Political Business Cycles in Crime: A Study of the Fifteen Major Indian States (1975-76 to 1998-99)

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MASTER OF PHILOSOPHY

Arkadipta Ghosh

Centre for Economic Studies and Planning
School of Social Sciences
Jawaharlal Nehru University
New Delhi 110067
India

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CENTRE FOR ECONOMIC STUDIES & PLANNING
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY

New Campus
NEW DELHI - 110 067

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CERTIFICATE

This is to certify that the dissertation entitled **Political Business Cycles in Crime: A Study of the Fifteen Major Indian States (1975-76 to 1998-99)** submitted by **Arkadipta Ghosh** in partial fulfilment of the requirements for the award of the degree of **MASTER OF PHILOSOPHY,** has not been previously submitted for any degree of this or any other university and this is his own work.

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(ARKADIPTA GHOSH)

PROF. SUGATO DASGUPTA
(SUPERVISOR)

PROF.ARUN KUMAR
(CHAIRPERSON)

ne : 6107676, 6167557, Ext. : 2421, 6105197 Cable : JAYENU Telex : 031-73167 JNU Fax : (011) 6165886, 6198234

In the memory of my late father whose "urge for the infinity" has always inspired me

and

in admiration of the undying spirit of my mother in the face of all adversities and sufferings.

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Arkadipta Ghosh

CONTENTS

Chapter 1

1

Political Economy of Crime and Corruption: A Review

Though crime has not received much attention in the Political Economy literature economists have worked and written extensively on a related topic – corruption. This section therefore surveys the literature on crime with special emphasis on the economic analysis of corruption. To accommodate the difference in approach and the range of issues dealt with by different authors the review has been carried out under the following five sub-sections.

1.1 Economic approach towards crime and enforcement

The papers in this area mostly incorporate the principal – agent model to investigate how particular contracts devised by the principal, i.e. the state affects the agents who are the potential offenders or criminals. We start our review of this particular genre of papers with the classic one by Gary Becker (1968) who first adopted an economic framework to determine optimal policies to reduce crime. Becker's paper is a seminal work in this area and hence we go through it in some detail.

Becker's decision variables were the probability of conviction *(p)* and the size of the punishment *(f)*. The optimization exercise aims at minimizing the total social cost from criminal activities and law enforcement with respect to the decision variables, assuming the form of punishment to be given. Here the contract devised by the state is in the form of a given p and an f to which the offenders react.

Let us first outline the decision environment as given by Becker through a simple set-up. A person is about to commit a crime, say theft. With probability (1-*p*) he is not caught and has an income Y from stealing. If he is caught and convicted with a probability *p* his income is Y minus the size of the punishment *f*. Therefore, his expected utility from crime is given by – $EU = p.U(Y-f) + (1-p).U(Y)$. Given *p* and *f* he has to decide whether it is worthwhile for him to steal or not.

Becker uses the expected utility approach to show that a change in *p* is more deterring to crime than a similar change in *f* if offenders are risk preferers at the margin. In other words the elasticity of expected utility with respect to *p* would have to be greater than that with respect to *f*. This is shown in the following exercise –

$$-\frac{\partial EU}{\partial p}\cdot\frac{p}{U} = [U(Y) - U(Y-f)]\cdot\frac{p}{U} \geq -\frac{\partial EU}{\partial f}\cdot\frac{f}{U} = p.U'(Y-f).\frac{f}{U}$$

according as $\frac{U(Y)-U(y-f)}{f} \geq U'(Y-f)$

i.e. according as $U'' \geq 0$, *which is the condition for risk preference.*

Now Becker uses a well-established result that in equilibrium the real incomes of risk preferers are lower at the margin if they are in risky activities. There are certain values of *p* and *f* where offenders would prefer risk. Hence, the problem of devising the optimal policy boils down to choosing such values of *p* and *f* such that "crime does not pay" at the margin because the offenders are risk preferers.

Becker further establishes this point through an optimization exercise aimed at minimizing the total social cost. The total cost to society arises from the following factors – damages due to criminal offenses, cost of prevention,

apprehension and conviction and finally the social cost of punishments given to the criminals. The optimality conditions for minimizing this cost are satisfied when the elasticity of the supply of offenses with respect to p exceeds that with respect to f. This, as shown earlier is precisely the condition associated with the risk preference of the offenders. So one has to choose p and f in those regions where "crime does not pay" and thereby potential offenders are deterred.

We shall now consider a few papers that are logical extensions of the Becker model. John Harris (1970) extends the analysis of Becker by incorporating the legal framework in his study. In Becker's study the probability of convicting a guilty person is p and it is implicit in his analysis that no innocent person is convicted or punished. Harris relaxes this assumption to allow for unjust punishments and introduces a new variable for legal safeguards. He derives the criteria for optimal levels of expenditure on law enforcement by taking the legal framework as being subject to policy choice. To this end Harris introduces a social loss function for wrongful punishment $R = R\ (p,\ O,\ \alpha,\ f)$ where α captures the degree of legal safeguards for suspects and O is the level of offences. He goes on to show that if social losses from unjust punishment are more sensitive to changes in p and f than in O then optimal levels of crime would be higher in the presence of the R function. Also p and f are likely to be lower when R is considered. Harris concludes by pointing out a limitation of the economic analysis of crime. He rightly points out that the optimal levels of the policy variables would depend on how various losses are perceived by different interest groups and also on which groups' interest prevails over the rest of the society.

Another interesting extension of Becker's work is a theory of rational enforcement offered by George Stigler (1970). Becker deals with the nature of contracts as determined by p and f, but does not consider the degree or scale of enforcement of such contracts. Stigler shows that the scale of enforcement should be such that marginal return and cost are equalized and there is an optimal selection of cases for punishment and damage control. This is ensured by the fact that a rational enforcement agency tries to minimize the sum of damages and enforcement costs and considers marginal deterrence as an important determinant of the supply of offenses. However, he suggests that inappropriate enforcement is sometimes deliberately used to retain flexibility in public policy and the room for continuous marginal adjustments.

Mookherjee and Png (1995) build their model of corruption adopting Becker's approach towards devising an optimal contract to tackle crime. They introduce an innovation wherein the contract devised by the state is enforced by an intervening layer of bureaucrats who are potentially corrupt. This added layer of corruptible law enforcers makes the situation more complex as an offender can get away by bribing a corrupt official that was not possible in the Becker set-up. In other words corruption through bribery is incorporated in the problem of devising and enforcing a contract.

Mookherjee and Png study the optimal compensation policy for a corruptible inspector in a set-up that has one regulator or enforcement agency and one polluting factory. They assume that the structure of penalties for the primary harm of pollution is exogenous and there are linear incentives for the inspector who is subject

to moral hazard. The cost of legal disposal of waste by the factory is $C(w)$ which when avoided becomes a private benefit. The inspector's monitoring intensity is μ for which the effort involved is $e(\mu)$. $\mu \in [0,1]$ is also the probability that the inspector learns the true pollution level w. The factory pays a fine of f dollars per unit of the pollution it causes and the regulator pays the inspector r dollars for every dollar of fines collected by him. The factory can bribe the inspector to underreport, i.e. report $w' < w$. The regulator learns about the bribe (b) and the true pollution level with probability λ.

On being caught the factory pays an additional penalty at the rate p' on the evaded fine, i.e. it has to pay $(1+p').f(w-w')$. The inspector is penalized at the rate p'' for accepting a bribe and underreporting which results in his paying $p''.(w-w')$. Bribery is profitable iff expected gains from bribery are positive both the parties taken together. The factory's expected gain is $-[f(w-w') - \lambda(1+p').f(w-w') - b]$ while for the inspector it is $-[b - rf(w-w') - \lambda p''(w-w')]$. Hence, the combined expected gain from bribery is given by –

$[\{1 - \lambda(1+p')\}.f(w-w') - b] + [b - (rf + \lambda p')(w-w')]$ which has to exceed zero for profitability. Simplifying we get $\{1 - \lambda(1+p')\}.f > rf + \lambda p''$ to be the required condition for bribery to be feasible.

So, in this set up, the policy variables with which the principal (regulator) designs the optimal contract are r, p' and p''. Given a particular contract (r, p', p'') F and I move simultaneously and choose a pollution level w and a monitoring

intensity μ respectively. After the choices are made, in the second stage of the game the players interact to decide on the feasibility and the amount of the bribe *(b)*.

Here Mookherjee and Png analyze the effect of small changes in the policy variables on the monitoring intensity and pollution level with the assumption that the regulator is able to distinguish between legitimate and illegitimate under-reporting. They show that if bribery is profitable, a small increase in the penalties *(p' and p'')* for underreporting reduce the monitoring intensity *(μ)* and has an ambiguous effect on the level of pollution *(w)*. On the other hand, if the incentive *(r)* for correct reporting is slightly raised then that lowers the pollution level while its effect on monitoring is ambiguous.

Adopting a utilitarian approach Mookherjee and Png derive a crucial result that for any policy vector or contract for which bribery is profitable there exists an alternative policy such that bribery is not profitable and welfare increases. So it is optimal to eradicate corruption. Only when one relaxes the assumption of the regulator's ability to distinguish between legitimate and illegitimate underreporting, tolerating some corruption does become optimal.

1.2 Economic analysis of corruption

Any meaningful review of the literature on corruption has to start with the pioneering paper by Susan Rose-Ackerman (1975) where she studies the incidence of bureaucratic corruption in government contracts under alternative market structures. While in the case of many sellers with no product differentiation, corruption is avoided in the presence of a private market, she shows that with product

differentiation and a well-defined government preference function over the goods sold, there is room for corruption and bribery. In the absence of well-defined government preferences and with the restrictive assumption of fixed quality but varying prices, legal remedies may totally fail to control corruption and there can be an infinite solution with infinite bribes when certain asymmetric conditions are fulfilled. She finally considers the case of bilateral monopoly with a particular bargaining structure. She assumes that a delay in reaching an agreement has a fixed cost per period for the firm and the official has a concession rate per period that captures his bargaining strength. Bribery is more likely to occur when the cost of waiting is higher for the firm as opposed to the government official. Rose-Ackerman identifies the market structure and the specifications of government preferences as important determinants of corruption in the government contracting process.

Shleifer and Vishny (1995) offer another simple yet elegant model of corruption and identify the structures of government institutions and the political process as being important determinants of the level of corruption. In the basic model they distinguish between two types of corruption – corruption without theft and corruption with theft. We consider the following two examples to distinguish between these two types of corruption.

In the first case (fig.1) the corrupt official sells a government good, say an import license for the government price plus a bribe. The government has set a price p for this good. The cost of producing this good is zero for the official. His marginal cost is p as this amount is returned to the government. There is a given demand *(D)* for this good. Being a monopolist he equates marginal revenue to

marginal cost (at the point E) and thereby charges the monopoly price $p' > p$ to a prospective buyer of the license. So $(p' - p)$ is the bribe collected by the official. There is no theft as the government gets its due from the sale of the import license.

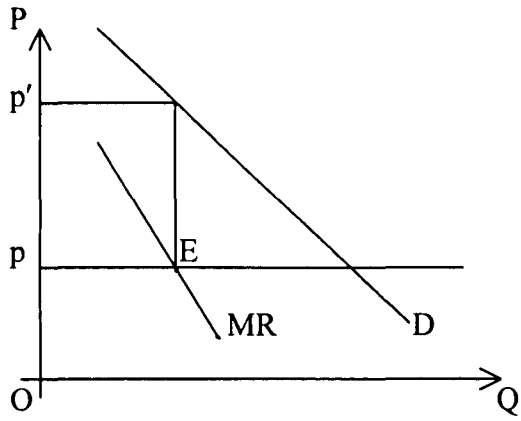

Figure 1

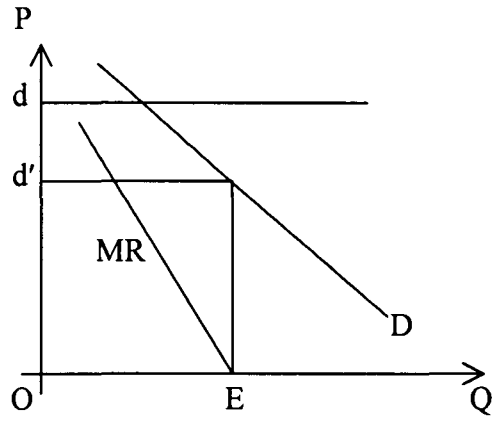

Figure 2

In the second case (fig.2) an official employed to collect customs duty on goods coming across the border does not return anything to the government and simply hides the sale. That is how the notion of theft is brought into the picture. Let us assume that the specified customs duty is d. The official collects a bribe d' instead of d and hides the transaction. His marginal cost is zero because the government gets nothing out of the deal. Here again marginal revenue is equated to marginal cost (zero) at E. This kind of corruption with theft can actually lower the price of the government good or service that is sold, i.e. the corrupt customs official can charge $d' < d$ and make the deal more attractive to a potential client.

Shleifer and Vishny nicely bring out the fact that weak state machinery together with a heterogeneous society create conditions where the worst kind of corruption can thrive – that of an individual monopolist setting high bribes and bringing down output and revenue. Conversely, a homogeneous society with a

small ruling oligarchy leads to the development of a joint monopolist agency selling complementary government goods that keeps the bribes down and raises output and revenue. The authors point out that the need for secrecy associated with corruption leads to further distortionary effects and therefore greater economic and political competition is needed to combat the malaise. Economic competition drives down corruption provided there is strict monitoring against stealing whereas political competition reduces secrecy by opening up the government.

Olivier Cadot (1987) sets up a simple game theoretic structure incorporating corruption where the players are government officials and candidates granting and competing for permits respectively. The candidates have to take a test to qualify for the permit and they are either good (pass the test) or bad (fail the test). Officials are either honest or corrupt. Given the proportion of honest officials and the discount rate he solves his model under alternative information structures. Under perfect information there is a separating solution to the problem of determining the equilibrium bribe and different bribes are taken from good and bad candidates. With asymmetric information both separating and pooling solutions are shown to exist. Cadot shows that both greater risk aversion and a higher wage rate result in smaller bribes. Allowing for corruption in a hierarchy such that high-ranking officials can let off lower officials for a bribe, two distinct equilibria are derived – with and without corruption at the higher level respectively. In this model corruption is treated as a gamble as the officials face risk every time they ask for bribes. This is however not true for the high-ranking officials as they are only affected by the intensity of bribery at the lower levels.

Basu, Bhattacharya and Mishra (1992) depart from conventional models of corruption by adopting a recursive structure of bribery. Person Z accepting a bribe B is caught by policeman 1 and gets away by bribing the policeman who in turn is caught by policeman 2 and the chain continues. By an assumption of asymmetry bribe taking and not giving is considered to be a crime. The analysis is done for an infinite chain case as well as for a finite chain with a hierarchical elite of incorruptible officials to solve the Nash bargaining problem. They also consider the case of the mingling elite where there is a fraction of incorruptible policemen in each layer. Allowing for chain arrests where all the earlier bribe takers are caught if the Kth policeman is caught for taking a bribe leads to the conclusion that a small increase in p (probability of getting caught) has a stronger controlling effect on corruption than a comparable increase in f (penalty for accepting a bribe). This contradicts the common perception that a greater reliance on f is better to curb corruption. The authors point out that the expected aggregate bribe paid by person Z can be a sum of small expected bribes. In such a scenario, a suitable reward scheme can provide enough incentive to an auditor to report corruption because his individual bribe is rather small.

Abhijit V. Banerjee (1997) offers a comprehensive theory to explain why red tape, corruption and lack of incentives are commonly associated with government bureaucracies. His paper occupies a prime position in the literature on corruption and government failure and therefore merits a detailed review. The agents in his model are the government, bureaucrats and the people outside. The key

assumption is that of market failure in the allocation of certain goods as a result of which the government is involved in the allocative process.

He considers the following set-up in his model. The government provides for a set of private goods or slots that are scarce through the bureaucrats. Let us assume that these slots are machines that give future returns to the individuals buying them. Now, there are two types of individuals – high types who generate a return H with the machines and low types who generate a return L, with L being lower than H. The individuals are constrained by their ability to pay *(y)*. In order to simplify our description we assume that y is always less than the willingness to pay, i.e. $y < L < H$.

The government wants to ensure that each high type gets a slot. If there are ten people (five each of types H and L) and a total of eight machines (slots) available for sale then no more than three low type individuals should get a slot. Though the government cannot observe the mechanism employed by the bureaucrats to allot the slots it can sample the individuals to find out the final allocation. To prevent any misllocation of slots the government devises an incentive mechanism. A sufficiently high fine F is imposed on the bureaucrat for each low type individual above the permissible three who gets a slot. The government sets prices p_H and p_L for the slots where $p_H > p_L$ and $p_H \leq y$.

Corruption arises from the simple fact that the bureaucrats are interested in making money while the government laws make it illegal to do so. This conflict of objectives is inherent in the model, as the government wants to maximize social welfare whereas the corrupt officials are only interested in their personal gains.

A bureaucrat would ideally want to charge an amount y for every machine he sells instead of the stipulated p_H and p_L in order to maximize his returns. But here he faces a problem of asymmetric information as each low type individual has an incentive to mimic as a high type and be assured of a slot. The bureaucrat's problem is that he has to pay the fine F for each low type individual above the permissible three who gets a machine. So he needs a screening device that would allow him to sort out the low type individuals, allot a machine to each of the high types (to prevent F) and charge everybody the higher price y. This is where red tape comes into the picture.

Red tape is used as a delaying device whereby the applicants for the slots would have to stand in long queues or face bureaucratic hassles that involve a significant wastage of time. The cost of waiting is the same for both types of applicants. However, the low types have a lower willingness to pay than the high types and also they are not assured of a slot even after standing in the queue. So they prefer to break out of the queue and disclose their true type to get the machine with probability $3/5^{th}$. The high types on the other hand have a higher willingness to pay and are assured of getting a machine by waiting in line. The bureaucrat is therefore able to separate the two types and also maximize his returns by charging y for every machine he sells. The final outcome is that all five high type and three low type individuals get a machine each.

However, Banerjee demonstrates that with a rapacious government (no conflict of objectives) and a sufficiently high ability to pay there is no red tape. In developing a theory of corruption the author allows the government some possibility of observing the bureaucratic mechanism. The government announces an optimal

mechanism stipulating the prices as well as the maximum red tape, given the ability to pay. It can also inflict a severe punishment on any deviating bureaucrat. Banerjee denotes the utility level of a bureaucrat undergoing the worst punishment by *B*. He shows that some bureaucrat with a value of *B* higher than the critical value will deviate and charge a price higher than that stipulated. In this setting fighting corruption by considerably curbing the amount of money the bureaucrat can make helps to reduce red tape as well.

Next we consider two papers by Daron Acemoglu and Thierry Verdier who approach the problem of government failure in general and those of corruption and misallocation of resources in particular in a general equilibrium framework. The first of these papers by Acemoglu and Verdier (1998) deals with bureaucratic corruption in an economy where the state enforces contracts to encourage private investment. The trade-off between property rights enforcement and allocation of talent arises because of a random selection of applicants in the public sector. There is a mechanism to prevent violation of contracts that leads to rents for public sector employees. This results in a misallocation of talent. The paper demonstrates that with low investment opportunities it is not worthwhile to have an honest bureaucracy, as contract enforcement is costly. So it is optimal to allow for some amount of corruption and not enforce property rights fully. However, with sufficiently high investment opportunities it is optimal to have an honest bureaucracy.

The second paper by Acemoglu and Verdier (2000) analyzes the relationship between government intervention to correct market failure and government failure in the form of rents for public employees, misallocation of

resources and corruption. The three basic assumptions are – government intervention requires bureaucrats, some bureaucrats are corruptible and bureaucracy is heterogeneous. The government instruments are the public wage, subsidy and tax. In this model government intervention in the absence of corruption is justified when the benefit is large enough compared to the output from either a good or a bad technology. With corruption and a serious enough market failure bureaucrats have to be paid a rent to correct the market failure. The optimal degree of government intervention is shown to be non-monotonic in the level of income. With a heterogeneous bureaucracy, intervention with some corruption is the best strategy – particularly so, if the probability of catching an honest bureaucrat is high and that of an agent being good at taking bribes is low.

1.3 Empirical studies in the economics of crime and corruption

David A. Anderson (1999) makes a novel attempt to measure the total annual cost of crime in the United States. The novelty of his study lies in the fact that he considers indirect costs of crime like the opportunity cost of victims', criminals' and prisoners' time, the fear of being victimized and the cost of private deterrence apart from the direct costs associated with crime and crime-prevention. Anderson adopts an interesting approach in measuring the opportunity cost of criminals' time which he estimates to be $ 13.14 per hour ($ 9.41 in wages + $ 3.73 in benefits, etc). This cost is estimated by considering both the time in prison as well as the time spent in committing crime. Using this estimate and after deducting the value of prison production the average incarcerated worker accounts for $ 23,286 in lost production

every year. Another staggering figure is that of the $ 89.6 billion worth of time spent in preventing crime. Anderson estimates this through a survey where he finds that each adult spends two minutes locking and unlocking doors and a little over two minutes looking for keys per day. Excluding the transfer of goods and money resulting from crime he estimates the net annual burden to be $ 1,102 billion in 1997.

There are two econometric studies linking corruption with growth and government expenditure by Paolo Mauro. In the first paper Mauro (1995) relates indicators of bureaucratic honesty and efficiency to economic growth. The basic data on indices of corruption and other institutional variables have been taken from Business International's publications on "country risk" factors. He combines the indicators for bureaucratic efficiency and political stability to obtain the indicator for institutional efficiency. To counter endogeneity problems arising from the interdependence between institutional efficiency and economic performance he introduces an instrument for institutional efficiency in the form of ethno linguistic fractionalization (ELF). It is the probability that two persons randomly selected from a country's population will not belong to the same ethno linguistic group. ELF becomes a good instrument for institutional efficiency because of a significant negative correlation between the two. Through an exhaustive econometric exercise Mauro establishes that over a period of 25 years (1960 – 85) both bureaucratic inefficiency and corruption are negatively associated with the rate of investment and that both significantly affect the per capita GDP growth. He concludes that corruption indirectly affects growth by lowering investment and that the direct effect operates through misallocation of resources.

In his second paper Mauro (1998) undertakes a cross-country study to determine whether corruption affects the composition of government expenditure. He uses the 1982 – 1995 average of the "corruption index" drawn from the publications of Political Risk Services, Inc. In order to address the endogeneity bias in his regression model Mauro once again uses the index of ethnolinguistic fractionalization (ELF) as an instrument. Apart from ELF he uses the colonial dummies which capture the fact whether the country ever was a colony (after 1776) and whether the country achieved independence after 1945. He also uses certain proxies for the extent of trade restrictions and protection and an oil dummy to indicate whether oil production is a large part of a country's GDP or not. These are taken because according to Mauro both trade restrictions and natural resources are important sources of rents. The primary data source for the composition of government expenditure is the Government Finance Statistics (GFS) published by the UNESCO and IMF. Mauro analyzes the relationship between each component of public expenditure (as a ratio of GDP) and the corruption index. It is found that government spending on education has a significant negative relation with corruption to the extent that one standard deviation improvement in the corruption index results in an increase of government spending on education by 0.6% of GDP. A similar result is obtained by using more disaggregated data and the relationship is found to be robust after controlling for additional determinants of education expenditure. Mauro points out that education being devoid of high technology inputs of the oligopolistic suppliers, as opposed to sectors like defense and infrastructure, has less room for corruption and hence suffers

cutbacks in government spending. This is a cause for concern as economic growth is affected by educational attainments.

Alberto Ades and Rafael Di Tella (1999) investigate whether rents (natural or due to lack of competition) cause corruption or not. Their model is designed to determine the effect of rents on wage contracts and the equilibrium level of corruption. It is found that with increasing competition wages come down as inducing honesty is less attractive. As the gains to the corrupt officials fall with competition the same wage becomes more deterring to corruption. The empirical exercise is aimed at determining the marginal effect of the variables capturing the level of rents and the market structure on corruption. The data on corruption is drawn from two different sources – corruption indices published by Business International and those in various issues of the World Competitiveness Report published by the EMF Foundation in Geneva. The other variables used are per capita GDP, schooling, lack of political rights, share of imports in GDP, fuel and mineral exports, trade distance, etc. Using the data from the 1980s it is found that a one standard deviation increase in per capita GDP reduces corruption by 1.57 points whereas a one-standard-deviation increase in share of imports in GDP reduces it by 0.47 points. During both the 1980s and the 90s per capita GDP, share of imports and schooling have a negative effect on corruption. Trade distance has a positive effect though it is significant at the 12 percent level. The authors conclude that policies should be aimed at making markets more competitive to tackle corruption.

1.4 Corruption and tax evasion

In this part we discuss a few papers that combine the problem of tax evasion with corruption in tax administration. Omkar Goswami, Amal Sanyal and Ira N. Gang (1991) construct a model of tax evasion where taxpayers interact with corrupt tax auditors. By solving the taxpayer-auditor interactive game the authors arrive at a truth revealing probability of audit that induces full income revelation. They point out that increasing the tax rate raises the truth revealing audit probability and that there can be a Laffer curve like outcome when the audit probability is chosen in a random manner. Plotting net revenues against the tax rate we get an inverted U-shaped curve because as the tax rate rises so does the truth revealing probability and when it exceeds the actual audit probability the net revenues fall. This simple model brings out the fact that greater fiscal liberalization can lead to a fall in tax compliance if the government fails to take into account the corruption in the bureaucracy.

Chander and Wilde (1992) analyze corruption in tax administration by distinguishing between naïve and sophisticated tax agencies. The first type presumes all auditors to be honest while the latter recognizes the presence of corruption. Having established the existence of unique naïve and sophisticated equilibria the authors point out a fundamental asymmetry between bribe-payers and bribe-takers. As the percentage of bribe-payers fall towards zero tax performance improves until there is no corruption. But as the percentage of bribe-takers fall towards zero the improvement in tax performance is bounded away from the level of zero-corruption system. The comparative static results show that an increase in the tax or fine rates

can decrease expected revenue because the likelihood of an auditor accepting a bribe also increases.

A second paper by Goswami, Sanyal and Gang (2000) extends their earlier model to show that as long as variations in the tax rate do not induce a regime change and the government chooses the audit probability optimally there are no Laffer curve like outcomes. It is later demonstrated that if variations in the tax rate do bring about a regime shift and the proportion of corrupt auditors is given then a Laffer outcome is possible where net revenues fall with a rise in the tax rate. The same thing happens if there is sub-optimal auditing or the government chooses an arbitrary audit probability. The most interesting extension of the earlier model is the treatment of corruption as being endogenously determined. The authors show that the rise in the truth revealing probability with a rise in the tax rate is faster in this case as the incentive to cheat also rises faster.

In another paper Sanyal (2000) constructs a model of hierarchical audit and investigates possible fine and reward structures for breaking bribe chains. He shows that if rewards and tax collections are related then it is possible to design income revealing equilibria over repeated audit encounters. The basic idea behind designing an optimal mechanism is that the principal devises a contract such that an auditor is rewarded in proportion to the total income returned under the area of his supervision.

Sanyal (2002) further qualifies the results to show that a tax collection based reward structure does not exhaust all potential tax revenue. More importantly it is established that offering a certain share of taxes as rewards to only the top level

auditors increases the tax revenue while sustaining the no-evasion equilibrium in repeated encounters.

1.5 Elections, crime and corruption

Matthew Ellman and Leonard Wantchekon (2000) investigate the nature and outcomes of political competition under the threat of political unrest being instigated by the stronger party. A party may be directly strong with control over the source of unrest or it may be indirectly strong when the threatening actor is a distinct agent (on its side). The voters have single peaked policy preferences and the model is based on a four stage electoral game. After describing the pay-off structures of the various players Ellman and Wantchekon go on to analyze the electoral outcomes under four alternative settings depending on whether there is complete information or not and whether the parties are committed to policy platforms or not. For instance, when there is platform commitment and private information (i.e. the weak party does not know the reservation policies of the opposition) the platforms diverge and either party wins with a risk of unrest under indirect or outsider control. In the case of insider control over political unrest, the weak party always loses if the platforms converge and sometimes wins when there is platform divergence.

John Ferejohn (1986) constructs a dynamic model of electoral mechanism where the voters have an incentive to base their choices on the behaviour of the officeholders who in turn choose their strategies in anticipation of this behaviour. This paper offers an alternative theory of elections where voters respond only to the performance of the candidate in office and do not pay any attention to the

promises of the contending candidates. We consider the following set-up to simplify Ferejohn's model for our understanding.

There is an incumbent politician with a benefit π of being in office (say, ego rents). He can exert effort $e \in \{e_L, e_H\}$ where e_L is low and e_H high effort with corresponding costs $(C_L, C_H) = (0, c)$. His effort level determines the state of the economy. When effort is e_L, the resultant effect on the economy is zero with probability one. When he exerts high effort (e_H) the effect is zero with probability p and one with probability $(1-p)$.

The voters observe the state of the economy and vote according to the following rule. If the effect on the economy is zero the incumbent is rejected or thrown out of office and if it is one he is reelected. The continuation pay-off for being in office is V_1 for the incumbent, and V_0 for being out of office. The voters are able to elicit a high level of effort from the incumbent if the following condition is satisfied - incumbent's pay-off from being out of office is less than or equal to that from continuing in office. In notations the required condition can be written as –

$$\pi + V_0 \leq (\pi - c) + pV_0 + (1-p)V_1$$

$$or,\ c \leq (1-p)(V_1 - V_0)$$

So if $(V_1 - V_0)$ exceeds c then that is sufficient to induce the incumbent to choose a high effort. In a static set up both V_1 and V_0 are zero and hence such an enforcement of high level performance is not possible on the part of the voters. Ferejohn's dynamic construction makes such an enforcement rule feasible through the continuation pay-offs V_1 and V_0.

In case of repeated elections with a homogeneous electorate, Ferejohn shows that voters have more control over officeholders when the value of office is relatively high and the future is less heavily discounted. He points out that in case of a two party system the loss of office is less consequential and hence officeholders have less incentive to pay attention to the interests of the electors. In case of a non-homogeneous electorate there is a possibility of the incumbent exploiting the divisions among the voters. To counter that the voters may need to use some kind of a sociotropic rule by which individual electors base their vote on an index of aggregate performance rather than on their individual shares of aggregate output. But the usual collective action problem can arise in the determination of a sociotropic rule and the voters may defect to vote on a distributional basis. However once a sociotropic rule is agreed upon the voters realize that the temptations to deviate are not credible.

In an empirical analysis of electoral rules and corruption Torsten Persson, Guido Tabellini and Francesco Trebbi (2003) relate corruption to different features of the electoral system in a sample of 80 democracies in the 1990s. The regression results corroborate the three-fold hypothesis that is initially outlined – larger voting districts are associated with less corruption, larger share of representatives elected on individual ballot as opposed to party list is also associated with less corruption and finally plurality rule in small districts rather than proportional representation in large districts result in less corruption. The authors use alternative measures of corruption or political rents while pointing out the difficulties associated with finding an empirical counterpart to rent extraction by politicians. Apart from the variables capturing differences in electoral rules and political

institutions several other explanatory variables are used to take account of economic development, colonial and legal history, geographical location and ethno-linguistic fractionalization. As mentioned before the estimates for both the cross-sectional and the panel data are consistent with all three theoretical hypotheses. For example, switching from a system of election by proportional representation from party lists to one of election by plurality rule from among individuals, is estimated to reduce the perception of corruption by about 20% in the sample of good democracies.

Chapter 2

2

Political Business Cycles in Crime

This chapter describes my empirical work. It establishes that there are political business cycles in the crime rates of the fifteen major Indian states over a period of twenty-five years. In order to develop my idea fully I first go through a brief introductory section, keeping in mind the literature surveyed. In section 2, I present the data. The third section analyzes the regression results, while the fourth section concludes.

2.1 The Hypothesis

In the literature surveyed so far the "benevolent state" designed explicit contracts in the form of a given p and an f to control crime and corruption. I depart from this traditional interpretation in two significant ways. First, I assume that the contracts designed and enforced by the state are implicit in nature. To understand this point more clearly, refer to the paper by Becker (1968). There a potential offender reacted to an exogenously given contract (p,f). In this case, the legislative and executive branches of the political system determine the contract and its degree of enforcement. Second, I explicitly take into consideration the *incentives* of the elected politicians (the legislative and particularly the executive branches) in designing and implementing particular contracts to tackle crime. This second point is further explained as I develop my hypothesis.

Consider Ferejohn's (1986) dynamic model of electoral behaviour. In the Ferejohn set-up there is an incumbent who chooses either high or low effort that determines the state of the economy. Voters observe the state of the economy and vote accordingly in each period. Should the incumbent have a higher pay-off from being in office than that when she is out of it, the voters are able to enforce a high effort on the part of the incumbent.

As in Ferejohn (1986), I also consider a model where there are politicians in power, who are elected by the people. Assume that these elected representatives constitute the executive branch of the government. Also, they can put in effort to control law and order of the states over which they rule. For instance, a representative can ask for greater deployment of security forces in regions that are prone to violent crimes. Alternatively, a representative can order the police in a crime-ridden city to increase the frequency and efficiency of night patrols. Quite critically however, voters do not directly observe the effort that politicians put in.

What the voters do observe in this model is the state of law and order and they vote accordingly. Assume that the elected politicians are in office for two periods – i.e., there is an election every two periods. While in office the politicians can choose either high or low effort to control law and order. This in turn determines the crime rate. Here I introduce an additional assumption of public memory being short so that the voters vote keeping in mind the law and order situation in the latter half of a political regime. With such a myopic electorate, the politicians in power would ideally put in high effort to improve law and order in the second period of their rule. This should be reflected in a consequent fall in the crime rate of a state just

before an assembly election. This, in turn, leads to the hypothesis that there are electoral cycles in the crime rate.

2.2 The Data

My data set consists of annual observations. It covers twenty-four financial years (1975-76 to 1998-99) and includes the fifteen major states of India. The empirical analysis is done using three dependent variables: the rate of total crime and the rates of two categories of crime – theft and burglary. The crime variables are measured per lakh (100,000) of population. Table 1 gives the state-specific means and standard deviations for each of these three variables. These have been computed over the financial years 1975-76 to 1998-99. The table shows that there are large variations across states in the crime rates. For instance, the average of the total crime rate for Madhya Pradesh is 295.4 whereas for Punjab it is 71.9 only.

The independent variables used in this study are divided into two broad categories: (1) *Political controls* - these measure the political attributes of a state that are likely to affect the crime rate. (2) *Other controls* – these capture the non-political attributes of states that influence the crime rate.

2.2.1 Political Controls

To test for electoral cycles in crime I define a variable *Elecdum* (Election Year Dummy) to indicate whether a state legislative assembly election was held in a particular state-year. For a given state-year this dummy variable is equal to one if a state legislative assembly election is held in the second half of that state-year or in

the first half of the next state-year, and is zero otherwise. To test for pre-electoral crime cycles I define a second dummy variable *Pre-Elecdum* (Pre-election Year Dummy) which indicates whether a state went to the polls in the next financial year or not.

The possibility of pre-electoral cycles arises due to the following reasons. First, it may not be possible for a politician to fine tune her effort level in such a manner that the crime rate dips in an election year only. In other words, the crime rate may start falling in a year just preceding the elections. Second, the incumbent politician is aware that the rate of crime responds with a certain time lag to a higher effort. So she starts putting in effort quite early in the latter half of her tenure. This combined with the difficulty of fine tuning the effort level can also lead to pre-electoral cycles in the crime rate.

2.2.2 Other Controls

There are five regressors in this category. They are *per capita net state domestic product* (in constant 1970-71 rupees), *work participation rate, literacy rate, per capita social sector expenditure* (in constant 1970-71 rupees) and *per capita police expenditure* (in constant 1970-71 rupees). These variables are assumed to influence the crime rate either directly or indirectly. Table 2 provides evidence of the substantial across state variations in *two* of these variables - *per capita net state domestic product* (in constant 1970-71 rupees) and *literacy rate*. See the Data Appendix for details on the construction and sources of the above regressors.

2.3 Estimation and Results

To test whether elections affect the crime rate or not I consider the following regression model:

$$Crime_{st} = \alpha_s + \beta t + \gamma_1 Elecdum_{st} + \gamma_2 pre-Elecdum_{st} + \delta Crime_{st-1} + \mu Z_{st} + \varepsilon_{st}$$

where $Crime_{st}$ is the rate of crime per thousand persons in state s in financial year t; $Elecdum_{st}$ and $Pre\text{-}Elecdum_{st}$ are the political controls; Z_{st} is a (5×1) vector of other controls; α_s is a state fixed effect; t is a time variable; and ε_{st} is the error term.

The features implicit in the model specification are as follows. First, the model tries to capture *within state* variations in the crime rate with respect to the *political controls*. That is to say, I want to see whether the fact of a financial year being either an election year or a pre-election year affects the crime rate of a state or not. In this connection the state fixed effect (α_s) becomes an important control. This is because each state has some unique characteristics that have a role in determining its crime rate. For instance, the degree to which the residents of a particular state are law abiding affects the crime rate, and this is bound to vary across states. One can readily think of other features that make a state stand out from the rest in ways related to the incidence of crime. Therefore, allowing for state fixed effects becomes imperative.

Second, I need to mention the role of the *other controls*. The five regressors in this category have already been described in the previous section. The reason behind including these variables is to ensure that one avoids the *omitted*

variable bias in estimating the coefficients of the political variables. It turns out, however, that the coefficient estimates of the control variables do not demonstrate any noticeable pattern in their effect on crime (see tables 3, 4 and 5).

Third, I have used the one-period lagged dependent variable as a regressor. This allows me to account for *state dependence*. The use of the lagged dependent variable as a regressor has one disadvantage. It leads to inconsistency in my regression estimates, where the inconsistency is of order 1/T (T is the number of observations corresponding to each state). In this case, T is equal to 24; hence, the inconsistency is likely to be small.

2.3.1 Basic Regression Results

The basic regression results for total crime as well as for the two other crime categories are given in table 3. Column 1 indicates that both γ_1 and γ_2, the coefficients respectively of *Elecdum* and *Pre-Elecdum* are negative. However, only the coefficient of *Pre-Elecdum* is statistically significant at conventional levels. So, I detect pre-electoral cycles in the total crime rate. How quantitatively important is this finding? Let me contrast a pre-election financial year (i.e., a financial year just preceding an election year) with all other financial years. Then the total crime rate is 6.66 per lakh of population higher in a financial year of the latter variety. What does this result mean in terms of a proportional change in the rate of crime? In the financial year 1998-99 (the last year in my data set) the total crime rate averaged over the fifteen states was 189.7 per lakh of population. Thus, 6.66 equals 3.51 per cent of the average 1998-99 total crime rate.

For the remaining two categories of crime – theft and burglary I detect electoral cycles. This is because γ_1, the coefficient of *Elecdum*, is negative and significant (refer to columns 2 and 3 of table 3). How quantitatively large is the electoral cycle? Let me contrast election years with all other financial years. Then the incidence of theft and burglary dips by 1.8 and 0.71 per lakh in a state-year of the former kind. To ensure that the results are not driven by any particular state, I reestimated the model by dropping one state at a time. The results in all cases remained virtually the same.

2.3.2 Regression Results with Robustness Check (I)

In the previous section I obtained estimates by allowing the error structure to be heteroskedastic. This meant that the error terms were assumed to be uncorrelated both across states and across time. In this section I relax this assumption. As before, the error terms remain uncorrelated across states. However, within each state the variance-covariance matrix is completely unspecified.

The regression results now obtained are given in table 4. The findings can be summarized as follows. First, the various coefficients remain the same. Second, the existence of pre-electoral cycles in total crime and electoral cycles in theft and burglary is confirmed.

2.3.3 Regression Results with Robustness Check (II)

In the previous section, the structure of the variance-covariance matrix of the state-specific errors was completely unspecified. However, the matrix (whatever its form)

was assumed to be identical across states. In this section, I impose a particular structure on the variance-covariance matrix for the state specific errors. I assume that these errors follow an AR(1) process. However, I allow the AR(1) process to vary across states.

The results are given in table 5. It shows that the point estimates of γ_1 and γ_2 do change a bit and that the results deteriorate. This is clearly demonstrated by the fact that the estimate of γ_2, the coefficient of *Pre-Elecdum*, is reduced to 3.93 from the earlier value of 6.66, for the total crime rate. Similarly, the estimates of γ_1, the coefficient of *Elecdum*, are reduced for the two other crime categories – theft and burglary. However, the broad implications of the estimates remain the same, indicating the existence of pre-electoral and electoral crime cycles as before.

2.4 Conclusion

This dissertation was devoted to testing the existence of political business cycles in the crime rate of the fifteen major Indian states. It was found that the rate of total crime does move in a cyclical fashion going down in the years just preceding an election year. The empirical testing also demonstrated that the rates of two categories of crime – theft and burglary, had electoral business cycles. These results were detected in the state-level data from India that I used for my study.

There is scope for further empirical work that tries to determine the effects of non-political attributes of a state on the rate of crime. For instance, one can explore the relationship between income inequality and the crime rate or the spillover effects of social sector expenditure on criminal activities. Also, there could be more comprehensive studies of the phenomenon of political business cycles in crime, taking several other crime categories into consideration.

The results indicate that the existing political institutions and the system of political competition through elections are not sufficiently developed to address the needs of the voters. The voters need to be better informed in order to discipline a poorly functioning incumbent, who wakes up to his duties only before an election. A well-informed electorate is a *sine qua non* for a more responsive government that effectively manages the law and order of a state throughout its term in office.

TABLES

Table 1

Summary Statistics of Crime Rates in Indian States

State	Total Crime		Theft		Burglary	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Andhra Pradesh	146.06	9.35	29.24	5.74	11.85	2.05
Assam	176.86	28.16	40.61	10.13	21.36	8.45
Bihar	140.02	12.00	30.29	11.32	13.80	7.15
Gujarat	236.53	33.81	53.06	8.83	16.39	3.01
Haryana	150.58	31.20	27.21	4.58	17.04	2.82
Karnataka	211.77	21.67	44.51	10.60	22.12	4.58
Kerala	216.41	46.69	13.66	2.30	15.78	1.33
Madhya Pradesh	295.36	23.48	68.61	23.35	37.29	10.84
Maharashtra	243.40	20.19	80.51	19.24	25.27	6.34
Orissa	154.03	12.31	37.26	11.47	20.06	6.98
Punjab	71.90	11.08	11.43	4.15	7.04	2.02
Rajasthan	233.68	49.62	35.91	5.30	19.22	3.94
Tamil Nadu	224.21	20.42	51.12	14.82	16.49	4.47
Uttar Pradesh	154.16	36.60	44.64	20.88	20.37	11.76
West Bengal	125.08	33.17	47.36	15.46	5.59	5.00

Note: The crime variables are measured per lakh of population (for details refer to the Data Appendix). The sample period is financial year 1975-76 to 1998-99.

Table 2

Summary Statistics of Per Capita Income and Literacy Rate in Indian States

State	Per Capita NSDP		Literacy Rate	
	Mean	Std. Dev.	Mean	Std. Dev.
Andhra Pradesh	805.46	164.09	41.94	7.94
Assam	648.23	87.15	47.59	9.03
Bihar	490.74	65.58	36.04	5.75
Gujarat	1202.26	393.68	57.38	7.24
Haryana	1343.67	333.33	51.10	9.29
Karnataka	1126.78	432.23	52.99	6.65
Kerala	811.16	276.37	84.89	6.24
Madhya Pradesh	666.19	177.97	41.63	9.24
Maharashtra	1341.91	424.81	61.50	7.92
Orissa	561.50	85.99	46.48	7.77
Punjab	1725.73	334.09	54.54	8.04
Rajasthan	773.02	235.38	37.03	9.01
Tamil Nadu	928.19	336.37	59.53	7.10
Uttar Pradesh	618.75	114.71	39.29	7.70
West Bengal	1009.31	295.30	54.26	7.64

Note: Per capita NSDP is in constant 1970-71 rupees. Literacy rate is measured in percentage points (for details refer to the Data Appendix). The sample period is financial year 1975-76 to 1998-99.

Table 3

Basic Regression Results

	Total Crime	Theft	Burglary
Elecdum	-2.64	-1.80	-0.71
	(-1.58)	(-2.41)	(-2.17)
Pre-Elecdum	-6.66	-0.89	-0.02
	(-2.53)	(-0.93)	(-0.04)
Real Per Capita NSDP	0.01	0.01	0.01
	(1.50)	(2.72)	(4.72)
Literacy Rate	0.53	-0.25	-0.10
	(0.58)	(-0.84)	(-0.86)
Work Participation Rate	1.21	-0.30	-0.27
	(1.22)	(-1.42)	(-2.10)
Real Per Capita Social Sector Exp.	0.16	-0.02	-0.01
	(1.93)	(-0.46)	(-0.91)
Real Per Capita Police Exp.	-0.72	0.20	0.03
	(-2.37)	(1.41)	(0.76)
State Fixed Effects	Yes	Yes	Yes
Lagged Dependent Variable	Yes	Yes	Yes
No. of Observations	359	359	359

Note: All the variables have been described in section 2.2. The dependent variables are the rates of total crime, theft and burglary measured per thousand persons. The *t*-ratios (given in parentheses) are heteroskedasticity-robust and are significant at the 0.05 level.

Table 4

Regression Results with Robustness Check (I)*

	Total Crime	Theft	Burglary
Elecdum	-2.64	-1.80	-0.71
	(-1.44)	(-4.72)	(-4.73)
Pre-Elecdum	-6.66	-0.89	-0.02
	(-2.55)	(-1.13)	(-0.05)
Real Per Capita NSDP	0.01	0.01	0.01
	(0.99)	(1.43)	(3.37)
Literacy Rate	0.53	-0.25	-0.10
	(0.41)	(-0.40)	(-0.47)
Work Participation Rate	1.21	-0.30	-0.27
	(1.01)	(-0.87)	(-1.56)
Real Per Capita Social Sector Exp.	0.16	-0.02	-0.01
	(1.29)	(-0.31)	(-0.51)
Real Per Capita Police Exp.	-0.72	0.20	0.03
	(-1.75)	(1.28)	(0.43)
State Fixed Effects	Yes	Yes	Yes
Lagged Dependent Variable	Yes	Yes	Yes
No. of Observations	359	359	359

Note: All the variables have been described in section 2.2. The dependent variables are the rates of total crime, theft and burglary measured per thousand persons. The *t*-ratios (given in parentheses) are significant at the 0.05 level.

* The details of the robustness check are given in sub-section 2.3.2

Table 5

Regression Results with Robustness Check (II)**

	Total Crime	Theft	Burglary
Elecdum	-4.34	-1.38	-0.49
	(-3.45)	(-3.53)	(-2.67)
Pre-Elecdum	-3.93	-1.17	-0.38
	(-2.97)	(-2.87)	(-1.99)
Real Per Capita NSDP	0.01	0.01	0.01
	(1.26)	(1.68)	(3.40)
Literacy Rate	0.71	0.34	0.17
	(0.54)	(0.78)	(0.83)
Work Participation Rate	3.84	1.03	0.17
	(2.99)	(2.45)	(0.86)
Real Per Capita Social Sector Exp.	0.13	0.03	0.02
	(1.27)	(0.95)	(1.17)
Real Per Capita Police Exp.	-0.38	-0.05	-0.01
	(-1.27)	(-0.55)	(-0.25)
State Fixed Effects	Yes	Yes	Yes
Lagged Dependent Variable	Yes	Yes	Yes
No. of Observations	359	359	359

Note: All the variables have been described in section 2.2. The dependent variables are the rates of total crime, theft and burglary measured per thousand persons. The z-ratios (given in parentheses) are heteroskedasticity-robust and are significant at the 0.05 level.

** The details of the robustness check are given in sub-section 2.3.3

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Data Appendix

Crime Variables

- Rate of Total Crime
  - aggregate of all categories of crime divided by state population (in lakh) for each financial year
  - unit: per lakh (100,000) of population
  - weighted average of successive calender year rates
  - aggregate of all categories of crime divided by state population (in lakh) for each calender year

  source : Crime in India (various issues) published by the National Crime Records Bureau, Ministry of Home Affairs, Govt. of India.

- Rates of Various Categories of Crime (Theft and Burglary)
  - aggregate of a particular category of crime divided by state population (in lakh) for each financial year
  - unit: per lakh (100,000) of population
  - weighted average of successive calender year rates
  - aggregate of a particular category of crime divided by state population (in lakh) for each calender year

  source : Crime in India (various issues) published by the National Crime Records Bureau, Ministry of Home Affairs, Govt. of India.

Political Control Variables

- Election Year Dummy
  - for a given state-year Election Year Dummy is equal to one if a state legislative assembly election is held in the second half of that financial year or the first half of the next financial year, and is zero otherwise.

  source : coded from India Decides, Elections 1952-1995 (see References for details) and India (various issues) published by the Ministry of Information and Broadcasting, Govt. of India.

- Pre-election Year Dummy
  - for a given state-year Pre-election Year Dummy is equal to one if the election year dummy is equal to one for the following year, and is zero otherwise.

  source : coded from the Election Year Dummy.

Other Control Variables

- Real Per Capita Net State Domestic Product
  - deflated nominal per capita net state domestic product
  - unit : 1970-71 rupees per person
  - nominal per capita net state domestic product

  source : Indian Public Finance Statistics (various issues) published by the Economic Division, Department of Economic Affairs, Ministry of Finance, Govt. of India.
  - deflator

- implicit net state domestic product deflator (base year 1970-71)

source : Indian Public Finance Statistics (various issues) published by the Economic Division, Department of Economic Affairs, Ministry of Finance, Govt. of India.

- Work Participation Rate
  - total workers (main and marginal) in a state divided by the state population
  - unit : percentage points

source : Censuses 1971, 81, 91 and 2001 published by the Office of the Registrar General, Census of India, Govt. of India.

- Literacy Rate
  - total number of literates in a state divided by the state population
  - unit : percentage points

source : Censuses 1971, 81, 91 and 2001 published by the Office of the Registrar General, Census of India, Govt. of India.

- Real Per Capita Social Sector Expenditure
  - real social sector expenditure divided by state population
  - Unit : 1970-71 rupees per person
  - nominal social sector expenditure

source : Reserve Bank of India Report on State Finances (various issues) published by the Reserve Bank of India.

  - state population data

source : Censuses 1971, 81, 91 and 2001 published by the Office of the Registrar General, Census of India, Govt. of India

  - deflator
  - implicit net state domestic product deflator (base year 1970-71)

source : Indian Public Finance Statistics (various issues) published by the Department of Economic Affairs, Ministry of Finance, Govt. of India.

- Real Per Capita Police Expenditure
  - real expenditure on police divided by state population
  - Unit : 1970-71 rupees per person
  - nominal expenditure on police

source : Reserve Bank of India Report on State Finances (various issues) published by the Reserve Bank of India.

  - state population data

source : Censuses 1971, 81, 91 and 2001 published by the Office of the Registrar General, Census of India, Govt. of India

  - deflator
  - implicit net state domestic product deflator (base year 1970-71)

source : Indian Public Finance Statistics (various issues) published by the Department of Economic Affairs, Ministry of Finance, Govt. of India.