—both external and internal. These unique influences differentially impact asset valuations, resulting in some ETFs exhibiting greater volatility and risk.

Data sampling and collection. To perform an aggregate and representative analysis of each sector, a sample is used consisting of ETFs that replicate the 11 economic sectors of the S&P 500 index, as well as the general index ETF (SPY) that acts as a market benchmark. Data on the performance of 10-year US Treasury bonds is included as the risk-free rate (r_f). This data consists of daily closing prices, expressed in US dollars (USD), obtained from the S&P Global (2024). Specifically, the ETFs analyzed for each sector are Technology (XLK), Health Care (XLV), Consumer Discretionary (XLY), Communication Services (XLC), Financial (XLF), Industrials (XLI), Consumer Staples (XLP), Utilities (XLU), Materials (XLB), Real Estate (XLRE), and Energy (XLE).

The total analysis period covers January 30, 2015, to April 21, 2023, yielding 2,071 daily records for most assets (see Table 1), except for Communication Services and Real Estate. This time frame was divided into two sub-periods for comparative analysis, *Ex-Ante* and *Ex-Post*.

Table 1

Number of observations of S&P 500 ETFs by economic sector, 2015–2023.

ETF code	Economic sector	*Ex–Ante*	*Ex–Post*	Total
XLK	Technology	1279	792	2071
XLV	Health	1279	792	2071
XLY	Consumer Discretionary	1279	792	2071
XLC	Communication Services	426	792	1218
XLF	Financial	1279	792	2071
XLI	Industrial	1279	792	2071
XLP	Consumer Staples	1279	792	2071
XLU	Utilities	1279	792	2071
XLB	Materials	1279	792	2071
XLRE	The Real Estate	1104	792	1896
XLE	Energy	1279	792	2071

Note: Own calculations based on S&P Global (2024).

Given that between February 27 and 28, 2020, the US president reported the first fatality from the COVID-19 virus in the US and travel restrictions were imposed on several countries, this date is used as a turning point as it is a *de facto* declaration of the crisis. Thus, this study defines the two sub-periods as follows: (I) the *Ex-Ante* period (before the crisis) from January 30, 2015, to February 28, 2020, with a total of 1,279 observations; and (II) the *Ex-Post* period (during and after the crisis), from March 1, 2020, to April 21, 2023, with a total of 792 observations. It should be noted that the selection of April 21 of 2023, as the cutoff date is based on its methodological robustness in capturing the end of the critical phase of the pandemic, considering two key factors: (I) the date is subsequent to the end of the national emergency due to COVID-19 in the US; and (II) in line with the principle of anticipation in financial markets, this date precedes the formal declaration by World Health Organization. This captures the moment when the end of the global crisis was effectively discounted by economic agents, selecting a stock market closing date.

It is important to note that the Communication Services (XLC) and Real Estate (XLRE) sectors have fewer observations in the *ex-ante* period because they were created more recently. Consequently, the risk-adjusted performance results for these two sectors should be interpreted with caution when compared with longer historical series.

Data analysis. The central methodological contribution of this study lies in the reinterpretation of classic financial metrics as indicators of strategic concepts. All processing, data analysis, and visualization generation were performed using the Python programming language, specifically the pandas libraries for data manipulation, including functions such as pct_change() and cumprod(), and matplotlib for creating charts.

In line with Ortiz-de-Mandojana & Bansal (2016), who define resilience as a company's ability to cope with unexpected situations, we propose quantifying financial resilience based on the logarithmic daily returns of each asset at a given level of risk. Volatility (σ_p) and systematic risk (β_p) measure the sector's exposure and sensitivity to social emergencies, respectively. Portfolio return (r_p) is calculated as the daily logarithmic change in closing prices, representing the value-generating capacity of portfolios by sector. Total risk (σ_p) is measured by the standard deviation of daily returns (volatility), representing uncertainty and perceived market risk. Systematic Risk (β_p) measures the volatility of a sector in relation to the overall market (SPY) and is interpreted as a sector's exposure to macroeconomic shocks.

Based on daily returns, the following performance measures, grounded in Portfolio Theory (Jensen, 1968; Markowitz, 1952, 1955; Sharpe, 1966; Treynor, 2008), are reinterpreted as *proxies* for strategic concepts.

In relation to risk management efficiency, the Sharpe ratio (S) is used as a *proxy*, reflecting a sector's ability to generate adequate returns for the new level of post-crisis volatility. This indicator measures excess return per unit of total risk (Sharpe, 1966), where a higher value indicates better risk-adjusted performance. It is calculated using the risk-free rate (r_f) with the following formula:

$$S = \frac{r_p - r_f}{\sigma_p} \quad [1]$$

In the case of the Treynor index (T), it measures excess return per unit of systematic risk (β_p) and is calculated using the following equation (Treynor, 2008):

$$T = \frac{r_p - r_f}{\beta_p} \quad [2]$$

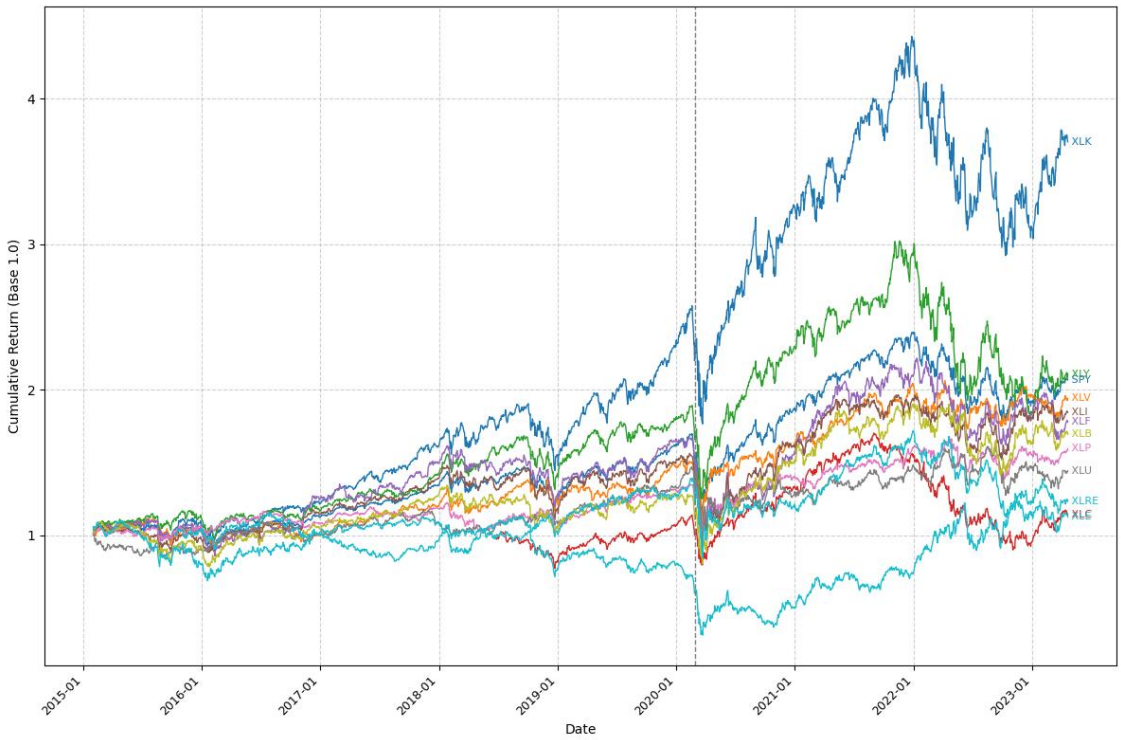
Adaptive resilience, understood as a sector's ability to generate value above market expectations and demonstrate a competitive advantage in adaptation, is measured using Jensen's Alpha as a *proxy*. This index quantifies the return that a portfolio has obtained above or below expectations according to the CAPM model known as the Capital Asset Pricing Model (Jensen, 1968), so a positive alpha indicates a superior ability to generate value. Considering market profitability (r_m), Jensen's Alpha is obtained using the formula:

$$\alpha_p = r_p - [r_f + \beta_p (r_m - r_f)] \quad [3]$$

Results

The empirical evidence of the sectoral resilience of the S&P 500 sectors in the face of the crisis generated by the COVID-19 social emergency is presented below in three sequential stages: (I) overview of the stock market; (II) performance by economic sector with *Ex-Ante* and *Ex-Post* crisis evidence; (III) analysis of financial resilience with performance indicators.

Initially, to establish the context of the crisis and its impact on the global market, creating a "stress test" for all economic sectors, an overview of the market is presented. Graph 1 shows the comparative evolution of the cumulative return of the eleven economic sectors of the S&P 500 index and the SPY benchmark between 2015 and 2023.



Graph 1. Comparative Performance of S&P 500 Sectors, 2015-2023.

Note: Own calculations based on S&P Global (2024).

It is indisputable that the social emergency caused by COVID-19, which began in 2020, caused a systemic shock in the financial markets. Longitudinal analysis reveals markedly varied performance among different sectors in the pre- and post-crisis periods.

In particular, the technology sector (XLK) significantly outperformed throughout the period, reflecting strong growth in the technology industry. Other sectors, such as consumer discretionary (XLY), also posted solid growth, albeit with greater volatility. Meanwhile, sectors such as energy (XLE) and financials (XLF) showed more cyclical patterns, heavily influenced by general economic conditions and market events. The utilities (XLU) and consumer staples (XLP) sectors confirmed their defensive nature by posting more stable, albeit modest, cumulative returns, validating their lower exposure to economic cycle volatility.

On the other hand, a comparative analysis of the performance, profitability, and risk of each economic sector is carried out before and after the shock. This "stress test" environment was characterized by a generalized increase in market risk and a reconfiguration of investor expectations, marked by a sharp drop in the general market index (SPY) followed by a volatile recovery. The volatility of the SPY, for example, nearly doubled, rising from 13.71% in the pre-crisis period to 24.59% in the post-crisis period.

Table 2 presents descriptive statistics that quantify the impact of the crisis. Special attention should be paid to the standard deviation (SD) column, which indicates a significant increase in perceived risk across all sectors, and to the average (Avg) column, which highlights the divergence in the ability to generate returns. It is in this scenario of high uncertainty that the true strategic resilience of each economic sector can be measured. The crisis drastically reconfigured the map of sectoral leadership, and the Energy sector (XLE) emerged as the undisputed leader in the post-crisis era, with profitability skyrocketing to 1.06%.

This phenomenal change suggests that its critical role in the global supply chain gave it significant market power during the disruption. Likewise, the Healthcare sector (XLV) showed remarkable resilience, improving its profitability from 0.36% to 0.65%, driven by inelastic demand and a social revaluation of its activity. On the other hand, previously leading sectors such as Technology (XLK) and Consumer Discretionary (XLY) saw their profitability decline, while Communication (XLC) and Real Estate (XLRE) moved into negative territory, highlighting their vulnerability to the new social and economic conditions.

Table 2.

Comparison of Financial Resilience Indicators in Ex-Ante and Ex-Post crisis scenarios

Economic Sector	***Ex-Ante* Scenario**				***Ex-Post* Scenario**			
	Avg	**SD**	**Min**	**Max**	**Avg**	**SD**	**Min**	**Max**
Technology (XLK)	0,99%	17,89%	-88,02%	93,09%	0,92%	31,28%	-235,99%	176,10%
Health (XLV)	0,36%	15,17%	-71,94%	67,77%	0,65%	21,21%	-164,81%	117,84%
Consumer Discretionary (XLY)	0,63%	15,07%	-65,49%	91,38%	0,42%	29,73%	-215,04%	142,32%
Communication (XLC)	0,01%	18,88%	-77,50%	86,79%	0,19%	27,91%	-189,98%	136,66%
Financial (XLF)	0,44%	17,27%	-87,42%	70,29%	0,35%	31,28%	-234,07%	196,21%
Industrial (XLI)	0,36%	15,54%	-73,74%	72,26%	0,57%	27,16%	-191,14%	189,11%

Consumer Staples (XLP)	0,23%	12,14%	-65,96%	46,21%	0,45%	19,51%	-156,63%	129,66%
Utilities (XLU)	0,31%	14,34%	-73,06%	42,21%	0,11%	26,42%	-191,39%	191,11%
Materials (XLB)	0,12%	16,90%	-76,18%	69,54%	0,77%	27,84%	-185,14%	176,50%
Real Estate (XLRE)	0,25%	13,89%	-92,37%	52,25%	-0,08%	28,77%	-276,80%	133,60%
Energy (XLE)	-0,64%	21,51%	-87,62%	95,82%	1,18%	43,72%	-357,03%	236,12%
General index (SPY)	0,49%	13,71%	-72,95%	78,25%	0,58%	24,59%	-183,96%	137,68%

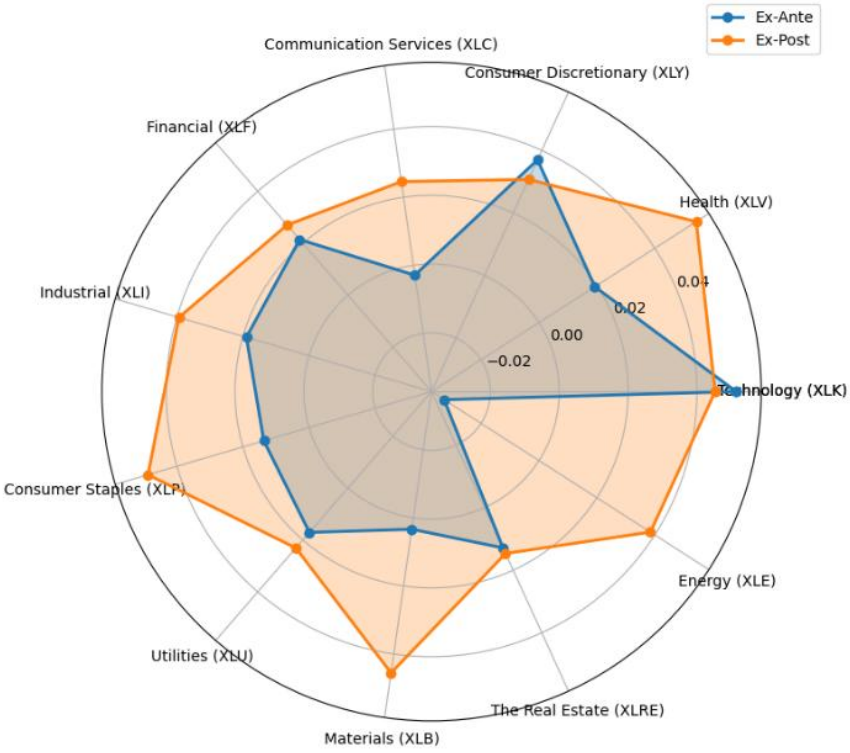
Avg: average, SD: standard deviation, Min: minimum, Max: maximum.

Note: Standard Deviation (SD) represents annualized volatility calculated from daily logarithmic returns. Source: Own calculations based on S&P Global (2024).

Consequently, the divergence in cumulative return curves illustrates the disparity in the strategic resilience of sectors in the face of market disruptions, serving as a visual proxy for their ability to adapt and survive in a volatile economic environment. The variability in performance is evident, highlighting how sectors with critical social roles or robust value chains demonstrated greater strategic sustainability, in contrast to those that showed greater vulnerability.

To assess resilience beyond gross profitability, risk-adjusted performance indicators were calculated, and the increase in post-crisis indicators is interpreted as evidence of superior strategic resilience. The resilience of economic sectors was quantified by presenting key indicators, accompanied by reasonable inferences regarding their business sustainability.

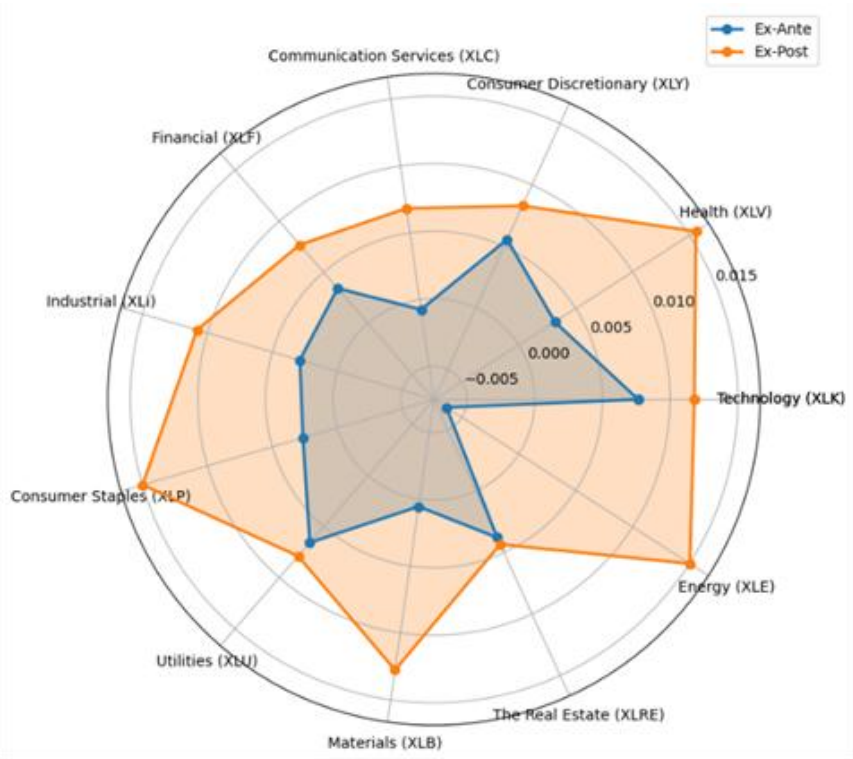
On the one hand, regarding the efficiency in total risk management, Graph 2 illustrates the Sharpe Ratio behavior. This metric improved significantly for the Health (from 0.02 to 0.05), Materials (from 0.00 to 0.05), and, most notably, the Energy sector (from -0.03 to 0.04). This indicates that, despite the general increase in volatility, these sectors were able to generate returns that more than offset the new level of risk, a key feature of crisis management efficiency.



Graph 2. *Sharpe ratio of S&P 500 ETFs in Ex-Ante and Ex-Post crisis scenarios.*

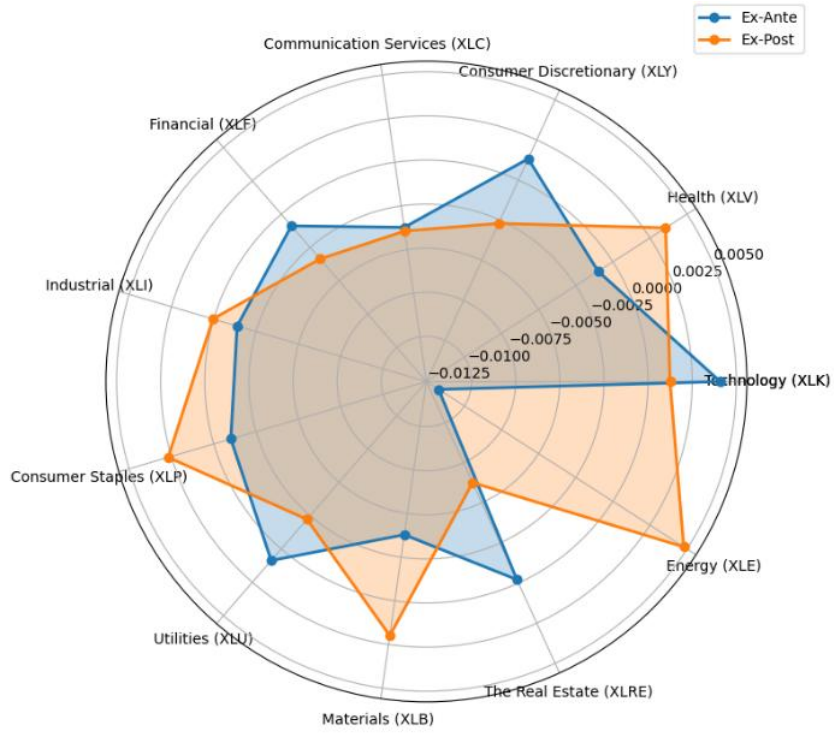
Note: Own calculations based on S&P Global (2024).

Complementarily, Graph 3 presents the Treynor Ratio, which isolates systematic risk. Consistent with the previous metric, the Energy (XLE) and Health Care (XLV) sectors exhibit a marked expansion in their ratios post-crisis, validating that their excess returns were not merely a function of market exposure but of idiosyncratic strength. Conversely, sectors such as Real Estate (XLRE) and Communication Services (XLC) show a contraction, evidencing an inability to generate premiums over the systematic risk assumed during the social emergency.



Graph 3.*Treynor ratio of S&P 500 ETFs in Ex-Ante and Ex-Post crisis scenarios.*
Note: Own calculations based on S&P Global (2024).

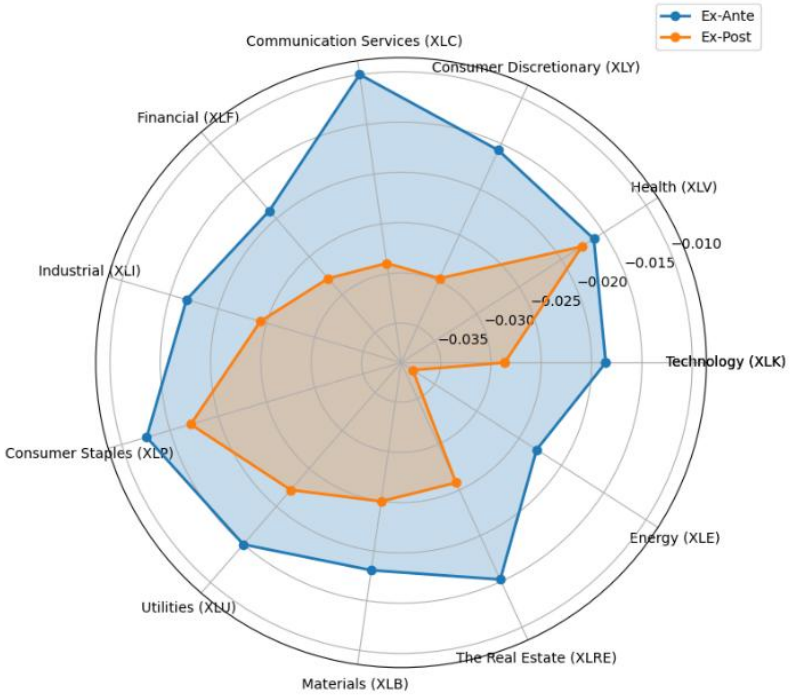
Regarding the adaptive capacity proxy, Graph 4 displays the Jensen's Alpha results. The Energy sector (XLE) transitioned from a deeply negative alpha (-0.0117) in the *Ex-Ante* period to a leading position with the highest positive alpha (0.0048) in the *Ex-Post* period. This result suggests that the sector not only recovered but also generated extraordinary value above market expectations. Similarly, the Healthcare sector (XLV) reversed a negative alpha to a positive one (from -0.0010 to 0.0036), demonstrating its ability to adapt and capitalize on its central role in the market



Graph 4.*Jensen's Alpha of S&P 500 ETFs in Ex-Ante and Ex-Post crisis scenarios.*
Note: Own calculations based on S&P Global (2024).

Finally, to assess downside risk exposure, Graph 5 compares the Value at Risk (VaR 95%). While an increase in potential maximum loss was observed broadly due to systemic volatility, the resilient sectors managed to contain this deterioration better than the

Technology (XLK) or Consumer Discretionary (XLY) sectors, which showed steeper expansions in their VaR, indicating higher susceptibility to extreme negative market movements during the stress period.



Graph 5. *Value at Risk of S&P 500 ETFs in Ex-Ante and Ex-Post crisis scenarios.*
Note: Own calculations based on S&P Global (2024).

Finally, the analysis of Systematic Risk (Table 3) shows how the exposure of sectors to market movements changed. The beta of the Utilities sector (XLU) doubled (from 0.37 to 0.77), as did that of the Real Estate sector (XLRE) (from 0.47 to 0.97), indicating that they became much more sensitive to macroeconomic uncertainty. This suggests a loss of their traditional defensive character, a strategic implication relevant to portfolio management in future crises.

The findings of this study demonstrate a clear strategic divergence in responses to the crisis across economic sectors. Given the increase in systemic risk and volatility for all players, except for certain sectors: Energy (XLE), Health Care (XLV), and Materials (XLB). These exempt sectors successfully translated this new environment into improved risk-adjusted performance, characterised by positive Sharpe ratios and Jensen's alphas in the post-crisis period. These data suggest that resilience is not a universal quality, but rather a specific capacity linked to the intrinsic characteristics of each sector's business model.

Table 3.
Systematic risk index of S&P 500 ETFs in Ex-Ante and Ex-Post crisis scenarios

Economic Sector	*Ex-Ante* Scenario	*Ex-Post* Scenario
Technology (XLK)	1,20	1,20
Health (XLV)	0,93	0,74
Consumer Discretionary (XLY)	1,00	1,10
Communication Services (XLC)	0,75	1,00
Financial (XLF)	1,08	1,10
Industrial (XLI)	1,02	0,99
Consumer Staples (XLP)	0,63	0,63
Utilities (XLU)	0,37	0,77
Materials (XLB)	1,03	0,99
Real Estate (XLRE)	0,47	0,97
Energy (XLE)	1,11	1,12
Average	0,87	0,97

Note: Own calculations based on S&P Global (2024).

Discussions

The results obtained extend beyond mere financial analysis to provide an overview of strategic sectoral resilience. The social emergency caused by the pandemic did not have a uniform impact; on the contrary, it magnified the strengths and weaknesses inherent in each business model, which aligns with the findings of Koronis & Ponis (2018) on the phases of an organizational crisis. The divergence in sectoral performance is not random; it is a manifestation of different organizational capacities to navigate uncertainty (Linnenluecke et al., 2012).

The substantial increase in the beta of traditionally defensive sectors such as Utilities (XLU, from 0.37 to 0.77) and Real Estate (XLRE, from 0.47 to 0.97) has profound strategic implications. It suggests that, in the face of systemic social emergencies, these assets lose their ability to decouple, ceasing to act as safe havens. This forces portfolio managers to reconsider the classic sector diversification strategy, as the defensive risk premium erodes precisely when the market needs it most.

The empirical evidence from this study not only quantifies the impact of a social emergency on markets but also validates theoretical postulates on strategic resilience. The superiority of the Health (XLV) and Energy (XLE) sectors supports the central thesis that strategic sustainability practices are a pillar of resilience (DesJardine et al., 2019), as well as the notion that sustainability and social centrality act as a buffer in times of crisis (Lu et al., 2022).

The healthcare sector benefited from inelastic demand and an increased perception of social value, while the energy sector, despite its volatility, proved to be indispensable to the functioning of global supply chains, a key factor in resilience (Kareem et al., 2024). However, it is crucial to note that this resilience is not purely defensive. The positive Jensen's Alpha in these sectors suggests a superior adaptive capacity, which allowed them not only to withstand the shock but also to capitalize on new market conditions, generating value above the systemic risk assumed.

The vulnerability of sectors such as Discretionary Consumer Goods (XLY) highlights the need to incorporate agility and digitalization as key organizational capabilities (Miceli et al., 2021). Companies in this sector that managed to pivot quickly toward e-commerce demonstrated greater resilience. For managers, the lesson is clear: investing in technology and flexible business models is not optional. Likewise, the crisis underscored the importance of supply chain resilience (Kareem et al., 2024). Sectors with more robust value chains and less dependence on cyclical factors, such as Materials (XLB), showed remarkable resilience, suggesting that supplier diversification and proactive risk management are strategies that generate tangible financial value in times of crisis.

Ultimately, this study provides quantitative evidence for the idea that strategic resilience is not an abstract concept. It can be observed and measured through the behavior of financial markets. The sectors that performed best were not necessarily the least volatile, but rather those whose business model was inherently more sustainable and adaptable to the new social and economic reality, demonstrating that proactive sustainability management is, in fact, a fundamental competitive strategy (Giancotti & Mauro, 2020).

It is essential to acknowledge alternative explanations. For example, the performance of the energy sector may also have been influenced by geopolitical factors that coincided with the post-crisis period. However, although these exogenous factors exist, they do not invalidate the thesis that the sector's intrinsic resilience, demonstrated by its ability to manage extreme volatility and still improve its risk-adjusted return, was the necessary condition that allowed it to capitalize on these geopolitical opportunities. Thus, it would be interesting for future research to employ alternative analytical tools to isolate these variables.

Conclusions

The findings of this research suggest that strategic resilience, far from being an abstract concept, is a tangible organizational capacity with measurable manifestations in financial market performance. The evaluation of sectoral performance validates the thesis that strategic resilience manifests itself through divergent financial behaviors, where adaptability and intrinsic sustainability, and not just growth, determine success in times of crisis. The use of data from the 2020 social emergency as a large-scale stress test shows that an economic sector's ability to weather the crisis and thrive in it is not a matter of chance, but rather the result of its inherent strategic sustainability, empirically validated by the positive Jensen's Alpha observed in resilient sectors. Likewise, it confirms that volatility and uncertainty, while affecting all sectors, clearly differentiated the resilient sectors from the vulnerable ones.

The main theoretical contribution of this work is to connect strategic management and quantitative finance by proposing a methodological framework that reinterprets Portfolio Theory metrics as valid proxies for resilience and sustainability. This approach allows for the empirical evaluation of concepts that, until now, have been addressed predominantly from a qualitative perspective (Ortiz-de-Mandojana & Bansal, 2016). For managerial practice, the findings are a call to action, considering that resilience cannot be improvised during a crisis, but rather must be built proactively. Investment in robust value chains, organizational agility fostered by digitalization (Miceli et al., 2021), and the development of a business model with a socially relevant purpose are revealed not as costs, but as crucial strategic investments that generate value precisely when the environment is most adverse.

In any case, it should be noted that the use of market data, although powerful for aggregate analysis, does not capture the internal decisions and mechanisms of companies. Among the lines of future research, the potential contribution of combining macro approaches with micro-level case studies for deeper validation is identified. Likewise, it would be of great value to replicate this analysis in other geographies and the face of different types of social, climatic, or geopolitical emergencies. The integration of specific sustainability ratings could refine the measurement of sustainability and its correlation with financial resilience.

One limitation of this study lies in the discrepancy of the time series for the XLC and XLRE sectors due to their later inception. However, this limitation, properly acknowledged, opens up valuable avenues for future research to validate these findings with longer data horizons or in different geographical contexts

However, it is necessary to acknowledge the limitations of this study, which open up valuable avenues for future research. Among the performance indicators considered relevant were Sharpe, Jensen's Alpha, and Treynor. On the other hand, risk measures such as Beta and Value at Risk (VaR) were also applied. Thus, the research demonstrates that analyses of additional indicators, such as the Sortino index and tracking error, can be incorporated to support further the results obtained from this work.

Finally, this research establishes a framework that can be applied to future periods of global crisis, given the understanding that pandemic events are recurrent throughout human history. These events exemplify the vulnerability of the global economy, as seen in historical antecedents like the Black Death, yet distinguishable by today's rapid globalization and mobility.

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They do not declare conflicts of interest.

Authors contribution
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