

THE IMPACT OF FINANCIAL ENGINEERING IN PROMOTING CAPITAL MARKETS.

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Abstract

The research aims to show the impact of financial engineering on the capital market development. The financial system has witnessed many changes that has stimulated financial engineering growth, which has contributed to the boost of capital market. This paper reports a theoretical examination that simultaneously considers the effects of the relationships between financial engineering and the development of the capital market, including the effect of financial engineering instruments in the boost of capital market and its efficiency. In addition to the impact of financial engineering in risk management. It encapsulates also the impact of technological advance and financial innovation in promoting capital markets.

Keywords: Financial engineering, Capital market, Derivatives, Financial innovation.

JEL Classification Codes: G1 Assets Markets and Pricing.

الملخص

تهدف الدراسة إلى إظهار أثر الهندسة المالية على تطوير سوق رأس المال. فقد شهد النظام المالي العديد من التغييرات، التي حفزت نمو الهندسة المالية، مما ساهم في تعزيز سوق رأس المال. وعلى وجه التحديد، تعرض هذه الورقة فحصاً نظرياً يأخذ في الاعتبار أثر العلاقات بين الهندسة المالية وتطوير سوق رأس المال، بما في ذلك تأثير أدوات الهندسة المالية في تعزيز سوق رأس المال وكفاءته. بالإضافة إلى تأثير الهندسة المالية في إدارة المخاطر. كما أنه يشمل أثر التقدم التكنولوجي والابتكار المالي في تعزيز أسواق رأس المال.

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الكلمات المفتاحية: الهندسة المالية، سوق رأس المال، المشتقات المالية، الابتكار المالي.

تصنيف JEL : G1 Assets Markets and Pricing.

1- Introduction.

Financial engineering is defined as: design, development, implementation, tools and innovative financial mechanisms, and drafting for creative solutions to the funding problems. In order to consider it successful should lead either to reduce transaction costs or to provide improved service lead in sum to fill the special needs of all participants in the financial system. So institutions must use financial engineering in the study of capital market (stock exchange, banks), and in the study of corporate financial balance. Limited financial and engineering function is to overcome the barriers and regulations imposed by the supervisory authorities.

The advancement in Technology and innovation have played an important role in improving service delivery standards in the capital markets which are considered as an engine to market growth.

Moreover, Development of very specific risk and investment management goals has been one of the main forces behind the development of financial engineering instruments. Because provision of synthetic and structured derivatives is the direct function of needs of end users. In addition, the question of market efficiency, or lack of that in market is critically important to financial engineers. Much of financial engineering over the last decades has sought to develop new and innovative instruments and strategies to exploit price discrepancies opportunities. It must be noted that, it is not always necessary to use derivatives to speculate, but tools and techniques of financial engineering can prove very advantageous.

For that, this paper seeks to treat the following problematic:

How does financial engineering impact capital market development?

A few subquestions stem from the main question

- 1- What are different financial engineering instruments?
- 2- What is the Role of Capital Markets in the economy?
- 3- What are the factors contributed to the change of capital market?

Hypotheses:

To answer the subquestions we consider the following hypothesis:

- 1- Financial engineering use a wide variety of instruments, theories and ideas, and processes in its operation, such as derivatives, which are considered as the building blocks of financial engineering.
- 2- The main role of the capital markets is that of financing the economy (especially the economic agents), by mobilizing capitals on medium and long term.
- 3- Financial markets in general and capital markets in particular have changed dramatically over decades, especially with the emergence of financial engineering which can be applied in wide varieties of financial operations and strategies.

Research objective:

The main aim of this study is to examine the role of financial engineering in the growth of the financial market. This in effect emphasizes the relationship between financial engineering, financial market and growth of the financial market, the role of financial engineering instruments and derivatives in market growth.

2- The conceptual framework for financial Engineering.

2-1. Definition of Financial Engineering.

Financial engineering is the phenomenon of product and/or process innovation in the financial industries the development of new financial instruments and processes that will enhance shareholders, issuers' or intermediaries' wealth (Felix W Kariuki, 2010, P: 02).

In other words, financial engineering means the creation of new and improved financial products through innovative design or repackaging of existing financial instruments. Financial engineers use various mathematical tools in order to create new investment strategies. The new products created by financial engineers can serve as solutions to problems or as ways to maximize returns from potential investment opportunities (Neeta Bporikar, 2018, p: 42).

Bansal (2001) defined it is design, implement creative tools and innovative creative solutions to financial problems (Iman Al_Khero, et al., 2019, P: 36).

2-2. Tools of Financial Engineering.

Financial engineering use a wide variety of instruments, theories and ideas, and processes in its operation to custom design

solutions to incredible array of problems in finance. All these knowledge, instruments, processes and rules together are considered as tools of financial engineering, which can be divided into: (Marshall, J.F., Bansal, V.K., 1996, P: 7- 8.)

2-2-1. **Conceptual tools:** This category involves the combination of concepts and ideas that can be used in finance studies and are considered as formal disciplines. Mostly these types of tools are essential knowledge base for people who are working in this field. Examples of conceptual tools are valuation theory, portfolio theory, risk and return measurement, hedging theory, accounting relationships, speculation, arbitrage, and market efficiency etc.

2-2-2. **Physical Tools:** include the instruments and the processes used by Financial Engineers in combination to gain a specific task or purpose (Ambrish Veernaik, 2016, P: 153).

- ✓ **The processes** include different trading mechanisms and techniques, such as electronic securities trading, public offering, and any other innovative methods or different requirements to reduce the cost of transaction or risks or any other problems existing in the trade process.
- ✓ **The instruments** include at a very broad level, securities, and derivatives.

a) **Securities:** Securities include debt securities, equity securities and, to some extent, investment fund shares or units (Jaime Caruana and al, International Monetary Fund, 2015, P: 09).

b) **Derivatives:** are financial contracts whose value is derived from some underlying asset (Viral Acharya, 2009, P: 232).

Financial derivatives are used for a number of purposes including risk management, hedging, arbitrage between markets, and speculation (The International Monetary Fund, 1998, p: 02). About 95% of the world's 500 biggest companies use derivatives. Derivatives with standardized terms are traded in markets called exchanges. Derivatives tailored for specific purposes or risks are bought and sold "over the counter" from big banks (Madsen, C., 2013, p: 03). These derivatives serve as the financial building blocks for building more complex derivatives. Such as a portfolio containing some combination of these building blocks. The process of building more complex financial derivatives from the elemental blocks is referred to as financial

engineering, (Robert W. Kolb, 2003, p: 13) and these Derivatives are considered as financial engineering instruments in our research. The three basic kinds of derivative are forwards and futures; swaps; and options.

- **Futures:** futures contract is an agreement to buy or sell a specified quantity of an asset at a specified price with delivery at a specified date in the future. Futures contracts are standardized traded on an organized exchange and settled through established clearing house (Michael Chui, 2012, P: 05). Consequently, counterparties can exit a commitment by taking an equal but offsetting position with the exchange, so that the net position is nil, and the only delivery will be a cash flow for profit or loss (The National Association of Pension Funds, 2013, p: 04). Moreover, participants in futures markets are required to post “margin,” reflecting the value of the transaction, which is essentially collateral against default, (Rangarajan K. Sundaram, 2013, p: 03) so participants trading futures can realise gains and losses on a daily basis.

- **Forwards:** an agreement between two parties to buy or sell an asset at a certain time in the future for a certain price. A forward contract is traded in the over-the-counter market—usually between two financial institutions or between a financial institution and one of its clients (John C. Hull, 2012, p : 07). The agreement is privately arranged to fulfill the need of both contracting parties, a buyer and seller, so forwards are customised in terms of the maturity date, the specific quality (grade) to be delivered, etc. If one party intends to close-out the contract, it must be at the consent of the other party, (Rosalan Ali, 2015, p: 210) which means also that each party takes on the risk of the other counterparty’s default. Contrary to futures, forwards transaction requires cash settlement at delivery.

- **Swaps:** a swap is a contractual agreement between two parties to exchange cash flows for a stated period of time. (Financial Services Commission Mauritius, 2014, p: 04). The most common of which are interest rate swaps and currency swaps. Other types of swaps include equity and commodity swaps. A plain vanilla swap usually involves one party swapping a series of fixed level payments for a series of variable payments (Martin Haugh, 2010, P: 04). Swaps is essentially a bilateral “Out the Counter” agreement used to transfer risk of a reference entity from one party to another (Christoph Theis, 2013, p: 06).

• **Options:** a contract that gives the buyer the right, but not the obligation, to buy (call) or sell (put) a specified quantity of an instrument at a specific price within a specified period of time (Commodity Futures Trading Commission (CFTC), 2008, p: 68).

The seller is obliged to deliver or accept the asset, when the option is exercised. (Deutsche Börse Group, 2008, p: 38). In options transaction, the option's purchaser pays the option's seller (the writer of the options) an amount for the right to buy or sell, this amount is known as the option premium (Michael Chui, Op. Cit, p: 05). Options are traded both on exchanges and in the over-the-counter market. There are two types of option. A call option gives the holder the right to buy the underlying asset by a certain date for a certain price. A put option gives the holder the right to sell the underlying asset by a certain date for a certain price. The price in the contract is known as the exercise price or strike price; the date in the contract is known as the expiration date or maturity. American options can be exercised at any time up to the expiration date. European options can be exercised only on the expiration date itself (John C. Hull, Op. Cit, p: 07).

2-3. Factors contributing to the growth of Financial Engineering.

The explosive growth in financial engineering over the last decades is the consequence of a number of factors. These factors can be divided into two groups: (Falguni Mitesh Thakkar, 2017, p: 39-40).

2-3-1. **Environmental factors:** It may be regarded as the factors external to the firm and over which the firm has no direct control but which are nevertheless of great concern, because they impact the firms performance. Such factors include:

a- **Increase in price volatility:** Most markets have experienced increases in the speed, frequency and magnitude of price changes since the mid-1970s. Commodities and financial market have become more volatile:

All these together have exposed investors, especially equity holders to more price risk. To a considerable degree, price risk can be decreased by diversification, but diversification alone is not sufficient. In recent years, volatility has been increased by a more rapid flow of information, and those who are threatened by must manage the risks it poses.

b- Globalization of the markets: Development of Eurodollars in 1970's gave rise to Multinationals, who introduced new financial instruments, which were the product of revolutionary financial engineering. Increased competition due to globalization has forced multinational companies to incorporate high degree of leverage in their capital structure making them vulnerable to Exchange rate and Interest rate risk, And managing of these risks are essential to their successfully operations.

c- Tax Asymmetries: Tax asymmetry exists if two firms are subject to different effective Tax Rate, which is cleverly exploited by Financial Engineers. This happens when some industries are granted special tax exemptions, different countries impose different tax burdens, past performance has left some firms with sizable tax credits and write-offs, Interest and Dividends are taxed differently at the level of recipient and paying corporations. Financial engineering does not assist firms in the evasion of taxes. Rather, financial engineers that arbitrage tax asymmetries help firms to avoid taxes.

d- Technological Advances: Technological advances have motivated a great deal of financial engineering. Improvement in Computer Technology along with advances in Telecommunication led to high speed data transmission. Synergy of these technologies with software programming led to advent of spreadsheet programs. With the introduction of spreadsheet programs, currency and interest rate swap blossomed.

e- Advances in Financial Theory: financial engineering cannot be used effectively without a solid foundation in financial theory. Extensive theoretical contributions from academicians to financial theories formed the backbone of new financial instruments and their usage. In addition, developments in finance theory have contributed immensely to the development of new hedging techniques.

f- Development of new markets and market linkages: There has been an explosive growth of futures and options exchanges worldwide. 24-hour trading has become possible on futures and options exchanges across the globe.

Deregulation and increase in competition: Initially, investment banks were the only ones, which could offer various services regarding risk management. Deregulation of the financial markets has brought in new entrants into the financial markets, particularly NBFIs, who have

aggressively competed with the traditional banking sector, by introducing new products and services. In return, banks were forced to come out with innovative ways to compete with Non-bank financial institutions by taking recourse to off-balance sheet transactions (Hoda Ahmed Ibraheem, 2013, p: 26).

g- Transaction and Information cost: Enormous technological development decreased the cost of information, on which many transactions feed. Thus, the cost of transacting itself, declined significantly during the decade of 1980's.

2-3-2. Intra-firm factors:

a- Liquidity Needs: Liquidity has many facets like ease of conversion of cash, or put cash to work, Degree to which market can absorb sale and purchase without imposing excessive cost, Size of bid-ask spread. Financial innovations help corporation and individual to meet these needs.

b- Risk Aversion by managers: managers have become increasingly aware of their risk exposures, hence products which can expose their holders to considerably less risks are largely needed. There are wide varieties of innovative instruments capable to limit the risk like interest rate futures, interest rate options, stock index futures, and so many other instruments.

c- Agency cost: Agency cost: An agency cost is an economic concept that relates to the cost incurred by an entity (such as organizations) associated with problems such as divergent management-shareholder objectives and information asymmetry.

d- Quantitative Sophistication and management training: In very few areas is quantitative sophistication more important than in investment arena. By deciphering complex situations through tedious mathematical could enhance returns by a respectable number of basis points. Hence, firm expend huge sums on training of management in quantitative sophistication.

3- The concept of Capital Markets.

3-1. Definition of Capital Market.

A Capital market is a market where financial instruments are exchanged or traded. It is the meeting place of the units of investment with financial deficit with savings units with surplus financial, to hold

medium and long-term transactions through the initial subscription of the financial instrument, or through the trading instruments market. Therefore, the main characteristic of these markets is risk, and thus the investor gives priority to the process of trade between return and risk, in the sense that the investor seeks a higher return on higher risk financial instruments (Mahdi SR, Jaber AH, Mashkour, 2018, p : 02).

The capital market is the sector of the financial market where long-term financial instruments issued by corporations and governments trade. Here “long-term” refers to a financial instrument with an original maturity greater than one year and perpetual securities (those with no maturity). There are two types of capital market securities: those that represent shares of ownership interest, also called equity, issued by corporations, and those that represent indebtedness, or debt issued by corporations and by the state and local governments (Valdone Darskuviene, 2010, p: 14).

3-2. Classification of Capital Markets.

There are different ways to classify capital markets. It can be classified in terms of **cash market** and **derivative markets**.

3-2-1. Derivative markets: is the market where derivative instruments are traded. Which are contracts that specify that the contract holder has either the obligation or the choice to buy or sell an underlying asset (a stock, a bond, a financial index, an interest rate, a currency, or a commodity) at some future date. Therefore, the price of such contracts derive their value from the value of the underlying assets.

3-2-2. Cash market: also referred to as the spot market, is the market for the immediate purchase and sale of a financial instrument. Thus cash market is divided into:

a) **Primary market:** is a market in which users of funds (e.g., corporations) raise funds through new issue of financial instruments, such as stocks and bonds, to support their needs when they do not have sufficient internally generated funds (P.Nivetha, S.Sudhamthi, p: 03). This market is also called the issue market, as they represent the real addition to investments.

b) **Secondary market:** is the market in which the trading of securities issued in the primary market. So do not add any capital to the company, but simply transfer ownership of these securities from one side to another, (Mahdi SR, Jaber AH, Mashkour SC, Op. Cit, p: 02), with the

help of a securities broker or a firm acting as an intermediary between seller and buyer.

Secondary markets are also classified in terms of organized stock exchanges and over-the counter (OTC) markets.

a) **Stock exchanges:** Stock exchanges are central trading locations where financial instruments are traded, (Valdone Darskuvienė, Op. Cit, p: 14) where buyers and sellers come together to buy and sell securities. The stock exchange is an important institution of the capital market, specific to the market economy, which concentrates in the same geographical and economic space the demand and offer of securities, openly, freely, based on known regulations. The price a security is negotiated for accurately reflects the economic-financial state of the company that issued it, in a positive or negative sense.

The role of the stock exchange is to facilitate the circulation of capitals, the securities being easily transformed into liquidities or exchanged into other securities, by selling or re-selling them on this market. Therefore, the most important function of the stock exchange is that the transactions with the securities issued and initially placed on the primary capital market are performed here. (Alin Marius Andrieș, 2009, p: 71).

b) **Over-the counter (OTC) markets:** an OTC market is generally, where unlisted financial instruments are traded. It allows to buyers and sellers to transact without meeting at one physical place. OTC market has less stringent minimums such as certain listing requirement and size of firms prevailing in exchanges, and majority of public firms not listed in exchanges trade over-the-counter through a network of dealers. There are also two alternatives to the traditional exchange-based and OTC-based market in the U.S., known as third market and fourth market, including elements of both OTC and exchange market. Generally, trades are done through an electronic communication network (ECN). In spite of difficulties in obtaining data on transaction costs in alternative markets, costs of trading in off-exchange market are lower. (Meir Kohn, 2004, p: 536-539).

3-3. Role of Capital Markets.

Capital markets perform several critical roles:

3-3-1. Link surplus economic units to economic units with deficits: through subscription, which encourages individuals and institutions to save, through the easy transfer of savings to investments

in stocks and bonds to obtain the appropriate financial return. While at the same time providing the producers with the cash needed in cash. The inability of their financial resources, or the development and expansion of their activities beyond the resources available to them, thus increasing the productivity and prosperity of the country.

3-3-2. Information aggregation and coordination: The importance of financial markets with the development of levels and activities of information and communication devices, and the availability of information, dominated the transparency in these markets, which is reflected on the role of financial markets to expand the scope of exchanges and the intensification of rates. (Mahdi SR, Jaber AH, Mashkour SC, Op. Cit, p: 02).

3-3-3. Savings aggregation and mobilisation: Better savings mobilization may increase the savings rate. If efficient stock markets enable savings to be allocated to investment projects with higher returns, the rate of return to savers increases, making savings more attractive. As a result, more savings are channeled to the corporate sector. The stock market is also expected to ensure through the takeover mechanism that past investments are also most efficiently used. Theoretically, a free market in corporate control, by providing financial discipline, is expected to provide the best guarantee of efficiency in the use of assets. (Charles Amo Yartey, 2008, P: 04).

In the less- developed countries, in the absence of a capital market, there are very little savings and those who save often invest their savings in unproductive and wasteful directions, i.e., in real estate (like land, gold, and jewellery) and conspicuous consumption.

3-3-4. Allocation of funds: Generally, The funds required for undertaking investments of any scale are beyond the means of most entrepreneurs. Therefore, capital markets take the relatively small savings of large numbers of individuals, aggregate them together, and thus make funds available for larger-scale enterprises. (Joseph E. Stiglitz, 1989, p: 56).

One of the important roles that a capital market plays is to allocate the resources rationally in accordance with the development needs of the country. The proper allocation of resources results in the expansion of trade and industry in both public and private sectors, thus promoting

balanced economic growth in the country. (Mohammed Rubani, 2017, p: 192).

3-3-5. Price determination: capital market constitutes a liquid trading and price determining mechanism for a diverse range of financial instruments. It provides an exit for investors and facilitate price discovery, the accurate valuation of instruments that ensures issuers are paying an appropriate price, for their access to finance and investors are adequately compensated for the risk they take in providing it. Liquidity providers are crucial to this latter function, as they take advantage of their superior expertise and information in order to arbitrage away inconsistencies in valuations as well as differences in risk appetites between investors.

3-3-6. Providing liquidity: the capital market is also expected to perform an 'act of magic' by permitting long term investment to be financed by funds provided by individuals, many of whom wish to make them available for only a very limited period, or who wish to be able to withdraw them at will. One benefit from the development of capital markets is their ability to diversify firms' sources of finance. Such diversification can help create not only faster but also more stable economic growth, (the Association of Chartered Certified Accountants, 2012, p: 05), because investors can be provided with the necessary funds for their projects.

3-3-7. Risk Sharing: capital markets help in reducing the risks facing savers by allowing for diversification, by enhancing the set of financial instruments available to savers to diversify their portfolios. In a well-developed capital market, share ownership provides individuals with a relatively liquid means of sharing risk when investing in promising projects. (Guglielmo Maria Caporale, and others, 2004, p 35).

4- The impact of financial engineering in the growth of financial markets.

Financial markets in general and capital markets in particular have changed dramatically over decades, especially with the emergence of financial engineering which can be applied in wide varieties of financial operations and strategies. Furthermore, financial engineering has influenced and was affected by capital market. This impact can be classified in four major categories including:

4-1. The impact of financial engineering in risk management in capital market.

One of the most important factors strengthening the application of risk management in capital markets has been the concept of financial engineering. Risk, can be defined and classified in many ways. In most basic form, it can be defined as the uncertainty regarding future outcome. In finance, on this basic definition, financial risk is the uncertainty of future state of a financial market; and this uncertainty may lead to a profit or a loss. Financial risk can be decomposed to various other classes including: Market risks, credit risks, liquidity risk and operational risk.

Development of very specific risk and investment management goals has been one of the main forces behind the development of **financial engineering** instrument.

The critical importance of using derivatives properly has created a new activity called risk management. Risk management can be considered as the practice of defining the desired level of risk, identifying the firm's current level of risk, and using derivatives or other financial instruments to adjust the actual level of risk to the desired level of risk. Most instruments particularly derivatives offered by financial engineering for this purpose, are highly leveraged. They allow speculators and investors to adopt positions with minimum risk.

During the last two decade, financial engineering has been directed to design some sophisticated risk management strategies and instruments. Among the risk management strategies, developed or improved over the last two decades are, assets/liability management techniques including various forms of duration and immunization strategies, better risk assessment, and measurement techniques. Including both the quantification of price risks via volatility measure, graphic representations via risk profiles, and the development and improvement of hedging strategies including duration based regression based and dollar value based techniques. In the other hand, some of the risk management instruments deal with liquidity, and have risk limiting capability. For example collateralized mortgage obligation bond, provide a vehicle by which, direct investment in mortgage or mortgage pass through certificates or instrument like adjustable rate debt are not very price sensitive in the general level of interest rates as equivalent maturity fixed coupon instruments thus only expose their holder to less risk.

Nowadays, risk management process has improved the practice of hedging from a simply taking a position in derivatives to reduce risks to a strategy to get desired level of risk, and controlling that according to their objectives. Most of the hedges can be constructed from futures, forwards, options, and swaps, which are now known as the building blocks of financial engineering. By combining forwards, options, futures and swaps, with the underlying cash position, a firm's risk exposure can be manipulated in a practically infinite variety of ways. Moreover, these instruments make complex hedging strategies possible in an efficient way.

Risk amelioration through diversification is another mechanism through which financial engineering may positively affect capital market. Financial intermediaries can help investors to mitigate the risk associated with individual projects, firms, industries, etc. by providing mechanisms for trading, pooling, and diversifying risks. While investors typically dislike risk, higher-return projects tend to be riskier. By making it easier for investors to diversify risks and allocate them to those willing to bear them, financial intermediaries may induce a portfolio shift towards riskier higher-return projects, altering resource allocation and increasing long-term growth.

Capital markets may also help investors to deal with liquidity risk. Some investment projects require a long-term commitment of capital, but investors typically are not willing to relinquish control of their savings for long periods. Financial markets allow investors to hold liquid assets, like equities, bonds, and demand deposits, and transform these liquid instruments into long-term and more illiquid capital investments. (Augusto de la Torre, 2007, p: 06. / Hoda Ahmed Ibraheem, Op. Cit, p: 29, 35. / David Hillier, Mark Grinblatt and Sheridan Titman 2012, p: 740).

4-2. The impact of technological advance and financial innovation in promoting capital markets.

Financial engineering relates to creation of new products and strategies that are useful to intermediaries and end-users, in which financial innovation and technological advancement are the basis. These latters have fostered the capital market development and financial globalization.

In the world over capital markets have made a significant and remarkable stride through technological advancement which facilitated the use of capital markets by reducing transaction costs and making trading, clearing, and settlement activities more efficient. The deployment of proper regulatory framework has intensely leaned the capital market into well-embraced market worldwide. Other innovative products, Institutional Regulators, laws and regulations, have tremendously evolved the fundamentals of the Market, which in effects provide vibrant market for investor to strive and be dependable.

Advances in communication technologies brought more efficient and faster transmission of financial information across the globe. This reduced information gaps and rendered geographic distance less relevant for investors. Technological innovations further influenced trading (e.g., shifts from floor to electronic trading systems, online brokerage services, etc.), custody, clearing, and settlement (e.g., real time gross settlement systems). This lowered transaction costs, improved liquidity in many securities markets, and provided the tools for around the globe and around-the-clock trading. In addition, Advances in telecommunication, computer technology, and computing power allow the real time information, monitoring, and rapid execution of orders. Competition among financial institutions brings forth and fosters the development of new products and markets. Existing regulations that impede the free flow of capital and competition motivate the development of financial products and trading strategies to get around these restrictions. Through technological advances and the reduction in trade and capital barriers resulting from globally internationalised financial markets, surplus funds in one country can be shifted more easily to another country. As a result, a need arises for innovative financial products and trading strategies to more efficiently protect against the adverse movement of foreign currencies.

Important technological advances that further reinforced the expansion of international securities markets assisted financial innovation. Financial innovation can be grouped as new products (e.g., adjustable rate mortgages, exchange-traded index funds), new services (e.g., on-line securities trading, Internet banking), new production processes (e.g., electronic record-keeping for securities, credit scoring); or new organizational forms (e.g., a new type of electronic exchange for

trading securities, Internet-only banks). Of course, if a new intermediate product or service is created that is used by financial services firms, then it may become part of a new financial production process.

Financial innovations formed the first step to crystallise the concept of financial engineering, that will focus on inventing new tools and risk management tools, which will ensure the companies planning for their future and service objectives on one hand. On the other, ensure yield positive economics whole through the development of capital markets, and provide them with the various tools and financing mechanisms that meet the objectives of all dealers.

Financial markets have been transformed by various waves of financial innovation. The fast pace of financial innovation enabled international securities markets to dynamically transform themselves. Therefore, the innovative financial products satisfy previously unmet market demand and generate calls for further innovation and new markets. New financial instruments allowed investors to benefit from portfolio diversification and risk management through advanced hedging practices involving derivatives.

In addition, financial innovation has helped in the development of new instruments that enable investors to diversify and hedge risks. A significant financial innovation has been structured finance. In its simplest form, structured finance is a process where assets are pooled and transferred to a third party, which in turn issues securities backed by this asset pool. Typically, several classes of securities with distinct risk-return profiles are issued. Another financial innovation that boosted securities markets is Securitization of illiquid assets, most notably of mortgage and consumer loans, to transform them into liquid securities that trade in capital markets, which is a structured finance technique.

The great advances in technology and innovation in the capital market has resulted in electronic trading platforms, improved trading software and more sophisticated financial products. However, what makes a market efficient and attractive, is not the system in place but trading capability of its operators. Technology is no doubt important and essential to advances in the capital market, but it will never replace confidence and trust upon which a vibrant market is built. Innovation in the securities market is all about engendering efficiency and creating volume and value to participants. There is little doubt that customer-

oriented innovation always expands securities markets faster and generates competitive advantage. However, any resulting competitive advantage should be passed on to the client and investing public.

There is a degree of consensus today that financial innovation has a positive impact on the financial system overall, and capital market particularly. However, whenever a financial crisis arises, the debate on financial innovation is once again on the table, frequently focusing on the benefits and dangers of these innovations. This was the case for the stock market crash of 1987 and for the Asian crisis. The financial crisis that began in 2007 is of course no exception to the rule.

Otherwise, there is broad consensus that financial innovation played an important role in the development and propagation of the financial turmoil. For example, the IMF has concluded that "... the proliferation of new complex structured finance products, markets, and business models exposed the financial system to a funding disruption and a breakdown in confidence" and that certain structured finance products "... likely exacerbated the depth and duration of the crisis by adding uncertainty relating to their valuation as the underlying fundamentals deteriorated". (Augusto de la Torre, 2006, p: 11, 33, 34/ Felix UO, 2015, p: 5, 6. / Scott Frame W., 2002, p: 03. / Hoda Ahmed Ibraheem, Op. Cit, p: 23. / Gunther Capelle-Blancard, 2010, P: 68/ International Monetary Fund, 2008, p: 11).

4-3. The role of financial engineering instruments in the boost of capital market.

Increasing risk and the need to manage, fluctuations in prices, as well as raising barriers to capital flows across geographical boundaries, political and rapid development in communication and transition and economic transformation of focus for labor economics knowledge-intensive. All this led to large swings and unexpected in the ocean of global economic whole, which form a major threat to businesses as threatened its existence, and the consequent extension need to produce new financial products and the development of high capacity to control the financial risks.

Designing new financing instruments, will pave the way for a clearer and enlarged scope of action of financial engineering instruments in the future regulatory framework in capital markets. Which led to the trading of these products and new financial instruments in the capital markets.

Where, derivatives are playing an important role in the process of decision making of investors, corporations, and investment funds. Derivatives can be considered not only as tools for hedging, but also as means of controlling risk that means reduce risk when one wants to reduce, and increase when one wants to increase it. The specific feature of derivatives such as low transaction cost and ease of use of derivatives have given flexibility to the firms to adjust the risk of a firm or portfolio. Most of the new instruments can be constructed from futures, forwards, options, and swaps, which are now known as the building blocks of financial engineering. By combining forwards, options, futures and swaps, with the underlying cash position, a firm's risk exposure can be manipulated in a practically infinite variety of ways.

In other words, financial engineering takes a building block approach to the building of new instruments. Other common examples of the building block approach to financial engineering.

1- Synthetic options: a call option can be synthesised from forward contracts and riskless securities.

2- Bonds with embedded options: Bonds with warrants/ convertible bonds/ callable bonds have options embedded in them. In a convertible bond, the bondholder has the right (but not the obligation) to convert. In a callable bond, the issuer has the right (but not the obligation) to call the bond for redemption prior to maturity. Varieties of other types of bonds have also been synthesised, which given the bondholder an option.

3- Synthetic futures: These can be built from forward contracts. We can also use an appropriate combination of single-period options to synthesise a futures contract.

4- Synthetic swaps: Since the payoff profile of swaps is similar to that of a forward contract, they can easily be synthesised from forwards. A swap can also be synthesised from an appropriate strip of futures or from a strip of futures-like option combinations.

Financial engineering is the design of new types of instruments to fill needs not satisfied by existing securities, so that instruments can be customised according to investor's desire and objective. Financial engineering instruments can be used as financial product to improve its return or risk characteristics in light of changing market conditions. These instruments provide relatively inexpensive and efficient ways for corporations and investors to bundle and unbundle various aspects of

risk, allowing those who are least able to bear the risks to pass them off to others who can bear them more efficiently.

Moreover, it enables the support of opportunities to achieve revenue, and increase profits by increasing investment opportunities, diversification of investment portfolios of financial institutions, entry of dealers in the operations of the market industry, as well as diversification of financial services provided to dealers, this would increase the number of customers with the agencies that provide these services.

Consequently, multiplicity and diversity of investment strategies is a result of the multiplicity and diversity of the renewed investment instruments (especially derivatives) available in the financial markets, has led to increased market liquidity, because these instruments are highly liquid. As providing more funding by attracting new investors and provide new opportunities for those seeking funding, which enables to customers to improve their liquidity. Thus, these instruments provide customer with multiple opportunities to form or cancel positions according to their needs and desires.

In short, as investment funding tools, financial instruments have all advantages we will need. They provide sustainability, by allowing for the recycling of funds in the long-term. As they have an advantage effect, attracting other sources of finance including private funds and not crowding them out, making possible combination of public/private sector financial resources. They provide incentives towards better performance and efficiency and promote new sources of expertise. Moreover, they work as catalyst for partnership and cooperation, and they can be tailored to specific needs of partners, of territory of a sector. As cohesion policy Operational Programmes will have to be better tailored to the specific needs, these instruments can generate better funding conditions. In addition to the ability to take advantages of a changed taxation, legal or general economic climate. All these, will lead to the modernisation and development of financial markets.

Overall, most economists recognise that derivatives have made a positive contribution to the economy, but since the global crisis of 2007-2010, critics are much more frequent and virulent and the perception of derivatives has changed quite a lot. Although the usefulness of derivatives is not called into question overall, a number of voices have

been clamoring about the risks that derivatives place on the stability of financial markets.

Derivatives particularly the exotic one, structured and synthetic products besides all their benefits, are complex and risky instruments, which need to be controlled properly from internal and external perspective. The main sources of complexity of these instruments relates to the specific process of their creation, which adds to the layer of analytical complexities; involvement of default and non-default risks and bringing about higher possibilities of non-default risks such as liquidity risk, model risk, or those arising from third party involvement. All these together may pose unanticipated losses. The rapid evolution of structured finance and exotic derivative markets implies that new structures and asset classes are continually being introduced. As a result, unfamiliar structures create new opportunities for unanticipated behavior by holders or third parties, while the scarcity of data on the historical performance of new asset classes generates additional model risk. In other words, while these instruments can contribute to market completion and better dispersion of credit risk, they also give rise to a number of questions with potential financial stability implication. The spread use of derivatives irrationally is considered as one of the main causes of financial turmoil that revealed a number of weaknesses related to the use of financial engineering instruments especially derivatives. (Danuta Hübner, 2010, p: 02, 04 / Hoda Ahmed Ibraheem, Op. Cit, p: 23, 25, 35, 36/ David Hillier, Op. Cit, p: 686/ Gunther Capelle-Blancard, Op. Cit, p: 72).

4-4. The impact of financial engineering instruments in capital market efficiency.

The financial engineering is an approach to contemporary finance systems designed to achieve efficiency in Capital market by designing innovative instruments. Efficiency and effectiveness were taking on greater importance in the case of the expansion base of participants, and markets generally directed towards high degrees of improving service delivery to customers. Hence, we find in this type tools or financial means (such as interest rate swaps) replace relatively old methods of financing such as refinancing loans. Therefore, the development of financial instruments, which meet these innovative tools to the needs of the new financing, or radical change in the existing contracts to increase the efficiency, with respect to risk and term to maturity and yield.

The efficiency of the stock market is achieved by providing customers with all the financial assets that suit their goals and desires, whether in terms of return or risk. Despite the fact that perfection in the previous image is impossible to achieve. Financial derivative contracts have become reliable in creating combinations of financial derivative contracts and securities traded on the current stock exchange, under which the investor achieves unique levels of return and risk not achieved by any financial paper traded on the stock exchange. Derivatives have amply contributed to the progress achieved in risk management. They broaden the range of assets available and facilitate the allocation of risk. Additionally, better distribution of risks contributes to economic growth by allowing high-yield projects – which are also risky ones – to be financed and by permitting asset portfolios to be better managed by investors. The primary interest of derivatives is to provide payoff that cannot be achieved with existing assets. In other words, derivatives can make the markets more efficient, so that risks are more easily shared.

Financial engineering instruments and their ever-expanding markets also seem to be playing a role in increasing efficiency in capital markets. Futures trading increases market information and thereby increases the efficiency of spot prices. By efficiency, he meant that spot prices provide more accurate signals for resources allocation, when the given commodity has a futures market. In addition, price volatility has increased because of rapid flow of information, a spate of takeover efforts and new form of spot future arbitrage thanks to financial engineering it was a decrease in the price volatility. Moreover, the introduction of derivatives changes the wealth of information publicly available and therefore the price discovery process. Indeed, given the leverage offered by derivatives, they are probably the best places to take advantage of expectations about the future value of financial assets, though this effect may be offset by illiquidity and higher transaction costs. Introducing derivatives improves the informational content of stock prices. In other words, since they enhance incentives to gather and disseminate information, derivatives theoretically make the markets more efficient. Derivatives are also useful for investors who seek to diversify their portfolios. They enrich the range of instruments available to investors by giving access to classes of assets that would otherwise require large transaction costs. Therefore, derivatives allow a decrease in

transaction costs – especially short-sale constraints, which translates into higher liquidity. Even if we consider that markets are complete, derivatives are useful because some investors face high transaction costs, which prevent the replication of some payoffs. Additionally, Multiplicity and diversity of investment strategies has led to increased market liquidity, and to provide more funding by attracting new investors and provide new opportunities for those seeking funding, which lead to high efficiency.

The efficient market hypothesis maintains that market pressures brought about by intense competition among speculators and arbitrageurs to exploit information and price discrepancies will ensure that competitive markets are informationally efficient at all times. This means it is not possible to earn return in excess of a fair return associated with the risks involved.

Successful speculation depends on the acquisition of superior information and, or the ability to interpret information and its implications better than others. The cumulative effects of speculators function have a very significant effect. They operate in response to their information acquisition and analyses, so they bring information to the market. They help market in evaluation of information by gathering and analysing them for getting proper position to profit, providing faster prices reaction to the changes in market conditions. On the other hand, the action of arbitrageurs is actually beneficial overall, because, in driving up underpriced instruments and driving down over-priced ones it rapidly restores market prices to their natural equilibrium. In fact, the arbitrageurs operation helps to ensure that prices of similar instruments are comparable. Which made it possible to improve the costs and increase the return and openness on the financial markets.

There is no question that speculation and arbitrage make prices more efficient, and there is also no doubt that financial engineering with its stress on innovative new ways to exploit inefficiencies have themselves contribution to make the market more efficient. As markets become more efficient, fewer exploitable opportunities remain and finding them up require even more effort. Financial engineering detest efficient markets, yet their activities facilitate new forms of speculation and arbitrage, which are the driving forces behind the market efficiency. The financial engineers' struggle is to continuously search for new opportunities, new

ways to trade, and even larger scale on which to trade in order to exploit ever-shrinking margins.

From a theoretical point of view, the consequences of financial innovations on market volatility depend on hypotheses about financial imperfections. The effect produced by introducing new financial products is favorable only if it promotes the participation of informed investors. For example, increased speculation via futures markets has a destabilizing effect when certain agents have imperfect information. Other agents over-react to what they believe to be inside information and this of course has a destabilizing effect. In addition, introducing options can lead to “artificial” equilibrium. the opening of a futures market has stabilizing virtues – at equilibrium, prices are less volatile – the learning curve due to the difficulty of anticipating the behavior of the other players makes equilibrium hard, or even impossible, to attain. The destabilizing effect is related to the fact that derivatives encourage agents to choose riskier strategies, thereby increasing social well-being, but also leading to an increase in volatility.

While A number of empirical studies have also dealt with the consequences of introducing derivatives on underlying markets. Mayhew (2001) assumed that introducing derivatives does not increase the volatility of underlying markets, whether they are the foreign exchange market, the stock markets or the commodity exchanges. On the contrary, derivatives promote increased activity on spot markets and facilitate the price discovery process, and this is obviously beneficial. All the factors listed above have shown the effect of financial engineering in the transformation of capital markets. (Hoda Ahmed Ibraheem, Op. Cit, p: 23, 25, 36. /Gunther Capelle-Blancard, Op. Cit, p: 72, 73, 75. / Sanford J. Grossman and Joseph E. Stiglitz, , 1980, p: 404).

5- CONCLUSION.

Capital market will be incomplete without financial engineering products like derivatives, which are useful in managing the risks associated with the financial system. Absence of financial engineering and derivatives market leaves financial system vulnerable, risky and unattractive to foreign participants, because of lack of hedging mechanism to manage their risk of investing in capital market.

During the last two decade, financial innovation has been directed to design some sophisticated financial engineering instruments, for risk management, one of the most important applications of financial engineering. Some risks can be easily managed using the elemental building block derivatives, but other risks require the services of a financial engineer to design a custom solution by creating customised derivatives which meet the needs of the management of specific risk.

Financial engineering is most often used to create custom solutions to complex risk management problems and to exploit arbitrage opportunities in capital markets. However, financial engineering can also be used to place leveraged bets on market movements and to engineer around portfolio constraints, tax laws, accounting standards, and government regulations. Sometimes a combination of elemental building blocks will replicate an already existing building block instead of a new financial instrument. The purpose of creating complex derivative instruments is often to exploit arbitrage opportunities between financial positions with equivalent cash flows.

Financial engineering enunciate policy direction that encourage innovation, reconstruction with timeliness for desirable market. As such, innovations in general are playing a role in the activation of global stock exchanges efficiency. In addition, financial Engineering improves the effectiveness of the capital market and driving economic growth, it affects the promotion and development of financial market. However and in some cases, financial engineering impact on capital market is negative. There is broad consensus that financial engineering instruments played an important role in the development and propagation of the financial turmoil. Likely exacerbated the depth and duration of the crisis by adding uncertainty relating to their valuation as the underlying fundamentals deteriorated, funding disruption and a breakdown in confidence.

RECOMMENDATIONS.

Among the recommendations that can be made to take advantages of the positive impact of financial engineering on capital markets and decrease the negative impact, we generally find the following:

- It is necessary to realise simultaneous changes in the supporting financial infrastructures. By improving the institutional interface between intermediaries and financial markets, regulatory practices, organization of trading and clearing facilities, and management information system. In order to achieve improvements in efficiency of innovations involving derivatives, which lead to financial and economic efficiency.
- The need of specific rules for setting, implementing, monitoring and auditing financial instruments.
- Institutions dealing with derivative products (synthetic/ structured) on a regular basis must build and maintain a proper internal control framework allowing efficient risk management. The internal controls can take various forms, but tends to relate to credit and market risk management, independent financial and operational processing, and internal auditing. The combination of the three, working in synchronized fashion, can create a more secure dealing environment and reduce the possibilities of unexpected losses of institutions.
- The need a good regulatory framework, designed in such a way that benefits of using financial instruments are fully exploited. However, to achieve what we aim at, we will need a much bolder regulatory framework that would go beyond overcoming barriers towards truly facilitating and enhancing new financial instruments. Instruments. because a good Regulatory environment that renders financial markets sustainable and effective is crucial, while making clear that leveraging financial means, the use of innovative models through the combination of public and private finance is necessary. For this to be effective. Experiences so far suggests the continued need of providing support for administrative capacity building in the area of financial
- The policy makers should consider putting in place policies aimed at encouraging the growth of the derivatives market to enhance financial engineering and innovation. Consequently, the stock market will experience tremendous increase in patronage with development of the derivatives market.
- improving the area of resource efficiency, innovation, cooperation, and risk management in capital markets, by enhancing financial engineering investments that will be needed not only in corporate finance linked investments, also in national finance.

- More work is needed to better understand the impact of financial engineering on the ground in general, and in financial markets in particular, in addition to the barriers to overcome. That because of the growing interest of States in the use of these financial engineering initiatives, as well as increasing application on the ground.

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