Agent-Based Simulation Modeling of Corrupt Practices through a Sub Divisional Hospital Governed by the state in an Underdeveloped Country - A Comprehensive Event-Based Illustration

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Abstract According to the Global Corruption Barometer published by Transparency International, India boasts the highest bribery rate in Asia. Nearly 50% of people who paid bribes in India were urged to do so, and 32% of those who used personal connections, according to a report released on the eve of International Anti-Corruption Day on December 9. Effective grievance methods have significantly reduced the arbitrariness and corruption described in Transparency International's report and helped make people more access to basic services and qualifications. In 2018 alone, 18 people were killed in exposing corruption, based on information under RTI Act. Despite this, the government has failed to frame rules and operationalise the Whistle-Blowers Protection law enacted in 2014 to provide a statutory framework for concealing the identity of whistleblowers and protecting them against victimisation. The law establishes a mechanism to receive and enquire into complaints against public servants relating to offences under the Prevention of Corruption Act. This law provides a mechanism for receiving and investigating complaints against government officials related to crimes under the Anti-Corruption Act. A corruption agent was incorporated in the Sub-Divisional Hospital Kalka for the victimization of whistleblowers through unlawful proceedings. Agent-based System Dynamic Simulation modelling of Corrupt practice in Sub Divisional Hospital Kalka District Panchkula regulated through state Government Haryana in an underdeveloped country India is formulated with the sequel of events captured and evidence submitted to the state government under Indian Evidence Act for initiating criminal proceeding by implementing the guidelines through Center Vigilance Commission (CVC). A dynamic general equilibrium corrupt practices model perceives corruption as a dangerous profession with negative long-term consequences. Individual corruption levels result in a societal level of corruption, which affects the risk and return of corruption at the individual level. It demonstrates, using simulations in a multi-generational setting with heterogeneous agents, that societies have locally stable equilibrium levels of corruption that are determined by a small number of socio-economic factors. It demonstrates that under certain conditions, corruption can escalate to the point where it stifles all economic activity.

Index Terms— Corruption, Regulatory Governance, Legal framework, Convictions, Embezzlements, Approval, Transparency, Statutory Compliance

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1 INTRODUCTION

The Grievance Redress Bill introduced in Parliament in 2011 created an architecture for receiving and dealing with complaints close to people's place of residence down to the panchayat and municipal ward levels. It sought to make the supervisory structure accountable for resolving complaints in a stipulated timeframe, with penal consequences for failure to do so. The Bill, however, lapsed with the dissolution of the Lok Sabha after the 2014 elections. Despite its poll promise to reintroduce the Bill in parliament if it came to power, the System has failed to do the needful. An effective grievance redress legislation would have helped significantly reduce arbitrariness and corruption captured in the Transparency International report and ensured better access to basic services and entitlements for people. In fact, even the Lokpal law meant to tackle corruption involving senior functionaries, which was passed after a long and arduous struggle in 2014, has been subverted. In 2016, key provisions regarding mandatory public disclosure of assets and liabilities of public servants were whittled down through amendments. For over five years after the law was passed, the chairperson and members of the Lokpal were not appointed. Finally, how appointments were made, by a selection committee with a preponderance of the government and its representatives, raised serious doubts about the independence of the Lokpal even before it became operational. Subsequently, for nearly a year the govt did not make the requisite rules, prompting one of the Lokpal members to tender his resignation. The anti-corruption ombudsman is a non-starter, with a deafening silence from the institution on all recent allegations of big-ticket corruption like the Rafael defence deal and banking scams that have rocked the country. Another significant finding of the Global Corruption Barometer is that while reporting corruption is critical to control its spread, as many as 63% of people surveyed were deeply concerned about retaliation. This concern is not misplaced. Brutal attacks on whistleblowers and RTI users in the country have highlighted the vulnerability of those who dare to show the truth to power. In 2018

alone, 18 people were killed for blowing the whistle on corruption based on information accessed under the RTI Act. Despite this, the government has failed to frame rules and operationalise the Whistle Blowers Protection Act enacted in 2014 to provide a statutory framework for concealing the identity of whistleblowers and protecting them against victimisation. As the current NDA Government began to focus on plans to combat corruption and ensure effective service delivery, the government was expected to soon introduce a strong anti-corruption and dissatisfaction relief framework. But over the last six and a half years, serious anti-corruption legislation has come to a standstill, and despite widespread opposition, the government has promoted immature programs such as demonization and election bonds as the definitive solution to the anti-corruption problem. I did. The limitations of relying on technical modifications such as Adhaar-based biometrics in anti-corruption are revealed by frauds such as Jharkhand's grant fraud. Transparency International's report should give the government a strong signal to change course if there is political will. The law establishes a mechanism to receive and enquire into complaints against public servants relating to offences under the PreventionofCorruptionAct.https://thewire.in/politics/grievance-redress-law

2   REVIEW OF LITERATURE

The original (Hammond 2000) idea was recently researched by Liu (2016), who argued that there is a high probability that firms within a given vicinity engage in acts of corruption if neighbouring organisations are already engaged in such acts. Bivalent coding of individual corruption is a generally accepted research approach. The individual corruption strategy, defined as the dishonesty level chosen from the (0, 1) interval by Chakrabarti (2001), is considered a departure from this rule. The optimal combination of the parameters κ and ι can minimise the consequences of a miscarriage of justice, i.e., verdicts punishing the innocent and acquitting the criminal (for a broader discussion of this topic, see Rizzolli and Saraceno 2013). The assumption regarding the anonymity of agents' honesty is not novel. The work of Hammond (2000) and the subsequent papers by Waldeck (2013) and Waldeck (2016) employed this assumption. Hammond (2000) proposed a defined length of agent memory including details of the players' strategies. The preceding out-of-memory event was discarded, and all stored records were given identical weight. The fraction of cases encountering a corrupt partner over the entire number of encounters was used to estimate $\pi mi, t+1$. In contrast, we use exponential SMOothing, in which previous experience is not lost but is given less weight, as demonstrated by the recursive replacement for $\pi mi, t$ in (8) as follows.

$$\pi mi, t+1 = \lambda\left[\sum\nolimits_{\tau=0}^{t}(1-\lambda)\,\tau mi, t-\tau\right] + (1-\lambda)\,t+1mi,0.$$

With increasing latency, assigned weights decrease exponentially. Using this notion, the agent's memory needs are drastically reduced to just recording the most recent experience dealing with the corrupt/non-corrupt partner $\pi mi, t+1$. and the most recent estimated

probability $\pi mi, t+1$. Self-organization means the internal order of the agent's reporting and arrest process, expectations, and selected strategies. This is called self-organizing criticality when the system evolves into an unstable state in the face of small perturbations. The best example of positive feedback is a mobile phone with new features that can only be used in combination with another mobile phone. In our case, the anxiety that propagates through the agent's social connections changes the behaviour of the members, forces them to adopt non-corruptive strategies, and erodes the memory of interacting with partners outside the social network. Therefore, agents begin to expect to meet honest partners who encourage honest behaviour. Klašnja and Tucker (2013) state that people's attitudes toward corruption in underdeveloped countries have refused to speak, and people in developing countries have responded to negligence. The results show that individuals accused of corruption are often elected to public office and represent their interests, emphasizing the lack of people's attitude towards corruption (Klašnja and Tucker 2013, p.541) Corruption is a critical phenomenon, both domestically and internationally. Corruption is a concept difficult to circumscribe referring to a large variety of levels, expressions and profiles. Due to its characteristics corruption has to be approached assuming a multi-perspective view. We believe that corruption has to be studied assuming that this is multi-perspective and multi-disciplinary. We support the idea that the governance perspective has to be considered central and innovative. The multi-disciplinary perspective wasn't completely explored in order to comprehend how the corruption phenomenon works and which consequences it is able to determine. Our study aims to stimulate the debate on the link between governance and the phenomenon of corruption as an illness affecting our capitalistic societies in many respects. Top management fraud is a problem that is causing public interest, concern and controversy. In this article, the author analyzes executive fraud in terms of its nature, scope, history, and consequences. They utilize the fields of psychology, sociology, economics, and criminology to increase or neutralize the social, industrial, and organizational precursors of management fraud and the potential and scale of such fraud. Identify the difference. The author also examines the impact of management fraud on various stakeholders such as shareholders, debtors, employees management, communities and society.[1]

Participants` actions in relation to accounting narratives may be understood in terms of, inter alia, both economic explanations based on utility maximisation and behavioural explanations based on psychology and the embeddedness of narrative in social practice. In terms of methodology and methods, the weakening of the deep-surface divide is exemplified by the common combination of corpus linguistics approaches with (critical) discourse analysis in other disciplines. Based on a discussion of key issues, theory, methodology and methods, a framework for thinking about research in accounting narratives is offered. The challenge is to better understand the role of narratives in the increasingly rich, complex information environment of external reporting.[4]With growing interest in corporate social responsibility (CSR) globally, its local manifestations are also diverse because they are increasingly evident in both developed and developing countries. We present in this document a multi-level review of the CSR literature in developing countries and highlight the key takeaways Differentiating factors and nuanced CSR, the considerations involved in defining it, are a special area of research. Our review included a content analysis of 452 articles spanning two and a half decades (1990, 2015). Based on this comprehensive re-

view, we identify the main distinguishing properties of the material about CSR in developing countries involves representations of how CSR or "CSR Thinking" is conceived and descriptions of how to practice and implement CSR or "Implement CSR". We sum it up from their Five main themes capture key aspects of variation in this document, which are: 1) complexity institutional background in the National System of Enterprises (SNB); 2) level, macro complexity NBS external background; 3) the predominance of many actors involved in both formal and informal management; 4) hybrids and other nuanced expressions of CSR; and 5) a diverse range of Adverse consequences on development and CSR. We conclude by emphasizing the nuances Forms of CSR in developing countries have always been contextually localized and shaped by elements and actors associated with broader formal and informal governance systems.[6]

In significant action from a broader national interest perspective, the ATO begin to demonstrate leadership in collaborative working groups to network for Australia's worst white-collar crime. I have long thought that in Australia there are a relatively small number, perhaps only a few hundred, who trade scams constantly. And that it is these few who often cause issues for all major regulatory bodies - tax office, competition and Australian Securities and Investments, Consumer Protection and Investment regulatory commissions, independent anti-corruption commissions, police units involved in money laundering, arms trafficking, human trafficking and others organized crime. They are not all men with black hats and white shoes; some are officers of large corporations that have a global business reputation and many seemingly respectable small business owners.[12]

An Agent-Based Model to examine the emerging dynamic characteristics of fraud in organizations. Individual heterogeneous agents interact in the model, each of whom may have the motive and opportunity to commit fraud and a profane attitude. This interaction provides a cultural transmission mechanism through which attitudes toward fraud can be propagated. Our benchmark analysis identifies two classes of organizations. In one class, we consider the con that is tending to a stable level. In the other class, the cheating dynamic is characterized by extreme behaviours; Organizations with mostly honest behaviour suddenly change their status to mostly fraudulent behaviour and vice versa. These changes appear to occur randomly over time. We then modify our model to examine the impact of various mechanisms thought to affect fraud in organizations. Each of these mechanisms has different effects on the two classes of organizations in our reference model, with approximate mechanisms being more effective in organizations with stable fraud rates and other mechanisms being more effective in organizations with extreme behaviour. Our analysis and findings have general implications for designing fraud prevention programs and assessing fraud risk in auditing.[22-27]

Local organisations in their home countries often engage in behaviour that constitutes corruption, at least from a cultural point of view. One such practice is the bribery of public officials. This study uses the multilevel theory to answer the question of why bribery activities of this type differ from country to country. We analyzed responses from nearly 4,000 companies worldwide using hierarchical linear models to examine conflicting predictions

about bribery. Building on the theory of anomy, we find support for cultural and institutional reasons for corporate-level bribery at the country level. We extend the theory of anomie by showing how corporate-level pressure can promote bribery as a business strategy.[33] This study examines corruption in relation to political, legal, and economic factors to see how these factors impact corruption over time and to test the direction of causality between these variables. To assess causality, cointegration analysis using an error correction model on data from over 100 countries spanning over 20 years was performed. Three antecedent variables are analyzed in relation to corruption. Over the long term, increases in these variables result in decreases in corruption. However, there is no evidence that changes in corruption impact any of these same variables. Interestingly, increases in GDP per capita are found to increase corruption over the short term while leading to a long-term reduction in corruption.[60]

3. A CLOSE LOOK AT CORRUPTION

Corruption is a slippery concept (see the discussion in Bardhan [1997]). At a broad level perhaps it may be defined as Transparency International defines it – "abuse of entrusted power for private profit". Tanzi [1998] presents a detailed taxonomy of the different forms corruption may take. It is not our goal to come up with a universal watertight definition of corrupt activity. For our purposes, a corrupt activity must satisfy three criteria – it must have a positive expected economic value to its perpetrators, it must have some risk of socio-legal censure associated with it and it must adversely affect the economy. The first criterion is obvious. The second one also is easy to defend. If an activity has

Table 1

Glossary of Terms

$\bar{b}$	Mean of the distribution of b, the risk-aversion parameter in the utility function in a generation
b_{range}	Range of b
S	Social capital
$\square$	The ratio of social capital to total human capital
$\bar{k}$	Mean human capital endowment in the first generation
γ	Proportion of national income spent on anti-corruption vigilance
p_i	Individual i's level of dishonesty, $p_i \square \ [0,1]$
q_t	Level of corruption in society in generation t, $q_t \square \ [0,1]$
q_{start}	Initial value of q based on which agents in the first generation make their choices
τ	A measure of equality in access to human capital
q_{eqm}	The "equilibrium" (average of last 50 generations) value of q.
y_{eqm}	The "equilibrium" (average of last 50 generations) value of y.
q_{conv}	The coefficient of variation in q in the last 50 generations
y_{conv}	The coefficient of variation in y in the last 50 generations
$prob_q$	Probability that the slope of the trend line through the last 50 observations of q is zero.
$prob_y$	Probability that the slope of the trend line through the last 50 observations of y is zero.

no risk of legal reprisal at all, then irrespective of its ethicality, it must be the 'custom' in the society in question and cannot be called 'corruption' by the relevant social standards. The third cri-

terion is more arguable. If the laws of a country are themselves sub-optimal then it is conceivable that certain forms of corruption may at times actually improve a lot of the citizens. But such situations are exceptions rather than rules and we shall ignore them1. Having thus characterized corruption, we have implicitly assumed that redistributing the gains of corruption cannot offset the harm caused. In other words, there 1 As the Mission Statement of Transparency International puts it, "Corruption is one of the greatest challenges of the contemporary world. It undermines good government, fundamentally distorts public policy, leads to the misallocation of resources, harms the private sector and private sector development and particularly hurts the poor...". Also, see Schleifer and Vishny (1993). 4 is a dead-weight loss to society because of corruption. Schleifer and Vishny [1993] support this position. There are thus both income-reducing and income-redistributing effects of corruption. Exactly how risky is the pay-off to corruption? The risk of corruption itself is a function of the level of corruption in society. It is hard to catch and convict a corrupt person in a corrupt society since the law enforcement agencies themselves are usually the breeding grounds of corruption. Social tolerance of corruption also grows after it reaches a certain threshold level. Gains from corruption are often viewed as the "unwritten perquisites" of government jobs in certain societies. A position of power is a prerequisite for corruption. Not everyone can be equally corrupt. The fact that corruption tilts the balance against the poor in a country has more to do with the fact that the poor and deprived have no control over resources to be corrupt than any innate honesty of the poor. Thus the capability of corruption is a function of position. Finally, while the citizens of a society usually have a feel of the average level of corruption in that society, there is neither a unanimous way to measure it nor a general agreement on the level. People, scholars and the laity alike have to rely on their perception of corruption, which at times is determined more by media attention than anything more scientific. Given these features of corruption, what is the best way to measure it? One way to measure social corruption is to have an index between 0 and 1 where 0 corresponds to a complete lack of corruption and 1 implies a debilitating level of corruption, i.e. the society produces nothing if the corruption level is 1. A society's corruption level is the 5 average of that of its constituents. However, this average cannot be a simple one. An honest pauper cannot undo the sins of a corrupt president. The relevant national index therefore should have as weights the economic power enjoyed by the individuals. The model described in the next section is built with these features in mind. It attempts to link individual choice of corruption levels to societal levels of corruption.

A brief description of how agents of the corrupt system enter the Government Organisation with low social esteem and develop a nexus and get adhere to the corrupt persons by taking and giving Unlawful Gratifications to the higher officials present in the Head Quarters and Government Secretariate and feed the corrupt system. The author personally closely witnessed each event which compelled him to think in a new dimension as an audacious attempt to raise his voice against the corrupt practice in the Government department.

3.1 A CORRUPTION AGENT AT SDH KALKA

UNLAWFUL ACTIVITIES IN THE HEALTH DEPARTMENT - A REFORMATIVE AFFIRMATIVE ACTION

In reference to the subject mentioned above following contentions were hereby submitted to the state government of Haryana in the light of fundamentals and principles of Hospital Administration, on the inauguration of Pressure Swing Adsorption(PSA) Oxygen generation plant incidence happened on dated 25.02.2022 in the gracious presence of the excellence Learned officers of the department in the vicinity of Sub-divisional Hospital Kalka:-

3.1.1

An Ifko Tokyo Insurance company installed an oxygen plant in SDH Kalka without the Approval from the Government and without technical inspection from the Government empanelled oxygen Gas plant engineer(Manifold engineer) by PWD or other government executive agency on unplanned site selection for construction. The architecture department clearly prohibits to execution of new construction in SDH Kalka. It is also worth mentioning to document here that there is no significant indoor patient load to install such a plant.

3.1.2

Further approved drafted MoU with terms and conditions regarding operational expenses for electricity, sampling and testing of gases generated by oxygen plant, its maintenance, its standard operating procedures, warranty and AMC, CMC etc. , after in-principle approval from CM, on the proposal of IFKO TOKYO, vetted by Legal Remberance department in concurrence with the finance department of the state. The department has not been executed hence Punjab Financial Rules 19.2, and 19.3 prohibited operational expenses of more than 200 Rupees by the administrative department. Rules are reproduced as under:-

Punjab Financial Rules *19.2*

The assent of the Finance Department is also given to expenditure (including advances) In those cases in which such expenditure is expressly authorized to be made by any Authority by the provisions of

(a) Any legislative enactment for the time being in force, or rules made under such Enactment; or

(b) The rules in Chapter I to XVIII of this Handbook or in any other Code or Handbook, Issued after consultation with the Finance Department; or

(c) any order delegating, financial powers after consultation with the Finance Department.

Punjab Financial Rules *19.3*

The consent of the Finance Department is not to be considered as given to:-

1. *(1) Any expenditure or advance authorized by any legislative enactment, code, rule or*

2. *(2) Order to be made by the Government except in so far as this is specially stated;*

3. *(3) The expenditure or advance which involves contravention of any existing order of the Government issued in consultation with the Finance Department, imposing any Scale, limit, or other restriction; or of the rules in this Handbook or in any other Code Or Handbook,*

4. *(4) Expenditure which forms part of a scheme which, as a whole requires the assent of The Department of Finance; and*

5. *(5) Any item of expenditure of an unusual or extravagant nature, it being the function of Audit to draw attention to any such item; Provided that petty*

6. *items of expenditure not exceeding two hundred rupees in any one Case may be sanctioned by the Administrative Department concerned where they are Satisfied that the expenditure was unavoidable.*

3.1.3

It was deliberately communicated to Agent SMO, SDH Kalka and drafted a letter no.2022/2534 on dated 20.12.2021 to civil Surgeon Panchkula and the copy were endorsed to DGHS and ACS health vide endorsement no.149-150 on dated 24.01.2022 from SMO SDH Kalka

3.1.4

Agent SMO ENT concealed the facts and proposed inauguration basic note without completion of the proceeding. Civil Surgeon & DGHS (program) came on the day of inauguration and asked the author to visit Community Health Center Nanakpur immediately to see necessary arrangements because Aditional Chief Secretary wishes to visit CHC Nanakpur on dated 25.02.2022.

3.1.5

It was deliberately communicated to the Deputy Director of Hospital Planning and designing that the above strategic planning is required before operationalization of life-saving plants which are installed as per corporate social responsibility against the prescribed work in schedule 7 of the company's Act to exercise the discretionary authority of Hon'ble Chief Minister in public interests at the level of HoD and Government through the planning branch.

3.1.6

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It was also contemplated to take the agenda in SKS SDH Kalka but Unfortunately, Swastya Kalyan Samiti for the hospital in SDH Kalka was not registered by NHM authorities in force in the state. I consistently insisted Agent SMO ENT, Designated chairman of Swasthya Kalyan Samiti SDH Kalka, by Civil Surgeon, to get it registered but he didn't like the interruption of members of other departments for their unlawful utilization of government funds with convenience by higher officers of the department and even director finance and accounts NHM did not bother who so ever is solely responsible for conducting quaternary audits of all Swastya Kalyan Samitis in the state as state authority.

It was personally apprised Civil Surgeon Panchkula district health authority regarding Swasthya Kalyan Samiti SDH Kalka when her good self visited SDH Kalka but Agent SMO ENT consistently created conflicts between the subordinate staff and other officers at District Headquarter to block the effective communication channels required for transparency so that he may enjoy unlawful gratification by breaking rules and creating conflicts.

3.1.7

Agent SMO ENT get his posting at SDH Kalka vide government order no. 18/14/2018 5HB1 on Dated 29.12.2020 (Annexure 3) neither against any vacancy nor against the already posted officer, and however against the instructions issued from chief Secretary vide order no. 5S/2004/1GS-II on dated 18 November 2020(Annexure 4). Further, He got his unlawful orders from the department to release his salary from SDH Kalka vide order no.78/R(631)-1E5- 2020/345-47 dated 10.02.2021 (Annexure 5) by providing unlawful gratification to officers and officials of the directorate and secretariat, inviting his criminal responsibility along with director HRMS and officers engaged in Human Resource Management System and planning as per THE PREVENTION OF CORRUPTION (AMENDMENT) ACT, 2018, unlawful activities prevention act, 1967, other laws and Acts in force in this context by registering the case in competent court since Agent SMO ENT is neither performing adequately as ENT surgeon in OPD and OT in SDH Kalka nor discharging his financial and administrative responsibilities honestly due to his corrupt behaviours and act as a tool for accelerating said nexus operated by Head office and Mission Director National Health Mission office of the department.

4. THE MODEL

4.1 The Static Model

Assume an economy comprising n agents. Each individual I, i=1,…,n, has a certain endowment of human capital, k_i, and an aversion towards risk summarized by the parameter, b_i , in his utility function,

$$u_i = \hat{y}_i - b_i\, \sigma^2_y$$

where $\hat{y}$ is the expected income level and σ^2_{iy} is the variance of $\hat{y}_I$ An agent is active for only 1 period and thus the human capital has to be used in one go. At the aggregate level, we think of the total output being the result of two basic inputs – social input, **S** and individual input **K**. We may think of K as simply the sum total of the individual human capital put to use and S as the institutional set-up – a public good that is essential for the creation of value. S may be thought of as the way production and indeed society itself is organized and governed – subsuming within itself the entire legal and socio-political and economic framework that channels all individual efforts into an orchestrated productive enterprise. So we have the aggregate production function,

$$Y = SK$$

Now the parameter S itself is likely to depend on the level of K. Better trained people are likely to design better social inputs. So if we assume a linear dependence here, then

$$Y = \alpha K^2$$
where
$$\alpha = S/K.$$

Every individual has a **"dishonesty index"**, p_i, i=1,…,n, in the closed interval [0,1]. This index may be thought of as the proportion of available rent that the individual appropriates through corrupt activity Or, (alternatively the proportion of transactions (value-weighted) that he cheats in) Thus 0 denotes a completely honest person while 1 signifies a person who has stolen all that was possible from his position of economic power. The societal "corruption index", q is then obtained as

$$q = 1/k \sum_{i<n} p_i k_i$$

The intuition for this weighted average is discussed in the previous section. In the presence of corruption, the efficacy of the social input is reduced as the efforts of individuals result in lesser output. In other words,

$$Y = \{(1-q)S\}K$$

This is the output reducing the effect of corruption. Therefore q may be interpreted as the proportional deadweight loss of output owing to corruption. Corruption also has distributive effects on output. Thus a proportion q of the total output is now distributed as the spoils of corruption while the remainder (1-q) part of the output goes to the agents as compensation This is done for simplicity. The two proportions do not need to be the same, but presumably, both would be proportional to the level of corruption. Thus the corrupt people gain at the expense of the honest. The size of the **"corruption pie"** in the society then is qY. Looking from a macro perspective, corrupt individuals are in a contest to grab a part of this corruption pie. This characterization of corruption undoubtedly treats it just like another form of tax. This view, however, is hardly novel. Schleifer and Vishny [1993], for in-

stance, underscore their similarity. They also point out that the "necessary secrecy" of corruption makes the distortions caused by it even more costly to society. Clearly, this secrecy is the result of the risk inherent in corrupt activity.

The spoils of corruption are not risk-free. One may or may not get away with corruption. Let us define $y_c{}^I$ to be the income from the corruption of an agent i who is completely dishonest (i.e. p_i =1). This $y_c{}^i$, then, is a random variable following, let us say, a normal distribution(It might appear, at first glance, that a person can only have two possibilities – get away with corruption or get caught. However, we must remember that we are not talking about a single act by the agent but the level of honesty he practices throughout his career. Normal distribution then becomes the obvious choice for characterizing his returns from his whole career or a part of it). Now there is a positive relationship between the human capital of an agent and how much he can expect to grab from the corruption pie. In other words, the higher up a person is in the economic hierarchy, the more he can get through corruption. The mean of the distribution of $y_c{}^i$ is thus proportional to the human capital endowment of the agent. It also depends positively on the size of the pie (qy) and negatively on the human capital weighted cumulative efforts of other contenders

$$q = 1/k \sum_{i<n} p_i k_i$$

or, for a large enough population,approximately qK

The variance of the distribution, a measure of the risk of corruption, is positively related to the level of "effective social capital", (1-q)S and the proportion of national income devoted to anti-corruption vigilance (ɣ). Also, the risk increases with the human capital of the individual (k_i), simply because of greater visibility and impact. A fully corrupt politician is more prone to come under scrutiny than an equally unscrupulous establishment assistant. **Thus a fully corrupt agent's income from corruption may be modeled as**

$$Y_c{}^i \sim N(k_i/qk*qY, \ ɣ(1-q) \ Sk_i$$

OR

$$Y_c{}^i \sim N\{SK_i \ ,(1-q) \ ɣSk_i\}$$

Notice that other things remain the same, both the risk and return of corrupt activity increase with the quality of the institutional set-up, an assumption that matches our intuition when comparing developed nations with underdeveloped countries.

An individual, however, does not have to be fully corrupt. As noted before, he can choose his level of corruption or dishonesty level anywhere between 0 and 1. In choosing this dishonesty level, pi, the agent is, in effect, making a portfolio decision. The entitlement to his income flow from honest activity, $\{(1-q)S\}k_i$, is a risk-less asset while the income from his corrupt activity, etc, is risky. How much he will partake in this risky asset depends not only on the distribution of yc I but also on his level of risk-aversion, bi. In other words, the agent chooses his level of dishonesty index, pi, to maximize the utility function I introduced before. Thus we can write down his problem as:

(1) $\underset{pi}{Max} (1-q)\{1-q)\}k_i + p_i k_i \{1-q)S\} - b_i[\gamma S(1-q)p_i k_i]^2$

If we assume that individual agents ignore the impact they have on the societal corruption level then this problem has a simple solution:

(1′) $P = 1/2 b_i \gamma^2 k_i (1-q)s$

Thus the individual's dishonesty level is decreasing in his risk-aversion, the proportional expenditure on vigilance, g, his human capital level, the quality of social institutions, and increasing the societal level of corruption. Thus with a very simple model of risk-averse agents, we have been able to produce the inverse relation between human capital endowment (since S is an increasing linear function of K) and corruption – a well known stylized fact (see Treisman [1997]). We must note here that the fact that the spoils from corruption are stochastic to the individual agent makes the total claim on output also stochastic albeit with a much lower variance. There is no guarantee then that the total claims will match up with the output produced. This problem, however, is not central to the discussion here and may be assumed away with the assumption of an external insurer who absorbs the aggregate shock. This assumption is quite realistic in today's world of international capital mobility. The agents, therefore, make their choice of dishonesty levels based on, inter alia, the societal corruption level. The societal corruption level, in turn, is the result of these choices. This is a fixed-point problem and it may not be difficult to prove the existence of a rational expectation equilibrium in this set-up. However, it may be closer to reality to assume that what goes on is adaptive expectation where agents make their choices on their perception of pre-existing societal corruption. Besides the relative levels of human capital itself needs to be made endogenous. This brings us to the multi-period version of the model.

4.2 The Multi-period Model:

The Evolution of Corruption

Let us assume an overlapping generation model for the economy with two generations alive at any one point in time, each generation living for two periods. The population is constant and every agent has one offspring. During the first half of his life, an agent accumulates human capital through a process that we shall soon describe and learns about the state of the society by observing the seniors. That is where he assesses the societal corruption level which he assumes will stay the same when he is productive in the second half of his life. In the latter half, he is active and chooses his dishonesty level based on this assessment. The adaptive expectation is a better way to go in this situation

because of two reasons. Firstly, the exact level of corruption depends on the joint distribution of k and b. Without assuming a correlation structure it is too complex to 10 exactly solve for q. Secondly, as noted in the previous sections, people, in reality, have at best an "idea" of the social level of corruption and that idea is likely to be influenced more by the perceptions of society early in life, before entering the productive period. Besides the bounded rationality of adaptive expectations has been shown to attain "near-optimal" utility levels in several situations (see Akerlof and Yellen [1985], Jones and Stock[1987] and Naish[1993]). The story remains incomplete without describing how agents acquire human capital. Since both honest and corrupt incomes are increasing in an agent's level of human capital, it is reasonable to assume that the agents would like to acquire as much human capital as possible.

Table 2
Parameters Varied

Average level of risk aversion, $\bar{b}$	3	3.5	4
Range of risk-aversion, b_{range}	1	1.5	2
Proportion of income spent on vigilance, γ	0.1	0.12	0.14
Mean human capital endowment in the first generation, $\bar{k}$	0.5	0.6	0.7
Equality in access to human capital, τ	0.1	0.5	0.9
Initial value of social corruption, q_{start}	0.1	0.3	0.5

We also assume that the agents take care of their children to the best of their abilities and thus there is a correlation between a parent's realized income and her offspring's level of human capital. However, in the presence of public schooling as well as due to individual differences, this correlation is not perfect. We may then think of the human capital endowment of an agent consisting of a mixture of two distributions. Both distributions are between exogenously determined bounds. In the first distribution, the relative position of an agent in the distribution of human capital is the same as that of his parent's realized income (y_i') in the income distribution of the previous generation. The second distribution is simply a uniform distribution between the bounds. The proportion of the second distribution in the mixture (τ) is a measure of the effectiveness of public schooling or political institutions to break the monopoly of power. Thus the human capital level is given by:

(2) $K_i = \left[k_{min} + \dfrac{y' - y'_{min}}{y_{max} - y_{min}} (k_{max} - k_{min})\right](1 - \tau) + \tau Z$

where $Z \sim U(K_{min}, K_{max})$

With these assumptions, a fully dynamic model of society becomes complete. Note that risk aversion is randomly distributed among agents of every generation. We now proceed to study the nature of equilibria in this model – their existence and stability. For this purpose, the tool of computer simulation of an artificial society built according to this model will be used in the next section.

5.   THE SIMULATIONS

5.1 The Method and the Parameters

Given the   closed-form solution and the difficulty of obtaining proof of dynamics due to the corruption of the above model, we are creating an artificial society Simulate the evolution of social corruption over several generations 5 .. Key The questions asked here are:

 (A)   How is the level of corruption in society evolving? Are there outliers? Corruption leads to a complete collapse of the system or does the corruption disappear completely after a few generations? Or is it more or less constantly flat? National level over time. This dynamic behaviour of corruption and income is captured by the degree of corruption and convergence of income levels
as time passes.

(B)   How important is history? Are the final values of corruption level dependent on the starting values? This issue is particularly important for countries with high present levels of corruption like Kenya, Zaire and India. In our simulations, we study the impact of initial values through the parameter, q_{start}.

(C)   How do socio-economic parameters affect corruption? This understanding is essential for designing an effective anti-corruption policy. In the simulation, compare them reaching equilibrium values under various combinations of parameters,
 do the underlying parameters affect the degree of long-term rot?

Table 3
Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
q_{eqm}	0.07869	0.04211	0.02768	0.23683
y_{eqm}	169251	48904.3	96093.1	238475
q_{conv}	0.02974	0.02216	0.01119	0.13675
y_{conv}	0.02917	0.01925	0.01153	0.10894
$prob_q$	0.81187	0.15651	0.18954	0.99941
$prob_y$	0.82106	0.15078	0.19024	0.99972

At the heart of the simulations is an artificial society where the agents behave in accordance with the decision rule laid down in our model. Generations of such agents are then created. Each generation has the risk-aversion parameter (b_1) distributed randomly over the agents according to a uniform distribution with mean b and range b_{range}. The first generation has human capital distributed according to a uniform distribution with mean k and range 1. The subsequent generations acquire human capital by the process described above. Each generation has 1000 agents and 100 generations are simulated to study the time path of societal corruption (q) and national income (y). The "long-run"
 values, i.e. the average values of the last 50 generations of the corruption level, q and income, y, as well as other measures of their convergence are noted. This whole process is then carried out 30 times and averaged to lessen the impact of an outlier on the results. The above-mentioned process gives us a set of observations for one particular combination of parameter values. This is then repeated to scan a section of the parameter space. Table II shows the parameter values at which the simulation is performed. As mentioned there, there are 6 parameters $(b, b_{range}, k, y, \tau, q_{start})$ and 3 values for each parameter are examined. This leads to 729 (=3^6) distinct parameter combinations.

The parameter intervals chosen for reporting the results were decided with both realism and span in mind though a certain degree of arbitrariness undeniably exists in them. Of the ones that have immediate real-life measurable counterparts, g is unlikely to ever exceed 10-15%. The values of t are chosen so that they span most of the unit interval. Ideally, q_{start} should also have done the same, but for our choice of the values of the other parameters, a level of q_{start} above 0.6 tends to lead to hyper-corruption. What exactly are we observing? Our observation consists of six variables, q_{eqm}, y_{eqm}, q_{conv}, y_{conv}, $prob_q$ and $prob_y$, all of which measure the level and extent of convergence in the time path of societal corruption (q) and national income (y). Before explaining these variables, however, it is worthwhile to note that the technique of studying the convergence of dynamic processes using simulations has its own limitations. There is no way to detect an unstable equilibrium except through sheer luck (i.e. if the starting value matches that equilibrium). Total convergence is not achieved in finite time and hence one has to be content with a lack of trend and dispersion below a certain preset criterion to detect convergence.

One way to do this is to see how many generations there are. Or the length of time it takes to reach a satisfactory range. Another way is to fix the problem. Examine the number of previous periods and the changes in the last few periods. We are adopting Here is this second approach. In both cases, the result lacks finality and elegance. Closed-form solution. Given these limitations, the simulation approach is Used only when closed-form solutions are not possible or necessary To make assumptions that are paralyzed and simplistic. Also maybe the loss is really not that serious firstly, an unstable equilibrium is hardly anything more than a mathematical curiosity. It does not do much damage to a policy maker not to know of its existence at all. Insisting on perfect convergence or knowing the exact figure for the equilibrium value too attaches more importance to the model than it deserves.

One must keep in mind that any model is only an imperfect simplified version of reality and it is the qualitative results that are of prime importance, not the equilibrium values. In our simulations, we look at the 'long run averages' of the corruption level q and national income y to ascertain the equilibrium levels. Thus q_{eqm} *and* y_{eqm} refer to the average of *q and y* respectively over the last 50 generations. To check if equilibrium or convergence has really been achieved, we employ two indicators – the coefficient of variation of values in the last 50 generations and the probability or p-value of the hypothesis of zero slopes of the regression line through the last 50 values (prob$_i$ where $i = q$ *or y*). The results of these simulations are discussed below.

5.2 The Possibility of Hyper-corruption

Hyper-corruption, a state of affairs where the societal corruption level is 1 and no economic value is created by the society, is an unnerving scenario. In real life, while we do not see this limiting case, societies like Zaire or Kenya have at times come close to completely dysfunctional economies owing to crippling levels of corruption. Near this state of hyper-corruption, social institutions themselves change and new power structures emerge.

<div align="center">

Table 4: Panel 1
Average values of variables by parameter levels

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		q_{eqm}	y_{eqm}	q_{conv}	y_{conv}	$prob_q$	$prob_y$
	3	0.095	165957	0.031	0.030	0.806	0.818
$\bar{b}$	3.5	0.076	169676	0.030	0.029	0.837	0.844
	4	0.064	172119	0.029	0.028	0.792	0.801
	1	0.076	171018	0.030	0.029	0.812	0.821
b_{range}	1.5	0.078	169363	0.030	0.029	0.810	0.819
	2	0.082	167371	0.029	0.029	0.814	0.823
	0.5	0.113	112262	0.042	0.041	0.807	0.821
$\bar{k}$	0.6	0.073	164846	0.026	0.025	0.821	0.828
	0.7	0.050	230644	0.022	0.022	0.808	0.814
	0.1	0.079	167006	0.055	0.051	0.718	0.726
τ	0.5	0.079	170357	0.020	0.021	0.843	0.855
	0.9	0.078	170389	0.014	0.015	0.874	0.882
	0.1	0.115	163640	0.033	0.032	0.801	0.817
γ	0.12	0.072	170238	0.029	0.029	0.831	0.838
	0.14	0.050	173874	0.027	0.027	0.803	0.809
	0.1	0.079	169259	0.030	0.029	0.808	0.819
q_{start}	0.3	0.079	169274	0.030	0.029	0.813	0.821
	0.5	0.079	169219	0.030	0.029	0.814	0.823

<div align="center">

Table 4: Panel 2
t-statistics of coefficients in regressions of variables on parameters

</div>

	$\bar{b}$	b_{range}	$\bar{k}$	τ	γ	q_{start}
q_{eqm}	-21.79	3.70	-43.90	-0.61	-45.10	0.03
y_{eqm}	13.60	-8.05	261.29	7.47	22.59	-0.09
q_{conv}	-1.71	-0.59	-18.37	-36.53	-4.94	0.05
y_{conv}	-1.67	-0.66	-21.71	-40.77	-5.04	0.04
$prob_q$	-1.11	0.11	0.05	12.01	0.18	0.48
$prob_y$	-1.35	0.13	-0.55	12.61	-0.67	0.36

These changes may be the political disintegration of a nation to smaller units or a revolution that changes the norms of doing business in the country. It may even lead to more fundamental religious or social upheavals that bring society back to 'reasonable' levels of corruption. Clearly, our model here is not broad

enough to incorporate these very long-run changes in the socioeconomic organization. For our purposes, we shall allow the phenomenon of hyper-corruption to be a legitimate possibility for our artificial society and look at parameter combinations, if any, that might lead to such unfortunate socioeconomic outcomes. As it turns out, given the parameter space that we have chosen, there are certain regions of it that lead to hyper-corruption with near certainty. While not really mapping out all those areas, we shall point out at least a few of them. For instance, *keeping b at 4, b_{range} at 1, k at 0.5, τ at 0.1 and γ at 0.1*, any initial value of societal corruption above 0.66 is almost sure to lead to hyper-corruption in our setting. Similarly, holding the other variables at the above setting and starting off with an initial value of corruption of 0.1, any value of less than or equal to 0.06 will also lead to hyper-corruption. Again with other variables at the same levels if we *fix γ at 0.1* then any value of *b below 2* is almost sure to cause hyper-corruption. Also, the behaviour of societal corruption is not enough near these critical points. For instance, in the first example, an initial value of 0.65 takes corruption to an equilibrium value of only 0.12. In the second case, a γ of 0.07 leads to a long-run value of only 0.25 and in the third case, a b value of 2.3 results in a long-run value of 0.25.

The exact value of the critical point in any parameter is, of course, a function of the values of other parameters. 16 Thus the behaviour of corruption does seem to depict a valley in a segment of our parameter space where the topography seems to be more or less SMOoth (as will be revealed by later results) and surrounded by sudden steep hills. Most real-life societies seem to be residing in the valley, properties which we shall be exploring in the following paragraphs. This also provides a rationale for our choice of the segment of the parameter space for exploration. The state of hyper-corruption is the social counterpart of a 'black hole' with its deadly circumference of attraction extending in all dimensions. Once countries stray into their sphere of influence, little can be done in terms of the policy. Most of the following discussion applies only to the more tranquil regions of the parameter space, a part of which we explore in our simulations. 4.3 Simulation Results: the Time Path of Corruption and Income As we saw before, we have 729 distinct parameter combinations in our simulations. The overall average 'long-run' (last 50 generations average) value is 0.078. We must bear in mind though that this is not an exercise in calibration and the value itself is of secondary importance. What is of fundamental interest is the pattern of the time paths, whether they actually converge to some number or not. However, the range of 'long-run' values is fairly large, from a low of 0.028 to a high of about 0.237. This verifies that the parameters considered here are capable of producing a significant dispersion in average corruption levels. But do these processes really converge to stable equilibria? Are the 'long-run' values really 'equilibrium' values? To answer that question we have to look at two 17 things. Firstly, is there a trend in the last 50 values of q (or y)? A trend would indicate that the path has not stabilized and the numbers would be different if we went beyond 100 generations.

The absence of a trend may be thought of as an indication of stabilization. The next thing to look at is the extent of convergence, i.e. how close are the values to the average. An indicator of that is simply the dispersion in the last 50 observations as measured by, say, the coefficient of variation. In our case, q$_{conv}$ and yconv record the coefficients of variation for q and y respectively. The lower the dispersion, the better the convergence. As mentioned be-

fore, we use two numbers, $prob_q$ and $prob_y$ to detect the presence of a trend. They are respectively the p-values of the hypothesis that the slope of the regression line through the last 50 values of q *and y is zero*. The higher these numbers, the less likely it is that a trend is present. The mean of both $prob_q$ and $prob_y$ is about 0.828. The minimum in both cases is about 0.19 while the maximum is 1. Only 43 of the 729 values of $prob_q$ lie below 0.59. On the whole, it does appear that the process stabilizes in 100 generations in most cases. The coefficient of variation in the last 50 generations has an average of about 0.03 for both q and y. The maximum is *0.14 for q* and *0.11 for y*. Once again reasonable convergence seems to be reached in 100 generations. The overall average, standard deviation, maximum and minimum of the different variables are presented in Table III. Time paths of corruption and income for a particular parameter combination are shown in figure I for illustrative purposes. 4.4 The Comparative Statics: Effects of Socio-Economic Parameters The first panel of Table IV lays down the average values of the different variables of interest for each level of every parameter value under study. The direction and intensity of the effects of the different parameters become quite apparent from this simple presentation itself. The other, and arguably a more convincing, way to tell the story is by running regressions of each variable on the different parameters. This is done and the results are displayed in the second panel of Table IV. It must be noted that the regressions themselves do not assume a linear causality between the parameters and the variables of interest. They are just a means of concise presentation of the comparative statics results. It is hardly surprising that a higher level of average risk aversion leads to lower corruption. Clearly more risk-averse people must be honest according to the model used here. The negative impact of k is also in line with our expectations since the individual choice of dishonesty level was inversely affected by k *(through S)* in eqn. (1') in the previous section. Similarly, the fact that higher y reduces corruption is also expected. As a higher y causes the fruits of corruption to be riskier, it can only reduce corruption. The interesting results in this section are really those that were not expected before running the simulations. For instance, one would have been hard-pressed to figure out the effect of b_{range} or t on the equilibrium values of corruption and income a priori. The simulations reveal that a wider dispersion in risk aversion raises corruption and cuts income in the long run. t, on the other hand, leaves the equilibrium corruption level unaffected but raises income in the long run and helps immensely in attaining convergence in both corruption and income. Regarding better vigilance, it is only expected that as g goes up q goes down. The key question here is: are the economic returns to higher vigilance commensurate with its costs?

A first cut at answering that question may be had from looking at the average values in the first panel of Table IV. Raising g by 2 percentage points first raises equilibrium income by a full 4%. The second such raise leads to a 2.1% increase. What this seems to suggest is that raising vigilance does pay in terms of higher equilibrium income but has diminishing marginal returns. Of course, this is over and above what other socio-economic benefits may accrue from the reduction in corruption levels. It may well lead to a more egalitarian distribution of income and fair returns to human capital that are not captured by the equilibrium income. An interesting result is that the initial level of corruption does not have much impact on the long-run levels of corruption or income. The model here seems to suggest that the long-run levels of cor-

ruption in societies are the results of their socio-economic "fundamentals" and not the initial values. In other words, the equilibria are stable over the section of the parameter space explored. We should, however, remember that in certain corners of the parameter space a high initial value does lead to hyper-corruption and the stability of the equilibria discussed here is, at best, local

VI. CONCLUSIONS AND FUTURE RESEARCH

With heterogeneous risk aversion agents using simulation, this paper showed that society has a locally stable equilibrium. The degree of corruption depends on some socio-economic parameters. However, for certain combinations of these parameter values, for example, Corruption follows an ever-increasing trajectory until it impedes all economic activity. Or The level of corruption equilibrium depends primarily on the level of risk aversion. Anti-corruption vigilance and share of national income spent at the human level Social capital. This paper raised as many, if not more, questions as it answered. what do you decide to avoid social risk? Is it related to religion or culture? cause? What are the roles of institutions and how exactly are they related to the model? Are you introduced here? What factors other than human capital affect S? In Countries where old colonies or foreign government systems are imposed Or when adopted by existing traditional societies, there appears to be greater corruption. How can i Is the model here extended to account for these situations? Why does a transitional society seem to have more corruption? Others-Transition from idyllic/feudal structure to industrial structure, etc. From a socialist to a market-oriented system? Is that possible during the transition? Well-known methods of organizing production in society are giving way to new industries. Does the organization open the window of low social capital S, corruption? If so, if the other parameters are not checked, twenty one can this corruption really completely upset the migration and development process? Our experience in Africa and the former Soviet Union seems to support these fears. What are the actual values of the parameters described here? Is it possible to do you adjust society and predict future levels of corruption? This will be an important step From a political point of view. These and some other questions are promising Economic development, politics, and International business certainly deserves more academic attention in the future

Applicability of the modelling in the context of SDH Kalka has also explored that a corruption agent introduced to victimize the whistleblower applied various tacts to hide his unlawful activities by instigating the lower subordinate like office assistants, plumbers, electricians, office class IV employees, field Staff health supervisors, and grassroots worker(ASHA-Coordinator) etc. Corruption agent ENT surgeon holding illegal possession of the office of SDH Kalka for drawing Government funds unlawfully and feeding corrupt system who gets his posting orders through unlawful means consistently instigating the staff posted at district Head quarter Quality consultants and other opportunistic officers, against the Hospital Administrator in SDH Kalka and fictitious complaints against the honest officers in SDH Kalka to compel them to quit thereto. A similar modus operandi was exhibited in the office of the Director-General, Health Services when a Master in Hospital administrator from tertiary care institute after his

fresh Post-graduation joins the office of Director Planning against the decision of the Minister of Health State Government, exercised such opportunistic tactics during his Graduation from the Russian country for the survival of the fittest environment, exhibited the illegal strikes under the guidance of Director Planning in the health department Haryana to gain the unlawful motives of corrupt officers of the department and to quit the voice raised as an audacious attempt of an honest officer against the corrupt practice in the department. It is a matter of administrative investigation by examining all stakeholders at various levels of operations in the department. This agent ENT Surgeon) is implanted in the sequel of events in PGIMER and the office of Director General Health services Haryana. Opportunistic unqualified persons lacking Administrative qualifications from Recognised Institutions are deputed in the key posts in Head offices of the department, and other Government offices. Professors/teachers without Civil Medical Services Cadre in the Medical Education department, and Specialist doctors Surgery, Gynae & Obs, Medicine, Child, Dental, and other specialities on the pick and choose basis in the National Health Mission State Government offices are posted formulating an administrative clutter and waste in the department. Director Planning in the Health department is a Dental Surgeon, who is not acclimatized with the processes of Emergency, Operation theatres, Indoor, Trauma centre, Laboratories, Radiology other hospital procedures being a Dental surgeon hence incapable of contemplating the proposal of planning health department and incorporating Information Technology in the health department due to the lack of his core competence being a Dental surgeon. Planning of the health department done by submitting the feasibility report of the project never contained the intellectual competencies and was just shallow proposals based upon his sweet will that is unlawful gratification. Higher officers of the department in the directorate tried to accommodate him being a senior health professional but he always tried to exploit the senior officers of the department by misguiding the authorities in the Government and making nexus with the officials of the directorate and other officials in the secretariat. When require he holds the establishment control of Chief Medical officers in the department to crush the voice against his corrupt practices and he implants Dental surgeons as Agents in the offices of Indian Administrative Services (IAS) officers in the Health Department to manage and control the nexus. The matter has also been communicated to the state and Union governments to intervene accordingly under the prevention of unlawful activities in the Government system by making fictitious societies (Non-Government Organisations) in the Government system damaging the linear structure and to set aside General Financial Rules applicable in various states.

The exact amount of loss to national economy will be quantified by applying different quantitative techniques for making decisions as soon as Government provides any opportunity to investigate the case at any level by assigning weightage to different stakeholder questionnaires and cost, value and market forces operating in the area of jurisdiction by cost and work analysis, value time analysis and procurement rules and other statutes applicable in this context and further research will be conducted accordingly.

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