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AN ANALYTICAL STUDY OF DERIVATIVES AND THEIR ROLE IN THE STOCK MARKET

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ABSTRACT

The markets are now transforming as a result of the information age, which makes information accessible to everyone involved in the market. Advanced mathematical models that analyse patterns and trends have become commonplace in most financial institutions. The proliferation of derivatives, financial instruments whose value depends on the performance of an underlying entity, such as an asset, a rate, or an index, has grown and is gaining momentum. The volume has grown, and so, too, has the variety of instruments, the number of stock index options, for example, and the number of types of interest rate swaps. Within the last 10 to 15 years, the number and variety of these have grown significantly. The use of derivatives has led to increased attention and interest from government bodies, regulators, and academic researchers. Derivatives are currently the most widely traded financial instruments worldwide, with swaps the most widely used. Even though the market for commodity derivatives has grown rapidly, equity-index derivatives are still the most actively traded, especially in the over-the-counter (OTC) market. Warrants, options, and total return swaps are other types of equity derivatives noted. The mushrooming of the secondary market for credit derivatives has prompted banks to establish separate credit departments, often headed by designated officials regarded as experts in credit risk management. In the case of credit derivatives, in particular, it has become commonplace to focus transactions in certain departments. Credit derivatives constitute contracts with a predefined agreement concerning the credit risk of a specified reference obligation: usually, the consequence of a default (failed payment or bankruptcy) involving the reference creditor or reference entity. Using credit derivatives, credit risk can be transferred from one institution to another without the sale or purchase of the underlying credit. (Agrawal, 2021).

Keywords: Derivatives, Hedging, Risk Management, Price Discovery, Liquidity, Futures, Options

INTRODUCTION

Derivatives have become an important aspect of international finance; they are contracts based on underlying assets, with parameters tied to those assets, and their speculative trading has contributed to the growth of the stock market. A large body of literature documents the benefits of stock-index derivatives in improving stock price discovery, particularly in emerging markets, which have relatively weak regulatory structures and market participants with limited experience Filis (1970). India faced a serious crisis in the late 1990s and has come a long way from an isolated economy to a fully integrated one, with rapid economic growth. Consequently, the stock market has become attractive, and the conditions and requirements that enable equity-index derivatives to facilitate price discovery have been established. Similarly, traded interest-rate derivatives facilitate the transmission of monetary

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policy signals to the debt and money markets and enhance price discovery efficiency under a stability programme Agrawal (2021). Thus, the debt and money-market price mechanisms are important in the formation of interest-rate derivatives.

The derivatives market has grown significantly since then, allowing the management of market, credit and operational risks. Derivatives can dramatically mitigate risks in one asset class but expose risks in another, and when they are tied to a zero-sum game, they can create systemic risk. Risk-sharing thus remains a major challenge. Furthermore, derivatives help to be efficient in one asset class and less efficient in another. Two such asset classes in less-developed economies are the stock market and interest rates. To manage inevitable price spirals and to achieve balanced development in the stock market and interest rates, the introduction of stock-index and interest-rate derivatives provides important information and has positive effects. Structuring derivatives to address systemic risk is possible. However, it is essential that any benefits outweigh the costs and that such arrangements do not hinder further development of the financial sector.

CONCEPTUAL FOUNDATIONS OF DERIVATIVES

Derivatives are financial structures whose value depends on the value of an underlying asset, rate, or index Singher and T (1994). They imply potential monetary gains but carry a higher risk than the reference obligations they are based on. The most common types of derivatives are options (which grant rights but impose no obligation to buy or sell the reference asset) and forward and futures contracts (which obligate the parties to buy or sell the reference asset). Options and forwards may refer to currencies, interest rates, commodities, stocks, other indices, and credit; hybrid instruments are a mix of different derivatives within a single contract (e.g., a swaption). There are many forms of each of these derivative types. There are several derivatives traded on organised exchanges, which allow trading via designated brokers, with values linked to the price variation of the underlying obligations, which can be the same reference assets.

The concept of risk transfer led to the creation of derivatives. Perhaps it is a business practice from yesteryear destined to be replaced by more sophisticated financing methods, but conventional leasing is still thriving in today's business world. The leasing of automobiles by individuals under relatively short-term leases became widespread after the introduction of the leasing concept several decades ago – a development that vastly motivated the overdriving of production of automobiles by the assembly industry in favour of quality vehicles that were needed to secure long-term contracts with customers Boyd (2015).

DEFINITIONS AND TYPES

A derivative is a financial product whose value derives from an underlying asset, interest rates, foreign exchange rates, or indices Singher and T (1994). They can be a fully standardised, exchange-traded product or highly tailored and negotiated between the parties. Consequently, they provide the capacity to convey specific forward-looking financial risk exposures but also entail complicated risks of their own. The definition of “derivative” covers a broad range of products and activities, including some that are not typically considered derivatives, such as asset-backed securities, collateralised mortgage obligations, and risk-linked notes.

The starting point for discussing standard derivatives traded on organised exchanges via brokers is to describe the different types of such derivatives. The parties agree, depending on the performance of a specified asset or index, that the “seller” will have to pay one payment to the “buyer”, and that the “buyer” will, in turn, pay an offsetting payment to the “seller” in the future, which is a normal practice in the market to take a “short” position. These are the specified assets, such as stock price indexes and price indexes for bonds, currencies, commodities, and commercial products. The long position party would like to see the asset or index price rise in the future, whereas the short position party would like the opposite, an asset or index price drop Agrawal (2021).

THEORETICAL BACKGROUND: RISK TRANSFER AND PRICE DISCOVERY

Financial markets include financial assets that are bought and sold for ownership and carry varying degrees of risk. Time is a common factor across all assets, so they must be discounted jointly, even for liabilities with different maturities. Also, economic incentives are affected by the change in the price of an underlying asset that is owned or traded. Other things being equal, the higher the price today, the higher the supply and the lower the demand. Due to this conversion, the price of the underlying asset, agent in units deposited at time t, reflects the market's intertemporal, intra-asset, or liquidity structure. Within the set absolute temperature of the economy, an atom from the financial network becomes a single security traded at a single location and at a single time, connecting dissimilar and overlapping assets at dissimilar locations and/or events. Derivatives are generally contracts between two or more parties in which the rights or obligations of the parties under the contract are derived from the price of an underlying asset, which can be an asset, an index or another derivative asset, either financially settled or not, and the transfer of the ownership of underlying securities may not occur at any time in the transaction. Usually, these contracts are without significant structural modifications.

They are typically "mixed" with straight debt/opt option/forwards indices to form new financial contracts that serve as the basis for covering cumulative market movements or for other types of risk transfers that are deferred or mitigated in terms of price, quantity and volume. In the simplest terms, modern Financial Engineering is based on the extracted forward risk of a real

produced/unproduced cash flow per period, without removing volatility. As maturing conditions of the underlying, the collateral, or both, suggest changes to underlying price theories, borrow/lend and borrow/price points are known & used to productise cash flows, with the movement forwards/matured and the extraction change. However, such changes are separate and alter Forward Cover contracts from any of the more straightforward Hybridised long/short Leveraged contracts – and therefore are not contract-theory changes or centralised in any rigid manner. Normally, there is no change in the ownership of the underlying or any equity exercised, among 'real' traded assets, which are securities and partially securities traded on Security Exchanges. That is not the case with non-existent and/or fake Broker Contracts that specify changes at each Financial Centre, all the way to Cash Settlement. Contracts in Money Markets, Futures/Hedging and other Instrument Deployments are still of a Cortical type and are utilised precisely for this simplistic depositary change screening. This can go on continuously, and prices can literally never change. Handel (2005)

DERIVATIVES IN FINANCIAL MARKETS

Financial instruments whose value depends on the performance of a reference rate, an index, or an underlying asset are derivatives. The underlying can be explicit (such as currencies, interest rates, equity prices) or implicit (such as climate, oil supply) and can also be the performance of other derivatives Singher and T (1994). Derivatives include a variety of contract types, such as standardised exchange-traded contracts and privately negotiated contracts. Importantly, derivatives can confer significant financial benefits and also inherently carry risks. Derivatives are therefore used for a variety of purposes, depending on the interests of the parties to the transaction (e.g., buyers versus sellers). Thus, regulators recognise a variety of derivatives, including currency, interest rate, commodity, and equity swaps, as well as options and futures contracts on a broad spectrum of world currencies and commodities. Some derivatives, such as the option on a swap, or "swaption", are composed of a combination of several of the basic derivatives. Numerous derivatives are traded on organised exchanges. In these cases, interested buyers reach out to brokers to perform the contacts.

There are many instruments considered derivatives Jameel (2018). These range from basic risk-mitigation products to highly complex financial products that require an advanced understanding of mathematics and stochastic processes Agrawal (2021). To understand the various aspects and complexities of the financial derivatives market, it is important to have a fundamental grasp of the concepts and characteristics of financial derivatives. While some financial derivative equations are complex, and it can be difficult to gain a deeper understanding of derivatives themselves, the market might evolve quickly, necessitating timely choices. Some derivatives are traded in the Over-the-Counter (OTC) market, in addition to regulated exchanges.

The use of derivatives for hedging, speculation, and risk management makes them essential tools in financial markets. The increasing recognition of such contracts as being a key part of complex and sophisticated risk management systems. Derivatives are agreements whose cash flows depend on the performance of underlying variables and market prices. Cash flows, expectations, valuation, and embedded optionality should be analysed carefully to determine the contract's value. Derivatives play an increasingly essential role in the modernisation and stimulation of financial-market development, and they need to be understood and assessed carefully at the individual level, in relation to all other markets, across various organisational dimensions, and in detail.

MECHANISMS USED BY MARKET PARTICIPANTS TO DEPLOY.

In the standard transaction, only the known is traded up and down in the secondary market. However, with derivative contracts, there are known events whose consequences are contingent on currently unknown states of the world. These trades, in which the odds of future events are anticipated, are perfectly valid. Parties remain free to engage in derivative trades before future states of nature are known, in the face of uncertainties. The central bank's prompt and flexible reaction to the expectations about future states of the economy does not give rise to market-wide contagion. Hence, empirical studies of derivatives are more closely related to information about expectations of endogenous shocks Perveen et al. (2018).

Many derivatives include contractual terms, such as maturity and premium, that give participants in the equilibrium the freedom to choose when to act in the face of future uncertainties. Prime brokers, in between some of the largest shadow finance entities called dealers, tunnel expectations of the state of the economy to market participants beyond their immediate counter-parties. Dealer leverage grows, creating new edges for which prime brokers mint new derivative contracts, in addition to the collateral asset trades that the counterparty faces under the contracted derivatives. Newly minted contracts extend their margins to a wide range of market participants by bidding on and trading long options contracts on publicly listed Eurodollar futures and forward rate agreements, alongside deposits and repos, with public institutions like the Treasury and municipalities. The additional premium on counterparty-hedger trades mirrors the overall equilibrium response of participants.

IMPACTS ON LIQUIDITY AND MARKET EFFICIENCY

The two main roles derivatives play in financial markets are risk transfer and price discovery. A deeper analysis of how market participants use derivatives sheds light on these two roles. The four perspectives on the role of derivatives in market activity are distinguished as follows: conceptually – why derivatives are used; economically – the net effect on demand; behaviorally – the

motives for market activity; and operationally – how derivatives are used. Each perspective enhances the understanding of derivatives.

Exchange traders may think of contracts on equity index futures, stock index options, and stock options as essentially synonymous and interchangeable in many situations. Government, institutional and structural obstacles can limit the scope of cross-market arbitrage activity, and actually cause substantial price differentials. The multivariate dependence among these contracts is sufficiently high at the general level that multivariate equations can effectively represent the relationships. Such a structure enables the analysis of equity trades and equity hedging (which can be considered as a "stock-market" trade). The patterns of options on securities at equity exchanges and of futures on the same securities at derivatives exchanges are similar overall.

Derivatives make a big impact on the stock market. They influence liquidity, volatility, and price stability and are needed for an efficient market Naik et al., (2020). In modern finance, liquidity is a key factor. Order flows to stock and derivatives markets are a driver of asset prices. The lack of liquidity in either market reduces price discovery and the efficient allocation of capital. Liquidity in the stock market depends on the size of the derivatives market, and vice versa. The stock market and the derivatives market are liquidity-dependent, meaning that when times are tough or uncertain, stock market liquidity affects the derivatives market. Liquidity in the stock or derivatives market changes, causing shifts in order flow allocation between the two markets and, in turn, changes in the liquidity of the asset classes traded on them.

BEHAVIOURAL AND ECONOMIC IMPLICATIONS OF HEDGING VERSUS SPECULATION

Derivatives are also an important tool for risk management, both for corporations and individuals, and can be used to trade in an underlying asset more precisely than outright purchase or sale. Derivatives can be used to transfer risk exposures to others who can absorb them. In fact, although there is a long history of people hedging risk with derivatives, substantial research indicates that speculation on risk was responsible for a significant share of corporate derivative activity. In finance, speculation is generally understood to be the practice of holding risky positions intended to profit from price movements in an economic variable. In contrast, hedging is the taking of a position intended to minimise the risk of price fluctuations in an economic variable.

Observations of non-commercial trading behaviour in futures and options markets indicate a close relationship between speculator-chasing and risk-seeking elements of trader psychology. Speculation is correlated with occasional large single-trade profit/loss spikes and with smaller losses occurring more frequently than smaller gains, and trader data analyses show that such behaviour has an important but underappreciated destabilising impact on markets, making hedging less effective. Taking into account the hedge for mandatory benefits, underfunded liabilities, and other backwards-looking exposures with longer commitment terms adds complexity to corporate risk management approaches Bartram (2019). Furthermore, it has been recognised that the behaviour of traders and corporations is interwoven, as active trading in derivatives influences firms' end-state exposure profiles, stock-price crashes, and many other market and economic phenomena Wang (2001).

THE PRICING AND VALUATION FRAMEWORKS

A derivative is a financial instrument whose value is based on another asset. Derivatives pricing and valuation frameworks are mathematical and statistical models that enable the fair value of a derivative to be calculated and represent the market price Li (2006). The four criteria for the derivatives pricing are: arbitrage-free pricing; equivalence of pricing and valuation (value of an asset, claim or its derivative can be derived using a valuation operator); unique and convex valuation operator (the valuation operator is unique and produces convex valuation – wealth of the broker increases when selling zero-cost claims); and having an economic model at the valuation stage (only if the derivatives pricing is done by using an economic model of the underlying asset, the claim or its derivative, the value can be derived in theory) Ilya (2006).

- Forward and Futures Pricing

Standard discrete-time forward/futures pricing can be expressed as:

$$P_{f_{t,0}} = P_0(1+r)^t$$

or using an equivalent compounded rate r^*:

$$P_{f_{t,0}} = (1+r^*)^t P_0$$

In a multi-period decomposition:

$$P_{f_{t,0}} = ((1 + r_1)(1 + x_1) \dots (1 + x_n))P_n$$

Here r_iare period-specific interest rates and x_imay represent other adjustments (e.g., storage costs, dividends).

- **Ordinary Futures vs. Forward**

Ordinary futures (daily-settled) and forwards (settled at maturity) differ in the treatment of interest rate compounding. Maximum pricing tables for short and forward positions are used to benchmark the highest plausible price of a future claim.

- **Contingent Claims**

For claims whose payoff depends on a stochastic underlying, the simple linear compounding of forwards/futures does not apply. The pricing involves an exponential of a stochastic integral:

$$C = \text{expected payoff} \times \exp\left\{\int_0^t \delta(s)ds\right\}$$

where δ(s)is the instantaneous risk-free rate or dividend yield.

FORWARD, FUTURES, AND OPTIONS PRICING MODELS

The two key similarities between forward and futures contracts are that both impose obligations on the buyer and the seller. The person who holds a forward contract has the duty to sell (buy) the asset at the end of the contract. So, the existence of such contracts (or option contracts with a zero exercise price) forces option pricing to equal the forward price Li (2006).

Forward prices are determined by discount factors, risk premia, and other fundamental factors that affect the spot price process Kolmogorov (1981). To price the European call and put options written on forwards, non-arbitrage arguments and the concept of liquidity-adjusted forwards are used, and the corresponding arbitrage-free option-pricing equations are derived.

Foreign exchange (FX) derivatives include foreign exchange options and foreign exchange (FX) swaps, which are valued based on a currency forward contract. Three-dimensional, three-factor, and multi-currency term-structure models for pricing currency derivatives are introduced and fit into a general-maturity framework, as per the currency-derivative pricing literature. The restrictions imposed on eurodollar futures help to limit the specification of the domestic short-rate process.

THIS COVERS THE ROLE OF VOLATILITY AND THE GREEKS.

The Black-Scholes formula is essential in financial theory. It can be used to calculate the value of a European option, which is determined by the underlying asset's price, the exercise price, the time to expiration, and the underlying asset's volatility Shen (2009). The formula has a trade-off between volatility and time to maturity: Higher volatility allows less restriction on the latter, and vice versa Voukelatos (2009). However, major market deviations from theory do exist, and traders use these parameters for risk management, denoted by Greek letters. With declining market confidence, the willingness to pay a premium for options is increasing, as traders prefer the underlying asset. So, derivative instruments are those that provide liquidity in the least-distorting manner.

The call price depends on the price of the underlying stock. The delta is the change in the call price that follows a small change in the stock price. The call price also reacts to changes in volatility, and vega measures its sensitivity to volatility changes. Additionally, the time to maturity and the option price are non-linearly related.

MODEL RISK AND EMPIRICAL CONSIDERATIONS

Derivatives are financial instruments that offer greater flexibility in financial risk management for economic agents. In the last 40 years, their transaction volume has grown by an order of magnitude, resulting in significant expansions of their application, pricing, and valuation models. However, the underlying theoretical principles of their role in risk transfer and price discovery remain strong today, even as economic and financial theory has evolved.

Derivatives can have a positive or negative impact on market liquidity and efficiency, either directly or indirectly. The offsetting interest in derivatives based on cash stocks offers the potential for wider use—thus better fulfilling market-clearing functions—so that cash-stock economic and balance-sheet adjustments are subsequently avoided altogether. Hedging can increase the financing spread for some firms and create an incentive to manipulate cash flows, perhaps due to asymmetric information. There is also a position that the more complex an instrument is, the more likely it is to be misused or misinterpreted, and the greater the risks it entails Kerkhof (1970).

REGULATORY AND SYSTEMIC CONSIDERATIONS

The derivatives market has expanded exponentially, and the need for regulation and control of systemic risk has become a pressing issue. To improve structural protections, regulators can become directly involved in reducing regulatory and legal impediments to derivatives design and execution, including the design of regulated derivatives, without creating them Libbey (2010). Among the key concerns are market integrity, the facilitation of the execution of market-completing contracts, price formation, fair competition among trading places, and the minimisation of counterparty risk. For example, the design of the instrument's contracts and the firms' portfolios may drive the need for clearing, as well as the time frame within which the bank hedges its position or engages in a speculative trade. Transparency to market participants is not limited to disclosing the trading venue; this point is also important to underscore. Hedge clearing and venues with organised public auctions and other trading mechanisms are beneficial for increasing the concentration of a given firm's trading volume over a particular time period Agrawal (2021).

The regulatory changes that were a direct result of the crisis in 2008 - counterparty clearing requirements and enhanced transaction data reporting - have been crucial for the correct functioning of OTC and exchange-listed derivatives activity at an international level. However, the governance architecture of the global financial marketplace works only if general attention is paid to implementing the new requirements across most systemic and cross-border outlets Singher and T (1994). There is continued debate on the regulatory perimeter, including the implementation of additional risk-weight classifications for swap-end-user activities, the formalisation of additional risk weights for external derivatives reporting liability, and two-tiered thresholds for such liability. There is a need for periodic consolidation of progress made by the international standard-setting community, widespread dissemination and communication of progress and intentions, peer-review and monitoring mechanisms, and increased ability to recognise work that still needs to be done. There are numerous types of derivative contracts already recognised in various financial systems.

ENSURING MARKET INTEGRITY, TRANSPARENCY AND RISK MANAGEMENT

Derivatives transactions generate positive and significant spill-over effects on market transparency and risk management. Information is not equally distributed among participants, but derivatives provide higher-quality information and can increase information availability, resulting in better price discovery. Furthermore, the global financial crisis has highlighted the need for timely, accurate information to evaluate counterparty risk. Uncertainty about counterparties spread throughout the system during the crisis, leading to a lessening of interbank funding and a general scarcity of credit to the real economy Agrawal (2021). However, the derivatives framework can not only convey information about deteriorating credit quality of counterparties, but also limit the development of system-wide risk through selective hedging using exposure netting, disclosure, and portfolio compression. Therefore, new or additional requirements are unnecessary, and the current body of work on derivatives is more than adequate to highlight their contribution to the development of a suitable pricing mechanism for counterparty credit deterioration and other systemic risks. In addition, the systemic staging of the analysis provides insights into counterintuitive findings, such as the increase in liquidity during the crisis and the relationship between increased fragility and the contraction of spreads.

POST-CRISIS REFORMS AND CONTINUOUS MONITORING

Some initiatives in the years since 2008 have aimed to fix derivatives laws, marking a move to shield banks from the dangers of derivatives. There are no regulations that limit the size of derivatives trading. The purpose of disclosure rules is to enhance the disclosure of derivatives' future cash flows Valiante (2010). Prudential regulation of financial instruments, including derivatives, should be applied to ensure that all such instruments are subject to systemic risk. The cash flows of derivatives are opaque, and policymakers have decided they need to be made more transparent Sarra (2011). Adding further restrictions to a derivative will encourage people to remove it from the books. Systemic risks and a lack of market transparency beyond derivatives are holding back post-crisis reform efforts.

EVIDENCE OF OUTCOMES FROM DERIVATIVES

A derivative is a formal expression of the right to buy or sell an underlying asset, in this instance, treasury bills. Casey (1973) writes that “A derivative is long when the payoff is made from an underlying asset in a way that makes the payoff positive” and that the underlying assets can be equity, currencies or commodities. For instance, in the market, stock options began to mature and consequently gained more attention from academia. However, many stock index options, stock index futures, interest rate swaps, currency swaps, currency options, and commodity options had been active much earlier. Derivatives are important financial instruments for pricing, optimising the timing of buying and selling the underlying asset, structuring financial instruments (e.g., swaps), and hedging.

EMPIRICAL RESEARCH ON HEDGING EFFECTIVENESS:

A large number of empirical studies have examined the hedging power of financial derivatives. The results of a meta-analysis of 38 primary studies on the effect of corporate hedging on firm value are also inconclusive. Hedging is a popular form of corporate risk management, especially for airlines. The primary reason for a company to hedge is to mitigate the negative consequences of earnings fluctuations for investment and financing decisions. Derivatives are the most common hedging instruments and have very low transaction costs; thus, studies on the role of derivatives in corporate risk management are vital for understanding their impact on firm value Bessler et al. (2019).

The basic asset pricing model indicates that reducing discount rates or relaxing borrowing restrictions, improving access to external financing, or reducing cash-flow risk can generate value for shareholders. These lower betas also imply that hedge activity can affect a firm's cost of capital, investment policy, and economic profitability. Empirical studies suggest that corporate hedging positively affects a firm's market value Bartram et al. (2006). Studies in the airline industry provide direct evidence of the impact of hedging on firm value and cash-flow risk. Delving deeper into the effects of certain contracts on market value also provides insights into derivatives analysis and companies' holding patterns.

Some studies have found negative effects of corporate hedging on firm value, while others have found either positive or neutral effects. A firm's market value is not affected by the recorded benefit of commodity price protection, but common corporate risk-hedging strategies offset commodity price exposure Aretz and Bartram (2009). Hedging reduces the sensitivity of stock prices to commodity price fluctuations but does not affect the risk of the stock's market value. These observations imply that a key aspect in subsequent hedging decisions is the firm value. Other factors affecting firms' use of derivative instruments include overall debt level, debt-maturity policy, dividend policy, liquidity policy, and operational hedging. Derivatives decisions are strongly affected by industry practices; the more firms in an industry hedge, the higher the exposure of the remaining firms that do not.

Held derivatives, cash and equivalents, and overall liquidity are interrelated in determining the firm's market value. Theories that view derivatives as a catalyst for value creation are less straightforward than theories that view the relationship between value and derivatives. The choice of instrument is determined by the properties of the valuation model underlying it, and can be related to operating decisions or to classes of fundamentally different goals. However, there are still opportunities for cross-sectional or time-series analysis of selected options, with the possibility that the types of derivatives a firm has, and the impact of cash liquidity on market value, may differ across firms and over time.

CHANGES IN MARKET STABILITY AND LIQUIDITY

Some derivative contracts, such as options and futures, have long been promoted as instruments to improve liquidity and market efficiency. However, there has been mixed evidence supporting this claim. The use of futures contracts, particularly equity index, interest rate, and foreign exchange futures, may amplify return volatility in the cash market for the underlying asset. Likewise, the addition of options trading may cause price volatility and increased observed volatility, especially for low-cap stocks. However, the price-formation function of derivative markets has not been studied as extensively as their role in enhancing liquidity and efficiency. Liquidity conditions can be tight in spreads, but there can be significant differences in the volatility of cash-market returns to these spreads.

Wang (2015) examines the effect of derivative trading on stock price discovery, highlighting the important relationship between liquidity and stock price volatility. The impact of cash-market shocks on equity index futures returns appears to be dampened by higher trading volume on the futures side. Okur, Tan, and Aydin (2019) discuss the relationship between price volatility in the spot and futures markets and examine how the futures market affects the stability of the underlying commodity market. In Pakistan, newly established derivative markets and their impact on the overall economic efficiency and stability of the system are discussed by Perveen et al. (2018).

CASE STUDIES: DERIVATIVES IN PRACTICE

Any financial instrument whose price depends upon the price of another one, called an underlying asset, is a derivative. Derivatives are financial instruments whose prices are based on the price of another instrument, called the underlying asset, such as options, futures, forwards, and swaps. The role of derivatives in risk transfer and price discovery mechanisms is important in economic terms Cummins et al. (1970).

From an empirical perspective, analysis of price movements indicates that derivatives are linked to information aggregation, thereby supporting price discovery. Informative transactions lead to predictable price changes related to expected returns. Price incentives between futures and underlying assets link the two markets, and an increased flow of price-relevant information reaches equity prices through the derivatives market Wang (2015).

Derivatives also allow for the far-reaching dispersion of common shocks across markets, resulting in a reduced effect in any particular market. After an action in the underlying market occurs in the distant past, the market price fluctuates but soon returns

to its normal level. This distortion in price information flows is transmitted to fewer markets that were affected by the initial market Nguyen (2016).

EQUITY INDEX DERIVATIVES

Equity Index Derivatives are sold by investors who take on risk to hedge using index-linked instruments. Abnormal returns on stocks are positive for an index buyer and negative for a stock index futures buyer Wang (2015). S&P 500 futures will generally be more favourable when they open on Sunday evening, and low relative-value stocks will gain quickly. Spot-future price differentials tend to narrow as index arbitrageurs exploit the phenomenon. In June 2001, indices and derivatives on the Indian stock exchanges were introduced, and this study assesses over 10 years of transactions, using daily spot and futures prices in a simple bivariate framework with a global player S and Suresh (2022).

EXPLAIN THE CONCEPT OF COMMODITY AND INTEREST RATE DERIVATIVES

Commodity derivatives are risk management instruments that shield producers and consumers from adverse price fluctuations. They help reduce disruptions to production, excessive price volatility, and volatility associated with supply shocks, and support inventory management. Commodity derivatives are traded on safety, price, and delivery risks. Farmers, companies, and individuals rely on commodity goods that require price protection, and commodity-specific hedging remains important. Companies are accelerating derivative transactions globally as part of their risk management strategies. The importance of commodity price forecasting for prudent policymaking was highlighted by inflation outpacing the real economy, rising commodity price volatility, and the 2008-2009 financial crisis Singhal (2015). Pricing options and interest rate derivatives, which act as hedges against variations in borrowing rates, have become popular in India and globally Wang (2015).

THE EFFECTS OF A CRISIS ON OTHER MARKETS AND SPREAD

Given the prevalence of derivative trading on equity indexes across many financial markets, there is an opportunity to explore the sector's implications beyond the underlying assets. Stock-index futures offer a helpful way to gauge market risk and can facilitate cross-market comparisons. Derivatives can transmit risk between related yet distinct asset classes, suggesting their impact transcends the market for the underlying asset. The relationship between commodity and interest-rate derivatives and the stock market can be further explored by examining the marginal impact of these derivatives (which are not traded directly in stocks).

Derivatives also offer information on contagion, the spread of shocks between markets, assets or sectors. This mechanism is extremely important for magnifying the impact of unforeseen events. Tremors in one stock exchange market can trigger a chain reaction, causing shocks in other markets. A large body of research on financial markets worldwide documents the prevalence of financial contagion. The participants argue that the crisis results from the interplay among limited information, limited arbitrage opportunities, and forced liquidation and rebalancing.

A post-Millennium and post-Lehman endogenous break study identified several such break dates in the equity markets of the BRICS and the G7. Spillovers that triggered systemic events occurred across BRICS countries before, during, or after the Lehman shock. In the absence of a crisis, one of the BRIC countries began spilling over to the rest, indicating a complete segmentation of regions, albeit on top of the institutional background of the international initiative on stock indexes and funds.

METHODOLOGICAL CONSIDERATIONS FOR ANALYSIS

Derivatives trading activity, its effect on underlying asset price movements, volatility spillover between derivatives and cash markets, and the regulation of these markets have all been studied and have received special attention in this research, particularly with respect to their impact on firms' equity value. A few of these studies focus on the impact of increased derivative use on firms' earnings volatility and related pricing. Another area of research explores the factors driving firms to use derivatives, the impact of derivatives on financial reporting, and the systemic risk embedded in OTC derivatives. Other methodological issues concern the role of derivatives in tax avoidance, the risk-hedging of executive compensation through derivatives, and the consequences of implementing trade agreements Mahardika (2018). The analysis has included cross-sectional regressions to interpret the price impact of hedging trades on various SWAP brands and to estimate this impact Wang (2015). Empirical evidence indicates that the magnitude of such effects on prices is significant, and that an understanding of those instruments and the use of the cross-sectional methodology followed is essential in the assessment of the incentive instruments under consideration in the context of the banking industry, as well as in the development of relevant regulatory provisions aimed at promoting improved market efficiency.

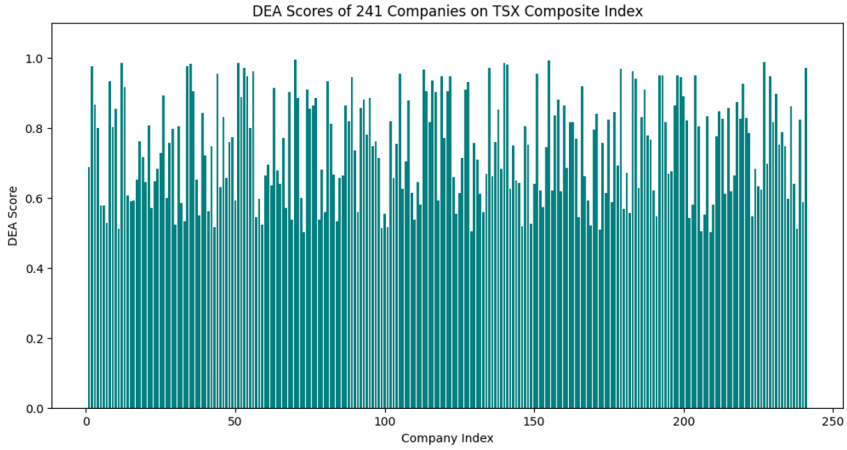
DATA, MEASUREMENT AND ECONOMETRIC APPROACHES

The analysis uses the functions “Data Envelopment Analysis_Composite Financial Indices. m and Data Envelopment Analysis_Main.m” from the British Columbia Institute of Technology (BCIT) School of Business to calculate Data Envelopment

Analysis (DEA) scores for the 241 companies in the Toronto Stock Exchange (TSX) Composite Index. Consistent with BCIT methodology, the original DEA scores have been inverted so they are less than or equal to unity. In the best-case scenario, DEA scores approach 1, while scores of 0 indicate the lowest possible efficiency.

Raw, inverted DEA scores of Companies on the TSX Composite Index and two Bloomberg-derived datasets are used for statistical analyses. The first is a time series of the number of Canadian financial derivatives contracts - total, equity, and other - traded on a selection of exchanges (Toronto, Montreal, TSE). The following are created using the Financial Derivatives Statistics and an excerpt of a Financial Stability Review prepared by the Bank of Canada (2001), together with proprietary statistics:

The second dataset consists of monthly securities transactions for very large (non-derivative) securities, denominated in Canadian dollars and various currencies. The data used for Extended Hamiltonian filtering comes from the Bank of Canada's "Transactions Between Banks and the Non-Bank Public" series, B2A6P_041_N-SIPF. The top-level data are the sum of the currency converted amounts. If an inverted DEA model is used, there is room for future research on netting analysis. Shen (2009)



CREATE A SCOPE OF LIMITATIONS AND FUTURE RESEARCH.

Derivatives, in general, are a way of coping with uncertainty, but when used inappropriately as an investment product, they can contribute to instability. Elasticity of this sophisticated market fuelled research for pricing contracts and other beneficial uses. More work is needed to create suitable benchmarks and to constrain futures.

The Indian market grew rapidly, and trading in derivatives began in 1996. Although overall volumes were higher on stock futures, turnover decreased in 2009, with limited developments in other segments. There is scope to study the growth of individual options, currency derivatives, interest rate derivatives, and credit derivatives in relation to global trends, as these are in their nascent stages in the Indian derivatives market" S and Suresh (2022). It should also be taken into account the interaction between derivatives and underlying assets, as well as the analytical work of various authors.

CONCLUSION

Derivatives are now a key part of the 21st century's global financial system for managing financial risk. Central to financial systems, stock markets have witnessed the development of derivative securities such as stock futures, stock options, index futures, and other securities based on the cash equity market. It is therefore important to understand the function these derivatives serve in stock markets and the implications thereof for market efficiency.

Derivatives are generally believed to play an integral role in ensuring liquidity and efficiency, and in facilitating price discovery and risk transfer in equity markets S and Suresh (2022). These functions have led to speculation that derivatives markets are simply a reflection of the underlying cash markets' supply-demand schedule, or perhaps that there are cross-market effects, both ways. This is especially true for the relationship between stock returns and stock index futures prices, and, from the perspective of regulatory authorities, equity index derivatives are well developed in developed markets.

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