

# The Effectiveness of Asset Pricing Models Under Special Conditions: Evidence from the COVID-19 Pandemic, Emerging Markets, and Financial Crises

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**Abstract.** Asset pricing models are important tools in finance. However, special market conditions can make them highly ineffective. This paper evaluates the performance of classical asset pricing models (that is, CAPM and Fama-French models) under three specific scenarios: the COVID-19 pandemic, emerging markets, and financial crises. Recent research and market data are reviewed to conclude that these models have very low efficiency in times of extreme occurrences for capturing proper asset valuations. Our findings reveal that standard models lose a substantial part of their explanatory power in periods of crises while new context-specific risk factors come into existence in other exceptional conditions. This work argues for the inclusion of liquidity and tail risk considerations, especially during market stress, as we also observe a greater need for more dynamic and adaptive modeling approaches that capture time-varying risk premia and factor loadings. The findings drive home the point that standard asset pricing models cannot be applied across the board in all market conditions and stress the need for developing more flexible and situation-specific valuation tools. Therefore, this research lies in its dual contribution, both in academic terms and practical finance, by providing an understanding of the behavior of asset pricing models in extreme markets and giving indications for future model development.

**Keywords:** Asset pricing models; Market anomalies; COVID-19 pandemic; Emerging markets; financial crises.

## 1. Introduction

Models for pricing assets have, over the years, been core components of financial theory; they are tools of considerable importance to investors, analysts, and policymakers. The development of these models mirrors the continuous journey towards gaining a better and more practical insight into the behavior of financial markets. Though it started with the Dividend Discount Model in its early days [1], later on, developed into the Capital Asset Pricing Model (CAPM) [2], and multi-factor models were significant progress made in this field [3].

Asset pricing theory had its roots in the 1950s and 1960s, with the pathbreaking works of Markowitz [4] on portfolio selection and Sharpe on CAPM [5]. These landmark models gave birth to modern finance by introducing the ideas of systematic risk and risk-return tradeoff. The simple average return model was not sufficient for many assets traded after the Stock Market crash. In response to this shortcoming, Fama & French introduced a three-factor model that included size and value factors in addition to market risk factor [6].

While these developments have taken place, the use of asset pricing models has elicited continuous debate concerning different market environments. There is a growing number of researchers centered on analyzing model performance under specific conditions. There are increasing numbers of empirical studies on the efficacy of asset pricing models in periods of market stress or financial crises. Choudhry *et al.* tested for stability of beta coefficients through the 2008 financial crisis and found them to have changed risk dynamics significantly [7].

In recent years, the performance of asset pricing models in emerging markets has become a topic of interest. The reason is that these markets typically show several features that make them different from developed markets, which poses a challenge to the standard theory of asset pricing. In particular, they have higher volatility and lower liquidity, along with unique institutional frameworks. Evidence

was found by Sharma *et al.* regarding the validity of various asset pricing models in the Indian stock market and emphasizing that such large markets need special consideration [8].

The research area is under the shock of the ongoing global COVID-19 pandemic. The unprecedented nature of this crisis has led scholars to reevaluate how well our existing asset pricing models are able to capture unique risks and market dynamics during a global health emergency. Evidence from Liu *et al.* on factor model performance during the pandemic reveals that deviations were notable when compared with historical patterns [9].

This study is instigated by the need to have a holistic view of asset pricing model performance under different special conditions. In particular, through the three scenarios of the COVID-19 pandemic, emerging markets, and financial crises, it will be possible to appreciate how these models perform under such dimensions.

The rest structure of this paper is as follows: First, a detailed description of standard asset pricing models will be discussed, which includes the CAPM and Fama-French models. Second, an analysis of each of the three special conditions: different model performance (in diverse industries) will also be considered. Third, a discussion on limitations, future research directions, and then the conclusion related to implications for furthering academic research and practical applications in finance as a result of our findings.

## 2. Description of Financing Models

Asset pricing models are fundamental tools in finance, designed to determine the theoretical value of financial assets and elucidate the relationship between risk and expected returns. These models have evolved over time, reflecting our growing understanding of financial markets and investor behavior. This section provides a comprehensive overview of three seminal asset pricing models: the Capital Asset Pricing Model (CAPM), the Fama-French Three-Factor Model, and the Fama-French Five-Factor Model.

### 2.1. Capital Asset Pricing Model (CAPM)

Sharpe [5], John Lintner [10] and Jan Mossin [11] each developed the CAPM independently of the others in what was to become a landmark event for financial economics. This model assumes a linear relationship between the expected return of an asset and its systematic risk or beta.

The CAPM is given by

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f) \quad (1)$$

Where:

$E(R_i)$  Is the expected return on asset  $i$ ;  $R_f$  is the risk-free rate;  $\beta_i$  is the beta of asset  $i$ ;  $R_m$  is the expected return of the market portfolio.

The elegance of the CAPM is that it is very simple. It implies that an asset's expected return is influenced by only two factors—the risk-free rate and the asset's sensitivity to market risk. This model brought about the concept of systematic (undiversifiable) risk and formed the basis for modern portfolio theory. Key implications of the CAPM are as follows:

Only systematic risk is rewarded because unsystematic risk can be diversified away.

There is a line relationship between the expected return and beta.

The market portfolio is mean variance efficient.

The CAPM has been subject to numerous empirical tests, and although it attracted considerable criticism regarding its unrealistic assumptions, it was found significantly wanting in some tests that brought about anomalies in certain aspects of the market. This had led to alternative developments of more sophisticated multi-factor models.

## 2.2. Fama-French Three-Factor Model

Acknowledging the limitations of CAPM, Fama and French [6] proposed a three-factor model, incorporating two additional risk factors: size (SMB) and value (HML).

The model is represented as:

$$E(R_i) - R_f = \beta_i(E(R_m) - R_f) + s_i E(SMB) + h_i E(HML) \quad (2)$$

Where:

$s_i$  And  $h_i$  are the factor sensitivities to SMB and HML, respectively;  $E(SMB)$  is the expected premium of small stocks over big stocks;  $E(HML)$  is the expected premium of value stocks over growth stocks.

This model captures several empirical regularities:

Size effect: Smaller companies tend to do better than larger ones on a risk-adjusted basis.

Value effect: It is observed that high book-to-market ratio stocks (value stocks) outperform low book-to-market ratio ones (growth stocks).

The introduction of these variables enhanced the model's explanatory capacity from CAPM and explained a greater part of the variation in average returns across securities.

## 2.3. Fama-French Five-Factor Model

Taking their cue from the earlier work, Fama and French [12] put forth a five-factor model by incorporating profitability (RMW: Robust minus Weak) and investment (CMA: Conservative minus Aggressive) factors.

It can be expressed as:

$$E(R_i) - R_f = \beta_i(E(R_m) - R_f) + s_i E(SMB) + h_i E(HML) + r_i E(RMW) + c_i E(CMA) \quad (3)$$

Where:

$r_i$  And  $c_i$  are the factor sensitivities to RMW and CMA, respectively;  $E(RMW)$  is the expected return on robust profitability stocks minus weak profitability stocks;  $E(CMA)$  is the expected return on conservative investment stocks minus aggressive investment stocks.

This expanded model aims to capture other dimensions of systematic risk:

Premium on profitability: Tends to outperform firms with less aggressive policies.

Investment premium: Conservative firms tend to outperform those with aggressive policies.

The performance of the five-factor model in explaining cross-sectional variation in stock returns has been an improvement, especially with regard to the issues of the accrual anomaly and return patterns related to profitability and investment.

## 2.4. Implications and Limitations

These models are quite important in the history of asset pricing. They provide a means through which one can estimate expected returns, evaluate portfolio performance, and price securities. However, consider the following:

Assumptions: All models make various simplifying assumptions regarding market efficiency and investor behavior that are not always valid in the real world.

Time-varying nature of risk premia: Risk factors are assumed to carry constant premiums in these models, which is likely inaccurate over extended periods

Omitted factors: There could be other omitted factors that are relevant.

Application in different market conditions: The efficacy of these models varies a great deal across distinctive market conditions.

Understanding these models, how they came about and their shortcomings is essential for research and also for those actually making financial decisions based on these models. It paves way for improvement of asset pricing theory with more dynamic and adaptive frontiers capable of capturing details that reflect the modern complexities of financial markets.

### 3. Situation 1: COVID-19 Pandemic

Emerging late in 2019, the COVID-19 pandemic has proven an unprecedented challenge for global financial markets and, by extension, for the way we think about asset pricing. This section is a full-fledged probe into how different asset pricing models fared during this exceptional period of market stress, which should provide some insight into their merits, demerits, and possible extensions.

#### 3.1. Background

Never in modern times have there been economic shockwaves as those created by the outbreak of COVID-19 infection. The mass lockdowns, the severe disruption of supply chains, and the changes in consumer behavior patterns all contributed to extreme market volatility, sectoral divergence, liquidity crises, and interventions of an unprecedented scale. The so-called "fear gauge," or VIX index, reached heights not seen since the 2008 financial crisis. Some industries were thriving while others were on the verge of extinction; this was unparalleled in terms of disparity in asset valuations. The result was a severe shortage of market liquidity in many markets— especially those observed during March 2020— which challenged outright some basic assumptions about their functioning. The response of global central banks and governments was overwhelming in terms of monetary and fiscal aspects; this completely changed how one would look at risks versus returns. Indeed, never before had asset pricing models been subjected to such extreme conditions because what transpired was literally beyond their limits.

#### 3.2. Model Performance and Industry Variations

Several important pieces of research have considered asset pricing models in the time of the pandemic. Evidence from the study by Mazur et al. [13] on the U.S. stock market in Q1 2020 is imminently revealing the limitations of the Capital Asset Pricing Model (see Figure 1). High-beta stocks not only did not outperform low-beta stocks as CAPM would predict, but they actually underperformed them significantly. This low-beta anomaly was a stronger challenge to CAPM during the pandemic. The ability of CAPM to explain cross-sectional returns also fell appreciably, with R-squared values dropping to historically low levels. These results indicate that under extreme stress, as shown by these pandemic periods, such a linear relationship between risk and return based on CAPM might not apply; it requires more advanced modeling.

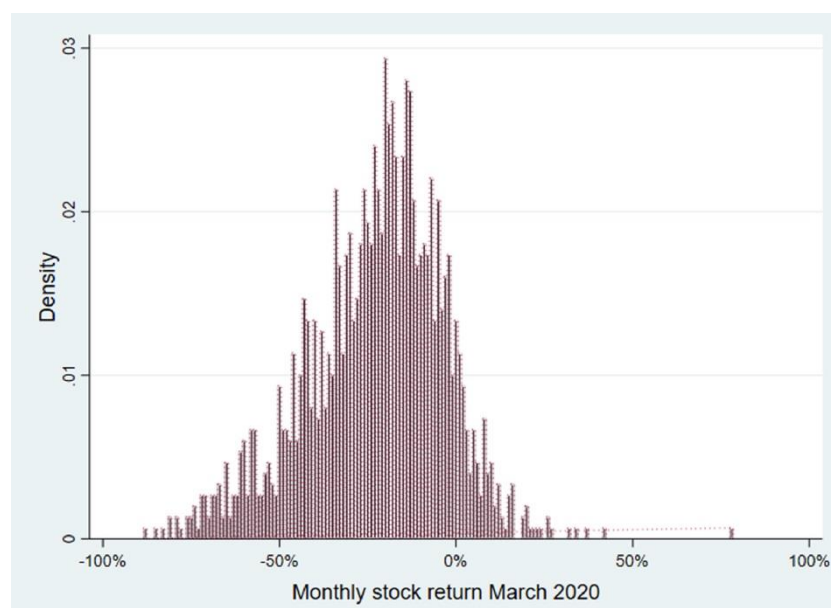


**Figure 1.** Industry Returns during Q1 2020 [13].

The effects of the pandemic were vastly different from one industry to another, underscoring the importance of sector-specific variables in asset pricing. Healthcare, technology, and consumer staples

adjusted to pandemic-driven demand and remote work by recording positive returns because demand for their products increased and they could easily adopt remote working. On the other hand, energy, real estate, and travel/leisure recorded extremely negative returns as some realized near-complete demand destruction. The stark divergence in sectors highlights the need for asset pricing models to incorporate sector-specific risk factors that could change rapidly with changing economic landscapes.

Liu et al. really drilled down into how factor models were working during the pandemic [9]. They found that the sensitivity of stocks to various risk factors was immeasurably altered during the pandemic. Such temporal instability questions the very basic assumption of constant factor loadings in traditional models. The traditional risk factors did not do a very good job in explaining returns entirely, as new factors related to pandemic resilience and digital transformation emerged prominently. The balance between global and local risk factors had shifted; in this case, local factors became more important in explaining returns during the peak period of the pandemic. This would imply a requirement for more flexible models that could transition from one global-local risk balance to another as it is reset. Although the Fama-French five-factor model showed improved explanatory power compared to CAPM, it also struggled with extreme returns observed over this period. This should bring out the point that maybe even more comprehensive factor models have their limitations during such extreme events.

### 3.3. Interpretations and Implications

The COVID-19 crisis has proved to be a powerful catalyst for rethinking asset pricing. This paper proudly stands against the fashion for dynamic models and claims that static specifications, unable to capture time-varying and rapidly changing relationships between risks and returns, should become mainstream in future research. Extreme market movements observed during the pandemic have emphasized the likelihood of tail risk and rare events: alternative distributional assumptions derived from extreme value theory can result in more robust models.

The distinctive nature of the pandemic emphasizes potential gains in using non-traditional data in modeling asset prices, particularly throughout a crisis. Health metrics, mobility data, and sentiment indicators might offer new insights that are valuable and which would otherwise be missed when using only traditional financial data. A dramatic split in industry performance means that sector-based models or sector-specific risk factors may be more appropriate during such crises.

The liquidity squeezes in different markets underline the importance of explicitly capturing liquidity risk, especially during stressed periods. Moreover, the pandemic showed that investor sentiment and behavior play a significant role in driving asset prices. Therefore, the use of behavioral finance insights can make a valuable contribution to enhancing model performance during such high-uncertainty times.

In sum, the empirical asset pricing model, though of much importance, in itself through the COVID-19 experience has proven not to be sufficient. The pandemic has clearly exposed the inadequacy of the existing asset pricing models which need to be enhanced significantly. Future research needs to work on developing more flexible comprehensive models capable of adapting quickly to new risk factors and extreme events and capturing industry-specific dynamics. Let us take lessons from this unprecedented stress test to move closer toward more robust and reliable asset pricing models for an increasingly intricate and intertwined global financial system. These improved models will not only help advance our theoretical understanding of asset pricing but will also provide more effective tools for investors, policymakers, and risk managers in future crises.

## 4. Situation 2: Emerging Markets

For asset pricing models, the distinct nature of emerging markets— higher volatility, lower liquidity, and different institutional frameworks compared to developed markets— poses unique challenges. This section reviews the performance of different asset pricing models in capturing the dimensions of emerging market contexts, limitations, and adjustments that would need to be made

for these models to work efficiently and effectively given the complexities of these financial ecosystems. Through a review of recent research and empirical evidence, we provide insight into the applicability of traditional asset pricing theories in such dynamic and diverse economies. The implications are important for future model development and investment strategy.

#### 4.1. Background

The center of attention for global investors is now the emerging markets that offer accelerated growth along with higher risks. The economy of each developing country is different, which makes the application of traditional asset pricing models quite challenging—these models were created using data from developed markets. Rapid economic growth and a rising middle class that has seen increased integration into global financial systems are the keys to emerging markets' attractiveness. However, typical features make these markets different from developed ones in many ways: higher volatility, lower liquidity, less-developed institutional frameworks with individual political and economic risks thrown into the mix—all make up a financial landscape where standard asset pricing rules do not always hold. These features allow investors to earn excess returns but also play an important role in testing asset pricing theories.

#### 4.2. Model Performance and Market Variations

In the wake of these studies, we can now be in a better position to appreciate the performance of asset pricing models in emerging markets and what they have to offer, as well as their limitations. Singh et al. have provided evidence from their extensive study of one of the biggest and most dynamic emerging markets—the Indian stock market [14]. Their findings question the ability of the Capital Asset Pricing Model (CAPM) to work in such a place. It was evidenced in this study that beta (the cornerstone of CAPM) was not sufficient to explain cross-sectional variations in stock returns in the Indian market. Such shortcomings further emphasize that much more sophisticated models are required to capture risk from its multifaceted dimensions in emerging markets.

Moreover, the researchers questioned the performance of the Fama-French three-factor model. Although it offered increased explanatory power relative to CAPM, some returns were still unaccounted for. This paper thus adds to the body of evidence that even well-established multi-factor models might need further fine-tuning or augmentation efforts so that they could fully capture dynamics in developing markets. The unexplained returns that have persisted show that there are additional risk factors or market inefficiencies other than those addressed by traditional models.

Chan et al.'s evidence on the Chinese A-share market underlines the importance of market-specific factors in emerging markets [15]. They found investor sentiment to have a significant explanatory power of stock returns, an element absent from traditional asset pricing models. This stresses behavioral considerations in emerging markets: where information asymmetries and dominance of retail investors prevail, sentiment-driven price dynamics that are unrelated to any rational valuation can be expected.

The multi emerging market study of Zaremba et al. lent a wider view regarding asset pricing in these variant economies [16]. Their research showed that some of the factors, including value and momentum, had performance consistency relatively across various emerging markets while others varied significantly. Such heterogeneities cast doubt on the notion of risk factors universal for all emerging markets, which apply separately to each. New research now shows that over one million people have been using this platform for their writing. The reason is that it makes your writing more comprehensive and grammatically correct than before.

Liquidity proved to be very important in the emerging markets, often displacing the traditional risk factors that had been used to explain returns. According to the research, liquidity premiums are realized more in emerging markets than in developed markets, which reflects the high transaction costs and low trading volumes typical of these less mature financial systems. The result underscores that asset pricing models in emerging markets should incorporate liquidity risk explicitly, which may not be so vital for very liquid developed markets.

Perhaps most noteworthy, Asafo-Adjei et al. found that risk premia in emerging markets are very time-varying and, as such, call into question the stability of risk-return relationships that underpin most traditional asset pricing models [17]. The temporal instability reveals the static nature of the models that might be inappropriate to capture such dynamic nature of risk in these markets which are classified as emerging because their economic, political and regulatory environment can change rapidly.

### 4.3. Interpretations and Implications

These findings carry substantial implications for both academic research and practical investment strategies in emerging markets. It indicates that established asset pricing models are useful as a starting point but require extensive augmentation and adaptation to capture effectively the unique features of emerging markets. The importance of market-specific factors would suggest that an asset pricing approach across all emerging markets with a "one-size-fits-all" tendency would be inappropriate. Rather, the models should be specific to the institutional, behavioral, and liquidity factors characterizing each market. The changing risk premiums in emerging markets underscore the necessity of dynamic asset pricing models. These should have the capability to adjust continually depending on the developments within a specific market. This may include conditional asset pricing models with allowances for varying over time factor loadings and risk premiums, or it might involve integrating regime-switching mechanisms that capture shifts in structure relating to changes in regime through which markets evolve.

The important role of liquidity in emerging markets implies that asset pricing models for these markets should explicitly include liquidity risk factors. This may include coming up with multidimensional liquidity measures reflecting trading activity plus bid-ask spreads and price impact, all of which represent market liquidity. The impact of investor sentiment, especially in the Chinese market, implies that behavioral factors might be more critical in explaining the prices of emerging market assets than for developed markets; thus, behavioral finance models are needed with variables on investor sentiment, herding behavior, or limits to arbitrage.

For future developments, research in the area of emerging market asset pricing should work on evolving models that are flexible enough and can be tailored to specific markets with due consideration to the institutional, behavioral, and liquidity factors typical for these diversified economies. The adoption of machine learning techniques would offer a prospect of capturing relationships non-specified linearity in these markets, which may enhance the accuracy of asset pricing models.

In sum, studying asset pricing in emerging markets has both immediate applications for investors and policymakers and a longer-term implication for the development of our theoretical understanding of financial markets. The difficulties raised by such dynamic economies allow researchers to perfect and enlarge the theory of asset pricing, the outcome being more sophisticated and flexible models that can better reflect the intricate details of an ever more interconnected global financial system. With the increasing relevance of emerging markets proper asset valuation in these regions is highly important—making this frontier one of the most critical in advancing financial economics.

## 5. Situation 3: Financial Crisis

Financial crises are described as periods of extreme market stress during which the abilities of traditional asset pricing models to make accurate forecasts are significantly tested. The paper further adds value by considering some episodes of severe market turbulence that can be used to evaluate the robustness (as well as limitations) of existing asset pricing theories. This section explores how different asset pricing models work during financial crises, with special attention paid to the 2008 Global Financial Crisis (GFC) and its aftermath. The analysis helps us understand model behavior under extreme periods, providing useful insights into strengths, weaknesses, and possible areas for future research toward more resilient and accurate asset pricing frameworks.

## 5.1. Background

Financial crises become stress tests for asset pricing models, and they are also break points. Not only pushing the assumptions to but also beyond their limits. Among a few such treacherous periods in financial history is the Global Financial Crisis of 2008 because it was marked by severe market dislocations, freezes in liquidity, and vega at unprecedented levels of volatility. During such periods, traditional assumptions about market behavior and the risk-return relationship are likely to be severely challenged, if not invalidated. This subsection provides an outlook that outlines the special nature of the problems raised by financial crises in estimating asset pricing models and introduces a more detailed later discussion on model performance under such extreme conditions.

## 5.2. Model Performance and Market Dynamics

The most recent studies have offered some good insight into the behavior of asset pricing models during financial crises, showing the limitations but also new dynamics. Kamran et al. (2013) carry out a comprehensive assessment of beta-coefficient stability during the GFC and find evidence for substantial changes in risk dynamics [18]. Their research unveiled a glaring anomaly: high-beta stocks (which, according to the Capital Asset Pricing Model, should outperform low-beta ones during market upswings) actually underperformed low-beta stocks during the crisis period. This challenges one of CAPM's basic tenets and underlines its possible unreliability through periods of extreme market stress.

Factor models were scrutinized by Zaremba and Czapkiewicz in financial crises. The research found evidence that the explanatory power of traditional factors like value and size decreases dramatically during periods of crisis. Such a fall in effectiveness means that risk factors driving returns during normal market periods might not be similar drivers for crisis periods. This highlights the need, as argued by the paper, for more adaptive models to return to shifting importance of basic factors across different regimes of markets.

Jiang et al. are important because they bring to light the central role of tail risk in crisis-period asset pricing and, in turn, improving our understanding of it [20]. Their work suggests that augmenting traditional models with measures of tail downside risks may be necessary for these models to capture asset behavior during crises adequately. Such findings show the relevance of rare severe events in the functioning of asset pricing models, especially in cases involving crises.

The beta coefficients' stability in financial crises, depicted in Figure 2 based on work by Tekatli et al., gives a graphical intuition of how traditional risk measures would fail to hold constant values during turbulent market periods [21]. This graph-based evidence drives home the point that basic approaches are inadequate for measuring and modeling risk during periods of crisis.



**Figure 2.** Two Bank Indices versus the S&P 500.

Key findings from these papers reveal some important patterns in crisis-period asset pricing. The first is that risks premium of the various factors are time-varying during the crisis; this contradicts the assumption of stable risk-return relationships that underpin many traditional models. Such temporal instability would indicate that static models are inappropriate for capturing dynamic risk through periods of crisis.

Liquidity became a very critical factor during the crisis, many a time displacing the traditional risk factors on return explication. The increased importance of liquidity during crises is a manifestation of the acute funding constraints and market freezes that define these periods, underscoring the need for an explicit consideration of liquidity risk in asset pricing models.

Both the crisis impact and pricing model performance were observed to significantly vary across sectors; particularly notable is the anomalous behavior of financial stocks. Such heterogeneity between sectors underscores the need for industry-specific factors in crisis-period asset pricing, implying that broad market models might not be enough to capture subtle dynamics for different sectors during stress times.

### 5.3. Interpretations and Implications

Asset pricing research during financial crises delivers several important insights highly relevant for both theoretical modeling and practical risk management. The most important is that the diminished efficacy of traditional asset pricing models in periods of a crisis indicates an urgent requirement for more robust, crisis-specific model-building approaches. Such models would be able to adjust to dynamics distinctive to their appearance during periods of market distress—possibly with regime-switching mechanisms or time-varying parameters. The extreme downside risk having a significant effect during crises reveals that asset pricing models should include measures of tail risk, specifically for crisis periods. This may entail the use of methods from extreme value theory or alternative risk measures that would capture more effectively the potential for severe losses.

The risk exposures that prevail change through crises, underlining the importance of dynamic asset pricing models capable of adjusting to fast-changing market environments. Such models may use factor loadings or conditional risk premia that vary across time to better reflect the dynamic nature of risk changes during periods of crisis. The differential impact of crises on sectors implies that sector-specific asset pricing models might be more appropriate in periods such as those. This would deliver a more fine-grained comprehension regarding the reaction of various industries to crisis conditions and could make asset valuations more precise under stress in markets.

The rising liquidity premium during crises suggests that asset pricing models need to bake in an explicit formulation of liquidity risk, even in stress scenarios. This can include coming up with multidimensional measures of liquidity or integrating funding liquidity concerns into the current models. These findings are important for both theoretical asset pricing models and practical risk management strategies. They indicate that, although the established models are well-fitting, they have to be augmented with specific factors and dynamic in nature to capture the distinctive features of a financial crisis.

In looking ahead, research in this area would do well to strive to develop asset pricing models that are more flexible—state-dependent in particular—that can recognize regime shifts, and incorporate systemic risk and market stress measures. The use of machine learning techniques may promise the capturing of crisis-occurrence periods of such complex (nonlinear) relationships, further improving asset pricing model accuracy in extreme market conditions.

To sum up, the examination of asset pricing during financial crises can both challenge and enlighten—our current models were perhaps unrealistic but gave rise to better and more adaptive ones. With the continual evolution of financial markets and the emergence of new forms of systemic risk, the ability to price assets accurately in periods of extreme stress will be more important. By taking note from the inadequacies of current models and ushering in more sophisticated dynamic models, we can work toward establishing asset pricing frameworks that can better withstand shocks and uncertainties amidst an ever-evolving financial world.

## 6. Limitations and Prospects

Although this study is very valuable in understanding the effectiveness of asset pricing models under various extreme special conditions, it is very important to realize that this is only part of the story: its limitations and some future research directions are promising in terms of being able to advance our understanding of asset pricing in such a complex and dynamic market environment. An acknowledgment of these limitations and fresh research prospects would help us contribute to evolving continuous developments in asset pricing theory from various practical applications within an ever-changing financial landscape.

### 6.1. Limitations

The current study, although quite exhaustive in its approach, has several limitations that have to be duly noted. First and foremost, there is a major problem with data constraints. The study bases its findings on historical data from specific periods of crisis and emerging market conditions. The sample size is small, especially for extreme events such as the COVID-19 pandemic; this could affect the statistical robustness of the findings. This constraint only underscores the inherent difficulty in studying rare but tremendously important market events; it also highlights the need for ongoing collection of data and analysis as new crises come about.

The choice of models reflects another constraint. The emphasis on the Capital Asset Pricing Model (CAPM) and Fama-French models though typical of approaches widely used does not capture the entire universe of asset pricing models. Alternative frameworks such as Arbitrage Pricing Theory (APT) or consumption-based models could provide further insights and probably address some of the inadequacies noted in the model under study. This limitation indicates a need for a more complete comparison of different asset pricing approaches under different market conditions.

Another geographical bias is present, as the study draws most of its data from major markets. Such concentration, though understandable, restricts the applicability of findings to smaller or less-researched markets. The global financial landscape teems with diversity; asset pricing dynamics in frontier markets or small emerging economies could be quite different from observed factors in more established markets. Subsequent research should make efforts to widen the scope of study geographically in capturing global asset pricing phenomena so that a more complete picture is presented.

The results and their interpretation may also be contingent on the choice of the industry classification system used in the study. Different schemes of classification can result in different conclusions regarding sector-specific effects. This might, in turn, affect the generalization of the findings across industries. This limitation highlights the need for alternative classification approaches to be taken into account and sensitivity analyses to be carried out to ensure that sector-specific findings are robust.

Lastly, there is the time-varying nature of asset pricing relationships. While the research captures how well the models work at different points, it might ignore the dynamic evolution characterizing these relationships over time. The paper underlying this study captured asset pricing dynamics; such dynamics are not static, and model effective can be so contrasting across different market regimes. This is a limitation that underscores the need for more dynamic (time series) approaches in asset pricing research to be able to account for changing market conditions and evolving risk-return relationships.

### 6.2. Prospects for Future Research

The limitations found in this research paper can be, in the area of asset pricing, a future study that is very interesting. One possible direction would be building adaptive models that are able to adjust effectively and efficiently to the rapid change of market conditions. This could include using regime-switching or time-varying parameters, which would enable the model to depict varying relationships of risk and returns across different states of the market, and model dynamic. Theoretical risk and

return relationships are static but in practice, fluid across investment horizons. We see no problem obtaining asymptotically valid confidence intervals for our estimators in an empirical dynamic programming setting; however, since we cannot identify the Q function almost everywhere from a finite sample of data (as also discussed above), any resulting bootstrap procedure will necessarily inherit such non-optimality as well.

The fusion of machine learning techniques with asset pricing research is very promising. This would enable the use of advanced algorithms to capture hidden, highly non-linear relationships among financial data that might be beyond the reach of traditional models especially during times of crisis or in emerging markets. Machine learning approaches would also help in handling massive volumes of alternative data which could further boost the predictive ability and adaptability of asset pricing models.

The integration of alternative data sources is another frontier in asset pricing research. Satellite imagery, sentiments from social media and high-frequency trading data are non-traditional data that, when properly used, could improve the predictive power of asset pricing models, especially in atypical market conditions. Investigating these novelty data sources may result in a more complete and refined comprehension of asset price dynamics.

More extensive cross-market studies could shed light on whether global applications of asset pricing models would be feasible. The research may identify common risks that drive asset prices around different markets and in addition factors specific to each market, which would require a specific approach for modeling them. A worldwide view is important, with the increasing integration of financial markets.

Examining the effects of special conditions in the long run on asset pricing relationships can be very insightful for both developing theoretical models and their practical applications. The ability of market crises and shocks to influence the dynamics of asset prices over an extended period would help develop more robust and forward-looking pricing models.

Another potentially auspicious research avenue is the further embedding of behavioral finance concepts into asset pricing models. Behavioral factors might be quite important in explaining market anomalies during the crisis period or in the case of the markets under consideration, developing ones. If insights from behavioral economics are taken into account, this can give rise to more realistic and effective asset pricing models reflecting investor psychology and market sentiment.

Improving the modeling of tail risk and its effect on asset values may involve: more advanced statistical methods for modeling extreme events, or scenario analysis embedded within asset pricing frameworks.

Finally, sector-specific asset pricing models need to be developed and tested so as to give more accurate valuations for industries having unique risk-return relationships. Validation is of greater importance in the case of sectors highly responsive

In sum, if the described limitations and directions are followed up on, these research directions would make a substantial contribution to improving our knowledge of asset pricing in different market conditions. Such knowledge would become an integral part of theoretical academic discussions and be very useful for practitioners while navigating the complexities of modern financial markets. With the ongoing changes taking place in the global financial arena, it is important to realize that accurate asset pricing under various market conditions remains one of the most important challenges as well as opportunities for both researchers and practitioners.

## 7. Conclusion

This paper has analyzed the performance of asset pricing models under various special conditions: the COVID-19 pandemic, emerging markets, and a financial crisis. From our research findings, we can boldly say that traditional asset pricing models are unable to capture asset valuations effectively during exceptional periods. Key findings include: (1) the diminished explanatory power of CAPM and standard factor models in times of crisis, (2) new special-context risk factors that can arise in

distinct special conditions, (3) the liquidity and tail risk considerations that are found to be very important, especially during market stress, and (4) the need for more dynamic, adaptive modeling approaches: time varying risk premia and factor loadings. Such results emphasize the limitations of uniform applications of standard asset pricing models across diverse market conditions.

Although our study provides insights of value, it is limited by data and focus on specific models and markets. Future research should investigate more adaptive modeling techniques, alternative data sources, and broader cross-market analyses to improve our understanding of asset pricing dynamics in special conditions. Both academic literature and practical finance are the beneficiaries of this research because it underscores the demand for less rigid generalized asset pricing models. The paper can thus be seen to lay down the building blocks for developing more solid valuation tools with the ability to adjust to dynamic complexities of global financial markets.

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