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Endogenous Institutional Change and Privileged Groups

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Since the recent advances in the institutional perspective of economic development, there is considerable increase in the literature on the evolution of institutions. In this study, while employing the game theoretic approach, we explore the rent-seeking fundamentals of institutions. We model the manner in which the rent-seeking behaviour of state actors results in inefficiency of the institutional framework. The main focus is on the rents provided by the availability of natural resources wealth, foreign aid or corruption potential. By originating a framework where rulers, agents of the state, and citizens act endogenously, we show that the rents from these resources can be a significant constraint to institutional reforms. In order to come out of the bad institutions trap, the society needs to offer a substantial amount of incentives to the privileged groups. The focus is on two privileged groups, i.e. the rulers and the state agents. In most of the societies, these two groups have the highest bargaining power in the negotiations over the rules and institutions.

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1. INTRODUCTION

Institutional framework has been one of the widely discussed topics in the explanation of cross-countries development gaps. Two points are common in most of the available literature related to institutions and economic success. First, institutions are collective choices and endogenous; and thereby, emerge, persist or change from the social interactions of individuals or groups. Second, the generally agreed conclusion is that societies which encourage the protection of property rights; exercise the rule of law; and enforce contracts efficiently prosper. In contrast, societies where the policies of expropriation prevail face a severe problem of underdevelopment [North (1981, 1990); Hall and Jones (1999); Easterly (2001); Acemoglu, *et al.* (2001, 2005); Acemoglu and Johnson (2005); Knack and Keefer (1995); Mauro (1995); Dollar and Kraay (2003) and Rodrik, *et al.* (2004)].[1] Theoretically, most of these studies regard institutions as social infrastructure that provides an economic environment within which economic actors

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[1]Most of these studies assert that in order to understand long-run economic performance, it is inevitable to address the interaction between institutions, politics and markets. Institutions form the rules of the game within which both politics and markets operate and ultimately determine economic outcomes.

solve their allocation problems. Thus, institutions have a direct bearing on the incentives structure of society. Accordingly, factors accumulation and technological progress are only the proximate causes of development while institutions are the fundamental ones.

Although it is unanimously argued that economic institutions such as private property, the rule of law, and contract enforcement are of primary importance in the realisation of economic development; there has, however, been lack of sufficient agreement on what determine the institutional framework in a society. There are a variety of opinions regarding the evolution of institutions. For instance, four different approaches have been prominent in the literature. They are the Efficiency View of Institutions, the Incidental View of Institutions, the Ideological View of Institutions, and the Social Conflict View of Institutions. The first approach is based on the cost and benefit analysis of institutions from social perspective. According to this approach, institutions appear and persist when their social benefits exceed their social costs. The second approach takes institutional change as a byproduct of some other activity.[2] The ideological view takes ideology and beliefs as the basis of institutional evolution. The final approach to the selection of institutions takes institutional change as a consequence of the conflict over the sets of institutions.[3]

This paper, combining the social conflict view of institutions and the theory of rent-seeking, examines the situation where the rent-seeking behaviour of state actors is a significant constraint to institutional reforms. Based on these two theories, we present an argument that institutional framework in any society is driven by its distributive implications. Second, it is an equilibrium outcome, whether it is efficient or less efficient. The winners of the prevailing institutional framework are those who had the greatest bargaining power during its formation. In order to change the existing inefficient institutional framework, the winner of existing institutional framework should be induced to change their strategy to the new equilibrium. This may be achieved by providing them with the incentives in the new equilibrium.

In this study, we develop an original model which contributes to the existing literature on three fronts. First, it studies endogenous institutional change taking agents of the state as a separate group besides politicians and citizens.[4] Given their *de jure* power, the state agents can prevent institutional reforms if the reforms endanger or reduce their rents. Second, it presents an argument that the choices of good economic institutions are not only constrained by the non-democratic rulers (dictators); but, in lacking democracies, the group of selected politicians also places hurdles, provided that they solve their within-group problems of free riding and collective action. Third, windfall income to the society either from natural resources or from foreign aid affects the

[2] For instance, according to the approach institutions emerge as an unintended consequence of other social or economic interaction or as a consequence of historical accidents.

[3]The detailed introduction of these approaches is given in Acemoglu (2003) and Acemoglu, *et al.* (2005). Both of these studies present an argument in favour of the Social Conflict view of Institutions by giving some historical data on European Colonisation and the comparison of North Korea and South Korea.

[4]The introduction of agents as a separate interest group is based on North (1981). North (1981) writes "it is the agents of the principals who enforce contractual agreements and enact penalties and not always, are these agents perfectly constrained by their principals". The main justification that renders the agents as separate interest groups is that they are self-interested individuals with their own interests; and their behavior is guided by those interests.

behaviour of state actors. In the same way, the corruption potential or other forms of rents associated with state intervention shapes the behaviour of rulers and their agents. In this study, we want to show how these cumulative types of rents affect the uncoordinated rent-seeking behaviours of rulers and their agents; and what does it imply for institutional reforms? The rest of the paper is organised in four sections. Section 2 surveys some of the available literature that clarifies the issue discussed in this paper. In order to motivate our hypothesis, we provide some descriptive cross-country evidence in Section 3. In particular, this analysis illustrates the growth performances of selected economies, given their endogenous and exogenous characteristics. Section 4 provides a theoretical model that formalises the main argument of the paper. Section 5 concludes the paper.

2. REVIEW OF LITERATURE

The basic argument in the paper is that institutional change is driven by their distributional advantages and the state actors, in order to sustain or expand their rents, prevent institutional reforms. We survey two strands of the literature: theoretical and applied. On the theoretical side, we focus on studies related to the social conflict view of institutions, rent-seeking, and their possible relevance to state actors. On the applied side, we survey the literature related to the possible types of rents available to the state actors and their implications for formal institutions.

2.1. The Social Conflict View of Institutions, Rent-Seeking and the State Actors

The basic premise of the social conflict view of institutions is that institutions are social choices and different groups benefit from different subsets of institutions. As a result, there is conflict of interest over these choices, and the conflict is won by the group with higher bargaining or political power. In other words, at any time and in any society, institutions which are favoured by the privileged groups persist. This approach, originated from Marx's theory of class conflict, is extensively discussed in the literature on the evolution of institutions.[5] The theories of interest groups and rent-seeking become relevant to the evolution of institutions once we take into account the distributive consideration of institutions.[6]

Rent-seeking meant to describe the resource-wasting activities of individuals and groups in seeking transfers of wealth through the aegis of state; and the groups involved in rent-seeking are the corresponding interest groups [Tullock (1967); Krueger (1974); Posner (1975)].[7] According to the traditional theory, rent-seeking arises generally due to the introduction of state to economic interactions; however, this is not the only setting in which rent-seeking may occur. There is trade-off between the social losses due to private expropriation (theft, robbery, piracy, war or disorder etc.), and the social losses due to

[5]Marx's (1970); North (1981, 1990); Libecap (1989); Knight (1992); Acemoglu (2003); Acemoglu, *et al.* (2005); Ostrom (2005); North, *et al.* (2009); Acemoglu and Robinson (2012); Khan (2013) are the most notable works in the elaboration of the social conflict view of institutions.

[6]This is justified by the fact that institutions then become the ultimate determinants of political and economic rights in any society.

[7]The formation of interest groups and the issues related to their collective action problems are extensively discussed in Olson (1965).

state expropriations (corruption, rent-seeking, malfeasance etc.).[8] Alternatively, there is some level of state interference essential for the efficiency of economic activities relative to stateless mechanism or disorder. Likewise, the traditional theories attempted to explain the rent-seeking behaviour of private groups or individuals who lobby or involve in illegal activities for attaining government transfers or other favours.[9] However, recent research has shown that state intervention in economic interactions creates public interest groups besides private groups [North (1981); Acemoglu and Verdier (2000); North, *et al.* (2009); Grief and Kingston (2011); Acemoglu and Robinson (2012)].[10]

So in general, in a rent-seeking society, there are two types of interest groups, i.e. private interest groups, and public interest groups. The public interest groups are the rulers and their agents (military, bureaucracy and judiciary). The rulers constitute as a separate group. For instance, a dictator not only uses the state to maximise his current payoffs; but he often changes the rules with a rent-expropriation view for the future. His payoff does not necessarily imply simple expropriation of the private resources; rather, it comprises the overall institutional payments, including both legal income as well as illegal rents. Similarly, in democracy, the rulers use their constitutional power to maximise theirs as well as their supporters' payoffs. Again, it does not necessarily imply that they simply transfer the rents from the minority either to them or to the groups maintaining their majority; rather, they do such maximisation constitutionally. Alternatively, in order to ensure their future rents, they choose the rules that maintain their economic and political power.

Likewise, the state agents, i.e. bureaucracy, military and judiciary constitute separate interest groups. They maximise their compensation package through their influence on the political and economic systems. Overall, this package consists of the salary paid by the state, any income (legal or illegal) obtained from outside activities, and the perks of their offices. We have substantial literature that highlights such behaviours of these groups. For instance, North's (1981) theory of the neoclassical state elaborate on how the agents' behaviour affects the emergence of institutional framework in a society? Similarly, Alesina and Tabellini (2007) argue that the rise of regulatory state has made the agents key players with regard to the decisions and execution of a large amount of legislation. In a slightly different version, Greif and Kingston (2011) argue that the enforcement of rules should be taken as an integrated component of the institutional structure.[11] Thus, the theories of institutional change should embody the enforcement

[8]The details of the Institutional Possibility Frontier are given in the Djankov, *et al.* (2003). In the paper titled as "The New Comparative Economics", the authors give the possible social orderings for a society ranging from 'Private Orderings' to 'Independent Judges' to 'Regulatory State' to 'State Ownership'. The authors give a detailed description of the social losses associated with each of these institutional structures.

[9]For instance, an entrepreneur wishing to get the monopoly rights of a government regulated industry might pay the campaign contributions to politicians, or might bribe a bureaucrat or judge for this purpose.

[10]For the details of the state and its contribution in economics interaction, see the neoclassical theory of state given in North (1981). Especially, it elaborately illustrates the instances and possibilities where the interests of the state actors may lead to the emergence and persistence of inefficient institutions. Similarly, state actors are part of the North's, *et al.* (2009) 'dominant coalition' and Acemoglu and Robinson's 'privileged groups'. See also Grief and Kingston (2011) for the enforcement of institutions as equilibrium outcome.

[11]Greif and Kingston (2011) argue that the view of institutions-as-equilibria focuses on how interactions among purposeful individuals create structure that gives each of them the motivation to act in a manner perpetuating this structure.

characteristics of institutions. So, unless we take all these groups into the structure of economics and endogenise their behaviours, it would be an incomplete discussion what Landes and Posner (1975) called 'a romantic view' that the members of the agencies are the unique guardians of some mystical "public interest".[12]

Similarly, the private interest groups maximise their payoffs given the set of informal and formal institutions. In particular, the set of formal institutions reflects their interactions with the public interest groups. The basis of these groups may be land, industry, or simply religious/ethnic causes. Olson (1965) provides the mechanism that result in the emergence of such groups; and asserts that the size and the solution of the collective action problem determine the actual effectiveness of such groups. Since, in this study, we focus more on public interest groups, so the remaining population will be assumed as a single group for simplicity.

2.2. Rents in Societies, Institutions and Economic Development

There are two types of rents that state officials can seize. First, the state actors can create or seize rents from their interactions with private individuals or groups, i.e. corruption or rent-seeking. The second source comprises the windfall rents like the rents from natural resources, foreign aid, or some other form of public funds that might exclusively be at the disposal of either the rulers or their agents. Regarding corruption, there are controversial claims with regard to its implications for economic outcomes. For instance, Mauro (1995) empirically concludes that corruption negatively affect economic growth, using cross-country data from 1960 to 1985. In contrast, Leff (1964) and Lui (1996) predict that corruption enhances economic success by avoiding bureaucratic delays. To reconcile these conflicting views, the dynamic effects of corruption need to be sought. In terms of static effect, corruption involves transfers from bribe-payers to the bribe-takers; so, it does not have a net social cost to the society. However, in terms of dynamic effects, corruption inversely affects the efficacy of institutions. Accordingly, corrupt rulers or agents will resist any institutional change that endangers this type of bounty either today or in future.

In the same way, sufficient literature exists on the implications of natural resources wealth, and foreign aid for economic growth [Auty (1990); Sachs and Warner (1997, 1999, 2001); Djankov, *et al.* (2008); Knack (2001); Brautigam and Knack (2004); Kronenberg (2004); Dalgaard and Olsson (2008); Khan (2012)]. In case of natural resources wealth, the assertions are not congruent. To some it enhances investment and productivity; while to other, it is a curse as it results in rent-seeking which hampers long run development. There are many case studies across the globe that confirms the hypothesis of the natural resources curse. For instance, resources rich countries like Mexico, Nigeria, and Venezuela are struggling in terms of their economic performances.[13] However, there is little progress on 'how it affects economic growth'? Given the recent emphasis on institutions, in this study, we explore the argument that the

[12]This concern is widely discussed in a paper titled as "The Independent Judiciary in an Interest-Group Perspective" by William Landes and Richard Posner in 1975 and a subsequent comment on the paper by Buchanan (1975). Both argue that in the economic approach to politics 'the judiciary's role is one of representing the under represented groups in the political process.

[13]In contrast, the four Asian Tigers including Singapore, South Korea, Taiwan, and Hong Kong are deficient in natural resources, but are economic miracles.

availability of natural resources rents weakens formal institutions which, in turn, transforms into underdevelopment.

Foreign aid has the same intrinsic characteristics that natural resource rents have. Most of the studies have found negative impact of aid on institutions and economic growth. For instance, Knack (2001) shows that aid flows are significantly correlated with the worsening of political risks for external investors, implying deterioration of economic institutions. Djankov, *et al.* (2008) find that both foreign aid and oil revenues have significant inverse effects on democratic institutions. Brautigam and Knack (2004) reported that the end of US aid to the South Korea and Taiwan resulted in their reforms in 1960s. Thus, the rentable resources have destructive effects on the behaviour of state actors. In particular, they encourage rent-seeking activities relative to productive activities.[14]

The model that we present below is expected to highlight on how the availability of rents in the form of natural resources wealth, foreign aid, or corruption potentials restrict the motivations to improve institutional framework. It also elaborates on how incentives scheme could change institutions if properly offered and implemented. But before going to the model, we would like to see the descriptive cross-country analysis of natural resources rents, foreign aid, corruption, and their probable implications for institutional quality.

3. DESCRIPTIVE CROSS-COUNTRY EVIDENCE

This section provides some cross-country evidence relevant to the issue in the paper. The variables of focus are those that directly or indirectly affect the compensation package of state actors. We highlight some countries where state actors have a handsome amount of rentable resources; corruption and malfeasance are common; economic performance is poor; and compare those with other countries which do not have these characteristics; and have achieved economic success. For this purpose, we choose Nigeria and Pakistan and compare them with Singapore and South Korea. The former two are economic failures while the latter two are economic triumphs.

Singapore, a small country of population slightly higher than 5 million, is one of the four Asian tigers in terms of growth performance. It has a highly market-based economy which depends heavily on exports, including largely manufacturing goods.[15] Economic growth has remained consistently high—at an average annual rate of 8.25 percent from 1960 to 2000. It has surpassed Canada, Australia, and U.K. in 1994, in terms of per capita GDP. In nominal terms, its total GDP is estimated at $194.92 billion with per capita GDP of $43,867 in 2010. Like other Commonwealth states, Singapore inherited the British model of governance. However, its institutional framework is widely known for its efficiency and competence.[16] The state-led economic achievements make

[14]For instance, Murphy, Shleifer, and Vishny (1993) argue that in situations where rent-seeking provides more lucrative opportunities than productive work does, the allocation of talent would be worse: talented and highly educated individual will be more likely to engage in rent-seeking than in productive work, with the adverse consequences for their country's growth rate.

[15]For instance, the value of its international trade is higher than its GDP, making trade one of the vital components of the economy.

[16]It has been consistently ranked high in terms of business-friendly environment by the World Bank. For instance, in 2012, it is ranked as first in terms of doing business.

Singapore a good case for studying contemporary reforms in governance and institutions. Table 1, in the Appendix, shows that Singapore has no rents from natural resources; and neither has received any foreign aid. Besides, public sector salaries and private sector salaries are almost at par in Singapore. Thus, the larger incentives to state actors combined with the lower windfall rents rank Singapore to have one of the efficient institutional frameworks in the world. This fact is evinced by its higher score on the institutional quality index, and its lower score on the corruption perception index.[17]

South Korea, likewise, is another shining example of a market driven economy, ranking 14th in the world in terms of nominal GDP. In the 1960s, Korea followed the policies of export-oriented industrialisation and import substitution, leading the economy to grow at the rate of 7 percent per annum during the whole decade. Onwards, in 1970s, they transformed to heavy and chemical industrialisation; followed by significant liberalisation in the 1990s. Given the recipe of such policies, it has been one of the fastest growing economies. For instance, from 1962 to 1990, its per capita income increased from $87 to $5199; and its total GDP expanded from $2.3 billion to $220.7 billion. Export-led industrialisation has been the major proximate factor behind the economic miracle of South Korea.[18] Second, the state actively intervened in the market, and took sufficient measures for macroeconomic stabilisation.[19] Alternatively, the state-supported industrialisation transformed South Korea from poverty stricken, inward looking, and economically backward economy in the 1960s into a globally competitive economy by the beginning of 21st century. As is evident from Table 1, South Korea has been a country with limited natural resources; and, likewise, it has never been a significant receiver of foreign aid. The limited amount of rents combined with higher incentives to state actors are the most probable reasons for limited rent-seeking, and higher economic development in South Korea.

Nigeria is the most populous country in Africa and the 8th most populous in the world.[20] It is characterised by larger ethnic and religious divisions. Additionally, it has been under colonisation; and has been endowed with enormous natural resources. For instance, since independence, the economy of Nigeria has been oil-based, providing 95 percent of foreign exchange earnings, and contributing 80 percent to the budgetary revenue. After the independence, Nigeria was expected to have potential for higher development due to its larger human and natural resources. But unfortunately, after five decades, the performance has been dismal as far as social and economic indicators are concerned. With per capita GDP of $1222 in 2010, the growth performance of Nigeria has been truncated during various decades. For instance, in the 1960s, GDP grew at the rate of 3.1 percent per annum, followed by the growth rate of 6.2 percent per annum in the 1970s which was caused by the higher oil prices in the world market. In the 1980s, the growth rate was negative due to oil price slump and debt repayment; however, in the

[17]See Table 1 for the details of data and table 2 for the definition of variables.

[18]In particular, the growth of large scale enterprises ensured the economies of scale and the technology transfer.

[19]For instance, it was often viewed as mercantilist economy as in the early periods of its industrialisation. It erected tariff barriers and imposed a prohibition on manufacturing imports, hoping that the protection would give the domestic firms a chance to improve productivity through learning by doing and technology transfer.

[20]For instance, its population is 152.217 million.

1990s, the economy again reverted to the positive growth rate and grew at the rate of 4 percent per annum.

Two factors are probably shaping Nigeria's poor economic outcomes. First, Nigeria's rulers have been unable to diversify its economy away from its overdependence on highly capital-intensive oil sector. Second, in most of the history of Nigeria, the government style has been remained as autocratic, leading to authoritarian operating rules. Table 1 illustrates that its score on institutional index is 2.8 while its score on corruption perception index is 8.3, both indicating poor institutional framework. Moreover, the rents from natural resources in Nigeria are 35 percent of GDP; and these rents are further augmented by almost half a billion dollars of aid per annum. The corruption and kickbacks of state actors resulted in squandering of the massive amounts of oil revenues and foreign aid.[21] Overall, lower public sector salaries combined with lower beliefs on meritocracy, and higher windfall rents are the most probable reasons for higher corruption, poor institutional framework and poor economic performance in Nigeria.

Finally, **Pakistan**, like Nigeria, has originated its institutional structure from the British. Pakistan, though average growing country at the rate of almost 4 percent per annum since its independence, is marked by higher levels of poverty and income inequality.[22] Pakistan though has experienced both democracy and dictatorship but the operating institutional framework in both forms of government has been authoritarian. Due to weak representative institutions, the state actors like the military and civil bureaucracy have been playing a dominant role in policy making and implementation. It has, on the one side, encouraged corruption and expropriation; and on the other side, capitalist developments have actually taken place under their patronage and close control.[23] This fact is obvious from Pakistan's lower score on the index of institutional quality. In addition, Pakistan has been one of the most aid receiving countries in the world, getting almost 1 billion dollar per annum. Alternatively, foreign aid has created a handsome amount of rents to state actors.[24] The availability of these rents and the lower relative salaries in public sector provide justifications for poor institutional framework, and higher prevalence of corruption in Pakistan.

4. THE MODEL

Consider a two period economy, populated by a continuum $1+\delta_p+\delta_a$ of economic actors, each with discount factor $\beta>0$. The population of common people is normalised to be 1; and also, it is assumed that they are the majority of the society. δ_p is the fraction of

[21]For instance, the 1996 study of corruption by the Transparency International ranked Nigeria as the most corrupt nation among 54 nations listed in the study.

[22]For instance, according to United Nation's Human Development Index (HDI), 60.3 percent of Pakistan's population lives on less than $2 a day and some 22.6 percent are living under $1 a day. Also, the distribution of wealth is highly uneven, with 10 percent of the population earning 27.6 percent of the total income.

[23]According to the rankings of the Transparency International in 1996, Pakistan was the 3rd most corrupt country in the world. Similarly, business opportunities have been restricted to selected people who have established good relationships with these two interest groups.

[24]In particular, the grants associated with Afghan War and War on Terror besides the Official Development Assistance (ODA) has added to this bounty.

politicians who are also rulers. Namely, rulers and politicians are synonymously used in this study. Finally, δ_a is the fraction of agents of the rulers. As stated earlier, in this study, agents like bureaucrats, military, or judiciary etc. are used as a separate privileged group. It is the agents of the state who enforce contractual agreements, and regulate law and order in a society. But not always, are these agents perfectly constrained by their rulers [North (1981); Acemoglu and Verdier (2000); Alesina and Tabellini (2007)]. The individuals are identical within the same group; however, there is heterogeneity across groups. This assumption is sufficient to ensure that the groups act like a player. The society is decomposed in such a way that the politicians are the rulers; the agents are the functionaries of the government; and the citizens are the subjects.

This is a two period economy, i.e. today and tomorrow. The individuals are risk neutral and their preferences are summarised by the following period felicity function:

$$u_{i,t} = C_{i,t} + \gamma_i l_{i,t} \qquad i = p,a,c \qquad t = 0,1 \qquad \ldots \qquad \ldots \qquad \ldots \qquad (1)$$

$C_{i,t}$ is the consumption of player I in period t. l_i and γ_i are the leisure and the marginal utility of leisure for individual i respectively. The subscripts p, a, and c denote the politicians, the agents, and the common people respectively. Each individual is endowed with 1 unit of time, which he exhausts in work and leisure. There is a single final good y, which is produced according to the following technology:

$$Y_t = R_t L_{y,t}^{\alpha} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (2)$$

R_t is the degree of the effective institutional framework in period t, while $L_{y,t}$ is the amount of labour used in the production, which is supplied by the common people or citizens. α is the share of labour in production sector; and as a tradition, it is assumed that $\alpha>0$. The industry is jointly owned by the rulers and some citizens. The share of rulers is $\kappa<0.5$, in order to be closed to reality.[25] Labour is paid at the rate of competitive wage rate and the net profits are distributed according to the respective shares. Accordingly, the wage rate is given as:

$$w_t = R_t \alpha L_{y,t}^{\alpha-1} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (3)$$

Since, there is single good, so it is also assumed to be the numeraire. Alternatively, all the incomes are measured in terms of this good. The life time value of a player from consumption is measured in terms of his current income or consumption, and his expected next period income or consumption discounted at a positive discount rate β. The institutional framework is introduced through Cobb-Douglas technology and its production function is given as:

$$R_t = \bar{R} A_t^{\rho} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (4)$$

[25]In this study, our focus is on the countries which are natural resources rich, or which depend on foreign aid. In addition, our focus is on countries where political and economic institutions are so absolutist that they create enough corruption potential in the society. If we characterise the countries of the world by these characteristics, then the elite section of the society or North, *et al.*'s 'Dominant Coalition' is the minority of society.

Equation 4 specifies the effective level of formal institutional order as a function of the effort by the agents of the state, denoted by A.[26] The justification is that once the rules are codified or written; they are ultimately implemented by the agencies like bureaucracy, military, and the judiciary. Accordingly, the effective formal institutional framework must reflect the optimality behaviour of these agents. To make things easy, we assume to measure effort in terms of the time devoted to the improvement in or the maintenance of institutional framework. There is some status-quo level of institutional framework R_0. This assumption is made in order to put restriction that A cannot be zero in any period. This assumption reflects that we avoid the state of complete anarchy deliberately. Assume that A_0 is the level of effort associated with the minimum level of the institutional framework, R_0. Similarly $\overline{R}$ is the ideal level of institutional framework. We can assume, without loss of generality, that $\overline{R}$ are the rules which are written in the constitutions; and they are optimal.[27] So if at any time, the rules are less than $\overline{R}$, we say that the rules are not efficiently implemented by the agents of society. Also, we further assume that at the ideal level of institutional framework, $\overline{R}$, there is no expropriation of the state resources or assets by either the rulers or their agents.

The agents are paid at the competitive wage rate from the government budget for the level of effort put forward in maintaining the institutional framework. Additionally, the maintenance of the institutional framework is financed through lump sum taxation, T, on citizens. The rulers exhibit their preferences for a particular set of institutions through their willingness to initiate reforms or to maintain with the status quo. Similarly, the agents display their preferences through their provision of the effort level to the maintenance of institutional framework. Finally, the citizens' preferences for institutional framework are represented by their reaction in terms of labour supply to the production sector. The reforms introduced today produce benefits tomorrow. This assumption implies that institutions have long lasting effects on development.

4.1. Descriptions of the Players

In this section, we describe the objective functions of the players, and characterise their optimal behaviour, given their control variables.

4.1.1. *The Rulers or Politicians*

The life time value function of ruler is given as:

$$V_p = \frac{S_0}{2} + P_0 + W_p + \beta\left[\frac{S_1(R_1)}{2} + P_1(R_1)\right] + l_p \qquad \ldots \quad \ldots \quad \ldots \quad (5)$$

$$S'(R) < 0 \ \textit{and} \ P'(R) > 0$$

[26]According to Grief and Kingston (2011), institutions as equilibria encompass the enforcement characteristics of formal rules. Thus, the actual prevailing institutional framework reflects the optimality behaviour of the enforcers.

[27]At this level of institutional framework, the behaviour of agents is like that of the Weberian bureaucracy. In other words, the agents are the unique guardians of some mystical public interest.

V_p is the life time value function of the ruling elite which is the sum of current period payoffs and the discounted value of the next period payoffs. *S*, *P*, and l_p denote the expropriation of rents from either foreign aid or natural resources, share in profits, and leisure respectively. Expropriation decreases with institutional improvements and profit share increases with it. Further, W_p is the share of the rulers accruing from the institutional framework sector, i.e. the difference between the government revenue and the amount paid to the agents. The payments to agents include both the wage and any other type of reward for their efforts. We make some further assumptions. First, each period, there is some fixed amount of rents, *Z*, either from foreign aid or from natural resources, coming to the country. Some of these resources are expropriated which are jointly shared by the rulers and agents in equal amount. The remaining part is equally divided among citizens. Second, reforms, once undertaken, cannot be reversed because it is costly. These costs may include either adjustment costs or the costs associated with the strikes or lobbying of the groups who are the winners in the prevailing institutional arrangements. As stated earlier, the expropriation and profit share tomorrow are the function of reforms introduce today. There is trade-off for rulers in institutional reforms, i.e. good institutions tomorrow implies lower expropriation but higher profits; while bad institutions implies higher expropriation but lower profits.

Fors and Olsson (2007) define an excellent measure for expropriation, which is used in this study. According to that definition, the amount of expropriation at any period *t* that can be made, given the level of reforms, R_t, is given as:

$$S_t = \left(\frac{\overline{R} - R_t}{\overline{R}} \right) Z \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

Similarly, in the production sector, the profits are distributed according to the respective shares after the payment of wages. The rulers' share, P_t, at any period *t* can be written as:

$$P_t = \kappa \pi_t = \kappa (R_t L_{y,t}^{\alpha} - R_t \alpha L_{y,t}^{\alpha}) = \kappa R_t \left[1 - \alpha\right] L_{y,t}^{\alpha} \qquad \ldots \quad \ldots \quad \ldots \quad (7)$$

Using the definitions, given by the Equations 4, 5, 6, and 7, we get the lifetime value function of rulers or politicians in terms of the effort of agents and labour supply supplied to the institutional and production sectors respectively.

$$V_p = (\frac{\overline{R} - R_0}{2\overline{R}}) Z + \kappa R_0 (1-\alpha) L_{y,0}^{\alpha} + T - \rho \overline{R} A^{\rho} + \beta (\frac{\overline{R} - \overline{R} A^{\rho}}{2\overline{R}} Z + \kappa \overline{R} A^{\rho} (1-\alpha) L_{y,1}^{\alpha}) + l_p \quad (8)$$

4.1.2. *Agents of the State*

As defined above, agents are the functionaries of the government that comprise organised agencies like bureaucracy, military and the judiciary. In most of the earlier literature, their role is either taken exogenous to other groups in society or taken in a limited form of principal-agent framework. In contrast to the existing literature, our model is innovative due to two aspects. First, we take all the groups as endogenous in their decision making. Second, the endogenous behaviour of state agents implies that their cooperation or effort for institutional reforms depends on the implications of these

reforms for their compensation package.[28] In other words, they choose their effort levels to maximise their payoffs. It is assumed initially that if there is any expropriation, it is jointly shared by the rulers and their agents. Second, agents have also the potential to be involved in the decentralised corruption.[29] Defining the preferences of agents of the state over corruption implies that corruption matter for the evolution of institutions.

Let X be the fixed corruption potential per period in the economy.[30] We have assumed only decentralised corruption, so corruption is taken out of the incomes of citizens or

$$0 \leq X \leq \alpha R_t L_{y,t}^{\alpha} + (1-\kappa)(1-\alpha) R_t L_{y,t}^{\alpha} + \frac{R_t Z}{\bar{R}} - T.$$

To simplify things, we assume that corruption income enters the value function of the agents in the similar way as the expropriation of the foreign aid or natural resources rents does. Then, it is obvious that the income from corruption declines with the improvements in the institutional framework. Using the given definitions, the lifetime value function of the agents is given as:

$$V_a = \underset{A}{Max}\left(\frac{(\bar{R}-R_0)Z}{2\bar{R}} + \frac{(\bar{R}-R_0)X}{\bar{R}} + \rho\bar{R}A^{\rho} + \frac{\beta(\bar{R}-\bar{R}A^{\rho})Z}{2\bar{R}} + \frac{\beta(\bar{R}-\bar{R}A^{\rho})X}{\bar{R}} + \rho(1-A)\right) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

The first order condition of agents implies that the optimal level of effort or cooperation offered to institutional reforms by the agents is given as:

$$A^{*} = \left[\bar{R}\left(\rho - \frac{\beta Z}{2\bar{R}} - \frac{\beta X}{\bar{R}}\right)\right]^{\frac{1}{1-\rho}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

A^{*} is the level of effort that the agent would assert in the maintenance of institutional framework. The structure in this study shows that institutional framework in any society is characterised by the optimality behaviour of agents. So, the status-quo, $A^{*}=A_0$ is equilibrium outcome. For any formal institutional change, the change in A^{*} is needed. Thus, in order to induce more effort from agents of the state, incentives are needed to be provided to them.

Lemma 1: *The effort of agent is an increasing function of its share in institutional framework sector,ρ, and a decreasing function of Z and X.*

Proof: The proof is understandable by taking the first derivate of the optimal level of effort of the agent with respect to the corresponding parameters.

[28]The compensation package includes both the legal income as well as the illegal rents.

[29]Easterly (2001) defines the decentralised corruption as the type of corruption characterised by many bribe-takers with their uncoordinated bribe-taking activities. So, by the virtue of its definition, decentralised corruption is directly related to the agents of the state.

[30]The corruption potential is defined majorly by the existing set of informal and formal institutions. For instance, the informal institutions like culture, religion or ideology determine the moral sentiments of corruption like shame, informal punishments etc. Second, the formal institutions affect corruption potential by defining the role of agents in economic interactions and the accountability procedures of the agents.

This result is very useful for the institutional explanation of cross-country development gaps. The result implies that the societies with more windfall rents like natural resources rents, foreign aid or with more corruption potential are expected to persist with the bad set of institutions. For such societies, a larger set of incentives needed to be offered to the rulers and to their agents in order to change the existing set of bad institutions. For instance, the incentives should be such that the expropriation and corruption are less advantageous relative to the legal incomes such as salary to the agents or the profits shares to the rulers. On the other hand, in societies where the history has provided them with the less corruption potential or expropriation level, good institution would emerge.

Definition 1: Define θ as the rate of incentives that the rulers offer to the agents to bring about institutional change. For instance, if the rulers wish to have an effective institutional framework R_t in the society, the incentives to the agent of the state becomes θR_t.

4.1.3. *Citizens*

The citizens are endowed with 1 unit of time, which they exhaust in labour to production sector and leisure. Their maximisation problem is given as:

$$V_c = \underset{L_{y,t}}{Max}(\alpha R_t L_{y,t}^{\alpha} + (1-\kappa)(1-\alpha)R_t L_{y,t}^{\alpha} + \frac{R_t Z}{\bar{R}} - T - \frac{(\bar{R} - R_t)X}{\bar{R}} + \alpha(1-L_{y,t})) \qquad for\ t = 0,1 \quad ... \quad ... \quad ... \quad ... \quad ... \quad (11)$$

According to the optimisation of the citizens, the equilibrium supply of labour to the production sector is given as:

$$L_{y,t}^{*} = [(\alpha + (1-\kappa)(1-\alpha))R_t]^{\frac{1}{1-\alpha}} = (QR_t)^{\frac{1}{1-\alpha}} \qquad ... \quad ... \quad ... \quad (12)$$

Lemma 2: *The labour supply is increasing in institutional reforms R_t. Moreover for $\kappa \leq 1$, the supply of labour changes positively with the change in κ if the indirect institutional implications of a change in κ are larger than the direct effects of the same change that is*

$$\frac{dL_{y,t}}{d\kappa} \geq 0 \qquad iff \qquad Q\frac{dR_t}{d\theta^{*}}\frac{d\theta^{*}}{d\kappa} \geq (1-\alpha)R_t.$$

Alternatively, the indirect effect of κ on labour supply must dominate the direct effect of κ on labour supply for labour supply to respond positively to changes in κ.

Proof: The Proof of the first line is obvious from the expression of the equilibrium supply of labour. The proof of second claim is given in the appendix.

The first result follows from the fact that improvements in institutional framework imply higher wage rate and higher profit shares. In other words, improvements in institutions implies higher price of leisure which cause an increase in the supply of labour. The second result implies that for $\kappa \leq 1$, the indirect effect of κ on labour supply must dominate the direct effect of κ on labour supply for labour supply to respond

positively to changes in κ. When κ increases, there are two effects on the supply of labour. One is the direct effect which decreases the labour supply because an increase in κ implies that the share of citizens in profits decreases. The other effect is indirect, i.e. through its effect on institutions. This effect is positive because for $\kappa \leq 1$,

$$\frac{d\theta}{d\kappa} \geq 0$$

that is institutions improve with the increase in κ, where θ is the rate of incentives that the rulers offer to the agents to bring about institutional change. The net effect is the sum of these two effects, which is only positive if the above inequality is satisfied.

4.2. Institutional Change and the Associated Incentives

According to North (1990), institutional change comes about when changes in relative prices create incentives for individuals or groups to renegotiate contracts or restructure rules. There are three relevant interest groups with two of them having the *de jure* political power to bring about institutional change.[31] Accordingly, we need to clarify their associated incentives with the institutional change. As stated earlier, the maintenance of institutional framework and the associated institutional change is financed by lump sum taxation on citizens. Now in this simple economy, the rulers will initiate reforms if and only if their life-time payoffs from the new institutional framework are, at least, as much as it would be if they maintained with the status quo. In our framework, this implies the following condition which we can name as the participation constraint of the rulers;

$$V_p^1 - V_p^0 = -\theta R_1 - \rho(R_1 - R_0) - \frac{\beta(R_1 - R_0)Z}{2\bar{R}} + \beta\kappa(1-\alpha)Q^{\frac{\alpha}{1-\alpha}}\left[R_1^{\frac{1}{1-\alpha}} - R_0^{\frac{1}{1-\alpha}}\right] \geq 0 \qquad C1.$$

The details of the derivation of $C1$ are given in the appendix. The first two terms is the loss in income associated with the transfers from the rulers to the agents with the corresponding institutional change. The third term is the change in the receipts from expropriation while the last term is their corresponding change in profits. According to the setting, all the first three terms are expected to be negative while the last term should be positive. To put it in more concrete words, there is a trade-off in initiating institutional reforms, i.e. good institutions imply higher share in profits from the production sector, lower expropriation receipts, and a loss in terms of transfer from the rulers to the agents. On the other hand, the persistence of bad institutions or the status quo implies higher expropriation of rents, lower share in profits, and no additional transfer to the agents. Thus any type of institutional change will be initiated if the net benefits to the rulers are positive.

In the same way like rulers, at the status quo level, R_0, $A_0=A^*$ is the optimal level of the effort of agents. Now in order to improve institutional framework, more effort from

[31]The *de jure* political power is the power which is allocated by the political institutions in a society. For instance, it includes the power of rulers and their agents, given to them by the constitution. See, also, for the details of different components of political power and their definitions Acemoglu and Robinson (2006).

agents of the state is needed.[32] In order to induce agents to supply more effort, there must be some incentives associated with any effort level, $A>A_0=A^*$. Here we assume that for any institutional improvement, the agents is provided with some constant rate, θ, of benefits that is

$$INC_a = \theta R_1 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (13)$$

Incorporating this increment in the optimal behaviour of the agents, we would drive the best response function of the agents.[33] This is given by the following function:

$$A^{**} = \left[\bar{R}(\rho + \theta - \frac{\beta Z}{2\bar{R}} - \frac{\beta X}{\bar{R}}) \right]^{\frac{1}{1-\rho}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (14)$$

The only difference between A^* and A^{**} is the inclusion of θ inside the bracket, i.e. with the offer of increment, A^* increases to A^{**}. Thus θ>0 implies higher level of optimal efforts by the agents in comparison with the status quo.

4.3. Equilibrium

This is sequential game with perfect information; so it can be solved by backward induction. The ruler serves as Stackelberg leader in the game. He observes two things before playing his strategy. First, he observes the optimal effort of agents of the state at all levels of incentives. Likewise, he observes the optimal supply of labour at all levels of institutional framework. After observing the behaviours of agents and labour, he decides whether to initiate institutional reforms or not?

4.3.1. *Strategies Sets*

The strategy of rulers is to either initiate reforms or maintain with the status quo; and if the reforms are to be initiated, then how much incentives are to be offered to the agents? To write it more formally, the actions of rulers are given by the function:

$$\sigma_\rho : [0,1] \times [A_0,1] \rightarrow \left\{ 0, (1, \theta \in \Re^+) \right\}$$

0 refers to status-quo and 1 refers to initiating institutional reforms. Similarly, the functional form of the actions of agents is given as:

$$\sigma_a : \left[0, \frac{(\bar{R} - R_0)Z}{2\bar{R}} \right] \times \left[0, \frac{(\bar{R} - R_0)X}{\bar{R}} \right] \times \theta \rightarrow [A_0,1].$$

Finally, the function of the citizens' actions is the following:

$$\sigma_c : [R_0, \bar{R}] \rightarrow \left[(QR_0)^{\frac{1}{1-a}}, (Q\bar{R})^{\frac{1}{1-a}} \right]$$

[32] Acemoglu and Verdier (2000) suggest when agents are difficult to monitor, they should receive higher wages. So in order to reduce corruption and improve the efficiency of agents, the incentives for corruption must be diminished that can be made possible with higher wages.

[33] The details of the derivation are given in the appendix.

Given, these sets of strategies, we define sub-game perfect equilibrium for this game.

Definition 2: *The sub-game perfect equilibrium is defined as* "*the strategy profile:*

$$\sigma^{*} = \left(\sigma_p^{*}, \sigma_a^{*}, \sigma_c^{*}\right)$$

such that the strategies of the rulers, agents and the citizens are best responses to each other".

There are various strategy profiles which can be in equilibrium depending on the values of parameters. Nevertheless, for any specification of parameters, the equilibrium is unique.

4.3.2. *Subgame Perfect Equilibrium*

Given any optimal values of A and L_y, such that the inequality $C.1$ in not satisfied, there is unique sub-game perfect equilibrium in which the players play

$$\sigma_p^{*} = 0, \sigma_a^{*} = A_0 \; and \; \sigma_c^{*} = (QR_0)^{\frac{1}{1-a}},$$

In the same way, for any optimal values of A and L_y such the inequality $C.1$ is satisfied, there is unique equilibrium for any specification of the parameters. In this equilibrium players play

$$\sigma_p^{*} = 1, \theta, \sigma_a^{*} = \left[\bar{R}(\rho + \theta - \frac{\beta Z}{2\bar{R}} - \frac{\beta X}{\bar{R}})\right]^{\frac{1}{1-\rho}} \; and \; \sigma_c^{*} = (QR_1)^{\frac{1}{1-a}}$$

The rate of incentives to the agents, θ, is determined by the maximisation problem of the rulers that is given by the following implicit equation

$$\frac{\partial V_p^1}{\partial \theta^{*}} = \frac{\rho}{1-\rho}\bar{R}A^{2\rho-1}\left[-(\rho + \theta + \frac{1-\rho}{\bar{R}\rho}A^{1-\rho} + \frac{\beta Z}{2\bar{R}}) + \beta\kappa(\bar{R}A^{\rho}Q)^{\frac{\alpha}{1-\alpha}}\right] = 0 \qquad \ldots \quad (15)$$

Given, the assumed functional forms, it is complex to derive the optimal level of θ^{*} in reduce form; however, assuming that the conditions of Implicit Function Theorem (IFT) are satisfied, we can characterise the comparative statics with respect to the parameters of the model. To do comparative statics, we assume α=2/3. In most of the empirical literature on growth, the labour share in production is estimated as α=2/3.[34] Also, we assume that the shares of rulers' and agents in the institutional framework sector are equal, i.e. ρ=1/2. These assumptions are made to make things clear for understanding. The resulting comparative statics with respect to the optimal rate of incentives that rulers would offer to the agents are summarised in the following lemma.

[34]See, for instance, Krueger and Lindahl (2001) for a detailed discussion of the most plausible world level of the labour share.

Lemma 3:*For the optimal level of θ with respect to the ruler, it is true that*

$$\frac{d\theta^*}{dZ} \leq 0 \quad if \quad \frac{\partial}{\partial Z}\left(\frac{\partial V_p^1}{\partial \theta^*}\right) \leq 0 \qquad and \qquad \frac{d\theta^*}{d\kappa} \geq 0 \; if \; \kappa \leq 1$$

Proof: Given in the appendix.

The change in the available rentable resources, *Z*, has four effects for the outcomes of rulers. One is the direct effect and the other three are indirect. For instance, when *Z* increases, the direct effect comes on expropriation which also increases. The indirect effect is through its effect on institutions. The increase in *Z* implies the worsening of institutions which, in turn, implies lower payments to agents, lower profits, and higher expropriation in future. So lemma 4.3 implies that θ^* will decrease with the increase in *Z* if the loss in profits is smaller than the benefits from higher expropriation and lower payment to agents. This result is very important in the sense that the improvements in institutions would be prompted only if the importance of profits was higher to the rulers relative to that of the expropriation. The second result is straightforward; as an increase in κ implies higher share of the rulers in profits from production sector, which induces the rulers to initiate institutional reforms and offer a positive rate of incentives to the agents. Now, we summarise the results of the equilibrium in the following proposition:

Proposition 1: *There is a unique sub-game perfect equilibrium in the game described above*

$$(\sigma^* = (\sigma_p^*, \sigma_a^*, \sigma_c^*))$$

It is such that if the inequality C.1 is not satisfied, then institutional framework is R_0 *and* $A=A_0=A^*$ *and*

$$L_{y,1} = (QR_0)^{\frac{1}{1-\alpha}}.$$

If the inequality C.1 is satisfied, then $A=A^{**}$*, and*

$$R_1 = \bar{R}(A^{**})^{\rho} \text{ and } L_{y,1} = (QR_1)^{\frac{1}{1-\alpha}}$$

It is highlighted how in economies with multiple interest groups, and having rentable resources, the incentives for institutional reforms diminish with the increase in rentable resources. Second, by taking the enforcement of institutions as endogenous and the agents of the state as a separate interest group, it is shown how the actual effectiveness of the formal institutional framework is shaped. In other sense, it is illustrated that the prevailing institutional framework in any society reflects the optimality behaviour of the various interest groups in that society. In order to bring about change, the privileged groups need to be incentivised to change their strategy to the new equilibrium.

4.3.3. *Efficiency*

What is the efficient output in this economy? The answer to this question is simple. We need to find the values of *A* that maximises the total output in the production sector. The output in the reduced form is given as:

$$Y = (\overline{R}A^{\rho})^{\frac{1}{1-\alpha}} Q^{\frac{\infty}{1-\alpha}}$$

The value of A that, for a given values of the parameters, maximises the total output is 1. When A=1, the institutional framework in the economy is at the best level, i.e. $\overline{R}$. By assumption, this implies no corruption, and no expropriation of natural resources or foreign aid. Using these facts in the expression for A^{**} implies

$$\theta^{**} = \frac{1}{\overline{R}} - \rho \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (16)$$

This is the level of θ that will induce the agents to offer its total supply of endowment to the institutional framework. θ** is decreasing with ρ. The intuition is that ρ is the share of agents in the institutional sector, and higher ρ implies higher rewards for the effort in the maintenance of institutions which serves as an alternative to θ. Similarly, θ** is also decreasing with $\overline{R}$. The justification is that relative expropriation increases at all levels of R_t with the increase in the ideal institutional framework, $\overline{R}$. Thus, the agents' opportunity cost of improvement in institutions decreases. As a result, little incentives are needed to induce agents for higher effort.

However, efficiency can only be achieved if the incentives of both the rulers and the agents are coincided with the ideal form of institutional framework. In other words, efficiency requires:

$$\theta = \theta^{**} = \frac{1}{\overline{R}} - \rho \ \textit{and} \ R_1 = \overline{R},$$

and C.1 is satisfied at the efficient level of institutions, *i.e.*

$$(\rho R_0 - 1) - \frac{\beta(\overline{R} - R_0)Z}{2\overline{R}} + \beta\kappa(1-\alpha)Q^{\frac{\alpha}{1-\alpha}}\left[\overline{R}^{\frac{1}{1-\alpha}} - R_0^{\frac{1}{1-\alpha}}\right] \geq 0 \qquad \ldots \quad \ldots \quad (C2)$$

This is equivalent to stating that the payoffs of the ruler at the efficient level are at least as much as it would be if the system continued with the status quo. The purpose of this discussion is to highlight the fact that in societies where the agencies are strong, the constraints to efficiency may not only be associated with the rulers; but also, these self-interested agents might hinder institutional reforms. In this simple model, if *C*.1 (C.2) is not satisfied, the rulers would prefer to continue with the status quo; i.e. they would never prefer the efficient level of institutional framework as there are no associated incentives. Similarly, for θ<θ**, the agents would never offer the efficient level of effort. In general, when it is in the interest of those with sufficient bargaining strength to alter the formal rules will there be major changes in the formal institutional framework [North (1981)].

5. CONCLUSION

This study is motivated by the previous literature that has emphasised the importance of institutions in the growth and development process. Especially, we have focused on the costs of incorporating state actors and their interests into the formal

sanctioning process. Additional motivation is given by the literature on the curses of natural resources, foreign aid or other types of rents that are associated with state intervention. Today there are many countries in the world characterised by lacking democracies along with powerful agencies. In order to create or sustain their rents, the selected rulers-cum-politicians avoid institutional reforms. Such reforms are usually of interest to the wide cross-section of society. In the same way, agencies, whether they are civil or military, are constraints to institutional reforms. There are various degrees of power that the agencies have in such countries. In some countries they are serving the interests of the rulers and, in return, are offered with perks and privileges. Yet in other countries, they are jointly involved in the expropriation of rents provided by the natural resources wealth or foreign aid. Their involvement in decentralised corruption is widely evidenced in many instances. In this study, we formalise these issues and provide a game theoretic framework which can explain the behaviour of rulers and their agents in the presence of such rents. Our model is innovative in showing that the availability of rents offered by the natural resources wealth, foreign aid or corruption potential instigate the rulers and their agents to persist with the bad set of institutions.

There are three main findings of this study. First, it shows that the greater the amounts of windfall rents, i.e. the rents from natural resources or foreign aid, the lesser are the incentives that the rulers and agents have for institutional reforms. This can be a possible explanation for the persistence of underdevelopment in natural resources rich economies like Nigeria, Venezuela, Mexico etc. and the most aid receiver countries like Mozambique, Congo Democratic Republic, Tanzania, Philippines, and Pakistan. Second, the incentives of state officials for institutional reforms decline with the increase in corruption potential. Alternatively, the larger the corruption potentials in a society, the smaller are the incentives of its state officials for institutional reforms. This finding supports the existence of underdevelopment in the corrupt countries like Nigeria, Bangladesh, Somalia, Haiti, Angola and some Central Asian Republics etc. Third, our model shows that, in order to improve institutions in countries with rentable resources or corruption potential, a larger set of incentives should be given to both the rulers and agents. Such incentives must be sufficient to make expropriation and corruption less advantageous relative to those incentives.

Although the model discusses the endogenous behaviours of different interest groups in a clear way, we believe that several other aspects might be fruitfully analysed within the given framework. For instance, we have focused only on the impact of institutions on labour supply or profits. It can be extended to see the dynamic effects of institutions on capital accumulation, including both physical as well as human. In addition, an econometric analysis is clearly needed in order to understand the exact channels of causation.

APPENDIX 1

A. Let

$$Q = (\alpha + (1-\kappa)(1-\alpha)) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \text{(A1)}$$

Then the labour supply is

$$L_{y,t} = (QR_t)^{\frac{1}{1-\alpha}}$$

B. The ruler's payoff from status-quo is given as:

$$V_P^0 = (\frac{\overline{R} - R_0}{2\overline{R}})Z + \kappa R_0(1-\alpha)(QR_0)^{\frac{\alpha}{1-\alpha}} + T - \rho R_0 + \beta\left[(\frac{\overline{R} - R_0}{2\overline{R}})Z + \kappa R_0(1-\alpha)(QR_0)^{\frac{\alpha}{1-\alpha}}\right] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (A2)$$

While his payoffs, given the new set of institutions is given as

$$V_P^1 = (\frac{\overline{R} - R_0}{2\overline{R}})Z + \kappa R_0(1-\alpha)(QR_0)^{\frac{\alpha}{1-\alpha}} + T - (\rho+\theta)R_1 + \beta\left[(\frac{\overline{R} - R_1}{2\overline{R}})Z + \kappa R_1(1-\alpha)(QR_1)^{\frac{\alpha}{1-\alpha}}\right] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (A3)$$

The individual rationality constraint, $V_p^1 - V_p^0 \geq 0$ implies that

$$-\theta R_1 - \rho(R_1 - R_0) - \frac{\beta(R_1 - R_0)Z}{2\overline{R}} + \beta\kappa(1-\alpha)Q^{\frac{\alpha}{1-\alpha}}\left[R_1^{\frac{1}{1-\alpha}} - R_0^{\frac{1}{1-\alpha}}\right] \geq 0 \quad \ldots \quad (C1)$$

C. With the new set of incentives, the agent's maximisation problem becomes

$$V_a = \underset{A}{Max}(\frac{(\overline{R} - R_0)Z}{2\overline{R}} + \frac{(\overline{R} - R_0)X}{\overline{R}} + (\rho+\theta)\overline{R}A^{\rho} + \frac{\beta(\overline{R} - \overline{R}A^{\rho})Z}{2\overline{R}} + \frac{\beta(\overline{R} - \overline{R}A^{\rho})X}{\overline{R}} + \rho(1-A)) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (A4)$$

As a result, the new level of effort after incentives is A^{**} and is given as

$$A^{**} = \left[\overline{R}(\rho + \theta - \frac{\beta Z}{2\overline{R}} - \frac{\beta X}{\overline{R}})\right]^{\frac{1}{1-\rho}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (A5)$$

D. Proof of Lemma 3: The first order condition of the ruler after he decides to bring about institutional reforms is given by the equation:

$$\frac{\partial V_p^1}{\partial \theta^*} = \frac{\rho}{1-\rho}\overline{R}A^{2\rho-1}\left[-(\rho + \theta + \frac{1-\rho}{\overline{R}\rho}A^{1-\rho} + \frac{\beta Z}{2\overline{R}}) + \beta\kappa(\overline{R}A^{\rho}Q)^{\frac{\alpha}{1-\alpha}}\right] = 0 \quad \ldots \quad (A6)$$

Given the assumptions on the parameters values, equation *A6* implies that

$$\frac{d\theta^*}{dZ} = -\frac{\frac{\partial}{\partial Z}(\frac{\partial V_p^1}{\partial \theta^*})}{\frac{\partial}{\partial \theta^*}(\frac{\partial V_p^1}{\partial \theta^*})} = -\frac{-\beta^2\kappa(Q\overline{R})^2 A^{\frac{1}{2}}}{\left[2\overline{R}\beta\kappa(Q\overline{R})^2 A^{\frac{1}{2}} - 2\right]} \quad \ldots \quad \ldots \quad \ldots \quad (A7)$$

Since θ* is the maximiser, so the denominator is negative by the definition of a maximum. The numerator is negative which completes the proof of the first part of the lemma, i.e.

$$\frac{d\theta^*}{dZ} \le 0 \;\; if \;\; \frac{\partial}{\partial Z}\left(\frac{\partial V_p^1}{\partial \theta^*}\right) \le 0$$

This implies that the marginal effect of θ^* is decreasing with the increase in *Z*. Increase in θ^* implies improved institutional framework, which in turn, implies higher profits, higher payments to agents and lower expropriation of available rents. Similarly increase in *Z* implies lower institutional framework, which in turn, implies higher expropriation, lower profits and lower payment to agents. Equation A7 implies this joint effect must be negative for θ^* to respond negatively to changes in *Z*.

Similarly, to see the effect of a change in κ on θ^*, we again using the implicit function theorem

$$\frac{d\theta^*}{d\kappa} = -\frac{\frac{\partial}{\partial \kappa}\left(\frac{\partial V_e^1}{\partial \theta^*}\right)}{\frac{\partial}{\partial \theta^*}\left(\frac{\partial V_e^1}{\partial \theta^*}\right)} = -\frac{\beta \bar{R}^2 QA(Q - 2\kappa(1-\alpha))}{\left[2\bar{R}\beta\kappa(Q\bar{R})^2 A^{\frac{1}{2}} - 2\right]} = -\frac{\beta \bar{R}^2 QA(1-\kappa)}{\left[2\bar{R}\beta\kappa(Q\bar{R})^2 A^{\frac{1}{2}} - 2\right]} \quad \ldots \text{(A8)}$$

Again by the definition of a maximum, the denominator is negative while the numerator is obviously positive for $\kappa \le 1$ which is the case by assumption. This completes the proof of the second part of the lemma.

E. Proof of Lemma 2:

$$L_{y,t}^* = [(\alpha + (1-\kappa)(1-\alpha))R_t]^{\frac{1}{1-\alpha}} = (QR_t)^{\frac{1}{1-\alpha}} \qquad \ldots \quad \ldots \quad \ldots \quad (12)$$

Taking the first order of derivative of the optimal level of labour supply with respect to κ, we get the result

$$\frac{dL_{y,t}}{d\kappa} = \frac{1}{1-\alpha}(QR_t)^{\frac{\alpha}{1-\alpha}}\left[-(1-\alpha)R_t + Q\left(\frac{dR_t}{d\theta^*}\right)\left(\frac{d\theta^*}{d\kappa}\right)\right] \qquad \ldots \quad \ldots \quad \ldots \quad \text{(A9)}$$

The first term inside the bracket is negative for any α<1. The second term is positive because $\frac{dR_t}{d\theta^*} \ge 0$ is implied by $\frac{dA^{**}}{d\theta^*} \ge 0$ and $\frac{d\theta^*}{d\kappa} \ge 0$ is implied by *A8* for $\kappa \le 1$. Thus

$$\frac{dL_{y,t}}{d\kappa} \ge 0 \qquad iff \qquad Q\frac{dR_t}{d\theta^*}\frac{d\theta^*}{d\kappa} \ge (1-\alpha)R_t.$$

F.

Table 1

Comparison of Two Asian Tigers and Two Developing Countries

Country	GDP per Capita	RSP	Inst	AID (US Million $)	CPI	NR
Korea, South	20756.69	0.500	6.620	91.265	5.012	0.012
Singapore	43866.92	0.802	8.856	14.374	0.819	0
Nigeria	1222.48	0.028	2.773	547.860	8.268	33.844
Pakistan	1006.95	0.083	3.655	899.189	7.730	3.581

Source: World Development Indicators, World Bank; World Bank Governance Indicators; and Rauch and Evans (2000).

Note: Each entry is the average of the available data as otherwise indicated in Table 2.

Table 2

Description of the Variables

Variable	Description
GDP Per Capita	It is Gross Domestic Product (GDP) per capita in current US $ in 2010, taken from the World Development Indicators.
Inst.	This variable is a measure of institutional quality. It is based on the World Bank's Governance Matters VII [Kaufman, Kraay, and Mastruzzi (2009)] and is the average of their three measures that is the average of the Government Effectiveness, the Rule of Law and Regulatory Quality. The basic purpose is to capture the effects of bureaucracy, judiciary and army etc. The original indices takes values from –2.5(poor quality) to 2.5(highest quality). However, here I changed the index for simplicity, which now in this study takes the values from 0(extremely poor institutions) to 10 (perfect institutions).
CPI	This measure is based on the Corruption Perception Index of the Transparency International and again the value of the original index has been changed for simplicity. In this study, the index takes the values from 0(no corruption) to 10(highest corrupt).
NR	This is a measure of natural resources rents, which are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents, taken from World Development Indicator (WDI).
AID	Foreign aid is denoted by aid, represents Official Development Assistance (ODA) and other official aid received in current US dollars, taken from the WDI, World Bank.
RSP	RSP is a measure of the salaries in the public sector relative to private sector and is taken from Rauch and Evans (2000), which is the ration of the salaries in the public sector and those in the private sector.

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