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Limits to Citizens' Demand in a Democracy

Santanu Gupta

and

Raghendra Jha

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Santanu Gupta
XLRI, School of Business and Human Resources
C. H. Area (East)

Rabhbendra Jha
Australia South Asia Research Centre
The Arndt-Corden Division of Economics
College of Asia and the Pacific
The Australian National University

Corresponding Address :

Raghbendra Jha
Australia South Asia Research Centre
The Arndt-Corden Division of Economics
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200
Email: R.Jha@anu.edu.au

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Limits to citizens' demand in a democracy

Santanu Gupta
XLRI, School of Business and Human Resources
C. H. Area (East)
Jamshedpur 831035
Jharkhand, India

and

Raghbendra Jha
Australia South Asia Research Centre
Australian National University
Canberra
Australian Capital Territory
Australia 0200

Abstract

This paper examines how citizens decide on their reservation utilities (expectations), in a model with democratic institutions and majority rule. If all individuals have identical incomes, then political competition amongst citizens, to attract resources from the government brings reservation utilities of citizens down to zero. The same is not the case when individuals have different incomes, but it is the richest and the median income citizens who win in the process and tax resources are equally distributed between them. In a situation where the government is corrupt and siphons off a part of the tax revenues, citizens can by having higher reservation utilities prevent it, but choose not to do so, given the political competition amongst citizens. Corruption is manifested in higher tax rates and not in a decline in public good allocation to jurisdictions.

JEL classifications: *H41; H72*

Keywords: median voter, local public good, reservation utility

1 Introduction

An important aspect which influences government decisions on allocation of public goods is the level of expectations of citizens or demands of different jurisdictions. Democratic governments should typically favor a majority of jurisdictions with the least expectations since that is what would maximize their probability of winning in an election. Individuals realizing this would strategically choose their expectations, if they demand too little from the government, they end up getting less; if they demand too much, they may be neglected completely at the expense of others. This might mean that citizens form expectations after taking into account both these factors. This paper attempts to find a level of expectations for each individual in a sense that it forms Nash equilibrium strategy for such an individual. Our results show that if all individuals have identical incomes, then political competition amongst citizens, to attract resources from the government brings reservation utilities of citizens down to zero. . The same is not the case when individuals have different incomes, but it is the richest and the median income citizens who win in the process and tax resources are equally distributed between them . In a situation where the government is corrupt and siphons off a part of the tax revenues, citizens can by having higher reservation utilities prevent this, but choose not to do so, given the political competition amongst citizens.

A large part of the interest in the Political Economy literature deals with problems with a majoritarian democratic government and ways to deal with it. Buchanan and Tullock (1962) discusses at length the problem of "tyranny of the majority" and ways to deal with it. From the perspective of public expenditures, Buchanan (1970, 1971) and Spann (1974) discuss the welfare gains and losses which occur when individuals with different incomes demand different levels of public good. When there is collective consumption where all individuals consume the same level of public good, under Lindahl taxation, the tax share of the richer individual is made higher and that of the poorer individual lower,

till all individuals demand the same level of public good. Under such circumstances there happens to be a transfer of income from the richer to the poorer individuals.

In our model, individual with different incomes live in different jurisdictions, they all contribute to taxes, but the decision on how much public goods they receive is with the Central government. Under these situations we show that it is optimal for the Central government to neglect the jurisdiction where the poorest individual lives, and concentrate on spending tax revenues in jurisdictions inhabited by the richer individuals. Therefore, even in our situation, we observe "tyranny of the majority", but there is a redistribution of income in kind from the poor to the rich which happens due to the fact that a higher income enables the rich to manoeuvre their expectations and extract the highest amount of resources from the government. In any country although there are constitutional provisions to prevent blatant discrimination against any jurisdictions, governments do get past it since there are provisions for discretionary grants under certain circumstances¹. It is how these discretionary grants are spent, is the major concern in our paper. As pointed out by Buchanan and Tullock, even if there are constitutional provisions against blatant transfers, the majority coalition may exploit the minority through levying general transfers to provide special benefits, or through financing general benefits by special taxes. Our model is based on the first strategy that is levying general transfers to provide special benefits.

The model developed here is a probabilistic voting model along the lines of Seabright (1996) and Gupta (2001). Both these models were developed to answer the federalism question, whether a centralized or a decentralized system serves the society better. In the Seabright model, centralization yields benefits of increased policy coordination, but has a cost in terms of diminished accountability, in the sense the consent of other localities are required if any locality wants to get rid of the incumbent government in a centralized structure. Using a similar model Gupta (2001) explains that in both a centralized and a

¹In India for instance, a part of the grants is decided by formula, however a large part of the grants are discretionary grants, for which the government is not accountable.

decentralized structure, experience tyranny of the majority in the sense some jurisdictions are denied local public good. A decentralized structure allows local government to raise taxes and augment the local public good supply in case a locality has not received local public good, however if benefits from public good provided by the central government which benefits all be very large, a centralized structure may score over a decentralized one. In both of these models, the incumbent government gets re-elected if the welfare provided to any jurisdiction net of the electoral uncertainty is greater than or equal to a reservation utility, which is interpreted as the welfare expected from a rival political party, and is exogenously given in the model. Since the strategies of the opposition is not explicitly modelled in both these papers, we interpret the reservation utility in our paper as the minimum amount of welfare net of electoral that citizens expect for the incumbent government in order to vote from the incumbent government, else they vote for the opposition. Since we consider a quasi linear utility function, the reservation utility is therefore a monetary equivalent of the value of services that need to be provided in order for the citizens to vote for the incumbent government. Citizens may place their demands to the representatives of the incumbent government in the jurisdiction in terms of public goods that they will like to be provided in the jurisdiction, while doing so they keep in mind that they are competing with other jurisdictions for public goods. Therefore, we attempt to determine reservation utility from within the system, that one of the main contributions of our paper. Both models have the government's objective function as maximizing the probability of re-election, we take on from this assumption, and extend it to one where the government might want to corner some of the tax resources, but only at the expense of reducing its re-election prospects.

This paper is organized as follows. The next section describes the basic model. Section 3 discusses resource allocation in a democracy and section 4 analyzes how citizens arrive at their expectations, given the government's behavior and the results therein. Section

5 describes the policy choices in a situation when the government is corrupt in the sense it corners a part of the tax proceeds for its own benefit, and the citizens response to it. Section 6 concludes.

2 The Model

We consider an economy with three² jurisdictions and with a single representative individual in each jurisdiction. We assume individuals with identical additively, separable utility function defined over a private and local public good³. Individuals differ in their endowments or incomes. A central government decides on a uniform proportional tax rate and the amount of local public good to be supplied to jurisdictions. The voting model incorporates the notion of reservation utility as in Seabright (1996) and Gupta (2001). Individuals are assumed to be immobile across jurisdictions. The central government has to satisfy a majority of jurisdictions (in this case two) in order to get re-elected.

Jurisdictions and thereby the individuals living in the jurisdiction are represented by i where $i \in \{1, 2, 3\}$. Let there be one individual in each jurisdiction with income level y_i . The utility function of an individual in jurisdiction i is given by:

$$W_i = x_i + \ln(c + g_i) \tag{1}$$

where $c < 1$, x_i is the amount of private good consumed by the individual in jurisdiction i and

$$x_i = (1 - t)y_i \tag{2}$$

where t is the uniform proportional tax rate levied by the central government. g_i is the amount of local public good delivered to jurisdiction i by the central government.

²The model can be easily extended to n jurisdictions where n is odd.

³These are simplifying assumptions which would help us highlight the result better.

The uncertainty regarding an incumbent government's re-election is captured by an electoral uncertainty ϵ , which is a random variable following a uniform distribution over the range $[-q, q]$ and a mean of zero. Let e_i denote the event that the individual is satisfied with the incumbent government and votes for it. The event e_i occurs when the welfare of an individual W_i in jurisdiction i , with income y_i net of electoral uncertainty ϵ is greater than a reservation utility R_i , which can be interpreted as the minimum welfare expected from the current incumbent government in order to vote for it. The amount of reservation utility expected is conveyed to the government in terms of demands for the local public good wanted for the jurisdiction, for a reservation utility R_i a demand of d_i is put forth such that $\ln(c + d_i) = R_i$ ⁴. The same is put forth to representatives of the incumbent government, within a jurisdiction. A representative individual in jurisdiction i would be satisfied with the government if

$$W_i + \epsilon \geq R_i \quad (3)$$

Therefore the event e_i occurs when

$$\epsilon \geq R_i - W_i \quad (4)$$

and the probability $p(e_i)$ of the individual being satisfied with the incumbent government and voting in its favor is given by

$$p(e_i) = p(\epsilon \geq R_i - W_i) = \frac{q - (R_i - W_i)}{2q} \quad (5)$$

The sequence of events is as follows: The government announces in the beginning of the period, the proportional tax rate that it is going to impose on citizens, citizens in each jurisdiction decide on the amount of public good, d_i to demand from the incumbent

⁴Since our utility function is quasi concave d_i of public good demand is equivalent to a private good demand of R_i .

government, once the demands of the citizens are known, the government can compute the reservation utilities as well as the probability of winning from each jurisdiction, if resources were to be equally allocated to the three jurisdictions, and then decides on the actual local public good allocation. Given that reservation utilities are dependent on the tax rate announced by the government, the government can act as a Stackelberg leader and announce an optimal tax rate that maximizes its re-election prospects.

The central government has to win from any two of the three jurisdictions. It has to spend the taxes raised from individuals on allocation of local public goods to three jurisdictions. Therefore it is subject to the budget constraint

$$\sum_{i=1}^3 g_i = t \sum_{i=1}^3 y_i \quad (6)$$

The central government will set the tax rate and distribute resources for local public good to the jurisdictions in order to maximize the probability of getting re-elected from any two jurisdictions. This would depend not only on the endowment/incomes of the individuals in the jurisdictions, but also on the level of reservation utility of individuals. Given that the electoral uncertainty is perfectly correlated amongst all individuals in all jurisdictions, the probability of getting re-elected from any jurisdiction depends on the gap between the welfare experienced and the reservation utility of the median voter in the jurisdiction. The larger this gap, the greater is the probability of getting re-elected from any jurisdiction. Therefore, the central government will always *ex ante* find it optimal to concentrate on the two jurisdictions with the largest gap and completely ignore a third jurisdiction in the allocation of the public good (see Appendix 1). This situation is similar to that discussed in Buchanan and Tullock (1962) of the tyranny of the majority, where, given the nature of democratic institutions, a minority of individuals will be discriminated against.

Citizens are fully aware that the tax proceeds collected from them would go only to two

of the three jurisdictions so would try and manipulate their reservation utilities demands in order to get the best deal from the government. If all individuals have the same income, and initially start with the same reservation utility, with equal allocation of local public good to all jurisdictions, the probability of winning is the same from all jurisdictions. The government can do better if resources are redistributed equally from one of the jurisdictions to the other two. Given that this is the situation, the individual in the jurisdiction discriminated against, has an incentive to lower his/her reservation utility to attract resources to his/her jurisdiction. As a countermove, there is incentive for each of the other two citizens to lower their reservation utilities, by lowering their demands for public goods down to zero, and the Nash equilibrium will be one where all individuals bring their demands for public good down to zero. The government still chooses any two of the three jurisdictions for allocation of local public good. The result can thus be summarized as:

Proposition 1 *In a situation where all individuals have the same incomes, competition amongst individuals to attract resources to their jurisdictions will ensure that in equilibrium, all individuals drop their demands for public good down to zero and that will be the Nash equilibrium. The government will choose any two of the three jurisdictions randomly for local public good allocation and one jurisdiction will be discriminated against.*

Let us now consider the situation when the incomes of citizens are not equal. Let us assume the individual in jurisdiction 1 to have the highest income i.e. $y_1 = y_h$, that in jurisdiction 3 to have the least $y_3 = y_l$, and that in jurisdiction 2 to have the median income, i.e. $y_2 = y_m$. Therefore $y_h > y_m > y_l$. With equal reservation utilities of all individuals and with equal allocation of local public good to all jurisdictions, the probability of winning is least from jurisdiction l , the jurisdiction with the individual with the least income. In order to attract resources to itself, the best that the individual in this jurisdiction can do is to drop its demand for public good down to zero, to reduce his/her

reservation utility to a minimum. However, the other two individuals, given their income advantage, can beat this strategy by keeping their reservation utilities just slightly below $(1 - t)(y_h - y_l)$ and $(1 - t)(y_m - y_l)$ respectively. This will ensure that probability of winning is highest and is equal from these two jurisdictions. The government's optimal policy would be to distribute resources equally amongst these two jurisdictions. Setting reservation utilities at these levels happens to be the Nash equilibrium, and no individual can do better by revising his/her reservation utilities given the other reservation utilities. Given that the government knows, the reservation utility that will be set by individuals for a given tax rate, it will set the optimal tax rate to maximize its probability of re-election and it will be set at $t^* = \frac{1}{y_l} - \frac{2c}{3y}$, where y_l is the income of the poorest individual and y is the mean income, and the amount of local public good received by the jurisdiction with the median voter and the richest voter is $[\frac{3t^*y}{2} = \frac{3}{2}(\frac{y}{y_l}) - c]$.

It will be interesting to compare the tax rate in situations with no income inequality and in situations with income inequality. Consider a scenario where $y_h = y_m = y_l = 2z$ and another one where $y_h = 3z, y_m = 2z, y_l = z$. In both these situations the mean and the median income is $2z$. However, in the situation with income inequality, the amount of local public good supplied to jurisdictions is higher, and so are the taxes, as compared to a situation with no income inequality.

In this situation, we observe that government intervention in the provision local public goods results in a redistribution of resources from the poorer to richer individuals. This is exactly the opposite to what happens in the standard public goods provision model. In the models discussed by Buchanan (1970, 1971) and Spann (1974) discuss a whole range of models where people with different incomes demand different levels of public good, but the tax shares are so designed that in equilibrium individuals with different incomes demand the same level of public good (Lindahl taxation can achieve the same). In this situation, it essentially implies that the rich pay higher amount as taxes than the poor for the same level

of public good provided, and therefore there is a redistribution from the richer to the poorer individuals. Redistribution from the rich to the poor is usually the norm in a democracy, especially where the poor substantially outnumber the rich, the poor would then vote for higher taxes and higher redistribution towards themselves. Meltzer and Richard (1981) explain that with a rise in income inequality, that is a rise in mean income relative to the income of the decisive voter, increases taxes and redistribution.

It should also be noted that since there is only one individual in each jurisdiction in our case, the public good is as good as a private good and can be seen as a transfer to a person with lower income. The poor definitely lose out, since they contribute in taxes and receive no services in return, the individual with the median income gains the most, since he/she does not contribute the most in taxes but receives an amount equal to what the richest person receives as public good. As far as the richest individual is concerned, he/she contributes ty_h as taxes but receives $t\sum_i y_i/2$ as transfers. Therefore it is a net receiver only if $y_h < y_m + y_l$, that is if its income is less than the sum of the income of all other individuals in the country, else it is a net contributor. The result can thus be summarized as:

Proposition 2 *In a situation where all individuals have different incomes, the Nash equilibrium would be when the individual with the least income drops his/her public good demand down to zero to keep his/her reservation utility to a minimum and the other two individuals have reservation utilities at the level slightly below $(1 - t)(y_h - y_l)$ and $(1 - t)(y_m - y_l)$. The tax revenues will be equally distributed between the two richest voters in the country. There is a redistribution of resources from the poorest individual to the two richest individuals in the country if the income of the richest individual is less than the sum of the incomes of all others, else there is a redistribution of resources from the poorest and the richest individual to the person with the median income. In a situation with income inequality, the amount of local public good supplied to jurisdictions is higher, and so are*

the taxes, as compared to a situation with no income inequality.

There also exist empirical evidence that the rich stand to gain in redistributive politics. Le Grand (1982) finds that much of the expenditures on social services in United Kingdom such as health care, education, housing and transport accrue to people who can broadly be classified to being in the higher income groups. The middle class are more likely to get opportunities in education than the poor and are more likely to get opportunities in professional jobs. The poor according to Le Grand live in areas poorly endowed with social services and have to travel far to avail such services.

Buchanan and Tullock (1962) mention that directly redistributive transfers would be normally prevented by constitutional transfers, however, even when such transfers are prohibited, the majority coalition may effectively exploit the minority only through levying general taxes to provide special benefits, or through financing general benefits by special taxes. However, in this situation, it is impossible for the party getting affected to form coalitions with another party, since resource allocation is in the hands of the central government.

3 Resource allocation by a corrupt government

Until now we had assumed that the democratic government although going for a distortionary resource allocation in order to maximize its chances for re-election was essentially honest in the sense that it spent all of tax revenues raised on local public goods. However, many governments are corrupt, and would siphon off chunks of public money for their own benefit. They would still choose to spend some of the public money on public services in order to get re-elected again. Therefore the government's objective function is to maximize their expected payoff which is: $(\text{Tax revenue collected less expenditure on public goods}) \times \text{probability of getting re-elected}$. Its problem is then to choose an appropriate

tax rate and redistribute some of the tax revenues to two jurisdictions in order to maximize its expected payoff (see Appendix 2). Let us initially assume all individuals having the same income, and individuals would still strategically lower their reservation utility to zero which is still a Nash equilibrium. The government would still spend equally on local public goods on two of the three jurisdictions, however it would not choose to spend the entire tax revenues on public goods. The optimal amount of local public good to be given to each of the favored jurisdictions would $g^* = \frac{3}{2}(\frac{y}{y_l}) - c$, and the optimal tax rate $t^* = \frac{1}{2y_l} - \frac{c}{3y} + \frac{1}{2y_l}[q + (y_l - 1) + \ln(\frac{3}{2}\frac{y}{y_l})]$. It should be noted that in this situation, the amount of public good supplied in this situation as that without corruption, however the tax is larger in this situation given the assumption $y_l > 1$. The empirical literature on corruption by Persson, Tabellini and Trebbi (2003) looked into electoral rules such as larger district magnitude and lower thresholds for representation, a larger share of representation elected on an individual ballot and a plurality rule in small districts to be associated with less corruption. Results from our model would suggest one can test whether prevalence of corruption would lead to higher tax rates, and not to a lowering of public good allocation to favored jurisdictions.

Now let us consider the situation when incomes are not the same across individuals. The poorest individual, despite having zero reservation utility, will fail to attract local public goods, so can he/she raise his reservation utility in order to lower the tax rate, and the extraction from himself/herself? If the poorest individual were to increase his/her reservation utility, there is incentive for the other two individuals to also increase their reservation utilities to appropriate levels in order to attract resources to itself. However, if the other two individuals were to do the same, there is incentive for the poorest individual to lower his/her reservation utility in order to try their luck and attract resources. This move will be met by a simultaneous lowering of reservation utilities by the other two individuals and the Nash equilibrium will again be the same as when the government is

not corrupt. The poorest individual will have his/her demand for public good down to zero to keep his/her reservation utility to a minimum and the other two individuals will have reservation utilities at $(1 - t^*)(y_h - y_l)$ and $(1 - t^*)(y_m - y_l)$ respectively. Resources for local public goods will be distributed equally between the two jurisdictions inhabited by the richest and the median income individuals.

In this situation, the poorest individual suffers a double loss; he/she subsidizes the local public good consumption of the richer individuals and pays a taxes part of which is siphoned off by the government. The rich and the median voter also lose out in the process, since although they receive the same amount of public good, they experience larger tax rates than they would have had the government not been corrupt. This situation is similar to the one discussed in Buchanan and Tullock (1962, chapter 11), when discriminatory transfers are prohibited by government provision, majority coalition can exploit the minority through levying general taxes to provide special benefits. Unproductive public projects whose total benefits are less than the cost imposed on society may be passed by simple majority voting rules, as long as the individual benefit from the public project exceeds the cost imposed on every individual in the dominant majority voting for the project. In our situation, the failure of collective action occurs due to the fact that all the three voters need to increase their reservation utilities to a certain level to prevent the government extract tax resources for itself, but no agent would choose to do so. The rich and the median voter would choose not to do so, since doing so would divert resources to the poorer individual, and the poor have no incentive, since even if he/she were to do so, the gains would be reaped by the richest and the median voter, since they would revise their reservation utilities and divert resources towards themselves.

Given that there are a part of resources that are not being returned to citizens, and citizens on their part may be unaware of the same due to rational ignorance (Downs 1957), the costs of acquiring such information is much more than the potential benefits to an

individual voter, can political groups or organizations that claim to work for the poor by mobilizing them, help them out in any way? If such groups can mobilize the poor to increase their demands and thus their reservation utility, the rich will have incentive to revise their reservation utility upwards appropriately. The poorest individual will definitely be better off having to pay less as taxes while still receiving no public goods. As for the richest and the median individual, they will be better off only if the tax rate charged would be less while they continue to receive the same level of public good.

However in most instances, the poor may not be as badly off in the presence of progressive taxation. If in this model we assume progressive taxation, where a positive tax rate exists only for an income above a threshold which is higher than the income of the poorest individual, and the tax is on the amount over and above this threshold income, then the poor do not end up paying taxes, but even in this case do not end up getting any public good. Therefore, in the presence of progressive taxation, the poor may be completely left out of the political process, where they neither contribute in taxes nor get any resources in the form of public goods.

The results can thus be summarized as:

Proposition 3 *In a situation where government is corrupt, and siphons off a part of the tax revenues, citizens can prevent the government from doing so by choosing a high enough reservation utilities. However, political competition amongst individuals would prevent them from doing so, and the Nash equilibrium in reservation utilities would imply that reservation utilities are set at the same level when the government was not corrupt. In the presence of corruption, the public good allocation is the same as that in a situation of no corruption, however the tax rate faced by voters is higher. Political activists can prevent the government from siphoning off resources by mobilizing the poor to have a high enough reservation utility. With progressive taxes the poor may be completely left out of the political process where they neither contribute in taxes nor receive any public goods.*

4 Conclusion

This paper presents a model of political competition where citizens compete amongst themselves for the highest share of public resources, and thus looks into another aspect of political competition from that in Persson and Tabellini (2000) which essentially looks upon competition between political parties for citizens votes. The model here depicts a scenario where the rich despite their higher demands for public good than the poor manage to receive public good allocation from the government, mainly due to the fact that the probability of winning from richer jurisdictions is higher for an equal public good allocation amongst jurisdictions. We also present a scenario where redistribution occurs from the poor to the other voters rather than one from the rich to the poor, which has been mainly discussed in the literature. Prevalence of corruption will be associated with high tax rates rather than a shrinkage of public good supply by the government. Citizens are unable to control corruption due to failure of collective action. Given that democratic governments would choose to favor only a majority of jurisdictions, in a situation where citizens have the same incomes, political competition to attract resources to themselves would imply that all citizens drop their demands for public good down to zero. In situations where individuals have different incomes, the Nash equilibrium strategies would be when the poorest individual has zero demand for public good to keep his reservation utility to a minimum, the richest and the median income individuals have high reservation utilities, high enough such that their probability of voting for the incumbent government is slightly more than that of the poorest individual. Resources would then be equally distributed amongst the two individuals with median and highest incomes. In a situation where governments are corrupt, and siphons off a part of the tax revenues, individuals can, by having higher reservation utilities, prevent it, but choose not to do so, due to political competition amongst themselves. With progressive taxes, the poor may neither gain nor lose in a democracy.

Future work will need to analyze the situation when there are more than one individual in each jurisdiction with different incomes and citizen's behavior in the presence of income inequality within jurisdictions.

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Appendix 1: Local public good allocation over jurisdictions when all individuals have different incomes

Let all individuals in society have an income y_i . Let us now consider the situation when the incomes of citizens are not equal. Let us assume the individual in jurisdiction 1 to have the highest income i.e. $y_1 = y_h$, that in jurisdiction 3 to have the least $y_3 = y_l$, and that in jurisdiction 2 to have the median income, i.e. $y_2 = y_m$. Therefore $y_h > y_m > y_l$. The central government has to decide on the allocation of local public good to jurisdictions for any given tax rate t . The total resources at the disposal of the central government will be $\sum_{i=1}^3 g_i = t \sum_{i=1}^3 y_i$, let us go for equal allocation of local public good across jurisdictions. Therefore the amount of local public good being given to a jurisdiction i , $i \in \{1, 2, 3\}$ is $\bar{g} = \frac{1}{3}t \sum_{i=1}^3 y_i$. Then

$$p(e_i) = \frac{1}{2q} [q - R_i + (1-t)y_i + \ln(c + \bar{g})] \quad (7)$$

Initially let the reservation utilities of the three individuals be the same i.e. let $R_i = R$. For an amount \bar{g} of local public good going to every jurisdiction, the probability of winning is highest from the jurisdiction with the richest individual and least from the one with the poorest individual. Therefore $p(e_h) > p(e_m) > p(e_l)$

The central government has to win from two of the three jurisdictions, so it will maximize the probability of re-election from any two of the three jurisdictions, the objective function given by

$$Z = p(e_l \cap e_m \cap -e_h) + p(e_l \cap -e_m \cap e_h) + p(-e_l \cap e_m \cap e_h) + p(e_l \cap e_m \cap e_h) \quad (8)$$

where $-e_i$ is the event of not satisfying jurisdiction i . The central government will maximize the above objective function subject to the budget constraint $\sum_{i=1}^3 g_i = t \sum_{i=1}^3 y_i$, to get the optimal resource allocation.

Given common electoral shock, the event e_l , e_m , or e_h will occur, when

$$\epsilon \geq R - (1 - t)y_i - \bar{g} \quad (9)$$

Therefore when e_h occurs, e_l and e_m , necessarily occur, since $y_h > y_m > y_l$. By similarly reasoning, when e_m occurs, e_l will definitely occur, which implies $p(e_l | e_m) = 1$. Therefore

$$p(-e_l \cap e_m \cap e_h) = p(e_l \cap -e_m \cap e_h) = 0 \quad (10)$$

and the objective function reduces to

$$Z = p(e_l \cap e_m \cap -e_h) + p(e_l \cap e_m \cap e_h) = p(e_l \cap e_m) = p(e_m) \cdot p(e_l | e_m) = p(e_m) \quad (11)$$

Therefore, with equal allocation of local public goods across jurisdictions, the probability of getting re-elected is the probability of the person with the median expectation voting for the government. One should also note that with equal allocation of local public goods, $p(h) \geq p(m) \geq p(l)$. Therefore, one can do better, i.e. increase the probability of getting re-elected, by redistributing local public good allocation from the jurisdiction with the poorest individual to the other two jurisdictions. So the optimal allocation would be one where $p(e_h) = p(e_m)$, which implies that the optimal allocation for the government would be one where $g_l^* = 0$ and one where the at which the government's budget constraint is satisfied. Therefore the jurisdiction with the individual with the least income receives no allocation of local public good, and is discriminated against.

Can the poorest individual alter his reservation utility to attract resources to his/her jurisdiction. Yes he/she can, if individuals were to do so, the probability of getting re-elected from any jurisdiction would be dependent on $R_i - W_i$, the two jurisdictions to be favored would be the two with the least $R_i - W_i$. The poorest jurisdiction in order to attract resources to itself would set the minimum reservation utility that is drop his

public good demand down to zero. However, the individual that ends up getting the maximum amount of local public good will be one with the median $R_i - W_i$. Therefore both the richest and the median voter would strategically position their reservation utility at slightly below $(1 - t)(y_h - y_l)$ and $(1 - t)(y_m - y_l)$ respectively, in which case the probability of winning from these jurisdictions would be slightly higher than that from the poorest jurisdiction with an equal allocation of public good allocation to all jurisdictions. Therefore, the optimal local public good allocation will be one by the government where $g_l = 0$, and $g_m = g_h = \frac{3ty}{2}$, where y is the mean income.

Now given that for any given proportional tax rate t , individuals will position their reservation utilities at a certain level, the government can choose a tax rate that will maximize its re-election prospects. As already discussed, re-election prospects will be decided by the probability of getting re-elected from the jurisdiction with the individual with the median income, which is

$$\begin{aligned}
p(e_m) &= \left[\frac{q - R_m + (1 - t)y_m + \ln(c + g)}{2q} \right] \\
&= \left[\frac{q - (1 - t)(y_m - y_l) + (1 - t)y_m + \ln(c + g)}{2q} \right] \\
&= \left[\frac{q + (1 - t)(y_l + \ln(c + g))}{2q} \right]
\end{aligned} \tag{12}$$

Maximizing the above function with respect to t , as first order condition for optimization the following equation is obtained.

$$\frac{\partial p(e_m)}{\partial t} = -y_l + \frac{1}{c + \frac{3ty}{2}} \left(\frac{3y}{2} \right) = 0 \tag{13}$$

or

$$t^* = \frac{1}{y_l} - \frac{2c}{3y} \tag{14}$$

The local public good allocation g^* going each to the jurisdiction with the richest voter and the median voter is given by

$$g^* = \frac{3t^*y}{2} = \frac{3}{2}\left(\frac{y}{y_l}\right) - c \quad (15)$$

Appendix 2: Policy choices of a corrupt government

A corrupt government would siphon off some of the tax revenues for its own benefit and maximize its expected payoff (EP). Let T be the total amount of tax revenues collected which is which is $3ty$ where t is the proportional tax rate, and y the mean income of the economy. Since the two richest individuals will strategically manipulate their reservation utilities and force the government to go for an equal allocation of local public good, let the amount of local public good given to any favored jurisdiction be g , then the expected payoff for the government is

$$\begin{aligned} EY &= (T - G)p(e_m) \\ &= (3ty - 2g)\left[\frac{q - R_m + (1 - t)y_m + \ln(c + g)}{2q}\right] \\ &= (3ty - 2g)\left[\frac{q - (1 - t)(y_m - y_l) + (1 - t)y_m + \ln(c + g)}{2q}\right] \\ &= (3ty - 2g)\left[\frac{q + (1 - t)y_l + \ln(c + g)}{2q}\right] \end{aligned} \quad (16)$$

where $p(e_m)$ is the probability of getting re-elected from the jurisdiction with the median voter. Maximizing the above function with respect to t and g , as first order condition for optimization the following equations are obtained.

$$\frac{\partial EY}{\partial g} = -2\left[\frac{q + (1 - t)y_l + \ln(c + g)}{2q}\right] + (3ty - 2g)\frac{1}{2q(c + g)} = 0 \quad (17)$$

$$\frac{\partial EY}{\partial t} = 3y\left[\frac{q + (1 - t)y_l + \ln(c + g)}{2q}\right] + (3ty - 2g)\frac{-y_l}{2q} = 0 \quad (18)$$

From equation 17 and 18, we get $g^* = \frac{3}{2}(\frac{y}{y_i}) - c$, and $t^* = \frac{1}{y_i} - \frac{c}{3y} + \frac{1}{2y_i}[q + (y_i - 1) + \ln(\frac{3}{2}\frac{y}{y_i})]$.

It should be observed that the amount of local public good supplied to the the median and the richest median voter remains the same as that in a situation without corruption, tax rate is however higher in a situation with corruption if we assume $y_i > 1$, and in equilibrium there exists positive levels of corruption.

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