Impact Factor (GIF:2019) 2.8229 ISSN-L 0972-1754

VOLUME 25 • NUMBER 2 • December 2021

INDIAN ACCOUNTING REVIEW

INDIAN ACCOUNTING ASSOCIATION
RESEARCH FOUNDATION

INDIAN ACCOUNTING REVIEW

Vol. 25 No. 2 December 2021

CONTENTS

Indian Accounting Review
Vol. 25, No. 2, December 2021

Accounting and the Firm: A Contract Theory[1]

Shyam Sunder
Yale School of Management
Email: shyam.sunder@yale.edu
Web Page: http://www.som.yale.edu/faculty/sunder

Abstract

We can think of each organization as a set of contracts among employees, customers, managers, shareholders, suppliers, auditors, etc. Each party seeks its goals through exchange of resources with the organization. Accounting helps implement and enforce this contract set by tracking resource inflows and outflows, furnishing information about fulfillment of contracts by various parties, distributing information to attract new participants in the organization, and by making some information public to reduce the risk of conflict and deadlack at the time of contract renegotiation. Accounting itself is a matter of negotiation and bargaining among the participating agents and the choice of the accounting system forms a part of the contracts it helps to implement. This way of looking at accounting encompasses virtually all its aspects including bookkeeping, cost and factory accounts, tax accounting, auditing, managerial accounting and financial reporting. In this sense, the contract model of accounting offers a unified economic approach to accounting, as well as a way of linking organizational forms to accounting solutions best suited to serve each.

ACCOUNTING AND THE FIRM: A CONTRACT THEORY

Accounting makes it possible for firms to work. An understanding of accounting requires an understanding of the firm. How should we think about firms?[2] How do firms operate and what is the role of accounting in making them work?

There are many ways of looking at the firm have been suggested, each suited to study of different phenomena. The neoclassical model of microeconomic textbooks visualizes the firm as a monolithic profit-maximizing entity. It is designed to explain equilibrium in markets for inputs and outputs of the firm and serves that purpose well. However, it does not yield insights into the internal

[1]A modified version of this paper appears as Chapter 2 of Sunder (1997). The paper was printed in Vol. 1, No. 1, June 1997, *Indian Accounting Review*, pp. 1-19 and is reprintd now with consent of the author. Shyam Sunder was, during that time, in Gradnate School of Industrial Administration, Carnegie Mellon University.

[2]Though the discussion here is confined to firms, much of it is applicable to organizations in general. Accounting is, in varying degrees, an essential aspect of the working of governmental, charitable, not-for-profit and even religious organizations. Peculiarities of such variations in organizational form, and its consequences for the accounting systems that are designed to serve them, are discussed in Sunder (1997, Chapter 13).

workings of the firm. It is no more reasonable to expect the neoclassical model to help describe and analyze the accounting system of a firm than it is for microeconomic consumer theory to explain the structure and dynamics of a family. The neoclassical model of the firm with perfect markets has no need or role for information, and therefore has no role for accounting in operating a firm.

Almost half a century ago, ideas of Berle and Means (1932), Coase (1937), Barnard (1938), and Simon (1947, 1952) began to give shape to a model of the firm that can help understand the internal workings of a firm. Berle and Means documented the separation of managerial control from stock ownership in major corporations of the United States.[3] They argued that the interests of shareholders and managers diverge significantly, and therefore the behavior of modern corporations is significantly different from the entrepreneur-run firm of the neoclassical models. Though their analysis was widely interpreted as a condemnation of the modern corporation as an efficient device for resource use and allocation in society, implicit in that analysis is the need for mechanisms that align the diverse interests of stockholders and managers, a function accounting helps carry out in a firm.

Coase (1937) addressed the question of why firms grow beyond the elemental unit of a single person firm, and why they do not grow indefinitely until all economic activity in the society is conducted by a single firm. His answer: there is a cost to using price mechanisms in the market place[4] and contracts based on market transaction are internalized by the firm when the cost of such internal contracts is smaller than the cost of executing the contracts based on price mechanisms. The design of a firm's accounting system is a major determinant of the costs of executing internal contracts in a firm.

Barnard (1938) viewed organizations as "system(s) of consciously coordinated activities or forces of two or more persons (p. 73)." Stability of the organization, he argued, depends critically on its ability to provide sufficient incentives or inducements to individuals so they find it more desirable to participate in the organization than to avail themselves of alternative opportunities. A mere six years after Berle and Means labored to document the separation of share ownership and control in large publicly-held firms, it is interesting to find Barnard, a phone company executive, apparently unaware of their work, taking it for granted that it is the executive and not the shareholder who plays a critical role in survival of organizations.[5]

Simon (1947) developed Barnard's view of organizations, making it more formal and precise in his 1952 article. Simon's formal mathematical representation of an organization as a set of arrangements among various factors of production,

[3]Though this idea can be traced back to Ripley (1927), Veblen (1923) and even to Adam Smith, Berle and Means' was the most effectively made argument. See Stigler and Friedland (1983) and Anderson and Tollison (1982) for further discussion of the earlier literature.

[4]Cheung (1983) identifies four types of these costs: costs of discovering the relevant prices, cost of knowing the characteristics of product, cost of measurement and the cost of identifying contribution of individuals to collaborative effort.

[5]In the half century since publication of these seminal works, much has been done to clarify, refine, revise and develop the original ideas. Interested readers may usefully refer to Cyert and March (1963), Alchian and Demsetz (1972), Williamson (1964, 1975, 1981), Fama (1980) and Fama and Jensen (1983). Moe (1985) provides a comprehensive review of this literature.

each motivated by personal, though not necessarily egoistic, considerations provides the basic framework on which an economic theory of accounting can be built.

The existence of diverse interests within the firm, and visualization of the firm as a set of contracts among these interests, are the two ideas in the contract model of the firm presented in the next section. Section 2 describes five major functions that accounting and control systems perform in order to implement and enforce the contract set. Enumeration of these functions amounts to a survey of the major components of the accounting and control system. An application of this economic perspective to the decisions faced by managers, investors and auditors yields a unified understanding of theory of accounting and is presented in Section 3. Different organizational forms have evolved their own accounting systems to serve these functions effectively. An approximate correspondence between organizational and accounting forms is sketched in Section 4.

THE FIRM AS A SET OF CONTRACTS

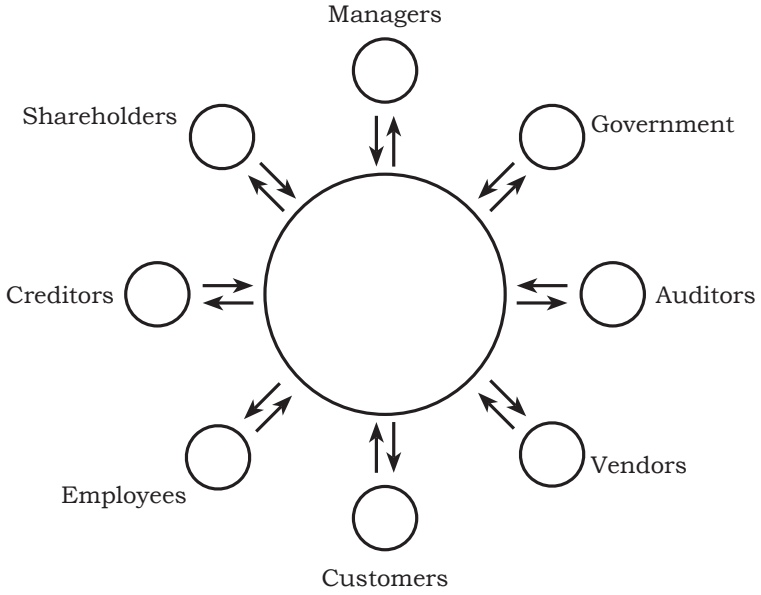
For the purpose of understanding and explaining its internal workings, the firm can be seen as a set of contracts among rational agents. Contracts can be explicit or implicit, short term or long term; agents can be of various types based on their preferences and endowments of capital, skill, and information. Agents are rational in the sense that they consistently seek preferred outcomes within the constraints of their opportunities and information. They do not knowingly pick less desirable courses of action over more desirable ones.

What do these agents contract for and why? Agents enter into contracts with others if they believe that they can improve their welfare by doing so. Contracts obligate each agent to contribute resources -- capital, skill or information -- to the pool of the firm and, in return, entitle her to receive resources from the pool. The form, amount, and timing of contributions and entitlements[6] is a matter of bargaining among the contracting agents (*see* Exhibit 1).

[6]Barnard and Simon use the terms incentives and inducements. Income, wage or return to various factors of production could be used. Since we are concerned primarily with the problem of executing contractual arrangements among agents, the term entitlement (of those who supply various factors of production) seems more suitable.

EXHIBIT 1

The Firm as a Set of Contracts Among Agents



Agents make economic as well as noneconomic contributions to the firm; they receive economic as well as noneconomic inducements or satisfactions from their participation in the firm. A general theory of organization must take both economic as well as noneconomic factors into consideration, as both Barnard and Simon do in their work. Since the focus of this paper is on accounting, and accounting deals largely with quantifiable, mostly economic resource flows in organizations, I limit my discussion to economic variables. This choice does not imply that noneconomic variables are unimportant. There are important aspects of firms for which understanding these non-economic factors is also important. However, we shall start to build a workable theory of accounting based on a simpler model of organizations by excluding variables that accounting systems are not usually designed to handle.

Whether an agent enters into a particular set of contracts depends on alternative opportunities for use or sale of her endowed resources that are available and known to her. A rational agent does not enter a contract that yields an outcome which is less preferred than another which is known and available to her. An agent could consume her endowment of resources directly, use it in production acting alone, or enter into a contract with one or more other agents. If she follows this last course of action, she has, in the sense discussed here, "joined" a firm. Rationality implies that she does so only if she prefers the package of obligations and entitlements in the contract over her alternative opportunities.[7]

Who are these agents? Agents are individuals endowed with preferences and factors of production: capital, skills, and information. When many agents have

[7]See the detailed example of the contract model of the firm in Barnard (1938, pp. 246-250).

similar endowments and preferences, they can be viewed as homogenous groups with the same attributes as individuals.

An industrial firm, for example could be seen as a set of contracts among agents who provide equity and debt capital, trade credit, labor, managerial skills, auditing services, raw materials, cash, utilities, infrastructural facilities, and security, and buy products and services from the firm.[8] It is the self-motivated mutual cooperation of these agents that makes the firm possible. Other organizations, too, could be similarly defined as contracts among an appropriate set of agents.

A general model of the firm includes contracts involving all transacting agents. In order to explain a particular aspect of the behavior of the firm, attention could be focussed on the relevant aspects of contracts and subsets of agents. For example, in examining the separation of ownership and control, Berle and Means, Williamson, and Fama and Jensen focus on the behavior of two classes of agents— shareholders (the suppliers of equity capital) and managers (the suppliers of managerial capital). In analysis of accounting, three classes of agents—investors, managers and auditors play critical roles.

An individual may become a party to several firms either because she wishes to diversify the investment of her resources or because she may be endowed with several different types of resources. Investors holding diversified equity portfolios, most auditors, and moonlighting employees are examples of the first kind of individual; an accountant who works for one firm, buys a car from a second and invests her savings in shares of a third is an example of the second kind. Indeed, most people participate as agents in many organizations[9]. Therefore, the term "agent" refers to a particular aspect of a person's behavior and not to the person herself (*see* Exhibit 2).

---

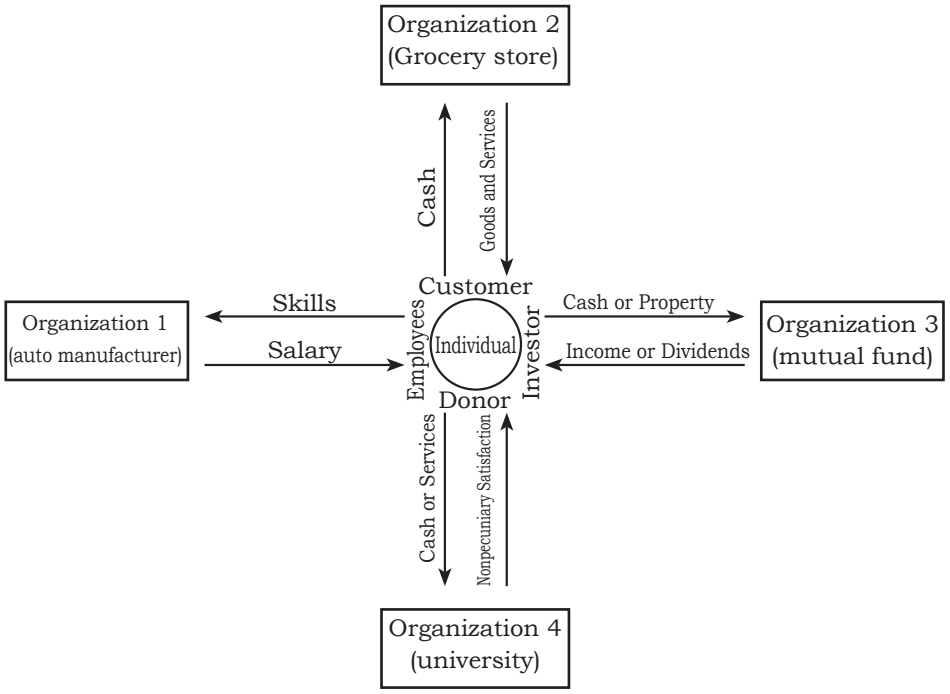
[8]Definition of the exact boundaries of a firm seems neither feasible nor necessary for analysis. As in any modeling effort, which agents and which contracts are included in analysis depends on the purpose of analysis. For most accounting purposes, our attention must be focused on shareholders, creditors, managers, independent auditors and sometimes on government and employees.

[9]The point is well made by Barnard (1938, pp. 71-72):

> "I select at random a man who is chiefly identified by his connection with the organization with which I am also ordinarily identified. He is an engineer whose career and living for many years have depended upon that organization. Without special enquiry, I know he has the following organization connections also: He is (1) a citizen of the United States, the State of New Jersey, the County of Essex, and the City of Newark - four organizations to which he has many inescapable obligations; he is a member of (2) the Catholic Church; (3) the Knights of Columbus; (4) the American Legion; (5) the Outanaway Golf Club; (6) the Democratic Party; (7) the Princeton Club of Newark; (8) he is a stockholder in three corporations; (9) he is head of his own family (wife and three children); (10) he is member of his father's family; (11) he is a member of his wife's family; (12) to judge from his behavior he belongs to other less formal organizations (but often seems not be aware of it) which affect what he wears, how he talks, what he eats, what he likes to do, how he thinks about many things; and (13) finally he gives evidence of "belonging" also to himself alone occasionally. Lest it be thought that his "major" connection is predominant, and the others trivial, it may be stated that he devotes to it nominally less than 25 percent of his approximately 8760 hours per annum; and that actually while he thinks he is working, and despite his intentions, he dreams of fishing, reflects on family matters, and replays a part of previous evening's bridge, etc."

EXHIBIT 2

Multiple Roles of an Individual as Agent in Various Organizations



A firm consists of a set of relationships or contracts, explicit or implicit, that link its shareholders, managers, and employees, etc., into certain patterns of behavior. It does not consist of these agents. Like molecules that constitute an organism, individuals come and go, often replaced in their positions by others with similar preferences and endowments; just as the pattern in which molecules are arranged persists and is recognized as the organism, so does the persistent contractual arrangement which is identified as the firm.

The contract model of the firm is different from the neoclassical model in important respects. In the neoclassical model, the firm is seen as an actor, motivated by a defined, usually profit-maximizing, objective; this firm is identical with the entrepreneur-manager and from this perspective all other economic agents are outsiders.[10] In the contract model, the firm itself is not an economic actor, has no objective or motivation of its own, and is not identifiable with any agent. Instead, it is seen as an arena in which self-motivated economic agents play by mutually agreed upon or implied rules to achieve their respective objectives. This arrangement itself is labeled "firm" for convenience. A firm is not

[10]The reason the neoclassical model of the firm is not useful in examining the role of accounting in the firm is the same as given by Demsetz (1983, p. 377): "The chief mission of neoclassical economics is to understand how the price system coordinates the use of resources, not to understand the inner workings of real firms."

seen as a purposive entity.[11]

Most organizations include a "statement of objectives" in their charter, however. It is tempting to argue on the basis of such statements that the objective of Calico Corporation, for example, is to manufacture and sell cloth. The irrelevance of such statements of objectives for our purpose can be seen by asking: Would the Calico Corporation still manufacture cloth if all participating agents felt that each of them would be better off if Calico produced, say, cars instead? In the contract model, objectives attach to people, not organizations; when applied to organizations they are simply a statement of activity that the participants have agreed to carry out. For example, operating a blood bank is an activity that agents participating in the Red Cross may agree to for a variety of personal motivations. However, Red Cross' statement of objectives, which may include operation of a blood bank, has little power to explain the behavior of these agents who may, one day, decide to abandon blood banks in favor of, say, organ banks.

ACCOUNTING AND THE FIRM

Accounting helps to implement and enforce contracts that constitute the firm. In order to make the firm work, (1) the input of each agent to the firm's pool of resources must be measured, (2) contractual entitlement of each agent must be determined and disbursed, and (3) each agent must be informed, to the level she is entitled to learn, about the extent to which other agents have fulfilled their contractual obligations and received their entitlements. Furthermore, since the continued existence of the firm, as distinct from that of specific agents who participate in it at any given time, depends on replaceability or alienability of individuals from their contractual slot in the firm, participants find it advantageous to (4) make certain information available to the potential agents in order to maintain a liquid market for these slots and for the factors of production supplied by their occupants. Finally, (5) since contracts of various agents are periodically renegotiated, a pool of common knowledge of verified information must be provided to all participants to facilitate negotiation and contract formation. These functions, measurement of inputs and entitlements, distribution of information about contract fulfillment, maintaining liquidity of factor markets, and providing common knowledge to all agents are key to

[11]Stripping the concept of firm of a purpose appears, at least on surface, a major departure from Barnard and Simon who emphasize the purpose of organizations. However, a closer scrutiny makes it clear that most of what they call organizational purpose consists of the purposes of some subset of agents participating in the organization. The choice of individual honored with this privilege seems to favor shareholders, managers or customers. Simon (1947, p. 113) recognizes this arbitrariness and discards it altogether in his 1952 article and treats all agents symmetrically:

> "In the F-theory, a single participant, the entrepreneur, is explicitly treated as a rational individual. The other participants - employees, customers, suppliers - enter into the theory only implicitly and only as passive 'conditions' to which the entrepreneur adjusts in finding the solution that is optimal to him.... In the O-theory the participants are generally treated in a more symmetrical fashion. Each participant is offered an inducement for his participation in the organization. Through his participation, he makes a contribution to the organization. The participant's contributions may be regarded as 'factors,' the inducements offered to him as 'products.' (p. 41)."

understanding the nature of accounting.[12]

Before analyzing these functions of accounting, two caveats must be posted. Accounting is one of several necessary parts of the contract enforcement mechanism of a firm. Common, civil, and criminal law, and the respective enforcement and adjudication systems on one hand, and the socio-cultural system on the other, combine with the accounting system to complete the enforcement mechanism. The following analysis is limited to accounting aspects of the enforcement mechanism; excellent analyses of the legal and social systems are available elsewhere.[13]

While the same system of law is applicable to all firms within a specified jurisdiction, agents have a degree of freedom in selecting the accounting system under which the set of contracts will be operated and enforced.[14] The accounting system itself is a part of the set of contracts it helps to operate and is subject to the same bargaining among agents and other economic considerations that apply to other parts of these contracts. Like a hand which feeds the body of which it is a part, the functioning of the accounting system of a firm also is, to a degree, self-reinforcing.

Measurement of Contributions

The survival of the firm requires that the resources contributed by each agent be measured and compared against her contractual obligation. Accounting systems are designed to efficiently measure and record these contributions.

The problem of attaining such efficiency arises because all factor inputs are not equally measurable. The cost of measuring them with equal accuracy may differ and systems of measurement which have identical cost may yield measures of different accuracy for different resources. Some resources, like certain types of labor, materials, goods, and equipment can be measured reliably at a small cost. Attendance registers, punch clocks, and receiving dock procedures are parts of accounting systems that routinize the measurement of such inexpensively measurable factor inputs. Inputs in the form of cash, usually received from shareholders, creditors, and customers, are also easily measured and routinely recorded by the accounting system. The input of managers and certain employees is not easily measured; direct measurement is either too costly (e.g., night duty guard at the bank) or simply impossible (e.g., chief executive officer). This differential measurability of factor inputs results in joint determination of the form of contracts for various types of agents and how their inputs and

[12]See Butterworth *et al.* (1982) for a parallel, though independently carried out analysis of the role of accounting in firm.

[13]Indeed the application of methods of economics to analysis of law by Coase (1960), Posner (1972) and others provided inspiration for the similar approach to accounting attempted here. Also see Coleman (1982) and Hirschmann (1971).

[14]This opportunity for choice may be regarded as a crude boundary between the accounting and legal aspects of the contract operating mechanism; crude because the system of law by which a firm is governed is not entirely beyond its choosing. The legal form of the business organization (proprietorship, partnership, cooperative or corporation) and the place of business and incorporation do determine, in part, the applicable laws. This unavoidable overlap between accounting and law is discussed in Sunder (1997, Chapter 12).

entitlements are determined. When direct measurement of input is too costly or impossible, the form of the contract is designed to be "self-enforcing".[15] This minimizes the agent's incentive to shirk her obligation as also the need to directly measure her contribution. Top managers and outside auditors belong to this class of agents.

Because their contributions and entitlements are easily measurable, contractual involvement of customers,[16] vendors, and labor in the firm, and therefore in the accounting system takes relatively simple forms.

Measurement of Entitlements

The set of contracts that constitutes a firm entitles each supplier of a factor of production to receive from the firm some resources in exchange. The second major function of accounting is to determine the entitlement of each agent. The contracts specify how the entitlement of each is determined and what form it takes. The measurability of each type of contribution is a major determinant of the contractual form.

The accounting system measures the contributions of most employees in manufacturing operations in hours, days, or weeks worked, and most of their entitlements in wages and benefits. The payroll part of the accounting system performs similar functions for other employees. Receivables, payables, purchasing, inventory, and shipping accounts are designed to keep track of the entitlements of customers, vendors, and other agents involved in the firm. Loan accounts measure the entitlements of the creditors.

When the input of an agent is not easily measurable, her entitlement cannot be determined by a simple function of measured input, because doing so may induce her to behave in a manner that is unacceptable to other contracting agents. This is true of the top managers and auditors. When the direct measure of an agent's input is difficult, her entitlement is either fixed in advance and thus made independent of measured input or made to depend on surrogate measures of factor input. The former method is used for auditors; both are combined to determine the compensation of the top managers.

The input of shareholders consists of capital, which is easily measured by the contributed capital accounts, and of risk-bearing which is not directly

[15]A contract is self-enforcing when the penalties or denial of benefits built into the contract are sufficient (without the benefit of outside enforcement mechanisms such as the courts of law) to ensure that all participants are motivated to act in a manner consistent with what is expected of them by the other agents. The concept of self-enforcing contracts is an analytical device used to distinguish models in which sufficient number of variables are formally included in analysis to predict the behavior of agents from those in which exogenous variables are necessary to predict behavior. See Telser (1981) and Baiman (1982) for elaboration.

[16]Involvement of the Department of Defense in the accounting system of its cost-plus contractors is an interesting exception caused by the difficulty of measuring the entitlements.

measurable.[17] The precommitment of capital by shareholders is coupled with their status as residual claimants. Given the size of the total wealth pool of the firm, and n agents, at most n-1 entitlements can be determined independently; the nth entitlement is determined by the first n-1, and is not directly linked to the corresponding input. This lack of a direct link between input and entitlement, necessary because there are only n-1 degrees of freedom in allocating wealth to n agents, is accepted by the group of shareholders as a quid pro quo for rights to all residual wealth.[18] The double-entry accounting system is therefore designed to measure the entitlement of the shareholders as a residual.

Distribution of Information about Contract Fulfillment

Each agent wants to know her own contribution to and entitlement from the firm to verify that she has received what she contracted for. In most cases, an agent can determine her own input without the help of the firm's accounting system. In some cases, especially when her entitlement does not depend on the inputs and entitlements of others, she can also determine her own entitlement without help of the accounting system. Most creditors, vendors, and customers fall into this category. Such agents are interested in the firm's accounting system to the extent that the disputes about the exchange of goods, services, and cash can be minimized and settled promptly. Accounting systems produce bills, invoices, and other documents to accomplish efficient settlements.

Other agents, such as hourly or weekly laborers and many salaried employees, may at least partly depend on the accounting system to measure their input and entitlements even though their entitlements are largely independent of the inputs and entitlements of others. The payroll accounting system therefore provides enough data to these agents so they can verify that the terms of their contract have been fulfilled by the firm. Such agents are interested in the accounting system in that it accurately records their input and calculates their entitlement.

It is hardly surprising that the agents whose own entitlements depend on the inputs and entitlements of other agents exhibit the greatest interest in

[17]Of course equity shareholders do not bear all the risk, only a relatively large part of it. Risk arises when one or more contracting agents behave differently than what others expected of them at the time of contracting: last year's customers may fail to return to buy the firm's products, employees may demand higher wages and go on strike, managers may prove to be extraordinarily foresighted or stupid and the auditors may prove to be negligent or worse in their duties. Such unexpectedly good or bad performance on the part of any agent affects the pool of wealth represented by the firm from which all agents draw their share. Certain contractual forms may shield some agents from short term variations in the size of this pool of wealth but sooner or later, all are affected to some degree. On the negative side customers may not be able to obtain spares, employees may lose jobs, auditors lose clients and reputation and managers lose both jobs and reputations. Even creditors may lose the principal amounts of a loan. Perhaps the key difference between equity shareholders and other agents is not that the former bear residual risk but that they have little flexibility, having bought the stock, to act to improve their contractual terms with other agents, and thereby to affect the total size of the pool of wealth. (They can, of course, sell the stock and lower the price but they themselves end up bearing the brunt of such loss in wealth.) In this sense, the equity holders as a body are almost completely *precommitted* with respect to this set of contracts and are therefore passive bystanders after the *primary* issue of the stock is completed. This precommitment or the relinquishment of the right to periodically recontract is a peculiar feature of the shareholder's contract and distinguishes them from all other agents.

[18]Once the entitlement of the shareholders as a group has been determined, the allocation of this entitlement among the individual shareholders is determined in strict proportion to their input.

ensuring that other agents contribute no less than their obligation and receive no more than their entitlement. Accounting systems are designed to efficiently provide each agent of this type with information about the fulfillment of contracts by other agents. Much of the cost accounting system, which includes job order or process costing, cost allocation, transfer pricing, and budgeting, etc., is designed to enable managers in a decentralized firm to evaluate contract fulfillment by other managers at higher levels of the organization's hierarchy. Accounting also enables the top managers to determine if they themselves have received their due compensation. Shareholders do not have many further obligations to meet because of precommitment. However, creditors use the accounting system to ensure that shareholders have not taken out more than their contractual due in the form of dividends or stock repurchases. Shareholders themselves, being most vulnerable to excess withdrawals by other agents, use the accounting system to ensure, through the board of directors and with the help of outside auditors, that the top management has not taken more than its due and is worth what it receives. Finally, the accounting system, which is verified by auditors cannot, in principle, be the instrument to determine whether or not the auditors have fulfilled their contract; the auditors' fees are determined outside the firm's accounting system and verification of their input is governed by laws on auditors' responsibility.[19]

Liquidity of Markets for Contractual Slots

While the first three functions of accounting involve only the participating agents, this fourth function relates to potential participants. Individuals or groups who occupy a contractual slot in a firm may sometimes wish to relinquish that position due to changes in endowments, expectations or preferences. If the law and the existing contracts permit them to capitalize the value of the slot, they will sell the slot to another agent who is willing to accept the terms of the contract.[20] It is in the interest of individuals who presently occupy those contractual slots in a firm which can be sold to create and maintain a liquid market for these slots. They can do so by distributing information to potential buyers about the contractual obligations and entitlements that attach to each slot and the profitability of occupying it in the past. Fear of manipulation or selective release of information can make potential buyers skeptical of the reliability of this information unless steps are taken to provide credible assurances to them. The desire to attract new contracting agents leads to the use of an accounting system which provides audited information about the past performance and future prospects of the shareholder and creditor slots in the firm to the potential

[19]This principle is violated when auditors are retained for recruitment of managers and other advisory services. Investors often disapprove of such activities by the auditors.

[20]If the capitalized value of the slot is negative, the agent will have to buy himself out by paying a price. For example, Westinghouse Electric Corporation bought itself out of long term contracts to supply uranium to certain electric utilities by paying hundreds of million dollars.

entrants.[21] The presence of moral hazard constrains the information that can be effectively communicated to the potential buyers of verifiable facts.

Even if the current occupant of a contractual slot in the firm cannot sell it, she often has an interest in making her contributions to the firm known to other potential buyers of her contribution. The "free" distribution of accounting information of a firm to nonparticipating agents is particularly important for suppliers of skills which are difficult to measure. Thus, a manager, auditor, or consultant carries much of her earning capacity in the form of reputation and is therefore interested in aspects of the accounting system that help create a market for her skills.

Finally, the agent interested in leaving the contractual slot is not the only one interested in creating a market for these slots; all other participating agents are also potentially interested in filling the vacated slots. Indeed, much of the risk of participation in a firm arises from the unexpected departure of co-participants. Departure of customers lowers sales, departure of employees lowers production, departure of managers lowers efficiency and departure of auditors lowers the credibility of the accounting system in everyone's eyes. The remaining agents are adversely affected by unexpected departures if the vacated slots are not filled. Thus, it is in the interest of the participating agents to create and maintain a liquid market for the inputs the firm needs. The accounting system is designed, in part, to help create such markets for equity and loan capital, managerial, and other human skills, equipment, materials and supplies, and for its products and services. It helps to create security markets as well as to recruit managers and engineers, and it assures vendors and customers that the firm is a reliable business partner. A substantial part of the print order of annual reports of large publicly-held corporations is distributed to nonparticipating agents.[22] The importance of the role played by financial analysts, the business press and other information intermediaries in accounting is explained by the help they provide in maintaining the liquidity of markets for the inputs.

Common Knowledge for Renegotiation of Contracts

The length of individual contracts that constitute a firm varies, both when measured in time and in the number of transactions covered. A contract to buy or sell could be a one time deal or a long-term commitment. The same is true of employment and credit arrangements. The audit contract is usually for a year, while the commitment of shareholders is indefinite. With the exception of shareholders, all contracts are periodically renegotiated.[23] The fifth function of accounting considered here is to facilitate contract renegotiation.

Accounting systems are designed to provide at least a minimal amount of

[21]While shareholder and creditor positions in firms are easily capitalized and frequently sold, they are not the only ones. Exclusive contracts to supply goods and services to a firm can sometimes be sold to other suppliers. Exclusive contracts to buy goods and services from a firm, called distributorships, are also sold. Even the top management positions are "sold," when in a negotiated corporate merger, the top executives of the acquired corporation are handed a "golden parachute" as the price of relinquishing their positions.

[22]Verrengia and Reynes (1984, p. 14): "W.R. Grace, for example, prints four times as many (annual) reports as it has shareholders and advertises the report in financial publications."

[23]See Dye (1985) on optimal length of contracts.

"common knowledge" to all participating agents; this knowledge serves as the basis for negotiation and bargaining.[24] Of course, agents may also use additional private information. However, the availability of a common, verified database helps eliminate certain types of strategic bargaining behavior which may result in Pareto inefficient outcomes.

A dramatic illustration of how large deadweight losses to social welfare can be when information asymmetries prevent economic agents from arriving at mutually beneficial arrangements is provided by Wiggins and Libecap (1985). Unitized operation of oil and gas leases on a single pool of these resources yields very large gains, as much as 100 or 200 percent in the value of resources that can be extracted from the field. Yet, for a majority of oil fields in the United States, lease owners are unable to successfully conclude negotiations for unitization of their leases.[25] Recovery of oil from independently operated leases leads to inefficient utilization of the underground pressure of gas to get the oil out and reduces the extent of secondary recovery. This loss frequently amounts to hundred of millions of dollars. However, since the lease owners and their engineers have superior information about the value of their own leases rather than of the value of other leases, negotiations often fail because the parties fail to agree on the relative shares of the net profits from the unitized operation of the field. It is interesting to note that the same lease owners apparently have no difficulty in joining hands to share the cost of exploratory drilling on neighboring lease tracts. The absence of asymmetric information at that stage of negotiations makes it much easier for them to reach agreements. Most of the unitization that does take place in the United States occurs during the secondary recovery phase of oil fields; by that time most of the information about the relevant characteristics of various leases has passed into public domain and it becomes easier to reach an agreement.

Securities laws in many countries require not just disclosure of financial statements to those who request them, but public disclosure as well. If information were only privately available, many agents may have reason to doubt that others have received the information and, therefore, may be tempted to behave strategically.[26] Public disclosure laws reduce such behavior by making financial statements "common knowledge."

THEORY OF ACCOUNTING AND CONTROL

Contractual forms that tie individuals to the organizations vary according to the economic characteristics of resources each of them contributes to and receives from the organization. Rational agents participate in an organization as long as the value of what they receive, or expect to receive, from the organization exceeds what they can get elsewhere for the resources they wish to give to the

[24]"Common knowledge" as a technical term is defined as follows: Information I is common knowledge to agents X and Y if (1) X knows I, and (2) Y knows I, and (3) X knows (2), and (4) Y knows (1), and so on to infinity. See Aumann (1976).

[25]In India and in many other countries, mineral rights belong to the state and the problem of unitization of leases held by independent leaseholders is solved by the state.

[26]Amershi and Sunder (1987) provide an example of suboptimal resource allocations when the common knowledge assumption is weakened. Strategic behavior implies acting in one's own best interest after taking into account how others might behave in a given situation.

organization. Some resource flows can be measured more easily or more precisely than others (e.g., machinery and cash versus managerial effort). These economic characteristics lead to simultaneous determination of the contractual links of the agent to the firm and the accounting and control mechanisms to execute the contracts.

Managers and Income

Managerial input, for example, is difficult to measure. Organizations and their control systems are designed so they can operate efficiently without having to measure this input. Managers are induced to deliver on their obligations by linking their compensation, promotion, and retention to output data which are observable as well as informative about their effort. These data are often produced by the accounting and control system.

Senior managers negotiate contracts of their juniors on a one-on-one basis. There is little effort to standardize this aspect of accounting across firms. At the top of managerial hierarchy, however, managerial performance is monitored by investors and auditors who deal simultaneously with many organizations. Since financial reports are also used for evaluating the top managers, financial reporting has been subjected to a substantial degree of standardization.

Income serves several functions and is the single most important number in financial reports. It is a measure of the entitlement of the shareholders as well as a basis for rewarding managers whose input cannot be measured directly. Most important, the residual nature of net income provides a vital clue to the continued viability of the contract set of the firm. When income becomes negative for reasons other than temporary, all participants in the contract set are immediately alerted that the existing contract set must be modified or dissolved. The use of income figures in managerial compensation and in stock valuation also induces managers to expend resources to "manage" income to their own advantage.

Shareholders, Stock Markets, and Auditors

The shareholders' contract has four major characteristics: (1) shareholders are completely precommitted to the firm in the sense that they have already put their money down; (2) their resource entitlement is the residual amount after entitlements of all other agents are set aside; (3) their contractual rights are transferable and often readily salable in a liquid market; and (4) the shareholders as a group have the right to choose managers and auditors, and to dissolve the organization. Without the protection afforded to the shareholders through items (3) and (4), few agents are likely to subject themselves to the risks imposed on them by items (1) and (2).

Managers control the information generated in the firm and may be tempted to be selective in allowing information to leave the firm. Shareholders need information to protect their own interests against managerial incompetence or malfeasance. To limit such selective controls over the information reaching shareholders from managers, publicly-held firms engage the services of independent auditors to verify the information. Managers furnish the auditors with unaudited reports and access to the corporate records so the reports can

be verified. The auditors provide verified reports to the investors and other participants in the firm so they can make their own decisions on subsequent participation.

Shareholders incur a cost (auditing fees) to reduce the chance of being misled by erroneous reports from managers. In the absence of verification, managers have an incentive to try to conceal unsatisfactory performance and to exaggerate good performance. Auditors receive fees for their professional services and for the risk of attesting to reports produced by managers. Managers' role in the process is more complex. Payment of audit fees to auditors reduces the net income of the firm as well as the financial remuneration of the managers. At the same time, the audit process makes managers' reports more credible and therefore increases the value of these reports to the investors.

Each class of economic agents, shareholders, managers, and auditors, has its own vested interest in accounting and seeks the accounting system that advances its welfare. Any change that adversely affects the interests of an agent would be resisted by her; if the change is effected, the agent can be expected to adjust her behavior in such a way as to gain advantage under the circumstances. Given the existing behavior of other agents, a manager chooses an accounting method that maximizes her welfare under the assumption that the behavior of other agents remains unchanged. After the manager has made and implemented her choice, the behavior of other agents does not remain unaffected since they, too, seek to adjust their behavior to maximize their welfare under the changed circumstances. This new behavior on the part of other agents presents the manager with a new situation in which her original choice may no longer be the most desirable one, and a new sequence of adjustments occurs. These adjustments continue until the system has reached equilibrium and no agent can increase her welfare by making further adjustment. Accounting theory is the study of each accounting agent's behavior and the nature and conditions of accounting equilibrium.

Government and Public-Good Organizations

Government plays multiple roles in accounting. First, the government is a contracting agent in ordinary firms, sometimes as a customer or vendor, and almost always as a tax collector. Since the government must simultaneously deal with millions of tax payers, the economics of tax collection dictates relatively hard, non-judgmental methods of accounting for the determination of tax liability of individual tax payers. A bilateral monopoly between the federal government and defense contractors also generates custom-designed accounting systems for enforcement of those contracts.

Second, the government acts as a super-firm in setting the laws, rules, and regulations in certain areas of accounting. This effort produces template contracts which can form the starting point of negotiations among the agents participating in an organization. These templates save negotiating effort, search costs and time for participants in the firm, just as printed lease forms for apartments do for tenant and landlord. The template contracts are fleshed out in negotiations among the participating agents. The imposition of mandatory audit requirements on publicly-held firms and the laws governing the training

and licensing of auditors are examples of such template contracts.

Finally, government itself is an organization like others. It, too, is a set of contracts among a large number of agents. These contracts also need to be implemented and enforced in an efficient manner. Accounting and control systems of government and many not-for-profit organizations differ significantly from those of business organizations. These differences can be understood in terms of the economic characteristics of the output of various organizations. Customers of private goods must be persuaded to buy them through arms length transactions; they impose a market discipline on the managers. This discipline is absent in organizations which produce public goods. Additional constraints on managerial behavior and lower levels of discretionary freedom granted to such managers is an attempt to provide an equilibrium system of controls for them. The differences in the accounting and control systems, and indeed, in their organizational structure, can be understood in terms of the economic characteristics of the output of government and not-for-profit organizations.

Correspondence Between Organizational and Accounting Forms

Since accounting systems help implement and enforce the set of contracts that constitute a firm, it is hardly surprising that these systems vary with the nature of the contracts they must help enforce. To illustrate the point, consider three stylized forms of business organizations and the features of accounting systems that serve them.

The corner grocery store or fruit stand, operated by its proprietor with little or no outside help,, is a simple business organization. The owner may use personal savings or borrow to finance the operation, may lease the premises, buy daily or weekly from wholesalers on credit and sell for cash to her customers. Few of these agents, other than the Income Tax Department and perhaps the bank, depend on the grocer's accounts to carry out their exchanges with her. Most of the grocer's accounting effort goes into recording transactions to help her own memory and much of it could be dispensed with if should could remember them. This form of business organization, without managerial hierarchy and with a closely-held residual interest, is the oldest and, even today, the numerically dominant one. The original forms of bookkeeping evolved as simple accounting systems to serve such organizations, largely as an aid to memory.

For a second organizational form, consider a firm whose residual interest is closely-held but which is internally decentralized by introduction of more than one level in the managerial hierarchy. The problems the accounting system must solve in such an organization are qualitatively different from those of the grocery store discussed earlier. Given the difficulty of directly measuring the contribution of each manager, a more complex system is designed to evaluate and control the performance of such agents in the firm. Budgets, transfer prices, interdepartment- and interperiod-allocations of costs and revenues are some of the devices used for this purpose in such organizations. These tools of accounting are rarely used or useful in the family run small businesses.

Finally, consider a third firm which is internally decentralized and in which the number of residual interest shareholders has become so large that they can no longer exercise direct control over the activities of the managers. When this

diffusion of ownership is extreme, its shareholders are willing to pay for the services of an independent auditor to verify the information provided by the management. Usually the diffusion of owners' control over management takes place through expansion o in the number of owners in the corporate form of business. Diffusion can also take place through the increased heterogeneity of the nonmanagement group that has interests in the firm. The demand for audited reports by banks and other creditors is an example of this latter phenomenon.

The above correspondence between accounting and organizational forms relates the entire system of accounting to the organizational form.[27] Accounting scholars have long recognized and analyzed this connection. Yamey (1977) traces the historical evolution of organizational and accounting forms. Skinner (1972, pp. 25-26) also identifies a similar correspondence between accounting and organizational forms. Littleton (1953, pp. 183-4) describes this relationship as follows:

Accounting has always been primarily a service tool of enterprise management. Morality is clearly involved here. As long as an owner-operator was the only person concerned accounting could only be operative in a very private and personal way. If deception was involved it was self-deception, except, of course, where an embezzling bookkeeper would try to falsify records. Wherever partners operated a business there was need for a factual record to which certain differences of opinion could be referred. Accounting however was still a personal service, although it must be said that a partner had more opportunity that a bookkeeper to falsify the facts into a deceptive picture. When we think of limited liability corporations of today with hired managers and large numbers of absentee stockholders, it becomes evident that the moral scope of accounting has been vastly expanded. Many people, wholly out of touch with the physical aspects of enterprise operation, depend upon future representations of managerial actions, of results of actions, and of potentialities for figure actions. As the size of enterprises increases and the distance between the owner-lenders and the operating managers grows wider, the opportunities expand for the practice of deceit by people of authority.

Each organization develops a system of accounting suitable to its own unique characteristics so that it may serve as an effective instrument of control. In small business firms, the control function is best served by simple forms of bookkeeping, but larger, more decentralized firms need more complex forms of accounting.

SUMMARY AND CONCLUSIONS

In summary, each organization can be seen as a set of contracts among the people who participate in it in a variety of roles such as employees, customers, managers, shareholders, suppliers, auditors, etc. Each party agrees to contribute to, and receive from, the organization specified resources, and thus seeks its own

[27]The distinctions between bookkeeping and accounting, and between financial and managerial accounting, have long been a matter of debate among accountants. More familiar definitions draw the line between bookkeeping and accounting in terms of the mechanical or procedural details versus judgmental or discretionary actions; managerial and financial accounting are differentiated on the basis of internal and external use of the data provided by them.

interests through such participation. Accounting can be thought of as a system that helps implement and enforce this contract set.

Implementation and enforcement of contracts requires five important functions to be carried out. First, resource contributions to the organization from various parties have to be measured and recorded. Second, resources disbursed to various parties have to be measured and recorded. Third, whether and to what extent each contracting party has fulfilled its contract must be determined, and this information about contract fulfillment must be provided to the relevant parties. Fourth, since many participants in the firm are free to leave at will (e.g., customers, employees and individual shareholders), the firm must have a mechanism in place to attract their replacements when needed. In order to attract new contracting parties who are willing to take the vacant contractual slots, the organization must "advertise" the costs and benefits of occupying these slots to potential participants. Fifth, all contracts, with the exception of shareholders', are limited term contracts and they come up for periodic renewal. At the time of contract renegotiation, people are tempted to bluff in the hope of getting a more favorable contract. Such behavior often leads to deadlock and strikes that hurt all parties. In order to minimize the chances of such losses, organizations design their accounting systems to make specified information public, because there is little reason for people to try to bluff on the basis of public information.

Different systems affect various agents differently. Therefore, accounting itself is a matter of negotiation and bargaining among the participating agents and the choice of the accounting system forms a part of the contracts it helps to implement. The degree of interest various agents exhibit in the accounting system, and the part of the system in which they are interested, varies according to the form of their contractual involvement and the characteristics of their contributions and entitlements.

This way of looking at accounting encompasses virtually all its aspects including bookkeeping, cost and factory accounts, tax accounting, auditing, managerial accounting and financial reporting. In this sense, the contract model of accounting offers a unified economic approach to accounting. It also offers a way of linking a variety of organizational forms to a variety of accounting solutions that are best suited to serve each form of organization.

References

Alchian, Armen A., and Demsetz, Harold, "Production, Information Costs and Economic Organization," *The American Economic Review,* Vol. LXII, No. 5 (December, 1972), pp. 777-795.

Anderson, Gary M. and Tollison, Robert D., "Adam Smith's Analysis of Joint Stock Companies," *Journal of Political Economy,* Vol. 90, No. 6 (1982) pp. 1237-56.

Amershi, Amin, and Sunder, Shyam, "Failure of an Efficient Market to Discipline Managers in a Rational Expectations Economy," *Journal of Accounting Research,* Vol. 25 No. 2 (Autumn, 1987), pp. 177-195.

Aumann, "Agreeing to Disagree," *The Annals of Statistics,* Vol. 4, No. 6 (1976) pp. 1236-39.

Baiman, Stanley, "Agency Research in Managerial Accounting: A Survey," *Journal of Accounting Literature,* Vol. 1 (1982), pp. 154-213.

Barnard, Chester I. *The Functions of the Executive.* Cambridge: Harvard University Press, 1938. (Thirtieth Anniversary Edition, 1968).

Berle, A.A., and Means, G.C. *The Modern Corporation and Private Property.* (Macmillan, 1983).

Benston, George J. *Corporate Financial Disclosure in the UK and the USA.* Lexington, Mass.: Lexington Books, 1976.

Butterworth, John E., Michael Gibbins, and Raymond D. King, "The Structure of Accounting Theory: Some Basic Conceptual and Methodological Issues," in Sanjoy Basu and J. Alex Milburn, ed., *Research to Support Standard Setting in Financial Accounting: A Canadian Perspective.* Toronto: Clarkson Gordon Foundation, 1982.

Cheung, Steven N.S., "The Contractual Nature of the Firm," *Journal of Law and Economics,* Vol. 26, (April 1983), pp. 1-21.

Coase, Ronald H., "The Nature of the Firm," *Economica,* New Series, Vol. 4 (November, 1937), pp. 386-405.

"The Problem of Social Cost," *Journal of Law and Economics,* Vol. 3 (October, 1960), pp. 1-44.

Coleman, James S., *The Asymmetric Society. Syracuse,* N.Y.: Syracuse University Press, 1982.

Cyert, R., and March, J. *A Behavioral Theory of the Firm.* Englewood Cliffs, N.J.: Prentice-Hall, 1963.

Demsetz, Harold, "The Structure of Ownership and the Theory of the Firm," *Journal of Law and Economics,* Vol. 26, (June 1983), pp. 375-393.

Dye, Ronald, "Optimal Length of Contracts," *International Economic Review,* 1985).

Fama, Eugene F., "Agency Problems and the Theory of the Firm," *Journal of Political Economy, Vol. 88,* No. 2 (April, 1980), pp. 288-307.

Fama, Eugene F. and Jensen, Michael C., "Separation of Ownership and Control," *Journal of Law and Economics,* Vol. XXVI (June 1983), pp. 301-325.

Hirschmann, Albert O., *Exit, Voice and Loyalty.* Cambridge, Mass.: Harvard University Press, 1971.

Jensen, Michael C., and Meckling, William H., "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics,* Vol. 3, No. 4 (October, 1976), pp. 305-360.

Littleton, A.C. *Structure of Accounting Theory.* Sarasota, Florida: American Accounting Association, 1953.

Moe, Terry M., "The New Economics of Organization," *American Journal of Political Science,* (Nov. 1984), pp. 739-777.

Ripley, William Z. *Main Street and Wall Street.* Boston: Little Brown & Co., 1927.

Simon, Herbert A. *Administrative Behavior.* New York: Macmillan Co. 1947.

"A Comparison of Organisation Theories," *Review of Economic Studies*, Vol. 20 No. (1952-53), pp. 40-48.

Skinner, R.M. *Accounting Principles: A Canadian Viewpoint.* Toronto: Canadian Institute of Chartered Accountants, 1972.

Smith, Adam. *An Inquiry Into the Nature and Causes of The Wealth of Nations.* (London, 1776).

Stigler, George J. and Friedland, Claire, "The Literature of Economics: The Case of Berle and Means," *Journal of Law and Economics,* Vol. 26, (June 1983), pp. 237-268.

Sunder, Shyam. *Theory of Accounting and Control.* Cincinnati: South-Western College Publishing, 1997.

Telser, Lester, "A Theory of Self-enforcing Agreements," *Journal of Business,* Vol. 53 No. 1 (1981), pp. 27-44.

Veblen, Thorstein. *Absentee Ownership and Business Enterprise in Recent Times.* New York:

B.W. Huebsch, Inc., 1923.

Verrengia, Peter J. and Reynes, Roberta, "Hello and Good Buys," *Management Focus (PMM)* (July-August, 1984), pp. 11-15.

Wiggins, Steven N., and Gary D. Libecap, "Oil Field Unitization: Contractual Failure in the Presence of Imperfect Information," *American Economic Review,* 75(3), (June 1985), pp. 368-385.

Williamson, Oliver E. *The Economics of Discretionary Behavior: Management Objectives in a Theory of the Firm.* Englewood Cliffs, N.J.: Prentice-Hall, 1964.

Williamson, Oliver E. *Markets and Hierarchies: Analysis and Antitrust Implications.* (Free Press, 1975).

Williamson, Oliver E., "The Modern Corporation: Origins, Evolutions, Attributes," *Journal of Economic Literature,* Vol. 19, No. 4 (December, 1981), pp. 1537-68.

Yamey, B.S., "Some Topics in the History of Financial Accounting in England, 1500-1900," in W.T. Baxter and Sidney Davidson, eds. *Studies in Accounting.* London: Institute of Chartered Accountants in England & Wales, 1977.

Editor's Note

The instant article, a reprint from Vol.1, No.1, *Indian Accounting Review*, pp.1-19, is a modified version of Chapter 2 of Sunder's *Theory of Accounting and Control,* Cincinnati: South Western College Publishing, 1977. Prof. Shyam Sunder was awarded '**American Accounting Association-American Institute of Certified Public Accountants' Notable Contributions to Accounting Literature Award for 1998** for this publication.

The complete book is now available for anyone to download (for free) from Sunder's research website: *https://faculty.som.yale.edu/shyamsunder/theory-of-accounting-and-control/*.

Indian Accounting Review
Vol. 25, No. 2, December 2021

Neurofinance - An Exploration of its Dynamic Linkages with Finance

Preety Patel*

and

Tanupa Chakraborty

Department of Commerce, University of Calcutta

ABSTRACT

Neurofinance is an area of finance which tries to understand the financial decision making process with the help of neuroscience. It perceives financial decision making from a biological angle in search of better answers to the questions which could not completely be answered by the Standard Financial Models. In this exploratory paper, a review of various literature is done to shed light on this nascent field of finance by showcasing its concept, origin and how difference in genetics, hormones and neuroanatomy i.e. structural areas of brain can lead to a difference in risk taking appetite and hence difference in financial decision making. The paper also draws attention towards the current research related to the field, and identifies the potential areas for further research.

Key words: Bounded Rationality, Behavioral Finance, Neurofinance, Behavioral Biases.

I. INTRODUCTION

Traditional Finance (also called Standard Finance) has talked about optimization of resources, return maximization and risk minimization, and all humans achieve this as they are rational. To this effect, a concept of *Homo Economicus* was given by John Stuart Mill which has posited the fact that the humans maximize their well-being given the constraints they face. But as we know that change is the essence of life, so as the concept of rationality of human beings. The episodes of economic bubbles – Tulip Mania of 1639, The Mississippi Bubble or the South Sea Bubble of the 1840s, Wall Street Crash of 1929, Japan's Real Estate and Stock Market Bubble of 1985, Stock Market Crash of 1987, Internet or Dot Com Bubble of the 1990s, Housing Bubble and Credit Crisis of 2007, are some of the indicators that investors are not always rational. Thus the 'rationality' assumption was questioned and challenged. Are humans really rational? Do not their emotions come into play while making decisions? These questions have opened up the scope for a modified concept of finance - *Behavioral Finance*, which is a subset of Behavioral Economics. It studies the

*Research Scholar, e-mail: preety95patel@gmail.com

behavioral elements behind an investment decision. It borrows concepts from other social sciences - psychology and sociology, and applies it to finance thus bringing out the fact that investor sentiment – emotions, psychological biases, stress, and individual differences, plays a key role in financial decision making. Experimenting further with this subject has made researchers probe into how and why these violations arise into the brain, and whether applications from neuroscience help to answer these questions. This has led to the birth of new interdisciplinary field- *Neurofinance,* the study of neural elements behind finance. It is in its embryonic stage, but an emerging field of research combining *Behavioral Finance* and *Neuroeconomics.* The departure of Neurofinance from behavioral finance lies in that the latter investigates how people act and interact in the process of financial decisions, and interpret these actions based on established physiological concepts and theories, while the former investigates why and how these behaviors occur based on observations of individuals' brain and hormonal activity (Tseng, 2006). Neurofinance has two goals - (i) to probe into the biological indicators of behaviors of financial market participants, (ii) to provide an alternative explanation regarding the failure of standard theories which are physiologically motivated (Miendlarzewskaet al., 2019). It looks into the cognitive processes which are involved in acquisition and processing of information in financial decision making. It incorporates neurological equipments – Functional Magnetic Resonance Imaging (fMRI), Electroencephalography (EEG), Magnetoencephalography (MEG), Transcranial Magnetic Stimulation (TMS), Positron Emission Tomography (PET)- and psychophysiological equipment – Electrocardiogram (ECG), Galvanic Skin Response (GSR), Eye tracking etc. to the financial decision making.

In this backdrop, the paper aims to provide an insight into the new discipline, i.e., Neurofinance, regarding its conceptualization, integration of biological components with financial decision making etc. It also draws light towards the current research related to the field and potential research areas.

The remainder of the paper is organized as follows. Section II introduces a brief review of traditional finance theories, section III narrates the origin and concept of this revolutionary domain of finance - Neurofinance, while section IV explores the synergy of biological disciplines with Neurofinance. Section V demonstrates some laboratory experiments relating to Neurofinance, while some potential research areas are outlined in section VI. Finally, section VII concludes the paper.

II. BRIEF REVIEW OF TRADITIONAL FINANCE THEORIES

As per the Traditional Finance Models, which started emerging around mid eighteenth century, humans are assumed to show rationality while making their financial decisions. Accordingly, the concept of Homo Economicus given by Stuart Mill has propagated maximization of returns and minimization of risks for any decision choice. The genesis of Traditional Finance theories based on 'rationality' assumption is as under.

TABLE 1

Traditional Financial Theories

AUTHOR	YEAR	THEORETICAL CONSTRUCT
JOHN STUART MILL	1848	INTRODUCED THE CONCEPT OF *HOMO ECONOMICUS*
DANIEL BERNOULLI	1738	EXPECTED UTILITY THEORY
VON NEUMANN AND MORGENSTERN	1944	
HARRY MARKOWITZ	1952	MARKOWITZ PORTFOLIO THEORY
TREYNOR, SHARPE AND LINTNER	1962, 1964, 1965	CAPITAL ASSET PRICING MODEL
JAN MOSSIN	1966	
EUGENE FAMA	1970	EFFICIENT MARKET HYPOTHESIS

(*Source:* Authors' Compilation, Ph.D. Dissertations available in Sodhganga.)

The Expected Utility Theory deals with the analysis of situations where individuals make decisions under 'uncertainty'. The investor will choose the act that will result in highest expected utility which is the sum of the product of probability and utility over the possible outcomes. It was first introduced by Daniel Bernoulli, who used it to solve St. Petersburg Paradox. A paradox is a statement which is self-contradictory. Previously, mathematicians considered a gamble with their Expected Monetary Value (EMV). In 1713, Nicholas Bernoulli exposed the weakness of the criteria of EMV. He raised a question that if a fair coin is flipped until it comes up to head for the first time, such that at this point the player wins 2^n, where n is number of times the coin was flipped, how much is a person willing to pay for the game? As per the EMV, the expected value of the game is infinite. So a rational person should play the game even if he is required to invest millions of dollars because the expected value of the game is infinite. But in reality, a person is not willing to invest even $ 25 to play the game. Here lies the paradox. Daniel Bernoulli, a younger cousin of Nicholas Bernoulli, suggested a solution by explaining that increase in expected wealth does not increase utility in the same proportion, and published it in the St. Petersburg Journal. Hence this paradox is known as St. Petersburg Paradox. However, John Von Neumann and Oskar Morgenstern in their book "Theory of Games and Economic Behavior" (1944), which is considered as the cornerstone of Expected Utility Theory, has provided mathematical foundation for Bernoulli's solution of the paradox in the form of a set of axioms.

The Expected Utility Theory says that in the face of uncertainty individuals maximize the utility expected across possible states of world. For a financial

asset like an equity stock that has innumerable possible outcomes, it is not a manageable proposition. However, if we assume that the investors are risk averse and the preference of the investors can be defined in terms of the mean and variance of returns, it is possible to quantify the trade-off between risk and return. This is the basic premise of Modern Portfolio Theory and Capital Asset Pricing Model. Modern Portfolio Theory is the first formal attempt to quantify the risk of a portfolio and develop a methodology for determining an optimal portfolio. Capital Asset Pricing Model predicts the relationship between the risk of the asset and its expected return. From the financial market point of view, the traditional finance theory of Efficient Market Hypothesis posits that all the information (past price series, publicly available information and insider information) are incorporated into the security prices and it is not possible for a market participant to earn abnormal returns consistently.

III. ORIGIN AND CONCEPT OF NEUROFINANCE

The traditional financial theories were well constructed to make calculated financial decisions. However, they were unable to explain the disruptions in stock markets. These disruptions or anomalies emerged time to time in the form of stock market bubbles, market overreaction or under reaction and momentum and reversals. Traditional asset pricing models like CAPM determine the expected returns of a security at a given point of time, but do not consider the same over a period of time that could provide an explanation for stock market bubbles. As a result, with time, the concept of 'rationality' has been challenged which led to the emergence of new concept of "bounded rationality" by Herbert Simon in the year 1957 (Klaes & Sent, 2005). It has made clear that humans are not *rational*, rather *bounded rational* which takes into account the cognitive limitation of the decision maker, i.e. limitations of both knowledge and computational capability. Given the canopy of irrationality and half fledged information, the decisions of all the people are never rational.

"Extraordinary Popular Delusions and the Madness of Crowds", written by Charles Mackay in 1841, remains a Wall Street classic to this day. He has shown how otherwise intelligent people sometimes succumb to mass idiocy. Mackay portrayed the history of alchemy, witch hunts, fortunetelling, and speculative frenzies such as the mania over tulips that gripped Holland in the early 17th century, when the flower bulbs traded at a higher price than gold (Vasile & Sebastian, 2010). This instance shows that herd instinct is a trait that is found in humans since the dawn of civilization; and it is not something which is related to gullible persons, wise men are also under its clutches.

The aforementioned concept has given a more realistic and practical approach to financial and economic hypotheses such as Efficient Market Hypothesis, Expected Utility Theory and others. It has allowed many economists to incorporate bounded rationality into their models of finance and market behaviors successfully and also consider the limitation of psychology as a small scarce resource (Tseng, 2006).

Application of cognitive psychology in financial decision making starts with the researches made by Tversky and Kahneman (1974). Daniel Kahneman is

called the Father of Behavioral Finance. It has been found that many personal factors affect decision of the individuals. Decision making can also be affected by internal (own perception and thinking) and external factors (the environment) that are directly connected to the decision itself. This financial genesis has led to the formation of a new branch of knowledge – *Behavioral Finance,* which postulates that humans use many shortcuts and biases in decision making. The application of psychology and sociology into financial decision making has answered some of the questions of the researchers who were defying the concept of traditional finance then. Juggling further with the evolved subject has made one understand the causes of deviations from the standard financial models, but has not specifically pointed out as to what drives such causes. This has made the financial scientists go one step forward and study the financial decisions at the micro level, that is, at the individual level. The study of individuals has made them look into the decision making organ of humans – THE BRAIN, which has fueled the emergence of NEUROFINANCE in the academic world. It looks into the neural substrates of the decision making.

The term 'Neurofinance' was first coined by David Edwards in 2004 (Ascher et al. (2016). It emphasizes a new science that uses neurotechnology to analyze decisions relating to finance. As per Miendlarzewska et al. (2019), *"Neurofinance strives to understand financial decision making by combining insights from fields such as psychology and neuroscience with traditional theories of finance. In addition to explaining individual and market behavior as a function of classic financial variables, it aims to explain how neural and physiological signals relate and give rise to individual differences in financial decision making."* But as per Rocha et al. (2013), the first study on Neurofinance was conducted by Gehring and Willoughby (2002) using Electroencephalography (EEG) to analyze brain activity associated with financial decision making in a monetary gambling risk task. The research has discovered that the amplitude of a negative-polarity event related brain potential, probably generated by a medial frontal region in or near anterior cingulate cortex, was greater when financial choice resulted in a loss than when it led to gain.

Tseng (2006) was the first who has shown neurofinance as a new field of study which will bring additional answers to behavioral finance and support the Adaptive Market Hypothesis (AMH). AMH is an economic theory introduced by Massachusetts Institute of Technology (MIT) Professor Andrew W. Lo in the year 2004. It combines the Efficient Market Hypothesis with Behavioral Finance and tries to explain the financial market behavior from an evolutionary biology perspective. According to Andrew Lo (2005), the *"primary components of the AMH consist of the following ideas:*

(A1) Individuals act in their own self-interest.

(A2) Individuals make mistakes.

(A3) Individuals learn and adapt.

(A4) Competition drives adaptation and innovation.

(A5) Natural selection shapes market ecology.

(A6) Evolution determines market dynamics."

IV. SYNERGY OF BIOLOGICAL DISCIPLINES WITH NEUROFINANCE

4.1 Genetic Influence in Financial Decision Making

Genetic studies help us understand whether the behavior depicted by the individuals is intrinsic (related to genes, i.e., hereditary) or extrinsic (related to the environment, i.e., conditioning). To understand this, researchers use 'twins' studies to compare monozygotic and dizygotic twins. Monozygotic twins are also known as identical twins. They result from the fertilization of single egg that splits into two. They share all their genes and are always of same gender. Dizygotic twins result from the fertilization of two separate eggs during the same pregnancy. They do not share the same genes and are ranked in par with siblings. If there is greater similarity of investment decisions in monozygotic twins than dizygotic twins, we can conclude that genetics play a role. Cesarini et al. (2010) have found in their paper that 25% of variation in individual risk taking is due to genetic variation. They also found that their results extended to several other aspects of financial decision making like social investing or ethical investing. Barnea et al. (2010) have found that genetic factors explain one third of the variance in stock market participation and asset allocation. Besides, Nicolaou and Shane (2019) posit that a genetic predisposition to risk taking preferences and choices exist in financial investment choices. According to Cronqvist et al. (2015), an investor's style of investment has a biological basis. The preference for value over growth stocks is partially ingrained in an investor already from birth. In their paper, genetic differences across individuals explain 18% of the cross-sectional variation in value versus growth orientation if P/E ratios are used for investment decisions, and 25% of such variation if Morningstar's Value Growth Scores are used. These studies have portrayed the role of genetics in investment decisions, but it has not underpinned as to why or how genes are responsible for a different decision. Further research on the influence of genes in investment behaviour made researchers look into the polymorphisms of genes which affected the dopaminergic and serotonergic systems, as these systems have been linked to investment decisions. Genetic variations can have a significant effect on the physiology of these systems thereby leading to a difference in risk appetite of the individual investors. Kuhnen and Chiao (2009) have shown that variants of two genes namely 5HTTLPR (Serotonin transporter) and DRD4 (Dopamine D4 Receptor exon III) regulate serotonin and dopamine neurotransmission. They found that the 5 HTTLPR s/s allele carriers take 28% less risk than those carrying the s/l or l/l alleles of gene. DRD4 7-repeat allele carriers take 25% more risk than individuals without the 7-repeat allele. Sapra et al.(2012) have found that distinct alleles of dopamine receptor 4 promoter (DRD4P) and Catecholamine O Methyltransferase (COMT) that affect the level of dopamine has been predominant in Wall Street traders as compared to a control group who did not trade stocks. Zhong et al. (2009) have found that dopamine tone modulates sensitivity towards valuation of gains, while serotonin tone modulates the sensitivity towards estimation of losses. They have found that subjects with 9 repeat allele of DAT 1(lower DA tone) are more risk tolerant over gains than

subject with 10 repeat allele, and the subjects with 10 repeat allele of STin2 (higher 5HT tone) are more risk tolerant over losses than subjects with 12 repeat allele. Further, Frydman et al. (2010) in their paper have found that carriers of the MAOA-L polymorphism are more likely to take financial risks.

So, from the above studies we can conclude that genes affect the risk appetite of a financial market participant thereby affecting their financial decision making.

4.2 Anatomy and Financial Risk Taking

Previous studies have illuminated us of the fact that financial decision making is shaped by specific brain networks. The structure of specific brain networks varies from person to person. As a corollary, structural differences of these specific brain networks can lead to differences in their financial decision making. Therefore, applications from neuroanatomy (study of structure and organization of nervous system) can throw some light in this regard. Some studies mentioned below can help us understand this clearly.

As per Gilaie-Dotan et al. (2014), brain analysis reveals that the grey matter volume of a region in the right posterior parietal cortex is significantly predictive of individual risk attitude. Participants with higher grey matter volume in this region exhibit less risk aversion. To test the robustness of this finding, they have examined a second group of participants and used econometric tools to test the hypothesis that grey matter volume in this area predicts individual risk attitude. Their findings have been confirmed in the second group.

In addition, Nasiriavanaki et al. (2015) have shed light on the fact that inter-individual differences play a role in risk taking behavior. They investigated this problem based on the well known Balloon Analog Risk Task (BART) in 48 healthy subjects in which participants inflate a virtual balloon (on computer screen) opting for a higher score in the face of a riskier chance of balloon explosion. In this study, based on a Structural Voxel Based Morphometry (VBM) technique, they demonstrate a significant positive correlation between BART score and the size of grey matter volume in the anterior insula in riskier subjects. In other words, the subjects of this experiment with greater risk appetite have shown a greater grey matter volume in their anterior insula.

Almost all risky decision making have possibility of losses and our human brain have evolved to analyze and avoid them. Many laboratory and field experiments have shed light on the fact that people generally avoid risky decisions in spite of the fact that they can earn high returns. This is called loss aversion. This cautionary brake is given by amygdala, the part of the brain which is activated in the face of uncertainty and is responsible for rebooting the human system to fight or flight mode. To measure individual sensitivity to financial losses, De Martino et al. (2010) conducted an experiment to study two rare individuals with focal bilateral amygdala lesions using a series of experimental economics tasks. They asked the participants to play a variety of monetary gambles with possible gains and losses. Although both the participants retained a normal ability to respond to changes in the gambles' expected value and risk, they showed a dramatic reduction in loss aversion compared to matched controls. The findings suggest that the amygdala plays a key role in generating loss aversion attitude by inhibiting actions with potentially deleterious outcomes.

Schneider et al. (2012), in their paper, conducted a Functional and Structural MRI on 266 healthy young adolescents and 31 adolescents reporting potentially problematic substance use. Activation of brain area during reward anticipation (using the monetary incentive delay task) and grey matter volume was measured. Monetary Incentive Delay (MID) Task is used to measure the neural activity in the brain throughout the stages of reward processing, starting from reward prediction to anticipation to outcome processing to consumption (Knutson et al., 2000; Lutz & Widmer, 2014). Risk taking bias was assessed by Cambridge Gamble Task. Cambridge Gambling Task (CGT) has been developed to assess risk taking behavior and decision making outside a learning context. As per Romeu et al. (2020) it is used to measure impulsivity in both clinical and healthy populations. As per Rogers et al. (1999), the subject (of CGT) is told that the computer has hidden a yellow token on random basis inside one of the red or blue boxes displayed at the top of the screen and that the subject has to choose the colour of the box which is containing the token. After choosing the colour, the subject has to bet some of their score points on the choice of colour being correct. Then the results are displayed on the screen as to which one of the boxes is containing the token. If the colour of the box containing the token is matched with the colour of the box chosen by the subject initially, the subject won the game and the points (which were bet) will be added to the total score, otherwise it is deducted from the total score. This task captures the time taken by the subjects to choose between the colour of the box. It also helps in measuring how many times the subjects choose the colour with most number of boxes and finally it also measures the rate at which the subjects put more points at risk in response to more favourable ratios (for example, the subjects will be ready to put more points on the bet of the colour of the box being red, if the ratio of red to blue boxes is 9:1). Schneider et al. (2012) observed that with risk taking bias, the ventral striatum showed decreased activation bilaterally during reward anticipation. Voxel Based Morphometry has shown that greater risk taking bias is also associated with and partially mediated by lower grey matter density in the same structure. The group with potentially problematic substance use has shown greater risk taking as well as lower striatal activation relative to matched comparison subjects from the main sample.

These studies show that difference in grey matter volume in anterior insula, amygdala, ventral striatum and posterior parietal cortex leads to difference in risk appetite among individuals. Inappropriate financial behavior is caused by the imbalance in information processing among the medial prefrontal cortex, amygdala, insula, anterior and posterior cingulate cortices, ventral tegmental area and NAcc {Srivastava et al. (2020)}. Thus structural differences in specific brain networks lead to divergent financial decision making.

4.3 Hormones and Financial Risk Taking

At a glance, the relationship between endocrine system and financial decision making seems to be uncorrelated. But a systematic thinking can make us override our pre-conceived notion and make us look to a different dimension of it. Endocrine system acts as a relay between the market events and the neural system involved in decision making. A hormone is any member of a class of signaling

molecules, produced by glands in multicellular organisms, that is transported by the circulatory system to target distant organs and regulate physiology and behavior. In particular, testosterone and cortisol have receptors throughout the brain region, identified in neuroeconomics research as contributing to irrational financial decisions. So these steroids, as they fluctuate with risk and return, may alter a trader's ability to make optimal decisions. Testosterone is a steroid hormone that affects one's attitude towards risk and hence in economic risk taking. As we know that risk is one of the factors affecting our decision making, therefore the role of testosterone driving optimism and increasing the risk appetite should not be left unventured.

Coates and Herbert (2008) sampled, under real working conditions, endogenous steroids from a group of male traders in the city of London, and found that traders' morning testosterone level predicts his daily profitability. They also reported that traders' cortisol rises with both the variance of his trading results and volatility of market. Their results suggest that higher testosterone may contribute to economic return, whereas cortisol is increased by risk.

Nadler et al. (2018), in their paper, elevated the level of testosterone in male traders, and tested testosterone's effect both on their trading behavior in experimental asset market, and on the size and duration of asset price bubbles. Using both aggregated and individual trading data, they have found that testosterone administration generated larger and longer lasting bubbles by causing high bids and the slow incorporation of the assets' fundamental value. They have also demonstrated how the changes in buying and selling pressures give rise to bubbles and subsequent crashes. These results demonstrate the effects of specific hormone, testosterone, on male traders in experimental markets, and are likely to have attendant implications outside the laboratory.

Cueva et al. (2015) have shown that cortisol, a hormone that modulates the response to physical or pathological stress, predicts instability in financial markets. Specifically, they recorded salivary levels of cortisol and testosterone in people participating in an experimental asset market and found that individual and aggregate levels of endogenous cortisol predict subsequent risk taking and price instability. They then administered either cortisol or testosterone to young males before they played an asset trading game. They have found that both cortisol and testosterone shift investment towards riskier assets. Cortisol appears to affect risk preferences directly, whereas testosterone operates by inducing increased optimism about future price changes. Their results suggest that changes in cortisol and testosterone can play a destabilizing role in financial markets through increase in risk taking behavior, acting via different behavioral pathways.

Thus, from the above mentioned studies it can be inferred that hormones can also underpin the financial decision making of humans via their risk appetite. Further research is needed to explore the un-ventured dimensions of these aspects of financial decision making.

V. CURRENT RESEARCH AREAS: LABORATORY EXPERIMENTS

The above surveyed literature provides evidence that while making financial decisions, investors deviate from rationality. It has been established that event related fMRI study can be used to examine as to which anticipatory neural activity will predict optimal or sub optimal choices in financial decision making. As per Kuhnen and Knutson (2005), "Nucleus accumbens activation preceded risky choices and risk-seeking mistakes, while anterior insula activation preceded riskless choices as well as risk-aversion mistakes."

It has been revealed by some studies that Medial Prefrontal Cortex (mPFC) assist in decision making. Others have also suggested that mPFC is selectively involved in the retrieval of remote long term memory. Gehring and Willoughby (2002), in their paper, reported the observation of neural processing that occurs within 265 milliseconds after outcome stimuli that inform human participants about gains and losses in a gambling task. They posited that a negative polarity event related brain potential, probably generated by a medial frontal region in or near the anterior cingulate cortex, is greater in amplitude when a participant's choice between two alternatives results in a loss than when it results into gain.

Neural data can also be used to test a theory of investor behavior. Frydman et al. (2014) have used measures of neural activity provided by Functional Magnetic Resonance Imaging (fMRI) to test "Realization Utility" theory of investor behavior, which posits that people derive utility directly from the act of realizing gains and losses. Subjects of the experiment traded in Experimental Stock Market, and they measured their neural activity. They found broad (albeit not perfect) support for the neural predictions of the realization utility model. First, they observed that the activity in the VmPFC (Ventromedial Prefrontal Cortex), an area known to encode decision values, is correlated with capital gain (the decision value under realization utility), but not with a measure of the net expected value of future returns (the decision under the expected value model). Second, they found that the strength with which the capital gain is reflected in the VmPFC decision value signal is correlated, across subjects, with the magnitude of proportion of gains realized; they, however, could not find the analogous correlation for capital losses. Finally, and perhaps the most striking of all, they have found that activity in the Ventral Striatum (an area known to encode information about changes in the expected value of lifetime experience utility) exhibits a positive response when subjects realize capital gains, while controlling for the size of the gains.

Further, Stallen et al. (2021) have conducted two neuroimaging experiments and specifically tested whether anticipatory affective brain activity in healthy humans could forecast aggregate changes in stock prices. They found that group anterior insula (Alns) activity forecast stock price inflections (i.e., changes in price directions) across two different stock markets. Group Nucleus Accumbens (NAcc) activity could forecast price direction (i.e., continuing price movement), but only in markets with autocorrelation in stock prices. These findings suggest that neural activity associated with anticipatory affect can forecast aggregate choice - even in dynamic and competitive environments like stock markets.

As per Srivastava et al. (2020) the insights from neuroeconomics are useful for

treatment of neurobiological disorders too. Castelnovo et al. (2012) have studied the strategic behavior of Schizophrenics through the use of neuroeconomic games, i.e., dictator game and ultimatum game and they show more rational bargaining behavior as compared to the rational subjects. Further, Chiong et al. (2014) developed a conceptual model derived from neuroeconomic literature that identifies factors which influence vulnerability to different types of financial error in different dementia syndromes. It has implications of early diagnosis and subsequent risk prevention.

VI. POTENTIAL RESEARCH AREAS

In view of the above discussion, some potential research areas can be identified as follows.

In the above discussion, testosterone levels of males and risk taking are found to be positively correlated. But a similar study on an equally important section of investors - female traders, has not been conducted so far. In no way testosterone levels of males and females are comparable. But how females' biological make up is affecting their stock market decisions can well be explored. Do all females avoid risk is worth a research question that can be examined.

Previously, we have mentioned that persons with amygdala damage have shown less risk aversion. Is this totally true? We know that *neuroplasticity* is the brain's ability to reorganize itself by forming new neural connections throughout life. This means that neurons (nerve cells) in the brain compensate for injury and disease and adjust their activities in response to new situations or to changes in environment. This can be examined in the future research.

All the aforementioned studies are out of India context. In India, no such published research work has yet been known depicting genetic, neuroanatomical or hormonal underpinnings to the financial decision making in practical context, thereby opening up scope for further research.

VII. CONCLUSION

It is clear from the above discussion that our genetics, structure of brain, hormones and emotions play a role in financial decision making. Only a few areas are covered in this paper. Though still in its embryonic stage, the concept of Neurofinance has given a paradigm shift to the knowhow of investment decision making process. It gives us valuable insights regarding the financial decision making process at micro level or, more specifically, at an individual brain level. It helps us look at the decision making process from a biological angle. It may help in improving our decision making. Being aware of mental process will definitely help market participants, more specifically the financial advisors, in their decision making. If financial advisors become aware of their own emotions as well as their clients' emotions, they can better manage the needs of their clients. Applications of Neurofinance can also be found in testing capital market phenomenon, or the theories of investor behavior as discussed in experiments cited in preceding sections. Behavioral Finance illuminates us with many behavioral biases that affect an investor's financial decision making. In future, it is expected that Neurofinance shall provide additional answers to such

biases and help devise suitable strategies to minimize them. For example, if we take overconfidence bias from the domain of Behavioral Finance, applications of Neurofinance can be used to find out the causes of the bias, and then professional managers can be trained to manage it. Some workshops can be conducted in the form of experiments to examine and explain some real life failures (case studies) in financial world so that suitable psycho-medico-neural responses can be developed to avoid such failures. Stock market bubbles and anomalies can be studied from a neurofinance perspective to gain some additional answers and lessons learned from these studies. In today's volatile, uncertain, complex and ambiguous (VUCA) world, by becoming aware of the mental process that leads to biases in financial decision making can help one minimize it and thrive better in a VUCA environment. It may also help in decreasing volatility in the financial market by improving one's decision making. In future, Neurofinance may help investors to train their minds to lessen the impact of negative financial situation by managing one's emotions well.

As we know that being aware is the first step to change. The field of Neurofinance is still un-ventured. More research is needed to give it a formal shape. Mostly, the research is done in laboratory setting till date. In some cases, it is done in a dynamic environment but the subjects examined are too less to give any conclusive evidence. The boundaries of the subject need to be defined to develop into a stand-alone branch of knowledge. We look forward to the day when Neurofinance becomes a focused area of specialization in the domain of Finance on receiving the synergistic benefits from other branches of knowledge or disciplines like medical science, social sciences such as psychology, sociology etc. and other finance areas like decision theories.

References

Ascher, D., Da Silva, W.V., Da Veiga, C.P., & Souza, A. (2016). Neurofinance: a systematic review about a new way to looking the financial decision- making. *European Journal of Scientific Research*, *141*(4), 407-426.

Barnea, A., Cronqvist, H., & Siegel, S. (2010). Nature or nurture: what determines investor behavior? *Journal of Financial Economics*, *98*(3), 583-604. https://doi.org/10.1016/j.jfineco.2010.08.001.

Castelnovo, A., Ranieri, R., Marcatili, M., & Scarone, S. (2012). Decision making in Schizophrenia: A neuroeconomic trial on social cognition, *European Psychiatry, 27***.**

Cesarini, D., Johannesson, M., Lichtenstein, P., Sandewall, Ö., & Wallace, B. (2010). Genetic variation in financial decision-making. *Journal of Finance*, *65*(5), 1725-1754. https://doi.org/10.1111/j.1540-6261.2010.01592.x.

Chiong, W., Hsu, M., Wudka, D., Miller, B.L., & Rosen, H.J. (2014). Financial errors in dementia: testing a neuroeconomic conceptual framework. *Neurocase, 20*(4), 389-396.

Coates, J. M., & Herbert, J. (2008). Endogenous steroids and financial risk taking on London trading floor. *Proceedings of the National Academy of Sciences of the United States of America*, *105*(16), 6167-6172. https://doi.org/10.1073/pnas.0704025105.

Cronqvist, H., Siegel, S., & Yu, F. (2015). Value versus growth investing: why do different investors have different styles? *Journal of Financial Economics*, *117*(2), 333-349. https://doi.org/10.1016/j.jfineco.2015.04.006.

Cueva, C., Roberts, R. E., Spencer, T., Rani, N., Tempest, M., Tobler, P. N., Herbert, J., & Rustichini, A. (2015). Cortisol and testosterone increase financial risk taking and may destabilize markets. *Scientific Reports*, *5*. https://doi.org/10.1038/srep11206.

De Martino, B., Camerer, C.F., & Adolphs, R. (2010). Amygdala damage eliminates monetary loss aversion. *Proceedings of the National Academy of Sciences of the United States of America*, *107*(8), 3788-3792. https://doi.org/10.1073/pnas.0910230107.

Frydman, C., Barberis, N., Camerer, C., Bossaerts, P., & Rangel, A. (2014). Using neural data to test a theory of investor behaviour: An application to realization utility. *Journal of Finance*, *69*(2), 907-946.

Frydman, C., Camerer, C., Bossaerts, P., & Rangel, A. (2010). MAOA-L carriers are better at making optimal financial decisions under risk. *Proceedings of the Royal Society B: Biological Sciences*, *278*(1714), 2053-2059. https://doi.org/10.1098/rspb.2010.2304.

Gehring, W.J., & Willoughby, A.R. (2002). The medial frontal cortex and the rapid processing of monetary gains and losses. *Science*, *295*(5563), 2279-2282. https://doi.org/10.1126/science.1066893.

Gilaie-Dotan, S., Tymula, A., Cooper, N., Kable, J. W., Glimcher, P.W., & Levy, I. (2014). Neuroanatomy predicts individual risk attitudes. *Journal of Neuroscience,34*(37), 12394-12401. https://doi.org/10.1523/JNEUROSCI.160014.2014.

Klaes, M., & Sent, E.M. (2005). A conceptual history of the emergence of bounded rationality. *History of Political Economy*, *37*(1), 27-59. https://doi.org/10.1215/00182702-37-1-27.

Knutson, B., Westdorp, A., Kaiser , E., & Hommer, D. (2000). FMRI Visualization of brain activity during a monetary incentive delay task. *NeuroImage*, *12*(1), 20-27. https://doi.org/10.1006/nimg.2000.0593.

Kuhnen, C.M., & Chiao, J.Y. (2009). Genetic determinants of financial risk taking. *PLoS ONE*, *4*(2). https://doi.org/10.1371/journal.pone.0004362.

Kuhnen, C.M., & Knutson, B. (2005). The neural basis of financial risk taking. *Neuron*, *47*(5), 763-770. https://doi.org/10.1016/j.neuron. 2005.08.008.

Lo, A.W. (2005). Reconciling Efficient Markets with Behavioural Finance: The Adaptive Market Hypothesis. *The Journal of Investment Consulting*.

Lutz, K., & Widmer, M. (2014). What can the monetary incentive delay task tell us about the neural processing of reward and punishment? *Neuroscience and Neuroeconomics*. https://doi.org/10.2147/nan.s38864.

Mackay, C. (1841). *Extraordinary Popular Delusions and The Madness of Crowds*. Richard Bentley.

Miendlarzewska, E.A., Kometer, M., & Preuschoff, K. (2019). Neurofinance. *Organizational Research Methods*, *22*(1), 196-222. https://doi.org/10.1177/1094428117730891.

Nadler, A., Jiao, P., Johnson, C.J., Alexander, V., & Zak, P.J. (2018). The bull of Wall Street: Experimental analysis of testosterone and asset trading. *Management Science*, *64*(9), 4032-4051. https://doi.org/10.1287/mnsc.2017.2836.

Nasiriavanaki, Z., ArianNik, M., Abbassian, A., Mahmoudi, E., Roufigari, N., Shahzadi, S., Nasiriavanaki, M., & Bahrami, B. (2015). Prediction of individual differences in risky behaviour in young adults via variations in local brain structure. *Frontiers in Neuroscience*, *9*, Article 359. https://doi.org/10.3389/fnins.2015.00359.

Nicolaou, N., & Shane, S. (2019). Common genetic effects on risk taking preferences and choices. *Journal of Risk and Uncertainty, 59*, 261-279.

Rocha, A.F., Vieito, J.P., & Rocha, F.T. (2013, December 10-11). Neurofinance: How Do We Make Financial Decisions [Opening Speech]. Investor Education and Financial Behavior Conference, Rio de Janeiro, Brazil.

Rogers, R. D., Everitt, B. J., Baldacchino, A., Blackshaw, A. J., Swainson, R., Wynne, K., Baker, N. B., Hunter, J., Carthy, T., Booker, E., London, M., Deakin, J. F. W., Sahakian, B. J., & Robbins, T. W. (1999). Dissociable deficits in the decision- making cognition of chronic amphetamine abusers, opiate abusers, patients with focal damage to prefrontal cortex, and tryptophan - depleted normal volunteers: Evidence for monoaminergic mechanisms. *Neuropsychopharmacology*, *20*(4), 322-339. https://doi.org/10.1016/S0893-133X(98)00091-8.

Romeu, R. J., Haines, N., Ahn, W. Y., Busemeyer, J. R., & Vassileva, J. (2020). A computational model of the Cambridge gambling task with applications to substance use disorders. *Drug and Alcohol Dependence*, *206*, 107711. https://doi.org/10.1016/j.drugalcdep.2019.107711.

Sapra, S., Beavin, L. E., & Zak, P. J. (2012). A combination of dopamine genes predicts success by professional Wall Street traders. *PLoS ONE*, *7*(1). https://doi.org/10.1371/journal.pone.0030844.

Schneider, S., Peters, J., Bromberg, U., Brassen, S., Miedl, S. F., Banaschewski, T., Barker, G. J., Loth, E., Schumann, G., Conrod, P., Flor, H., Mann, K., Nees, F., Rietschel, M., Spanagel, R., Garavan, H., Struve, M., Garavan, H., Heinz, A., …Büchel, C. (2012). Risk taking and the adolescent reward system: A potential common link to substance abuse. *American Journal of Psychiatry*, *169*(1), 39-46. https://doi.org/10.1176/appi.ajp.2011.11030489.

Srivastava, M., Sharma, G.D., Srivastava, A.K., & Kumaran S.S.(2020). What's in the brain for us: a systematic literature review of neuroeconomics and neurofinance. *Qualitative Research in Financial Markets*, *12*(4), 413-435.

Stallen, M., Borg, N., & Knutson, B. (2021). Brain Activity Foreshadows stock Price Dynamics. *The Journal of Neuroscience*, *41*(14), 3266-3274.

Tseng, K. C. (2006). Behavioral finance, bounded rationality, neuro-finance, and traditional finance. *Investment Management and Financial Innovations*, *3*(4), 7–18.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*(4157), 1124–1131.

Vasile, D., & Sebastian, T.C. (2010). Neurofinance: Getting an insight into the trader's mind. *Annals of Faculty of Economics*, *1*(2), 723-729. https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=65287345&site=ehost-live.

Von Neumann, J., & Morgenstern, O. (1944). Theory of Games and Economic Behavior. Princeton University Press.

Zhong, S., Israel, S., Xue, H., Sham, P. C., Ebstein, R. P., & Chew, S. H. (2009). A neurochemical approach to valuation sensitivity over gains and losses. *Proceedings of the Royal Society B: Biological Sciences*, *276*(1676), 4181–4188. https://doi.org/10.1098/rspb.2009.1312

Indian Accounting Review
Vol. 25, No. 2, December 2021

Does Economic Policy Uncertainty Affect Stock Markets? Empirical Evidence from India

Raktim Ghosh*
Swarup Saha*
and
Bhaskar Bagchi
Department of Commerce, University of Gour Banga

ABSTRACT

This paper tries to analyse empirically the impact of India's economic policy uncertainty (EPU) on India's stock market. Monthly data from December, 2007 to November, 2021 have been considered. All the data are converted into log return natural. We applied DCC-MGARCH, Bai-Perron test and descriptive statistics to investigate the impact of EPU index on volatility of select variables across a multivariate framework. The results of DCC-MGARCH model indicates presence of volatility in the dependent variables arising out of economic policy uncertainty. Bai-Perron test confirms the presence of structural breaks during the study period.

Key words: Economic Policy Uncertainty, Stock Market, DCC-MGARCH

I. INTRODUCTION

As an economic body, the stock market plays a vital role of accelerating the competence of capital formation and distribution, and all-round development of the economy is a function of the stock market performance along with certain other factors. Empirical evidence has shown that the development of a capital market is essential for economic growth (Ashaolu & Ogunmuyiwa, 2010). The performance of stock markets around the globe may be affected by economic policy uncertainty and in order to assess the impact of such uncertainty, Economic Policy Uncertainty (EPU) index was constructed based on the coverage by the newspapers by Baker, Bloom & Davis (2016). EPU can be defined as a risk factor associated with macroeconomic policies resulting from frequent changes made in the policies at national and international level. Rising EPU over the world affects all the stakeholders in the world economy where Indian economy is not the exception. Effective and steady economic policy is highly required for the growth of any economy and uncertainty in policy, making leads the ongoing

*Research Scholars in the Depatement of Commerce, University of Gour Banga.
Corresoponding author's e-mail address: raktimghosh19@gmail.com

growth in struck. Different sectors in Indian Economy are vastly affected in an adverse way due to uncertain behavior of Economic Policy, and stock markets being one of the important pillars in Indian economy are equally affected.

Standing on such a scenario, it is quite relevant and imperative to make necessary and in-depth analysis to look into the impact of India's EPU index on stock markets from India during post-recession period. Findings from different existing literatures like Bonaime et al. (2018), Antonakakis et al. (2013), Dzielinski (2012) and others suggest that most of the decisions with regard to business and investment are linked with EPU. The lower the EPU is, the more the economy is likely to develop leading to escalating investment by the prospective investors. Considering the significance and magnitude of EPU on a country's economy, the present study delves to investigate the effect of such EPU on the Indian stock markets. In this study advanced econometric tools like DCC-MGARCH (1,1) model has been used to capture the dynamic conditional correlation in the select variables where structural breaks may be present along with volatility spillovers. Our study is expected to enrich the existing EPU literature in terms of advanced econometric tools that have been used to study the impact of EPU on the select variables along with dynamic conditional correlation and volatility spillovers across a short-run and a long-run time horizon commencing from global-recession period.

II. LITERATURE REVIEW

The uncertainty of a country's economic policy influences the markets of other countries depending upon the size and strength of economies which has a great impact on future economic growth and stability. Benzid & Chebbi (2020) in their study applied GARCH (1,1) model to investigate the shock of COVID-19 on the US exchange rate volatility. It was found that an augmentation in the number of cases and the deaths (both in logs) in the US bears a positive shock on the USD/EUR, USD/Yuan and USD/LivreSterling. Škrinjarić & Orlović (2020) in their study examined the spillover effects of shocks on the economic policy uncertainty (EPU) index and stock market returns and the associated risks for selected Central and Eastern European markets namely Bulgaria, Czech Republic, Estonia, Hungary, Lithuania, Poland, Croatia, Slovakia and Slovenia. VAR model was used and significant results were found. Syahri & Robiyanto (2020) in their study analysed the effects of association of gold, exchange rate, and CSPI on COVID-19 pandemic by introspecting the consequence of gold exchange prices and exchange rate on CSPI and volatility of stock. JCI daily data, gold prices and exchange rates were collected from January-June, 2020. Further, DCC-MGARCH model was also applied. It was found that adjustment of gold prices has noteworthy consequence on stock price volatility. Further, the occurrence of a positive dynamic correlation among CSPI and gold and a negative dynamic correlation between CSPI and exchange rates were also observed. Dash et al. (2019) in their paper inspected the causality and co-movement between economic policy uncertainties and stock market liquidity using monthly data of G7 countries. They applied wavelet coherence and wavelet phase angle tests. It was found that there exists relationship between economic policy uncertainty

and liquidity in stock market. In addition to it, it was also found that liquidity in stock market varies with uncertainty but moves in the same direction but liquidity moves in the opposite direction. Asgharian et al. (2018) in their paper investigated the impact of EPU shocks on US and UK stock market volatility. The findings demonstrated presence of EPU shocks on US and UK stock market and also positive correlation between stock market volatility and EPU. Debata & Mahakud (2018) in their paper examined the relationship between economic policy uncertainty and stock market liquidity in an emerging stock market by applying vector autoregressive Granger-causality tests, impulse response functions and variance decomposition analysis. A moderate impact on the liquidity of stock market during normal conditions was found though there is a significant and greater influence during the presence of financial crisis. Hoque & Zaidi (2018) in their paper investigated the shock of global economic policy uncertainty on Malaysian sectoral stock performance. They applied two-stage Markov-switching model for finding impacts of global economic policy uncertainty on sectoral stock returns in regime switching environment. Empirical evidence suggests that Markov-switching model displays major effects of global economic policy uncertainty on all sectoral stock returns apart from technology sector in Malaysia stock market. The effects of global economic policy uncertainty differ across regime states, sectors and nature of effects, where the negative effects of global economic policy uncertainty govern over positive effects. The global economic policy uncertainty reveals greater impacts on stock returns in high-volatility regime. Thus, the findings prove the survival of asymmetric, nonlinear, non-monotonic, and state-dependent connection between global economic policy uncertainty and sectoral stock returns in Malaysia. Nyawo & Wyk (2018), in their paper, examined the spread of an uncertainty shock from the US economy to the Indian economy within a two-country Structural Vector Autoregressive model (SVAR) and they concluded that the effect of US economic policy uncertainty on Indian economy is more when compared to India's economic policy uncertainty. Peng et al. (2018), in their paper, applied quantile regression techniques to study the relationship between economic policy uncertainty (EPU) and stock market returns in G7 and BRIC. It was found that EPU reduces return from stock market excepting France and UK with asymmetric reliance. Phan et al. (2018), in their paper, collected data of 16 countries across the globe to witness whether economic policy uncertainty forecasts excess returns from stock and EPU is from either or both the cash flow and discount rate channels. It was observed that the sectors selected for the study largely predicts the excess return rather than the country. It was also found that economic policy uncertainty is relevant to some country. Discount rate channel was supported by the results. Xiong et al. (2018), in their paper, collected data from January 1995 to December 2016 to inspect the time-varying correlation between EPU and stock market returns of China. DCC-GARCH model was applied for analysis which portrayed that there is a large fluctuation during a financial crisis and the shock of EPU on the Shanghai stock market is superior to Shenzhen stock market. Abul et al. (2015) in their paper applied Markov-switching model to explore the shock of oil on real exchange rates with a sample of oil exporting and oil importing countries. An increase is exchange rate can be noted following an oil price shock in the

context of oil exporting economies. Further, global economic demand shocks influence exchange rates in both oil exporting and importing countries, though no systematic pattern of appreciation or depreciation in real exchange rates could be witnessed. It can be observed that the existing literature serves with findings on volatility only, but no research work has been found on volatility spillovers in recent times. Therefore, an attempt has been made to study volatility spillovers running from EPU to other select variables.

III. DATA AND METHODOLOGY

3.1 Dataset and econometric tool

The study is based on monthly data of Economic Policy Uncertainty (EPU) Index, BSE SENSEX and NIFTY 50. For better analysis, all the raw values have been converted into corresponding log return values. The data of EPU is collected from the database of Baker, Bloom & Davis, 2016 (https://www.policyuncertainty.com/). BSE SENSEX data is collected from the database of Bombay Stock Exchange (BSE) (https://www.bseindia.com/Indices/IndexArchiveData.html) and data of NIFTY 50 is collected from the database of National Stock Exchange (NSE) (https://www1.nseindia.com/products/content/equities/indices/historical_index_data.htm). In order to have a clear picture regarding the impact of EPU Index on the Indian stock markets, we have considered the study period from December, 2007 to November, 2021. At the beginning, in order to identify presence of structural breaks in the dataset, Bai-Perron test has been applied and it has been decided that if structural breaks are identified, then, DCC-MGARCH model will be applied to study the presence of volatility in the dependent variables arising out of EPU index. Structural breaks can be defined as the sudden change in a time series at any point of time. The change can be within the mean or any parameter of the time series that constructs the data. The rationale behind identifying structural breaks is to confirm the breaks within the dataset empirically as we know several major national and international economic events like global recession (December, 07 – June, 09), European Debt Crisis, high volatility in crude oil prices, demonetisation of domestic currency by Government of India, outbreak of COVID-19 pandemic across the globe have occurred during our period of study. Finally, E-views 12 and R studios 16 have been used to analyse the data.

3.2 Dynamic conditional correlation multivariate GARCH (DCC-MGARCH) model

MGARCH models are dynamic multivariate regression models in which the conditional variances and co-variances of the errors follow an autoregressive-moving-average structure. The DCC-MGARCH model uses a nonlinear combination of univariate GARCH models with time-varying cross-equation weights to model the conditional covariance matrix of the errors.

MGARCH models differ in the parsimony and flexibility of their specifications for a time-varying conditional covariance matrix of the disturbances, denoted by H_t. In the conditional correlation family of MGARCH models, the diagonal elements of H_t are modeled as univariate GARCH models, whereas the off-

diagonal elements are modeled as nonlinear functions of the diagonal terms. In the DCC-MGARCH model,

$$h_{ij,t} = \rho_{ij,t}\sqrt{h_{ii,t}h_{jj,t}} \quad \text{.....(1)}$$

Where the diagonal elements $h_{ii,t}$ and $h_{jj,t}$ follow univariate GARCH processes and ρij,t follows the dynamic process specified in Engle (2002). Because the $\rho_{ij,t}$ varies with time, this model is known as the DCC-MGARCH model.

The DCC-MGARCH model proposed by Engle (2002) can be written as:

$$y_t = C_{xt} + \varepsilon_t$$

$$\varepsilon_t = H_t^{\frac{1}{2}}$$

$$H_t = D_t^{\frac{1}{2}} R_t D_t^{\frac{1}{2}}$$

$$R_t = diag\left(Q_t\right)^{-\frac{1}{2}} Q_t diag\left(Q_t\right)^{-\frac{1}{2}}$$

$$Qt = (1 - \lambda_1 - \lambda_2)R + \lambda_1 \varepsilon_{t-1}\varepsilon_{t-1} + \lambda_2 Q_{t-1} \quad \text{.... (2)}$$

Where y_t is an m × 1 vector of dependent variables;
C is an m × k matrix of parameters;
is a k × 1 vector of independent variables, which may contain lags of yt;

$H_t^{\frac{1}{2}}$ is the Cholesky factor of the time-varying conditional covariance matrix H_t;

ν_t is an m × 1 vector of normal, independent, and identically distributed innovations; D_t is a diagonal matrix of conditional variances

$$D_i = \begin{pmatrix} \sigma_{1,t}^2 & 0 & \cdots & 0 \\ 0 & \sigma_{2,t}^2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \sigma_{mt}^2 \end{pmatrix}$$

in which each $\sigma_{i,t}^2$ evolves according to a univariate GARCH model of the form

$$\sigma_{i,t}^2 = S_i + \sum_{j=1}^{p_i} a_j \varepsilon_{i,t-j}^2 + \sum_{j=1}^{q_i} \beta_j \sigma_{i,t-j}^2 \quad \text{.....(3)}$$

by default, or

$$\sigma_{i,t}^2 = \exp\left(Y_i Z_{i,t}\right) + \sum_{j=1}^{p_i} a_j \varepsilon_{i,t-j}^2 + \sum_{j=1}^{q_i} \beta_j \sigma_{i,t-j}^2 \quad \text{.....(4)}$$

R_t is a matrix of conditional quasi correlations,

$$R_t = \begin{pmatrix} 1 & \rho_{12,t} & \cdots & \rho_{1mt} \\ \rho_{12,t} & 1 & \cdots & \rho_{2mt} \\ \vdots & \vdots & \ddots & \vdots \\ \rho_{1mt} & \rho_{2mt} & \cdots & 1 \end{pmatrix}$$

$\tilde{\varepsilon}_t$ is an m×1 vector of standardized residuals, $D_t^{-1/2}\varepsilon_t$; and λ_1 and λ_2 are parameters that govern the dynamics of conditional quasi correlations. λ_1 and λ_2 are nonnegative and satisfy $0 \le \lambda_1 + \lambda_2 < 1$. When Qt is stationary, the R matrix in (1) is a weighted average of the unconditional covariance matrix of the standardized

residuals $\tilde{\varepsilon}_t$, denoted by $\bar{R}$, and the unconditional mean of Q_t, denoted by $\bar{Q}$. Because $R \neq Q$, as shown by Aielli (2009), R is neither the unconditional correlation matrix nor the unconditional mean of Q_t. For this reason, the parameters in R are known as quasi correlations [Details are available in Aielli (2009) and Engle (2009), (www.stata.com)].

3.3 Bai-Perron test

The Bai–Perron test was propounded by Bai & Perron (1998) to recognize the multiple structural breaks occurring at unknown dates in a time series data. This test offers us the benefit of selecting structural breaks endogenously. This test can be applied with a large sample size of at least 100. The Bai–Perron test can be represented through an equation in the following way (Bagchi et. al., 2020):

$$y_t = x_t^{'}\beta + z_t^{'}\partial_j + u_t \quad \text{.....(5)}$$

IV. DATA ANALYSIS AND FINDINGS

4.1 Descriptive Statistics

TABLE 1

Results of Descriptive Statistics

	EPU	**SENSEX**	**NIFTY**
Mean	-0.0043	0.006	0.0061
Median	0.0006	0.0064	0.0057
Maximum	1.0011	0.2473	0.2488
Minimum	-0.803	-0.3066	-0.2729
Std. Dev.	0.357	0.0647	0.0638
Skewness	0.004	-0.9671	-0.7676
Kurtosis	2.8359	8.1337	7.3329
Jarque-Bera	0.1876	209.4238	147.0407
Probability	0.04**	0*	0*
Sum	-0.7241	1.0176	1.0342
Sum Sq. Dev.	21.1671	0.6964	0.6768
Observations	167	167	167

* indicates p value significant at 1 percent level,
** indicates p value significant at 5 percent level

Table 1 represents the result of the descriptive statistics of the select variables namely EPU, Sensex and Nifty. With a total 167 observations, it is seen that Sensex and Nifty are normal in nature due to p value of JB test less than 0.01 which indicates significance at 1 percent level with 99 percent confidence interval. The mean values are the average values of the variables during the study period.

4.2 Bai-Perron Test

TABLE 2

Results of Bai-Perron Test

	EPU	SENSEX	NIFTY
1st Breakpoint	July, 2011	November, 2011	November, 2011
2nd Breakpoint	May, 2012	October, 2014	October, 2014

The change or break point in a time series data structure indicates a change in the nature of a data due to any shock either from any national or international events. The structural breakpoints of the select variables during the study period, shown in table 2, have some specific reasons.

The decisions taken in early 2008 to increase public-sector wages, forgive loans for farmers who had borrowed from the banks, and massively expand the rural-employment guarantee scheme assisted the economy before the global financial crisis unfolded in the last quarter of the year. Not surprisingly, India staged its recovery within two quarters of the crisis striking, as economic growth accelerated from 6.7 per cent in 2008–09 to 7.2 per cent in 2009–10 and 7.5 per cent in 2010–11. Most forecasts for 2011–12 predicted over 8 per cent growth. But the economy has shown significant signs of slowing down. With the economy growing at about 6.9 per cent in the second quarter of 2011, and the November estimates of industrial production showing over 5 per cent decline, the growth rate for 2011 fall below 7 per cent (https://www.eastasiaforum.org/2012/01/27/india-s-economic-slowdown-a-stain-on-2011/).

The moderation in India's economic growth rate was not the only matter for concern in 2011. The economy possesses a number of structural imbalances, and no effective mechanisms have been put in place to correct them. The government has not been able to control fiscal deficits at the budgeted levels and the central government's fiscal deficit was about 5.5 per cent of GDP and the consolidated fiscal deficit was around 8 per cent. Providing for additional expenditure commitments in education, healthcare and food security proved to be a daunting challenge over the next few years — especially when combined with the political difficulty of phasing out ill-targeted subsidies and achieving fiscal consolidation in the medium term (https://www.eastasiaforum.org/2012/01/27/india-s-economic-slowdown-a-stain-on-2011/).

There are worries on the balance-of-payments and inflationary fronts as well. The virtual stagnation of the global economy has resulted in stagnating exports for India, and as crude oil prices remained elevated throughout 2011, a high growth in imports also continued. With exports even slowing in the services sector, India's current account deficit touched 3 per cent of GDP. In normal times, this could have been managed with capital inflows, but with foreign institutional investors shying away from India, financing a deficit of this order was very difficult. Not surprisingly, the value of the rupee plummeted by over 20 per cent in the second quarter of 2011, and even with the Reserve Bank of India in possession of reserves surpassing US$300 billion, a significant depreciation of the rupee could not be prevented. In addition, the inflation rate for 2011

was close to 10 per cent, and the rupee's falling value has not helped matters (https://www.eastasiaforum.org/2012/01/27/india-s-economic-slowdown-a-stain-on-2011/).

The major concern for 2011-12 was the government's apparent inability to forge political consensus and enact reforms which could bring in FDI and institutional investment. Moreover, the overall functioning of the Indian government during this period has raised serious questions about the government's ability to carry forward much-needed reforms. These issues of governance together with the inability to phase out subsidies to achieve fiscal consolidation and India's 'policy paralysis' in several areas are serious cause for worry which had adversely affected important economic reform policies. Thus, all these concerns have an impact on India's economic policy uncertainty as well as on stock indices like BSE Sensex and NIFTY during 2011-12 which causes structural breaks in the dataset of EPU, BSE Sensex and NIFTY.

In the last week of October 2014, a surprise announcement by the Bank of Japan (BoJ) to increase its asset purchases have caused key stock indices across the globe including that of India to soar ahead. In India, BSE Sensex, and the 50-unit CNX Nifty, hit record high on intraday basis as well as on closing basis. In addition, plummeting global crude oil prices also acted as a catalyst to move the Indian stock indices surge high. The market sentiment was also boosted by substantial buying of Indian stocks by foreign portfolio investors during that period. Foreign portfolio investors (FPIs) bought shares worth net Rs 1488.74 crore from the secondary equity market on October 30 2014, which caused the BSE Sensex to jump 519.50 points or 1.9% to settle at 27,865.83 points. The market breadth indicates that the overall health of the market was positive and the NSE Mid-Cap index rose by 1.24%. Fall in crude oil prices augur well for India as the country imports 80% of its oil requirement (https://www.business-standard.com/article/news-cm/sensex-nifty-hit-record-high-as-crude-oil-prices-drop-114103101104_1.html).

Now, as two particular breakpoints have been identified here, DCC-MGARCH model has been employed to measure the volaitility in the next section.

4.3 DCC-MGARCH Model

TABLE 3

Results of DCC-MGARCH (1,1) Model

	EPU	**SENSEX**	**NIFTY**
EPU	1.00	-0.2520	-0.2589
SENSEX	-0.252	1.00	0.9929
NIFTY	-0.2589	0.9929	1.00

		Estimate	Standard Error	t value	p value
EPU	Overall (μ)	-0.0092	0.0221	-0.4198	0.6746
	Constant(Ω)	0.015	0.007	2.1323	0.0329**
	ARCH(α)	0.1816	0.0733	2.4763	0.0132**
	GARCH(β)	0.6949	0.0931	7.4602	0*
SENSEX	Overall (μ)	0.0112	0.0034	3.2547	0.0011*
	Constant(Ω)	0.001	0.0007	1.5363	0.1244
	ARCH(α)	0.4926	0.3636	1.3547	0.1754
	GARCH(β)	0.2972	0.3397	0.8748	0.0381**
NIFTY	Overall (μ)	0.0117	0.0038	3.0619	0.0021*
	Constant(Ω)	0.0015	0.0004	3.1728	0.0015*
	ARCH(α)	0.6047	0.2665	2.2689	0.0232**
	GARCH(β)	0.1172	0.1553	0.7548	0.4503
Short run Volatility	[Joint] DCCα_1	0.0204	0.0111	1.8405	0.0656***
Long run Volatility	[Joint] DCCβ_1	0.9543	0.1231	7.7475	0.00*

(* indicates p value significant at 1 percent level, ** indicates p value significant at 5 percent level, *** indicates p value significant at 10 percent level)

Table 3 shows the volatility spillovers running from EPU index to the other select variables namely BSE Sensex and Nifty 50 during the study period. This model takes into account the dynamics of the volatility and the correlation between the select variables. The dynamic conditional correlation among EPU and other variables are also portrayed here. There persists negative correlation between EPU with Sensex and Nifty indicating an inverse impact on Indian stock market due to rise in EPU. The overall estimates of the model along with constant, ARCH and GARCH term are also indicated through this model. The variance in volatility is significant for Sensex and Nifty as confirmed by β term. The DCCα_1 measures the short-run volatility impact i.e., the persistency of the standardised residuals from the preceding period. The DCCβ_1 measures the lingering effect on the conditional correlation. Both short run and long-run volatility is significant due to EPU in the study period.

V. CONCLUDING OBSERVATIONS

It can be noted from the above analysis that the results of DCC-MGARCH (1,1) model indicate that there is a noteworthy dynamic conditional correlation between EPU and the stock indices like BSE Sensex and NIFTY. Both short-run and long-run volatility persist in the indices spilling over from EPU to Sensex and NIFTY during the study period. It can be implied that impact of EPU in terms of volatility on the Indian stock market will lead to an unfavourable investment conditions for the prospective investors across both short-run and long-run time

period. The possible reasons behind such volatility could be the impact of global recession (December, 07 - June, 09) and European debt crisis on Indian stock markets, sudden abrupt fall of BSE Sensex, demonetisation of domestic currency by Government of India in 2016, introduction of GST bill in 2016, outbreak of COVID-19 pandemic on March 11 2020, extreme volatility in global crude oil prices and other international geo-political factors and international relations that also have an impact on Indian economy along with the stock markets.

VI. LIMITATIONS OF THE STUDY

A greater sample size would have provided a better result. Further studies can be carried out considering other macro economic variables in Indian context and other stock markets at international level with their EPU index. Other methodologies could also be used.

References

Abul, B.S., Haug, A. A., & Sadorsky, P. (2015). The impact of oil shocks on exchange rates: A Markov-switching approach, *MPRA*.

Antonakakis, N., Chatziantoniou, I. & Filis, G. (2013). Dynamic Co-movements of Stock Market Returns, Implied Volatility and Policy Uncertainty. *Economics Letters.* Vol. 120, No. 1, pp. 87-92.

Asaolu, T.O. & Ogunmuyiwa, M.S. (2010). An Econometric Analysis of the Impact of Macroeconomic Variables of Stock Market Movement in Nigeria. *Asian Journal of Business Management.* Vol. 3, No. 2, pp. 72-78.

Asgharian, H., Christiansen, C., & Hou, J. A. (2018). Economic Policy Uncertainty and Long-Run Stock Market Volatility and Correlation. *CREATES Research Paper.* Department of Economics and Business Economics, Denmark.

Baker, S.R., Bloom, N. & Davis, S.J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics.* Vol. 131, No. 4, pp. 1593–1636.

Benzid, L., & Chebbi, K. (2020). The impact of COVID-19 on exchange rate volatility: Evidence through GARCH model. *Available at SSRN 3612141.*

Bonaime, A., Gulen, H. & Ion, M. (2018). Does Policy Uncertainty Affect Mergers and Acquisitions? *Journal of Financial Economics,* Vol. 129, No. 3, pp. 128-141.

Dash, S. R., Maitra, D., Debata, B., & Mahakud, J. (2019). Economic policy uncertainty and stock market liquidity: Evidence from G7 countries. *International Review of Finance.*

Debata, B., & Mahakud, J. (2018). Economic policy uncertainty and stock market liquidity: Does financial crisis make any difference?. *Journal of Financial Economic Policy.*

Dzielinski, M. (2012). Measuring Economic Uncertainty and its impact on the stock market. *Finance Research Letters,* Vol. 9, No. 3, pp. 167-175.

Engle, R. F., & Sheppard, K. (2001). *Theoretical and empirical properties of dynamic conditional correlation multivariate GARCH (No. w8554).* National Bureau of Economic Research.

Frühwirth-Schnatter, S. (2006). *Finite mixture and Markov switching models. Springer Science & Business Media.*

Gordis, L. (2009). Epidemiology Philadelphia PA: Saunders Elsevier.

Hamilton, J. D., & Susmel, R. (1994). Autoregressive conditional heteroskedasticity and changes in regime. *Journal of Econometrics, 64*(1-2), 307-333.

Hamilton, J. D. (1990). Analysis of time series subject to changes in regime. *Journal of*

Econometrics, *45*(1-2), 39-70.

Hamilton, J. D. (1988). Rational-expectations econometric analysis of changes in regime: An investigation of the term structure of interest rates. *Journal of Economic Dynamics and Control*, *12*(2-3), 385-423.

Hoque, M. E., & Zaidi, M. A. S. (2019). The impacts of global economic policy uncertainty on stock market returns in regime switching environment: Evidence from sectoral perspectives. *International Journal of Finance & Economics*, *24*(2), 991-1016.

Khanthavit, A. (2020). Foreign investors' abnormal trading behavior in the time of COVID-19. *The Journal of Asian Finance, Economics, and Business*, *7*(9), 63-74.

Krolzig, H. M. (1997). The markov-switching vector autoregressive model. *In Markov-Switching Vector Autoregressions* (pp. 6-28). Springer, Berlin, Heidelberg.

Nyawo, S.T. & Wyk, R.B.V. (2018). The Impact of Policy Uncertainty on Macro-Economy of Developed and Developing Countries. *Journal of Economics and Behavioral Studies.* Vol. 10, No. 1, pp. 33-41.

Peng, G., Huiming, Z., & Wanhai, Y. (2018). Asymmetric dependence between economic policy uncertainty and stock market returns in G7 and BRIC: A quantile regression approach. *Finance Research Letters*, *25*, 251-258.

Phan, D. H. B., Sharma, S. S., & Tran, V. T. (2018). Can economic policy uncertainty predict stock returns? Global evidence. *Journal of International Financial Markets, Institutions and Money*, *55*, 134-150.

Bhattarai, S., Chatterjee, A., & Park, W. Y. (2020). Global spillover effects of US uncertainty. *Journal of Monetary Economics*, *114*, 71-89.

Škrinjarić, T., & Orlović, Z. (2020). Economic policy uncertainty and stock market spillovers: Case of selected CEE markets. *Mathematics, 8(7), 1077.*

Syahri, A., & Robiyanto, R. (2020). The correlation of gold, exchange rate, and stock market on Covid-19 pandemic period. *Jurnal Keuangandan Perbankan*, *24*(3), 350-362.

Xiong, X., Bian, Y., & Shen, D. (2018). The time-varying correlation between policy uncertainty and stock returns: Evidence from China. *Physica A: Statistical Mechanics and its Applications*, *499*, 413-419.

https://www.eastasiaforum.org/2012/01/27/india-s-economic-slowdown-a-stain-on-2011/

https://www.business-standard.com/article/news-cm/sensex-nifty-hit-record-high-as-crude-oil-prices-drop-114103101104_1.html

https://www.bseindia.com/Indices/IndexArchiveData.html

https://www.nseindia.com/products/content/equities/indices/historical_index_data.htm

https://www.policyuncertainty.com/

Indian Accounting Review
Vol. 25, No. 2, December 2021

Asset-Liability Management Practices of Non-Banking Financial Companies in India: Canonical Correlation Analysis

Priyata Chaudhury*

and

Ashish Kumar Sana

Department of Commerce, University of Calcutta

ABSTRACT

Asset-Liability Management involves the planning, positioning and monitoring of all the assets and liabilities, in alignment with the objectives of the organization, within the ambit of legal, industry and market constraints. The main purpose of Asset-Liability Management is to mitigate, reduce and control liquidity risk, interest rate risk and credit risk. The study uses Canonical Correlation to analyze the nature of Asset-Liability Management of 10 Non-Banking Financial Companies (NBFCs), selected from the list of 'India's Top 50 Non-Banking Financial Companies Ranking 2018', based on annual turnover, (Banking & Finance Post, Asia). The study indicates warning signs of injudicious Asset-Liability mix present acutely in the Indian NBFC sector, with respect to prudency of maturity duration matching between the assets and liabilities. The results also indicate a threat to the Indian NBFCs, as far as payment of the interest rate sensitive short-term liabilities in due time is concerned.

Key words: Asset-Liability Management, Canonical Correlation, Liquidity, Maturity duration matching, Interest rate sensitivity

I. INTRODUCTION

Financial institutions facilitate the mobilization of capital from the surplus unit to the deficit unit of economy. The traditional banks continue to adopt narrow assessment criteria for lending decisions, for which the lower income group individuals, the individuals having inadequate past credit history and Micro, Small and Medium Enterprises (MSMEs) have been continually denied credit by the bank in many cases.

Mohan (2014) focussed on the fact that NBFCs help in facilitating diversification in financial products and contribute to inclusive economic development. The Reserve Bank of India (RBI) regulates the functioning of NBFCs. According to PricewaterhouseCoopers (PwC), the ability of NBFCs to customize financial

*Research Scholar in the Department of Commerce, University of Calcutta.
For correspondence her E-mail is chaudhurypriyata@gmail.com

products and rapidly scale operations, along with the fact that it takes lesser time compared to banks for loan sanctioning, has led to a rapid increase in their share in total credit market from 13% in 2015 to 16% in 2017.

The biggest achievement in case of NBFCs is that, they were successful in reaching out to the under-banked segment of India to support the financially weaker sections of the society, which was corroborated by Makhijani (2014). They play an active role in providing innovative financial services to the MSME sector of India, in addition to them providing a wide array of services, comprising mainly of Equipment Leasing, Hire Purchase Financing, Housing Finance, Automobile Financing and Loan Finance.

The operations of Asset-Liability Management (ALM) include evaluation, assessment, management and quantification of risks, taking remedial measures by bringing in changes in the Asset-Liability Mix to mitigate potentially fatal risks. It is only when the objectives can be balanced with risk management practices, an organization experiences an enhancement in its value. Sasidharan (2000) found that broadly the ALM practices cover the areas of liquidity risk, interest rate risk, credit risk and exchange risk, of them the first two being of prime importance.

At the very crux of ALM is a set of procedures and processes followed to address Asset-Liability Mismatches, which occurs due to changes in financial environment. The entire framework is focused on identifying and mitigating risks, ensuring long-term solvency, managing credit quality, ensuring presence of adequate capital and maintaining profitability of financial institutions.

II. LITERATURE REVIEW

There are large number of studies carried out on the significance of NBFCs, their potential strengths and weaknesses, various industry-specific and company-specific factors that influence their performance and their role in overall economic growth. On the other hand, there are also a number of research studies based on the importance, relevance and application of ALM to regulate, control and rectify Asset-Liability Mismatches in financial institutions.

In his research study, Gosh Roy (1995) concluded that ALM is a mechanism for enhancement in profitability and bringing control in interest rate volatility, and it has been in vogue in the international banking scenario since the late seventies. An important inference drawn by Kantawala (1997) with respect to some behavioural parameters of different categories of NBFCs, corroborated the fact that different categories of NBFCs behaved differently even under same macro-economic conditions. Trivedi (1998) stated that ALM is the process of managing bank liabilities to meet loan demands, liquidity and solvency requirements. In respect of the effectiveness of ALM, Saha & Subramanian (1998), found that proper ALM helped in the correct evaluation of the impact of changing profiles of various risks in the bank's Balance Sheet, and with adjustment and alteration in the ALM practices, the profitability position of the banks can be optimized. Iyer (1999) conducted a study on ALM in banks and concluded that the future success of any individual bank will depend primarily on the ability to manage and mitigate risks and not on the volume of business activities undertaken or even its profit

generating capacity. Different aspects and dimensions of ALM were analyzed by Mehta (2003) and Choudhry (2007) in their respective studies, which included strategic Balance Sheet Management, risks caused by changes in the interest rates, exchange rates and liquidity position of banks. Srinivas (2010) built a risk assessment model in his research paper where the liquidity risk has proved to be the most significant risk of all kinds of risks faced by a concern. Akhan (2010) elaborated on the functioning and reforms of NBFCs in India. Singh & Ramniwas (2011) suggested in their study that Non-Banking Financial Institutions must engage in the reduction of the borrowing component of liabilities, and increase the proportion of other liabilities such as public deposits and share capital for promoting growth and sustainability. The performance of NBFCs in Pakistan were critically analyzed by Ahamad et al (2011), and the reason of decline in their performance was attributed to the increase in discount rate, unstable economic conditions, less confidence of investors on NBFCs, capital market conditions and high reliance on the borrowings from other institutions. Kaur & Tanghi (2013) concluded that NBFCs have to concentrate on their core strengths, constantly search for new products and services and engage in innovation in order to survive and grow. The systemic interconnectedness of the NBFCs and consequent scope of contagion risk was corroborated by Oncu (2013) in his study, wherein he concluded that there is a possibility of failure of NBFCs posing systemic risks to the financial system due to its bank-finance linkage. Mondal (2015) in his study found that over a period of 2005-16 to 2014-15, the contribution of NBFCs towards capital formation and overall economic growth increased at a higher rate than that of banks. An assessment of the role of NBFCs in India was undertaken by Subramani & Sathiya (2017), and they reached the conclusion that the NBFCs played a leading role in financial inclusion by reaching out to the MSMEs with credit.

Most of the research studies as discussed above explained the role, significance and basic functioning of NBFCs and assessed the nature of their performance based on some basic criteria and measurement. The research studies on ALM explained the role, significance and need of ALM in managing Asset-Liability Mismatches with special reference to banking sector. However, there is no detailed and methodical seminal work carried out on ALM in NBFC sector. Detailed research work is needed to understand the crucial risks associated with NBFCs in India,which have taken up a complimentary role to banks. Further, critical analysis of the assets and liabilities of NBFCs, to understand the reasons leading to Asset-Liability Mismatches and suggestions of appropriate methods for improvement in the present practices of ALM in the sector, is of vital importance. Thus, there exists a significant scope for further investigation and this study is an attempt to bridge the above mentioned gap.

III. STATEMENT OF THE PROBLEM

Despite the fact that the NBFCs were showing immense potential in the development of Indian economy, in the year 2018, a crisis hit upon the NBFC sector. The crisis spread as a contagion and the entire Indian financial system underwent distress as NBFCs are systemically and deeply connected to functioning

of banks, mutual funds and corporate sector in general. The Infrastructure Leasing & Financial Services (IL&FS) (which is one of the leading NBFCs that had a net-worth of around Rs. 9000 crore, as on March 2018) had a debt of more than Rs. 90,000 crore and it started defaulting on the repayment of its loans. Dewan Housing Finance Limited (DHFL), a housing finance NBFC with a net-worth of Rs. 8,700 crore, showed similar signs of distress. Deloitte and Chaturvedi & Shah, the two auditors for DHFL, noted that there was significant mismanagement in rollover of unsecured borrowings at DHFL, and that there had also been other irregularities and deficiencies in the granting of certain loans. The NBFC had defaulted on the payment of Rs. 960 crore of interest due on bonds. The Credit Rating Agency, CARE (Credit Analysis & Research Ltd.) had downgraded the ratings of instruments of the Anil Ambani group NBFCs, Reliance Home Finance and Reliance Commercial Finance to default status. The ESSEL group started to sell off assets in various group companies to meet its debt repayment obligations. The stocks of Reliance Home Finance and Dewan Housing Finance suffered a decline of more than 50% in the Bombay Stock Exchange, setting off a bloodbath in the stock market. Other important NBFCs that suffered a decline of 30% and above in their stock valuations were Mannapuram Finance, Magma Fincorp, Indiabulls Housing Finance, JM Financial and IIFL Holdings, though these NBFCs were not directly involved in non-repayment of loans. More than half of the NPAs were reported in loans to transport operators and construction sector, which were almost entirely financed by Asset Finance NBFCs.

According to Financial Stability Report published by the RBI (June 2019), the flow of funds of banks to NBFC sector has substantially fallen since November 2018 posing a serious credit risk to the sector, as banks are one of the primary lenders to the sector. The subscription of banks to Commercial Papers of NBFCs continued to show a decline from 50.2% in March 2017 to 41.5% in March 2019, while at the same time the funding provided by mutual funds turned negative at (-)12% in April 2019. The same report by the RBI corroborated the fact that NBFCs were the largest net borrowers of funds from the Indian financial system, with gross payables of around Rs. 8,466 billion. However, the amount of gross receivables was around Rs. 723 billion at the end of March 2019. This means that the expected outflows of money of NBFCs far exceeded their expected inflows.

In this background of a serious crisis, it is also expected that the findings of the study shall be useful to develop new policies and practices to mitigate the crucial risks of the NBFC sector in India, which is important to bring about financial stability in the sector that occupies an important position in the Indian economy, given its high level of systemic interconnectedness.

IV. OBJECTIVES OF THE STUDY

The main objectives of the study are as follows :

(a) To examine whether the matching between assets and liabilities of the Indian NBFCs is prudent with respect to maturity duration and interest rate sensitivity.

(b) To find out whether the Indian NBFCs focuses on Asset Management or on Liability Management.

V. DATA AND METHODOLOGY

5.1 Data Source

The study is based on secondary data obtained from the Annual Reports of NBFCs available in the CMIE PROWESS database. Besides, different books, journal articles, annual reports and web-based materials have been consulted.

5.2 Sample Selection

Ten top NBFCs, from the list of 'India's top 50 Non-Banking Financial Companies Ranking 2018' based on annual turnover, (Banking & Finance Post, Asia), was selected as sample for this study primarily. Due to non availability of continuous Balance Sheet data of the NBFC named HDB Financial Services Limited from 2000-01 to 2018-19, it was excluded from the sample. Hence, the 11th company in the list of 'India's top 50 Non-Banking Financial Companies Ranking 2018' was taken into account for the purpose of the study. The select 10 NBFCs are as follows:

(i) Power Finance Corporation Limited
(ii) Rural Electrification Corporation Limited
(iii) Bajaj Finance Limited
(iv) Shriram Transport Finance Company Limited
(v) Indian Railway Finance Corporation Limited
(vi) Mahindra & Mahindra Financial Services Limited
(vii) Muthoot Finance Limited
(viii) Cholamandalam Investment and Finance Company Limited
(ix) L&T Finance Limited
(x) Shriram City Union Finance Limited

5.3 Period of Study

NBFCs had started to show signs of significant progress in the Indian financial system since 2000-01. Further, a series of problems occurred in this sector in September 2018 and onwards. Keeping in mind of these issues, in this study, secondary data have been collected of select 10 NBFCs for the period from 2000-01 to 2018-19.

5.4 Methodology

Keeping in mind the database and objectives of the study, the Canonical Correlation Analysis is used for the purpose of analysis. Canonical Correlation Analysis is conducted between two sets of data, i.e. the assets and liabilities of the selected NBFCs, for the afore-mantion period using the MANOVA syntax in the statistical software SPSS, Version 15.

Canonical Correlation is a type of multivariate statistical technique. For example, if Y be a set of variables where $Y=Y_1,Y_2...Y_n$ and X, another set of variables where $X=X_1,X_2,...X_m$, then Canonical Correlation shall measure the overall strength, the inter-relationship between the linear composites. According to the inferences drawn from the studies of Jang & Ryu (2006) and Faraji &

Nazarian (2018), its basic function lies in analysing cross covariance between two sets of variables, i.e. Canonical Correlation has the power to predict multiple dependent variables from multiple independent variables. Basically, it will help in finding out the strength of relationship between two sets of variables, and in the process generate a number of canonical functions, as is implied in the studies of Dash & Pathak (2009) and Karthigeyan, Mariappan, & Rangaiah (2013). From the studies of Jain & Gupta (2004), Said & Rim (2018) and Meena & Dhar (2018), it can be understood that it helps in identifying the optimum structure that maximizes the relationship between the two variable sets. The two sets of linear composites, comprising of dependent variables and independent variables respectively, are known as Canonical Variates. In the context of Asset-Liability Management of NBFCs, it will reflect whether the liabilities is commensurate and properly matched with the assets of NBFCs. Broadly it will find out the relationship between the major groups of assets and liabilities, based on the 'New Vertical Format' of Balance Sheet, given in the directions of Guidance Note on the Revised Schedule VI to the Companies Act, 1956 and in the instructions of Ministry of Corporate Affairs, India (2/6/2008-C.L-V dated 30.3.2011). The format of it is, as follows:

$L\,(\text{Liabilities}) = L_1\,(\text{Shareholders' Funds}) + L_2\,(\text{Non-Current Liabilities}) + L_3\,(\text{Current Liabilities})$

$A\,(\text{Assets}) = A_1\,(\text{Non-Current Assets}) + A_2\,(\text{Current Assets})$

The basic objective of any financial institution must be to maximize the correlation between L and A to maintain liquidity, solvency and profitability. In case of Asset-Liability Management, Canonical Correlation shall help acting as a single summary measure, to assess whether there is a proper matching between the assets and liabilities.

VI. ANALYSIS AND FINDINGS

In accordance with the objectives of the study, the results of Canonical Correlation Analysis are presented in Table 1, and are analyzed and interpreted accordingly. The steps followed in interpretation of results are as follows:

Step 1: For the purpose of the interpretation, the Squared Canonical Correlation (R^2) is computed at first, as it gives the measure of significance of the Canonical Correlation.

Step 2: In the next step of interpretation, the Eigen Values are analysed. A comparatively much higher Eigen Value of the first Canonical Root compared to the other Canonical Root/Roots, indicates the direction in which data set has maximum variance (normally above 60%). This means that the results of other Canonical Root/Roots apart from the first Canonical Root, can be ignored for the purpose of analysis. In Table 1, the percentage of variance corresponding to each Eigen Value is given in brackets.

Step 3: Interpretation of Canonical Loadings is the most important step, as it measures and concludes on the strength of association between the constituents of the two sets of variables, wherein normally a loading greater than 40% is taken to be significant. Canonical Loading measures the simple linear correlation between an observed variable and the respective Canonical Variate, to which

the observed variable belongs. Just like the Factor Loadings in the case of Factor Analysis, if a particular variable has significantly high Canonical Loading corresponding to its own Canonical Variate, and if the two Canonical Variates or linear composites, share significantly high correlation; then logically this particular variable will share a strong association with the variables, who have significantly high Canonical Loadings in the other Canonical Variate. This is the method by which, the strength of correlation or relationship between variables of the two Canonical Variates can be determined. In cases where Canonical Loadings of two variables, belonging to the two different Canonical Variates respectively, are such that one is positive and the other is negative, an inverse relationship between these two variables is indicated. In cases where Canonical Loadings of two variables, belonging to the two different Canonical Variates respectively, are such that one is positive and the other is positive; or one is negative and the other is also negative, direct relationship between the two variables is indicated .

Step 4: From the redundancy factor, one concludes how redundant one set of variables is given the other set of variables. It gives an idea of the dependent set and the independent set, and this helps in identifying whether the NBFC is predominantly asset managed or liability managed.

TABLE 1

Canonical Correlation Analysis of Assets and Liabilities of Non-Banking Financial Companies

Sl. No.	Name of the Non-Banking Financial Companies	Eigen Value of 1st Canonical Root	Eigen Value of 2nd Canonical Root	Squared Canonical Correlation (R^2)	Canonical Loadings					Redundancy	
					Liabilities			Assets			
					Shareholders' Funds(SF)	Non-Current Liabilities (NCL)	Current Liabilities (CL)	Non-Current Assets (NCA)	Current Assets (CA)	Liabilities	Assets
1	Power Finance Corporation Ltd.	469.153 (99.901%)	0.464 (0.099%)	0.998	0.997	0.962	0.986	0.997	0.981	0.96212	0.97956
2	Rural Electrification Corporation Ltd.	382.891 (99.870%)	0.500 (0.130%)	0.997	0.995	0.994	0.974	0.987	0.761	0.97344	0.77493
3	Bajaj Finance Ltd.	0.902 (99.040%)	0.009 (0.960%)	0.474	0.617	0.658	0.798	-0.811	-1.000	0.22926	0.39318
4	Shriram Transport Finance Company Ltd.	86.417 (98.292%)	1.502 (1.708%)	0.989	0.999	0.960	0.995	0.986	0.838	0.95830	0.82758
5	Indian Railway Finance Corporation Ltd.	3688.891 (96.911%)	117.591 (3.089%)	1.000	0.829	0.856	0.822	0.847	0.759	0.69837	0.64639
6	Mahindra & Mahindra Financial Services Ltd.	354.953 (99.939%)	0.216 (0.611%)	0.997	0.994	0.650	0.995	0.996	0.982	0.79805	0.96708

TABLE 1 (Contd.)

Sl. No.	Name of the Non-Banking Financial Companies	Eigen Value of 1st Canonical Root	Eigen Value of 2nd Canonical Root	Squared Canonical Correlation (R^2)	Canonical Loadings					Redundancy	
					Liabilities			Assets			
					Shareholders' Funds(SF)	Non-Current Liabilities (NCL)	Current Liabilities (CL)	Non-Current Assets (NCA)	Current Assets (CA)	Liabilities	Assets
7	Muthoot Finance Ltd.	11182.617 (99.997%)	0.379 (0.003%)	1.000	-0.952	-0.873	-0.989	-0.822	-1.000	0.882211	0.83744
8.	Cholamandalam Investment and Finance Company Ltd.	141.359 (99.258%)	1.056 (0.742%)	0.993	0.995	0.989	0.948	0.999	0.922	0.94953	0.91824
9.	L&T Finance Ltd.	455381.734 (100%)	0.499 (0.000%)	1.000	0.998	0.998	0.997	0.999	0.998	0.99504	0.99695
10.	Shriram City Union Finance Ltd.	153.139 (99.914%)	0.131 (0.086%)	0.994	-0.990	-0.374	-0.992	-0.971	-0.952	0.69679	0.91891

For the purpose of analysis, the first Canonical Root is considered in all the cases. The first Canonical Root in case of all the ten NBFCs, have much higher Eigen Value and corresponding percentage of variance, in comparison to the respective second Canonical Root.

In line with the first objective of the study, analysis of the matching between the assets and liabilities of select NBFCs, with respect to maturity duration and interest rate sensitivity, reveals a number of observations. In NBFCs such as Power Finance Corporation Ltd., Rural Electrification Corporation Ltd., Indian Railway Finance Corporation Ltd. and Cholamandalam Investment and Finance Company Ltd., remedial measures are required in matching the short-term Current Assets, judiciously with the short-term Current Liabilities. This is indicated by the lower value of Canonical Loading of Current Assets in each case (0.981,0.761,0.759 and 0.922 respectively), in comparison to the values of Canonical Loadings of the other variables. Hence, the short-term assets in the afore-mentioned companies, share a comparatively weaker association with the short-term liabilities. The short-term assets being more sensitive to interest rate fluctuations, are more susceptible to interest rate risk. On the other hand, if the short-term assets are not sufficient to pay the short-term liabilities, it will lead to liquidity risk issues. Hence, the companies have to concentrate on investment in and management of short-term assets prudently.

Among the total liabilities, Non-Current Liabilities of NBFCs such as Power Finance Corporation Ltd, Shriram Transport Finance Company Ltd., Mahindra & Mahindra Financial Services Ltd., Muthoot Finance Ltd., and Shriram City Union Finance Ltd., have lower strength of association with the Non-Current Assets. This is reflected by the comparitively lower value of Canonical Loading of Non-Current Liabilities (0.962, 0.960, 0.650, -0.873 and -0.374 respectively), in case of each of the NBFCs. This indicates a mismatch between long-term liabilities and long-term assets both of which have a long maturity duration. If this is not corrected in time, it can lead to solvency issues in the long run, where the revenue generated from long-term assets, will not be sufficient to pay the long–term liabilities.

For NBFCs such as, Power Finance Corporation Ltd., Rural Electrification Corporation Ltd., Shriram Transport Finance Company Ltd., and L&T Finance Ltd., an injudicious mix of short- term liabilities (Current Liabilities) with long-term assets (Non-Current Assets) is evident from Table 1. In the afore-mentioned NBFCs, both short-term liabilities and long-term assets have high values of Canonical Loadings. This implies the presence of strong association between short-term liabilities and long-term assets. The funds sourced in short-term were being used to invest in long-term assets. The long-term assets will yield revenue in the long run, but by then the short-term liabilities shall be long due. Also, short-term liabilities are more interest rate sensitive compared to long-term assets. Hence, this can lead to liquidity as well as interest rate risks. Power Finance Corporation Ltd., Rural Electrification Corporation Ltd., Shriram Transport Finance Company Ltd., and L&T Finance Ltd, especially, have shown presence of high liquidity risk and interest rate risk. This was due to injudicious mix of assets and liabilities in the above-mentioned NBFCs, with respect to maturity duration matching and interest rate sensitivity matching between the

assets and liabilities.

In accordance with the second objective of the study, it is found that five of the ten NBFCs, i.e. Power Finance Corporation Ltd., Bajaj Finance Ltd., Mahindra & Mahindra Financial Services Ltd., L & T Finance Ltd. and Shriram City Union Finance Ltd., had the assets forming the independent set, due to the higher Redundancy Factor of the assets compared to liabilities. This means that these NBFCs were actively managing assets, and the liabilities were dependent on how well the assets were being managed. In case of the other five NBFCs namely, Rural Electrification Corporation Ltd., Shriram Transport Finance Company Ltd., Indian Railway Finance Corporation Ltd., Muthoot Finance Ltd. and Cholamandalam Investment and Finance Company Ltd., the liabilities formed the independent set with a higher Redundancy Factor, indicating focus on liability management, with the assets being dependent on the efficiency of liability management in each case. It may be inferred from this study that there was an equal distribution in number of cases of the Indian NBFCs being asset managed and liability managed, respectively.

VII. CONCLUSION

Asset-Liability Management is a continuous management and planning procedure that covers all the assets and liabilities of a financial institution with focus on their maturity duration and interest rates involved. It basically serves the purpose of risk management. Indian NBFCs have a potent risk in their basic operational strategy with respect to Asset-Liability Management as can be noticed in the study. The inherent problems of the NBFCs as mentioned above have adversely affected the Indian NBFC sector immensely, with various important aspects of the sector showing signs of distress. The funding cost for NBFCs shall rise significantly when the market sentiments and especially those of the primary lenders of NBFCs like banks and mutual funds, turn against them. According to a report by the Credit Rating Agency, CRISIL in 2019, this has the potential to affect the consumption demand in the economy badly. The importance of NBFC sector in a developing economy like India is significant. In view of cases of Asset-Liability Mismatch, deterioration in asset quality and resultant drying up of sources of funds affecting the NBFC sector in India, shows that the these issues needs to be further investigated, to simplify, identify and correct the important factors causing such problems.

VIII. LIMITATIONS AND FUTURE SCOPE OF RESEARCH

The present study has focussed on ten NBFCs within limited scope, whereas according to the list of NBFCs released by the Reserve Bank of India in January 2021, there are 9507 NBFCs registered with RBI. Therefore, further elaborate studies may be conducted, with a larger sample size, for corroborating the findings of the present study. There also remain other pertinent and significant scope of further study in analysis of Asset-Liability Management of Indian NBFCs. Out of them, the analysis of assets and liabilities on the basis of logically appropriate maturity buckets, and detailed investigation into interest rate sensitive assets and liabilities are most important. The analysis of assets and liabilities of Indian

NBFCs, categorized according to maturity duration in a fragmented manner, on a monthly, quarterly, half–yearly and annual basis, shall help in correcting Asset-Liability Mismatches at the earliest. Hence, it shall prevent any major mismatch in the long-run. The interest rate risk of a particular NBFC can be studied in more details, if the rate sensitive assets and rate sensitive liabilities are analyzed with respect to prevalent movements of interest rates in the financial market, over a reasonable period of time. The impact of Asset-Liability Management practices of Indian NBFCs on profitability of the respective companies is a salient subject on which further research may be conducted.

References

Akhan, J. A. (2010). *Non-Banking Financial Companies (NBFCs) in India -Functioning and Reforms.* New Delhi: New Century Publications.

Ahamad, H. K., Raza, A., Amjad, W., & Akram, M. (2011). Financial Performance of Non Banking Finance Companies in Pakistan. *Interdisciplinary Journal of Contemporary Research in Business, Vol.2* (No. 12), pp. 732-745.

Arunkumar, B. (2014). Non-Banking Financial Companies-A Review. *Indian Journal of Research, Vol. 3* (No.10).

Choudhry, M. (2007). *Bank Asset and Liability Management Strategy, Trading, Analysis.* Singapore: John Wiley & Sons (Asia) Pvt. Ltd.

Dash, M., & Pathak, R. (2009). *Canonical Correlation Analysis of Asset-Liability Management of Indian Banks.* Retrieved from https://ssrn.com/abstract=1412739

Faraji, A., & Nazarian, R. (2018). Investigation of Asset/Liability Structure of the Alpha Commercial Bank:A Canonical Correlation Analysis Approach. *Quarterly Journal of Islamic Finance and Banking Studies, Vol. 4* (No. 10).

Ghosh Roy, D. (1995). Asset-Liability Management. *Banking Finance, Vol. 8* (No. 12), pp. 30-31.

Iyer, V. (1999). Asset-Liability Management in Banks in India-A Conceptual Overview. *STC Bulletin* , pp. 8-10.

Jain, P., & Gupta, V. (2004). Asset-Liability Management among Commercial Banks in India-A Canonical Correlation Analysis. *Vision-The Journal of Business Perspective, Vol. 8* (No. 1), pp. 25-40.

Jang, S., & Ryu, K. (2006). Cross-balance sheet interdependencies of restaurant firms: a canonical correlation analysis. *International Journal of Hospitality Management, Vol. 25*, pp. 159-166.

Kantawala, A. S. (1997). Financial Performance Of Non Banking Finance Companies in India. *The Indian Economic Journal, Vol. 49* (No. 1), pp. 86-92.

Karthigeyan, A., Mariappan, D., & Rangaiah, D. (2013). Asset-Liability Management in Indian Private Sector Banks-A Canonical Correlation analysis. *International Journal of Management, Vol. 4* (No. 5), pp. 06-13.

Kaur, H., & Tanghi, B. S. (2013). Non Banking Financial Companies, Role & Future Prospects. *International Journal of Global Research Analysis, Vol. 2* (No. 8), pp. 125-126.

Makhijani, N. (2014). Non Banking Finance Companies-Time to Introspect. *Analytique, Vol. 9 & 10* (No.2), pp. 34-36.

Mehta, S. (2003). Asset-Liability Management. *Journal of Banking and Finance, Vol. 4*, pp. 42-47.

Meena, A. K., & Dhar, J. (2018). An Empirical analysis and Comparative Study of Liquidity Ratios and Asset-liability Management of Banks Operating in India. *International Journal*

of Economics and Management Engineering, Vol. 8 (No. 1).

Mohan, B. (2014). Non Banking Financial Companies in India:Types,Needs,Challenges and Importance in Financial Inclusion. *International Journal in Multidisciplinary and Academic Research, Vol. 3* (No. 6).

Mondal, S. (2015). Comparison of Growth between Non-Banking Financial Companies and Banks & Their Contribution in the Indian Economy. *International Jounal Of Arts,Humanities and Management Studies, Vol.1* (No.8).

Oncu, S. T. (2013). Are Indian NBFCs Shadow Banks?Do they pose Systemic Risks? *Economic and Political Weekly, Vol. 48* (No. 51), pp. 10-11.

Saha, A., & Subramanian, V. (1998). Banking in the New Century:An ALM Perspective. *Bank Economists' Meet*, (pp.1-8). Bangalore.

Said, H. B., & Rim, Z.-H. (2018). Tunisian bank Asset-Liability Mangement : A Canonical Correlation Analysis. *Corporate Ownership& Control, Vol. 15* (No. 3).

Sasidharan, K. (2000). Asset-Liability Management in Banks:Issue and Implications. *The Journal of Indian Institute of Bankers, Vol. 67*, pp. 20-25.

Singh, J., & Ramniwas. (2011). Growth and Performance of Non Banking Financial Institutions in India. *Journal of Banking Financial Services and Insurance Research, Vol.1* (No. 8), pp. 94-112.

Srinivas, G. (2010). Risk Assessment Model for Assessing NBFCs' (Asset Financing)Customers. *International Journal of Trade,Economics and Finance, Vol. 1* (No. 1).

Subramani, P., & Sathiya, N. (2017). Performance of Non Banking Financial Institutions in India. *International Journal of Commerce and Management Research, Vol. 3* (No. 4), pp. 22-33.

Trivedi, A. (1998). Asset-Liability Management, A Task to Mandate. *IBA Bulletin, Vol. 20*, pp.15-23.

Websites:

https://www.theweek.in
https://www.indiabudget.gov.in
https://www.sbi.co.in
https://m.rbi.org.in
https://www.business-standard.com
https://m.economictimes.com
https://www.businesstoday.in

Indian Accounting Review
Vol. 25, No. 2, December 2021

Impact of Financial Inclusion on Women Empowerment: A Case Study on Working Mothers from Kolkata

Sanchita Som
Eastern Institute for Integrated
Learning in Management-Kolkata, West Bengal

Anish Kumar Dan*
Department of Commerce, Bangabasi College

ABSTRACT

Women empowerment, a multidimensional social process which includes strength, control, self-reliance, capability of fighting for own rights, independent decision making, is having a strong dependence on financial inclusion. Broadly speaking, financial inclusion refers to a system under which individuals get the equality in awareness and opportunity to access financial products and services. Objective of this study is to focus on the impact of financial inclusion on economic, social and political aspects of women empowerment. For this purpose, data have been collected from 143 working mothers from Kolkata City and in the course of analysis, correlation and regression analysis are applied. This study concludes that people will be aware of financial inclusion at all levels of income and education groups, which will ultimately result into a financially managed society at large ensuring equality between genders.

Key words: Biographical characteristics, Empowerment Index, Financial Literacy Score, OLS Regression, Socio-Economic Indicators

I. INTRODUCTION

Indian history says that women in the early Vedic period were worshipped as *Prakriti*, the mother Goddess, a very honourable position in the society and it was strongly believed that the merit of civilisation depends on the position given to women in the society. However with the passage of time the position of women deteriorated and they were recognised only as a subordinate to men playing the role of reproductive home maker. This gender disparity in terms of social discrimination and economic deprivation results poor socio-economic health of our country as a whole. However, articles 14, 15, 15(3), 16, 39(a), 39(b), 39(c) and 42 of the Indian Constitution not only mentioned about equality of women to men but also empowered the State to adopt effective measures of

*Corresponding author's email: anishdan13@gmail.com
Guest Lecturer in Commerce, University of Calcutta

positive discrimination in support of women for neutralizing the growing socio-economic-political disadvantages faced by them (*www.legislative.gov.in*). In a newspaper article, former special judge Justice H B Das (2018) expressed that in spite of various legal provisions for women safety and empowerment in Indian legal system, the irony is, most of the women population is unaware of their legal rights. It is also conveyed by him that law alone is a weak instrument for establishing their rights in society (*www.dailypioneer.com*).

In this context, women empowerment is a process which provides them a greater access to education, knowledge and resources both economic and non-economic, most importantly the right of independence in decision making for day to day functioning of life, freedom of say and expression, choice of customs, beliefs and practices as per their desires. Women empowerment is indispensable for the improvement of every country's potential as they play dual responsibilities of managing their household while simultaneously juggling to earn money for satisfying their family needs and also managing financial resources in a better manner.

Women empowerment could be defined in five separate categories: social, educational, economic, political, and psychological (Mandal, 2013). But most importantly, empowerment will be true and effectual only when they are endowed earnings and property so that they may stand on their own feet and make up their identity in the society.

In this regard, financial inclusion is necessary for women not only to access loans or credit to make transactions, but also it is essential to save money and build assets in a safe place because women often search for safe savings vehicles. It is noteworthy to mention that to overcome the difficulties faced by women to access and utilises financial services several recommendations are proposed for G20 countries in the world (*www.gpfi.org/sites/gpfi*). This financial inclusion will have a positive impact on women's economic empowerment and livelihoods and in turn overall empowerment of women.

The present study aims to figure out the quantum of financial inclusion and some other socio-economic factors on women empowerment. It is true that social and family structures are also having influence on the empowerment of a woman in that particular family, which have also been studied in the present work. For convenience during the pandemic restrictions, individuals from the city of Kolkata have been only selected for analysis purpose.

II. LITERATURE REVIEW

Some literatures in the related areas are reviewed and the observations are summarized here.

In order to conduct a brief study on the role of financial inclusion on women empowerment some scholarly papers have been reviewed. In this regard, Kishor (1997) studied on empowerment of women in Egypt and found that there is a positive relationship between gender inequality and low per capita income. It's also argued in this literature that there is an inverse relationship between the gender inequality and low government expenditure on education.

In a study, Kenworth & Malami (1999) found that economic development

empowers women by increasing their social standing and also giving them a mindful satisfaction while they work on their domestic front of taking care of their family and rearing up of children. In a similar study by Wezel (2003), it is observed that education of women not only helps the women to make choices for themselves but also of their family which includes their parents, spouse and specifically the children, which previously has always been a man's domain. Kumar *et al* (2019) had ricocheted similar view through study of the impact of SHGs in India on the family of the member.

In a research work by Rocca *et al* (2009) it is observed that enhancing women's social or economic resources may result in increase in gender disparity as well as domestic violence whereas Kwagala *et al* (2013) in a study found that women in professional employment were more empowered compared to other unemployed women. Singh (2013) studied the efficacy of different schemes under SGHs in empowering women. It has been established that SHGs have served the cause of women empowerment and socio-economic uplift men of underprivileged rural women.

Sultana & Hasan (2011) analysed the impact of micro-credit on rural women's economic empowerment by considering three economic indicators i.e., personal income, savings behavior and assets ownerships. Bagil & Dutta (2012) and Barik & Sharma (2019) made similar studies with different sample type.

Prabhu (2017) measured various direct and indirect indicators of women empowerment in the western regions of Maharastra on married women outpatients of reproductive age group.

Siddik (2017) studied that financial inclusion empowers women by increasing income, purchasing power, living standard and position in the family. In addition to this, the study revealed that after availing financial inclusion programmes, rural women become capable of meeting their emergencies, providing better education to their children, accessing better medical facility and most importantly reduce dependency on local money lenders. In a nutshell, all these benefits of financial inclusion programmes promote economic empowerment of rural women. In a similar study by George & Thomachan (2018), it is revealed that women empowerment is highly correlated with financial inclusion through getting easy access to financial services which helps women in their social and economic development and finally leads to overall empowerment.

Choudhry *et al* (2019) presented a descriptive review of socio-cultural factors like educational barriers, decent work and access to property etc. affecting women economic empowerment in Pakistan. According to this study, each and every socio-cultural factor is the potential barriers and creates hurdles for women to become empowered.

The article by Bhatia & Singh (2019) studied dimensions of women empowerment were investigated with reference to social, political, and economic indicators. It also undertakes a test to see if the dimensions change with financial inclusion schemes from the central government. They studied approximately 700 women living in urban slums in the industrial town of Ludhiana, Punjab.

A recent study, initiated by UNCTAD Economists in April 2021, incorporated the effect of pandemic where more women lost jobs than men, assectors like tourism and personal services were hardest hit (*www.unctad.org/news).*

According to the World Bank, remittance flows to developing countries in 2021 are projected to decline by roughly US$78 billion, relative to 2019. This amount to a projected drop of above 7% for both 2020 and 2021. Losses in remittances have an indirect impact on women's economic empowerment in their countries of origin. Remittances are generally used for food, health and other social services for the benefit of a family. The group suggested domestic and international policy measure to reduce gender gap in financial inclusion.

Due to time and space restrictions, other literature reviews are not given, but they can be provided by the authors on demand. However, from the literature survey, it can be concluded that women empowerment in the society depends greatly on the financial inclusion, awareness and literacy. Some other social factors cannot be ignored, too. A systematic study on financial literacy and women empowerment of the working mothers in Kolkata could have been conducted to point out their problems and prospects, which is the intention of the present paper under consideration.

III. OBJECTIVES AND METHODOLOGY

It is quite evident that financial awareness and literacy about financial inclusion is having some bearing on women empowerment. Echoing the widespread phrase "knowledge is power", this paper has the *primary objective* to measure the empowerment index (EI) on the basis of eight broad domains and several indicators; and to check correlation of EI with financial awareness and literacy score. The *secondary objective* of the paper is to find out the association of other biographic and socio-economic characteristics with EI as control variable.

Research Design

The present study is *descriptive* in nature as it aims to explore of causes to the variables, which are beyond the control of the authors. This is also an *empirical* study as we have formulated the working hypothesis first, collected data accordingly, so as to prove (or, disprove) the stated hypothesis.

The hypothesis can be stated as:

- H_0 = There is no significant linear correlation between empowerment index and literacy score
- H_1= There is significant linear correlation between empowerment index and literacy score

Financial awareness about financial inclusion is measured through a questionnaire containing ten objective type questions from the areas mentioned earlier. Each correct answer carries one mark.

Our structured questionnaire also collected biographic and socio-economic data like age, education level and income of the respondent. Also, we have collected data about the husbands of the respondents and their conjugal life as detailed in table 2.

For measurement of EI, eight domains and 22 indicators have been identified with respective weights as given below:

TABLE 1

Summary of Domains and Indicators

Domain	Number of Indicators	Indicator Weight	Domain Weight
Education	2	1/16	1/8
Mode of earnings & expenses	5	1/40	1/8
Savings & Investments	4	1/32	1/8
Family Decisions	3	1/24	1/8
Information accessibility	2	1/16	1/8
Rituals	2	1/16	1/8
Family Planning	2	1/16	1/8
Future Planning for Kid/s	2	1/16	1/8
		TOTAL	1

All the indicators are prone towards women empowerment, thus a positive response will be noted as one, whereas the negative response will be recorded as zero. The weighted total will give us the EI of an individual respondent. Needless to mention, the EI will be a continuous variable ranging between 0 and 1.

Sample Design

The sample has been collected from the city of Kolkata for our convenience during pandemic restrictions. Data have been collected on random basis from female employed persons from Kolkata who are married and having at least one child. The respondents were given with structured questionnaire and responses have been collected through personal interview.

Data Collection

Data have been collected from 143 female employed persons from Kolkata who have fulfilled the criteria decided in sample design. The study started with a draft questionnaire which was first distributed among 30 women for pilot survey. Based on their comments, queries, doubts and suggestions, the questionnaire was revised several times and the final structure was given eventually. The structured questionnaire was then given to two other research associates to widespread the area of data collection. Financial awareness and literacy about financial inclusion are measured through a questionnaire containing ten objective type questions from the areas mentioned earlier. Each correct answer carries one mark. Our structured questionnaire also collected biographic and socio-economic data like age, education level and income of the respondent. Also, we have collected data about the husbands of the respondents and their conjugal life as detailed in table 2.

Variables Used

While approaching towards the above-mentioned objectives and rationale of the study, we considered eight domains, mentioned in table 2, which can be treated as a measurement proxy for decision making ability of working mothers. To measure financial literacy, the respondents were questioned on areas like

e-banking, banking and loan procedures, and the financial inclusion schemes of state and central governments. Later on, seven control variables, mentioned in table 2, were added to the present study as suggested by some authors found while surveying the literatures.

The variables used in our study have been detailed hereunder in table 2:

TABLE 2

Types of Variables

Variable/s	Code	Details
Dependent		
Empowerment Index	empower_score	Actual calculation
Independent		
Financial literacy score	lit_score	Actual calculation
Control		
Age	age	In years
Education	edu (dummy)	0: Illiterate, 1: Primary, 2: Secondary - HS, 3: Graduate, 4: Post Graduate
Income(₹/000)	income (dummy)	1: Less than 25, 2: 25-50, 2: , 3: 51-75, 4: 75+
Husband's education	husb_edu (dummy)	0: Illiterate, 1: Primary, 2: Secondary - HS, 3: Graduate, 4: Post Graduate
Husband's income (₹/000)	husb_inc (dummy)	0: Unemployed, 1: Less than 25, 2: 25-50, 2: , 3: 51-75, 4: 75+
Number of kids	kids	In number
Conjugal period	conjugal_yr	In years

Tools Used

We have applied Cronbach's Alpha for checking the reliability of the data. Correlation coefficients between the variables are studied next, and finally the analysis proceeded towards regression analysis under ordinary least square (OLS) method. The regression analysis is divided into eight models. The first model related the dependent variable with independent variable solely. No other control variable was considered there. Subsequently, the other control variables were introduced step-wise from model 2 through model 8, as shown in table 6. The intention of such step-wise inclusion was to find the effect of added control variable on the entire regression model at each stage.

IV. FINDINGS AND ANALYSIS

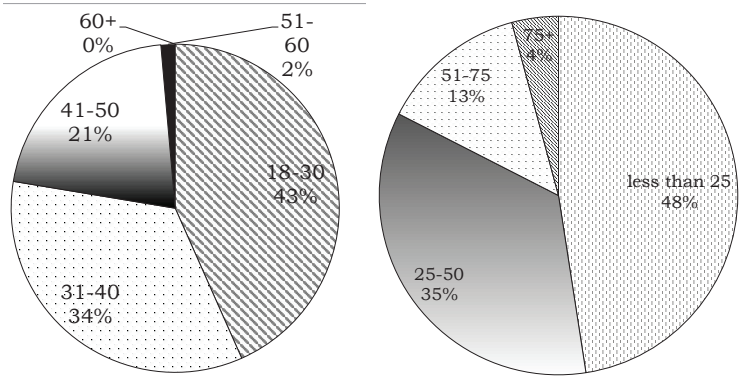
We have studied 143 female employed persons from Kolkata who are married and having at least one child and calculated their empowerment indexes (EIs)

and financial awareness and literacy scores.

The age and income distributions are shown through the following figures:

FIGURE 1

Age (years) & Monthly Income (₹/000) Distribution of the Respondents

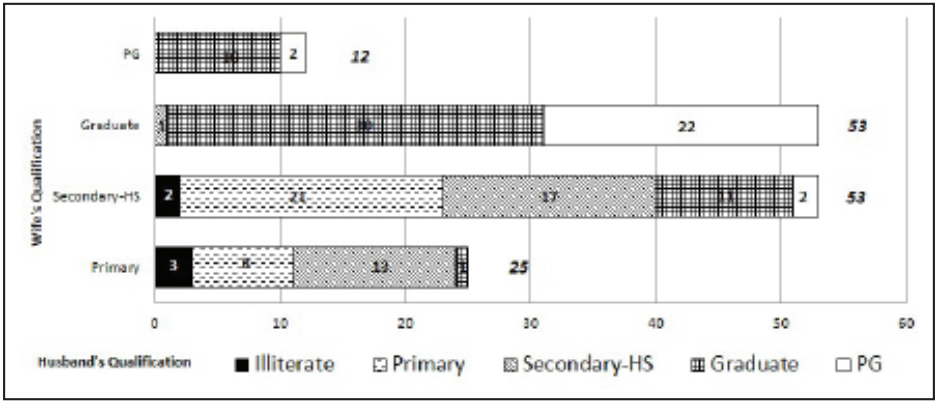


The majority age group is 18-30, followed by the immediate seniors in job. No senior citizen (above 60 years) has participated in the survey. 48% is found in the lowest income bracket (i.e. less than ₹25,000 per month) and 35% of the respondents are earning ₹25,000 – 50,000 per month. Earners above ₹50,000 per month are mere 17%.

We have studied the education level of the respondents along with the education level of their respective husbands. None of the respondent working females are found to be illiterate. A general preference is noticed among the working females to select husbands with same or higher qualification, as shown in the following figure 2:

FIGURE 2

Qualification Combination of Spouses



The above figure explains the academic qualification combinations between the spouses. Among the respondents, 25 (17.5%) women have completed their primary level of education, 53 (37.1%) each has completed school level and

college level learning respectively and remaining 12 (8.3%) have post graduate degrees. Figure 2 also shows the qualification of their husbands. In the primary educated group of wives, three husbands are illiterate, eight have primary level education, 13 completed high school level, and one husband is a graduate. The same array is followed for other groups, viz. among the 12 PG qualified wives, 10 women have their husbands with graduate qualification and two of them have husbands with post graduate degrees.

In the following table 3 the mean Empowerment Indexes (EIs) are shown for different biographical and socio-economic characteristics (viz. age, education, and income). Higher EI indicates higher empowerment and greater participation in decision making in all facets of life. The EI will always lie between 0 and 1, which is clear from the formula given in table 1.

TABLE 3

Mean EI for Biographical and Socio-economic Characteristics

Age	18-30	31-40	41-50	51-60
Mean EI	0.699597	0.529337	0.370417	0.304167
Income (₹'000 per month)	Less Than 25	25-50	51-75	More than 75
Mean EI	0.392647	0.720542	0.707566	0.810417
Education	Primary	Secondary	Graduate	Post Graduate
Mean EI	0.368833	0.461832	0.708844	0.813889

Thus, we get a snapshot how EI are varying over the biographical and socio-economic characteristics. We find the EI is decreasing over age, which states that new generation is more conscious about their own selves and position in the family and society. With increase in income EI is not always strictly increasing, thus from the mean score, we cannot conclude that monetary power is always the source of women empowerment. Education level is showing a positive relation with EI.

Around 30 questions, including 22 on EI, were asked from 143 working female respondents. As it was not possible to collect the data by the authors, after collecting data from different collectors, reliability test is done. The Cronbach's Alpha score is 0.876 which is pretty high and near to one. Thus, the internal consistency of the variables in the scale is strongly established. The test result is given in table 4:

TABLE 4

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.876	.874	22

Next, we have calculated the correlation coefficient between Empowerment Index, Financial literacy score, Age, Education, Income, Husband's education, Husband's income, Number of kids, and Conjugal period. The results are given in table 5 below:

TABLE 5

Correlation Analysis

	empower_ score	lit_ score	age	edu	income	husb_edu	husb_inc	kids	conjugal_ yr
empower_score	1								
lit_score	.732**	1							
age	-.542**	-.466**	1						
edu	.682**	.698**	-.358**	1					
income	.663**	.781**	-.406**	.830**	1				
husb_edu	.600**	.695**	-.580**	.667**	.651**	1			
husb_inc	.224**	.561**	-.299**	.578**	.601**	.677**	1		
kids	-.414**	-.335**	.480**	-.332**	-.292**	-.433**	-.295**	1	
conjugal_yr	-.646**	-.593**	.969**	-.525**	-.548**	-.687**	-.407**	.498**	1

** Correlation is significant at the 0.01 level (2-tailed)

From the correlation coefficient table, we find that EI is having significant correlation with all other factors at 1% level of significance (i.e., at 5% level of significance, too). Considering the independent and dependent variables only, we find a moderately high positive correlation between them. Form this, we can infer that with increase in the awareness and participation in financial inclusion, scope for women empowerment increases. Other coefficients are also significant among themselves; some of these results will be discussed duly in the following parts.

For the regression eight models are framed simply by increasing the independent and control variable/s; keeping the dependent variable unchanged, as shown below in table 6:

TABLE 6

Regression Models

Model	Dependent variable: Empowerment Index							
	Independent variable	Control variables						
	Financial literacy score	Age	Education	Income	Husband's education	Husband's income	Number of kids	Conjugal Year
1	✓							
2	✓	✓						
3	✓	✓	✓					
4	✓	✓	✓	✓				
5	✓	✓	✓	✓	✓			
6	✓	✓	✓	✓	✓	✓		
7	✓	✓	✓	✓	✓	✓	✓	
8	✓	✓	✓	✓	✓	✓	✓	✓

The model summary derived in SPSS 15.0 can be stated as below:

TABLE 7

Model Summary

Regression Model	R	R Squared	Adjusted R Squared	Std. Error of the Estimate
1	.732	.536	.532	.149839
2	.766	.587	.581	.141777
3	.799	.639	.631	.133100
4	.799	.639	.629	.133514
5	.801	.641	.628	.133600
6	.870	.758	.747	.110223
7	.875	.766	.754	.108699
8	.878	.770	.757	.108073

As the number of independent variable is getting increased, we find the adjusted R-squared values are also increasing in most of the models. We know that adjusted R-squared value increases when the new variable improves the model more than would be expected by chance. In the 4th and 5th model, where the own income and husband's education parameter is added respectively, the adjusted R-squared values have been coming down marginally, as R-squared value has not improved with increase in number of independent variables. These two parameters will again be scrutinised in the following portion.

Reliability of the eight models was checked through the following ANOVA table:

TABLE 8

ANOVA Test Results

Regression Model	F	Sig.
1	162.565	.000
2	99.533	.000
3	81.907	.000
4	61.083	.000
5	48.969	.000
6	70.832	.000
7	63.119	.000
8	56.192	.000

All the significant values are zero i.e. less than alpha level (0.01) and, we can conclude that the independent variables reliably predict the dependent variable in all the eight models.

Now we can go for the regression analysis under OLS for all the eight models to find the value, sign, and significance of coefficients for the independent variables.

TABLE 9

Multiple Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			VIF
1	(Constant)	.353	.021		16.835	.000	
	lit_score	.047	.004	.732	12.750	.000	1.000

TABLE 9 (Contd.)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			VIF
2	(Constant)	.631	.069		9.084	.000	
	lit_score	.040	.004	.612	9.975	.000	1.277
	age	-.007	.002	-.257	-4.182	.000	1.277
3	(Constant)	.492	.072		6.802	.000	
	lit_score	.026	.005	.397	5.280	.000	2.175
	age	-.007	.002	-.243	-4.214	.000	1.281
	edu	.080	.018	.317	4.455	.000	1.954
4	(Constant)	.494	.073		6.791	.000	
	lit_score	.027	.006	.412	4.812	.000	2.803
	age	-.007	.002	-.244	-4.215	.000	1.285
	edu	.086	.023	.339	3.667	.000	3.273
	income	-.010	.028	-.039	-.371	.712	4.321
5	(Constant)	.530	.083		6.364	.000	
	lit_score	.028	.006	.436	4.862	.000	3.072
	age	-.008	.002	-.268	-4.214	.000	1.544
	edu	.092	.024	.365	3.770	.000	3.570
	income	-.010	.028	-.040	-.371	.711	4.321
	husb_edu	-.015	.016	-.076	-.907	.366	2.658
6	(Constant)	.422	.070		6.030	.000	
	lit_score	.029	.005	.445	6.014	.000	3.072
	age	-.006	.002	-.194	-3.639	.000	1.591
	edu	.096	.020	.381	4.776	.000	3.572
	income	.022	.023	.084	.948	.345	4.454
	husb_edu	.040	.015	.202	2.624	.010	3.319
	husb_inc	-.092	.011	-.491	-8.079	.000	2.075

TABLE 9 (Contd.)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			VIF
7	(Constant)	.462	.071		6.473	.000	
	lit_score	.029	.005	.442	6.054	.000	3.074
	age	-.004	.002	-.154	-2.780	.006	1.777
	edu	.091	.020	.361	4.555	.000	3.620
	income	.027	.023	.102	1.159	.249	4.491
	husb_edu	.037	.015	.187	2.453	.015	3.346
	husb_inc	-.093	.011	-.498	-8.299	.000	2.081
	kids	-.043	.019	-.108	-2.200	.029	1.387
8	(Constant)	.274	.137		1.999	.048	
	lit_score	.027	.005	.420	5.678	.000	3.187
	age	.007	.007	.233	.940	.349	35.827
	edu	.075	.022	.299	3.412	.001	4.486
	income	.025	.023	.097	1.110	.269	4.496
	husb_edu	.031	.015	.160	2.058	.041	3.514
	husb_inc	-.093	.011	-.497	-8.317	.000	2.082
	kids	-.044	.019	-.110	-2.260	.025	1.388
	conjugal_yr	-.012	.008	-.450	-1.603	.111	45.970

In the above table 9 the anomalous figures are shaded in dark and will be discussed in this section. In the correlation coefficient table 5, we found self-income is significantly related. However, in regression, right from the point of insertion (i.e., model 4 onwards), it is statistically insignificant, which means self-income with other factors is not relevant in predicting the EI of an individual woman. In model 5, we notice that husband's education is not significant, however, from the next models (i.e., model 6 onwards) husband's education is becoming significant when coupled with other control variables. In the last model 8, self-age becoming statistically insignificant where conjugal period is taken into consideration.

V. CONCLUSION

Women empowerment in domestic arena got importance as it has a bearing on financial literacy. Financial inclusion and awareness are not only making the women empowered, but also serving the society towards development of a

duly managed household. From the correlation coefficient figure, we find null hypothesis is getting rejected and thus there is a significant correlation between empowerment and awareness.

Further analysis revealed that in most of the cases, husband's qualification is more than qualification of their wives. Age-wise analysis indicates that young generations are more conscious towards women empowerment than their aged counterparts. The typical idea of economic empowerment leads to women empowerment got negated as the control variable own income got rejected throughout the regression analysis. Model 5 of regression analysis shows that husband's education is not significant (p value is 0.711, greater than 0.01). The reason may be less educated husbands depend on wives' income, so these wives enjoy the controlling power whereas more educated husbands may have male ego. From Model 6, it is found that greater the husband's income more will be the husband's control towards family decisions and on wife, so women empowerment getting curbed. Model 8 infers that irrespective of age, education and income, the families in Kolkata somewhere follow some unwritten social practice for getting their daughters married at a certain age group. Thus, we find a very strong correlation between age and conjugal years. Number of kids is having a significant relation with EI, but it is negative. This requires further analysis considering the age group, education and gender of offspring which may be the scope for future study.

The study is not free from *limitations*. Empowerment is a qualitative social issue, which we have tried to quantify through EI in the present work considering only eight domains and 22 indicators. Such EI can further be developed considering other social domains and indicators. The sample size can be increased and stratified sampling technique may be recommended for future work in similar area. In the present study, we have only considered one metropolitan city. Comparison between cities and towns may give a different outlook of the study.

Nevertheless, the present study is supposed to have achieved the objective. At the end we can hope that along with traditional literacy missions, people will be aware of financial inclusion at all levels of income and education groups, which will ultimately result into a financially managed society at large ensuring equality between genders. In this context, there can be nothing more appropriate than to quote from Swami Vivekananda in the matter of "women and literacy":

> "The best thermometer to the progress of a nation is its treatment of its women … There is no chance for the welfare of the world unless the condition of women is improved."

REFERENCES

Bagil, S &Dutta, P (2012). A Study of Financial Inclusion in India.*Journal of Radix International Educational and Research Consortium*, Vol. 8(1).

Barik, R & Sharma, P (2019). Analyzing the progress and prospects of financial inclusion in India. *Journal of Public Affairs*, Vol. 1948,1-6.

Bhatia,Shivangi& Singh,Seema(2019).Empowering Women through Financial Inclusion: A Study of Urban Slum, *Vikalpa: The Journal for Decision Makers*, Vol. 44 (4),182-197.

Choudhry, A, Mutalib, R & Ismail N (2019). Socio-Cultural factors affecting Women Economic Empowerment in Pakistan: A Situation Analysis, *International Journal of Academic Research in Business and Social Sciences*, Vol. 5.

George, B &Thomachan, K (2018). Financial Inclusion and Women Empowerment: A Ggender Perspective, *International Journal of Research Granthaalayah*, Vol. 6.

Kenworth, A &Malami, M (1999). Gender Inequality in Political Representation: A Worldwide Comparative Analysis, *Social Forces*, Vol. 78(3).

Kishor, Sunita (1997). Empowerment of Women in Egypt and Link to the Survival and Health of their Infants, *International Union for the Scientific Study of Population*, France.

Kumar, N, Raghunathan, K, Arrieta, A, Jilani, A, Chakrabarti, S, Menon, P, &Quisumbing, A R (2019). Social networks, mobility, and political participation: The potential for women's self-help groups to improve access and use of public entitlement schemes in India. *World Development*, Vol. 114.

Kwagala, B, Wandera, S O, Ndugga, P &Kabagenyi A (2013). Empowerment, Partner's Behaviours and Intimate Partner Physical Violence among Married Women in Uganda, *BMC Public Health*, Vol. 13.

Mandal, K C (2013). Concept and Types of Women Empowerment, *International Forum of Teaching and Studies*, Vol. 9(2).

Prabhu, Priya M (2017). A Study of Empowerment Level in Currently Married Women in Western Maharastra India, *International Journal of Research in Medical Sciences*, Vol. 5(12).

Rocca, C H, Rathod, S, Falle, T, Pande, R P & Krishnan, S (2009). Challenging assumptions about Women's Empowerment: Social and Economic Resources and Domestic Violence among Young Married Women in Urban South India, *International Journal of Epidemiology*, Vol. 38.

Siddik, N A (2017). Does Financial Inclusion Promote Women Empowerment? Evidence from Bangladesh, *Applied Economics and Finance*, Redfame Publishing, Vol. 4.

Singh, Y (2013). Effect of Self-Help Group in Economic Empowerment of Rural Women in Himachal, *Journal of Indian Research*, Vol. 3.

Sultana, S &Hasan, S (2011). Impact of Micro-Credit on Economic Empowerment of Rural Women, *The Agriculturist*, Krishi Foundation, Vol. 8.

Websites

www.dailypioneer.com/2018/state-editions/law-alone-cannot-ensure-women-empowerment.html
www.gpfi.org/sites/gpfi
www.legislative.gov.in/constitution-of-india
www.unctad.org/news/covid-19-shows-need-close-financial-inclusion-gender-gap

FIFTEENTH INTERNATIONAL ACCOUNTING CONFERENCE - 2022

Theme

CHANGING DIMENSIONS OF ACCOUNTING & FINANCE

January 8th & 9th, 2022 (Saturday & Sunday)
Science City Auditorium, Kolkata-700 046

IAA RESEARCH FOUNDATION

The Indian Accounting Association (IAA) Research Foundation is a body constituted under the Societies Registration Act for promoting, among others, accounting, higher education and research in India and abroad. The Foundation has already earned a great deal of reputation in India and abroad through its activities of conducting national and international conferences, publishing research volumes, sponsoring research projects and conducting management development programmes. The Foundation has been publishing Indian Accounting Review (IAR), a bi-annual research journal, since 1997. IAR has already made its mark as an international research journal in accounting and finance (see *www.iaarf.in*).

ABOUT THE OTHER HOST BODY

EIILM: Situated in the heart of Kolkata, the Eastern Institute for Integrated Learning in Management (EIILM) is a highly focused source of professional education (2-year MBA and other allied courses) for building careers in management, representing an effective and significant investment in human potential development in India in the evolving context of the world (see *www.eiilm.kolkata*)

CONFERENCE THEME AND VENUE

The 15th International Conference of the Indian Accounting Association (IAA) Research Foundation will be held at **the Science City Mini Auditorium**, Kolkata-700046 on 8th & 9th January, 2022 in collaboration with EIILM. The theme of the Conference is **"Changing Dimensions of Accounting and Finance"**.

Research-based papers on the ***following topics*** are invited for presentation at the Conference:

- Accounting and finance in digital age
- Accounting as a tool of decision science for Value Optimization for new age Corporations
- Artificial intelligence in accounting and finance
- Audit risk in digital environment
- Future of accounting and finance
- Issues in Behavioural Finance
- Accounting for MSMEs
- CSR accounting and reporting
- Corporate governance and profitability
- Sustainability Practices of Micro-entrepreneurs

- Collection of Revenue and Enforcement of Tax Laws
- International Business Topics

Submission Guidelines

(1) Two hard copies and one soft copy of the paper should be submitted. The text of the paper will be in double space, 12 font, Times New Roman, keeping a margin of one inch in three sides. MS Word (.doc format) is required. Each paper should be preferably within 5000 words including tables and references, in addition, **an abstract** of not more than 500 words in a separate page.

(2) There should be a **separate title page** on each paper giving details of author/s, affiliation, address, telephone numbers and e-mail.

(3) A declaration must be made, along with the paper, by the author(s) mentioning that the manuscript is not copyrighted, and has not been submitted / published elsewhere.

(4) Paper presentation will take place in **concurrent sessions** and abstract of each accepted paper will be published in the Conference Proceedings.

(5) Papers must be submitted within **December 15, 2021.**

(6) Notification about the acceptance or otherwise of a paper will be made by **December 25, 2021.**

(7) Papers submitted for presentation will be subject to blind review and the decision of the Scientific Committee will be final.

NAMITA BANERJEE BEST PAPER MEMORIAL AWARDS

The **best two papers** will each be awarded ₹2500/- (Rupees two thousand five hundred only) to be selected by a panel of distinguished reviewers. Research papers submitted by the Delegates from SAARC countries within the age limit of 40 years will be considered for the purpose.

There will also be two other awards funded by EIILM-Kolkata.

REGISTRATION FEES

(For delegates from India and other SAARC Countries)

	For payment on or before **December 15, 2021**	For payment after **December 15, 2021**
Member of IAARF / IAA	₹ 2000	₹ 2250
Non-member	₹ 2250	₹ 2500
Corporate	₹ 3000	₹ 3500
Research Scholar	₹ 1500	₹ 2000

- **Deadline for Registration: December 31st, 2021 (no spot registration).**
- Accommodation Charges for delegates from outside West Bengal only (for 3 nights, i.e., January 07, 08 & 09): **₹2000 per delegate on a double occupancy basis.**

(*Only a few rooms at State Guest House, International Guest House

of Ramakrishna Mission, Gol Park, etc. will be available on a first come, first served basis.)

- Registration fees will cover 3 breakfasts, 2 luncheons, 2 dinners, copy of Conference Proceedings and transport facilities within the city (for attending Conference only).

In December–January, the weather in Kolkata is pleasant, with temperature varying between 12°C and 22°C. There are many beautiful places and monuments of tourist attraction in the City. Popularly known as the Cultural Capital of India, the City is famous for the warm hospitality of Kolkatans. Kolkata is well connected by air (Netaji Subhas Chandra Bose International Airport) and rail (Howrah Station, Shalimar Station, Sealdah Station and Kolkata Station).

PARTICIPANTS

Distinguished academics and practitioners from different parts of the world are expected to attend the Conference. Besides, members of the IAA Research Foundation, representatives of Deloitte, members of Indian Accounting Association (IAA) and its key office-bearers, academic heads and deans of many reputed business schools and universities in India, representatives of three professional bodies, viz., the Institute of Chartered Accountants of India, the Institute of Cost Accountants of India and the Institute of Company Secretaries of India, will grace the occasion by their kind presence and active participation in different sessions. About 150 delegates are expected to attend the Conference.

BRIEF PROGRAMME

On 8 January,2022, at the inaugural session, one of the past Presidents of the American Accounting Association, Present and Past Presidents of Indian Accounting Association are expected to grace the occasion among others. In the **First Plenary Session, Professor Shyam Sunder,** Yale School of Management, and past President of American Accounting Association, USA, and CA Mr. Dipankar Chatterji of L.B.Jha & Co. will give their addresses on contemporary issues and there will give their addresses on a contemporary issue and there will be Concurrent Sessions on different business topics in the post-lunch session. On 9th the Conference will be resumed with Concurrent Sessions followed by post-lunch. Panel Discussion on Changing Dimensions of Researches in Accounting and Finance There will be many more distinguished academics and professionals (from India and abroad) who will either chair a con-current session or speak in different Sessions. Interested participants may visit the Foundation's website (www.iaarf.in) from time to time for updated information in this respect.

Some of the Eminent Scholars/Professionals who attended the previous conferences

- Professor Stephen A.Zeff, Past President, AAA (22nd Conf.) (Rice University), USA
- Professor Sidney J. Gray, Professor of International Business and Co-Director of the Entrepreneurship and Innovation Research Group at the University of Sydney Business School. The University of Sydney
- Prof. Kazuo Hiramatsu, Past President, JAA (Kwansei Gakuin University) and Past President International Association for Accounting Education and

Research (IAARF)

- Donna L.Street, Past President, IAAER (University of Dayton)
- Professor Andrew D. Bailey, Past President, AAA, University of Illinois at Urbana Champaign
- Professor Stefano Zambon, Italy (10th Conference)
- Professor Belvered E. Needles, Jr., De Paul Univertsity, Chicago
- Professor Tony Kang, Member, AAA(USA)
- Professor Shyam Sunder, Past President, AAA (Yale School of Management)
- Professor Rajendra P. Srivastava, The University of Kansas, USA
- Professor Bruce K. Behn, Past Pesident, AAA (Deloitte LLP Professor, The University of Tennessee)
- Professor Bikki Jaggi, Former Chair, Rutgers University, New Brunswick, USA
- Professor S. Gupta, Former Chair, Department of Accounting, Lehigh University, USA
- CA P. R. Ramesh, Chairman, Deloitte India
- CA Dipankar Chatterjee, Partner L.B.Jha & Co.
- Professor Asis Kumar Banerjee, Former Vice-Chancellor, University of Calcutta
- CMA Souren Dutt, Direcrtor of Finance, Damodar Valley Corporation of India
- Dr. Bhaskar Banerjee, Chairman, The Calcutta Stock Exchange Ltd.

CONTACT PERSONS FOR SENDING QUERIES, PAPERS, REGISTRATION OF INTEREST

Dr. Dhrubaranjan Dandapat
Secretary, IAA Research Foundation
Professor, Dept. of Commerce
University of Calcutta
Kolkata 700 073
Email: dhrubacal@yahoo.co.in
drdcaluniv@gmail.com
(M) +91 9433538800

Dr. Ashish Kumar Sana
Treasurer, IAA Research Foundation
Professor and Head, Dept of Commerce
University of Calcutta
Kolkata-700 073
Email: iaarf.t2019@gmail.com
aksanacu@gmail.com
(M) +91 9477276331

INDIAN ACCOUNTING REVIEW

[Vol. 25, No. 2, December 2021]

IAR is indexed in :

1. Indexed Copernicus
2. Research Bible
3. Directory of Research Journal Indexing (DRJI)
4. Cosmos Impact Factor
5. Cite Factor
6. ISRA Journal Impact Factor
7. Scientific Indexing Service (SIS)
8. Google Scholar
9. International Scientific Indexing (ISI)
10. Academic Keys
11. General Impact Factor
12. Open Researcher and Contributor ID (ORCID)
13. International Institute of Organised Research (I2OR)

and

14. Research Junction

IAR is distributed free to its members.

Printed by Dr. Dhrubaranjan Dandapat, on behalf of IAA Research Foundation, at Rohini Nandan, 19/2, Radhanath Mallick Lane, Kolkata - 700 012 (Mobile.: 9231508276)