

Income Inequality, Club Formation and the  
Quality of Public Good: A Developing  
Country Perspective

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## **Abstract**

That the high growth-rising inequality phenomenon - experienced by many high growth developing economies in the recent past - may lead to discontent among the poor is an well-discussed issue. This paper argues that as the demand for higher quality of the public services rises with income, the rising income in the hands of the rich leads to dissatisfaction among the rich about the quality of available public services, inducing them to form their own club for self-provision of the public services whenever possible. But this results in a lowering of quality available to the others outside the club despite less crowding at the publicly provided facilities.

# 1 Introduction

This paper attempts to connect some apparently disparate observations related to high rate of growth of the economy, rising income-inequality, gradual transformation of merit goods like health, education, etc. into market goods and growing discontent of the common people regarding the quality of public good provisioning in terms of a unifying model of club formation. The social segregation is induced by income inequality and the size of the rich people, when exceeds a critical level, creates incentive to form club to make own provision of superior quality club goods accessible to the members only. If such clubs are formed to provide different public utilities like electric supply, water supply, supply of health services or education facilities then eventually the club members will cease to participate in the public domain and this withdrawal will lead to a general deterioration in the standard of the common pool services available to the mass from public sources. Since the richer section of the society has more options and, therefore, stronger voices, so the non-participation of the affluent in the public sphere would adversely affect the accountability of the system. The poorer section does not have many alternatives to fall back on and so when the service quality would fall below the tolerable floor the discontent would take the form of protest leading to even vandalism. If this happens then there will not only be a general law and order problem but the level of welfare of even the poorer people will be adversely affected. Before getting into the analytical details it would be useful to contextualize the problem in terms of a set of easily accessible stylized facts.

Over the last few decades, the world saw economic boom in many developing countries. Actually the economic performances in some developing countries were so vigorous that a new term BRIC has been coined to represent four emerging economies, Brazil, Russia, India and China. While the

gap between the rich and the poor is very large in many developing countries, it is widening even more rapidly in the emerging economies. In China, the Gini index soared from 0.29 to 0.415 in the past two decades as the GDP average increased by 9.8% annually. Over the same period India experienced an annual average GDP growth of 7.4%. China has seen an incredible change in wealth distribution, turning from a more or less evenly distributed communal country into a distributed capitalist country with a wide income gap between rich and poor [?]. China has entered the list of countries with serious imparity of wealth distribution, compared to 0.55 in Brazil and 0.37 in India (HDR 2009). While the poorest 20% of Chinese population shared less than 5% of gross domestic income, the richest 20% has more than 45%. By comparing per capita income of the bottom 20% of population with the per capita GDP, it has also been shown in the Human Development Reports that in Brazil the poor earn only one tenth as much as the average person and the ratio of the income of top 20% to bottom 20% of population is nearly 32.

This income inequality leads to social segmentation and encourages club formation to ensure private provision of club goods. This club is a kind of social closure which is formed by the rich people to exclude the less fortunate individuals from some common enterprises or social communities. In recent days, with the opening up of private participation in the domain of public services, especially in the provision of health care facilities, education, etc., lot of elite institutions are coming up and the richer people are forming clubs to patronize these elite institutions and in some cases these clubs are promoting institutions of their own. Being dissatisfied with the quality of public services they are creating and utilizing private arrangements and this is affecting the quality of the public service available to the commoner even further. If the motto of public service is inclusion, expansion and efficiency then the propensity of club formation itself would contradict this goal.

The continuous establishment of world-class private hospitals and schools

with much higher user charges in all the emerging economies are siphoning off the affluent class from the public domain. So, these newer expansions may be efficient but not inclusive. This would contribute towards sharper division between rich and poor and would help in accentuating social tension. It is more common to come across the cases of sub-standard provisioning of public utility services in the developing bloc and the destruction of social capital by the discontent mob as a popular expression of protest. Umpteen instances of such violence are reported in media indicating a poor state of public utility services along with very high cost of participation on the part of the beneficiaries reflected in long waiting period, unpredictable quality of services, and so on. Thus, rapid economic growth is the demand of the day but, if this growth fails to be inclusive in nature it would eventually have its toll on social cohesion and integrity.

In this backdrop the present paper would propose a simple game theoretic formulation where there is a public good enjoyed by all members of the society and when the income inequality exceeds some critical level the richer section would have incentive to form social club to arrange for their own provision. This would affect the quality of public good enjoyed by the poor and, under certain plausible assumptions that would affect the utility of the weaker section adversely. So, high growth followed by rising income inequality would lead to higher social segregation and that would benefit the club members at the cost of the poor people's welfare.

## **2 Literature Review**

The present paper argues that in an economy consisting of two disparate income groups, one group would segregate and form a club of their own to provide a public good of their desirable quality. Hence viewed from this perspective this paper falls in the literature on the theory of clubs. There is an

extensive and well developed literature on the theory of clubs.<sup>1</sup> “A club is a voluntary group deriving mutual benefits from sharing one or more of the following: production costs, the members’ characteristics or a good characterized by excludable benefits.” [?] One of the first economic theories of club originated in the seminal work of Buchanan [?]. In his model agents form a club to share the costs of public goods. In other words, Buchanan viewed “clubs as private nongovernmental alternative to the optimal provision of a class of public goods.” This special class of public goods is referred to as club goods and share the features of excludability and partial rivalry in form of congestion.

Another seminal work in the area of clubs is that of Tiebout [?]. His “voting-with-the-feet” hypothesis is a theory of the optimal jurisdiction size where a heterogeneous population divide themselves into a number of non-overlapping homogeneous clubs by choosing the jurisdiction which provides the optimal tax rate and optimal level of public good provision. The third pioneering theory regarding clubs was proposed by Olson [?]. In “The Logic of Collective Action” Olson mentioned that clubs are formed to share the costs of public good and to exploit the economies of scale. He distinguished between two types of clubs – inclusive and exclusive. Inclusive clubs share pure public goods and hence do not require any restriction on membership size. Exclusive clubs on the other hand share impure public goods characterized by partial rivalry and some excludability of benefits. As a result the membership size is restricted due to the presence of congestion.

The theory of clubs has gone a long way since the publication of these three seminal works. In a recent paper, Jaramillo et al. [?] looked at the relationship between income inequality and social segmentation by developing a formal model of club formation. Following the model proposed by Barnham et al. [?], the above paper proposed a two-stage game to explain the

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<sup>1</sup>For a review of the economic theory of club see Sandler et al. [?, ?] and Scotchmer [?].

formation of club. In the first stage, a cooperative game is played resulting in the partition of players. Each player has a given endowment which he/she spends between private good consumption and voluntary contribution to fund a public good. In order to enjoy the club good, an agent should be part of a club. On the basis of these individual characteristics, stable clubs are formed such that no individual wants to come out of club and join other possible coalition. The second stage game is a non-cooperative game on voluntary contributions. Each individual decides on how much he/she would contribute non cooperatively. The decisions regarding club good production and consumption are also decided in this stage. One of the important results in this paper is that an increase in income inequality leads to an increase in the number of clubs thereby resulting in social segmentation. In the present paper a static game-theoretic model is formed to find whether the rich would be better off by forming a group of their own to provide better public service. The result in this paper is therefore similar in one respect to the finding by Jaramillo et al. in that the rich would segregate out and form their own club only when the income distribution gets more unequal. Further emphasis is also placed on whether the poor would be worse off or not in presence of such a club.

The present paper can also be related to the literature on private provision of public goods. There is a well-developed literature on voluntary provision of public good. Most notable works in this regard include those by Bergstrom et al. [?], Bernheim [?] and Andreoni [?]. All these papers employ a static model of voluntary donations where individuals simultaneously decide on the amount of voluntary contributions to a pure public good. The standard result coming out of these theories is that in general there is an under provision of public good from voluntary contributions. As the economy grows in size, only the very rich people contribute for the public good and the others free ride. Bergstrom et al. argued that if all individuals are identical except for

wealth endowments, then less of public good will be supplied voluntarily if the wealth distribution is more equal. This is in one respect related to the result in the current paper namely that the rich would privately provide for the public good only when the income inequality is above a threshold level.

A more relevant literature includes a few papers which consider mixed systems consisting of both governmental and private provision of public goods. These papers [?, ?, ?, ?, ?] are different from the traditional papers in the literature on private provision of public goods in that they do not take the level of collective provision of public good by the government as exogenous. Decisions regarding the public good provision are taken by the government by majority rule supplemented by the individual decisions to voluntarily contribute before or after the collective decision is made. Important examples of such dual provision would include education and health care. The pioneering works in this regard have been done by Epple and Romano [?, ?, ?] . They analysed a dual collective-voluntary provision of health care with both forms of finance being endogenous. They also considered the issue of desirability of dual system by including in their model the households' decision of whether to permit individual contributions or not. Results in their papers find an "ends-against-the-middle pattern". A majority consisting of rich and poor preferred the dual system over the one-tier public system. This is in contrast to the middle class who puts greater emphasis on the governmental provision of public good. This result is again similar to one of the main results in this paper namely that had income distribution been not that unequal, there would not have been any incentive to supplement the public good provision by the government. However the quality aspect of public good is not considered explicitly in these models. In the present paper, one of the main reasons that why rich would segregate to provide the public good on their own is that they are dissatisfied with the existing quality of public good and seek some enhanced service. Furthermore the paper also analyses the effect



of such provision on the utility of the poor who are non contributors in this dual system.

## 3 The Model

### 3.1 Background

We consider an economy consisting of two types of people - poor with income  $Y_1$  and rich with income  $Y_2$  where  $Y_2 > Y_1$ . The total number of rich people in the economy is  $N_1$  while the number of poor people is  $N_2$ . Furthermore it is assumed that the poor and rich form a constant fraction of population. So,  $N_1 = (1 - \delta)N$ ,  $N_2 = \delta N$  where  $0 < \delta < 1$ . The rich people's income is a multiple  $\beta$  of the income of poor, i.e.  $Y_2 = \beta Y_1$  where  $\beta > 1$ . The preference of a typical individual over private good and quality of public good is

$$U = x^\alpha g^{1-\alpha} \tag{1}$$

Here it is assumed that 1 unit of public good is always provided. Hence  $g$  represents the quality of the public good. Higher the value of  $g$ , better is the quality of public service that is provided. Better quality of a public service would mean a public school with a better infrastructure, a better health care facility with access to all modern equipments and properly trained staff. So the question is what would be the quality of public service that would be provided by the government. In this model, this decision is purely supply determined. The choice variable at the hands of the government is tax rate and given the tax rate, that  $g$  would be chosen which ensures that the cost of providing such quality is covered up by tax revenue. The cost of providing public service of a higher quality is also higher. Also there is a scale factor in the cost of provision of the public good. The cost of providing public good of quality  $g$  is  $C = (N_1 + N_2)g$  The marginal cost of

providing one unit of quality of public good is assumed to be unity. The tax revenue is given by  $t(N_1Y_1 + N_2Y_2)$ . Hence given  $t$ ,  $g$  can be determined from  $t(N_1Y_1 + N_2Y_2) = (N_1 + N_2)g$ .

The budget constraint is given by  $x = (1 - t)y$ , where  $t$  is the tax rate chosen by the government. Government chooses  $t$  to maximise social welfare  $W = N_1V_1 + N_2V_2$  where  $V_i$  is the  $i$ th group's indirect utility. The resulting choice is

$$t^* = (1 - \alpha) \quad (2)$$

Accordingly, the optimal quality of public good is given by,

$$g^* = (1 - \alpha)[(1 - \delta) + \delta\beta]Y_1 \quad (3)$$

Here  $Y = N_1Y_1 + N_2Y_2 = [(1 - \delta) + \delta\beta]NY_1$ .

### 3.2 The Nash Game

As mentioned before this economy consists of two distinct groups with different average incomes. The rich may not be satisfied with the quality of public service that the government will be providing and may desire a better quality. Suppose now that rich form a club among themselves for providing their desirable quality of public good on its own. The club chooses a tax  $t_c$  on top of the government tax  $t$ .

The club's desirable quality of public good is again supply determined and is given by  $g_2 = \frac{t_c N_2 Y_2}{N_2} = t_c Y_2$ . In presence of the club, there will now be a difference in the quality of public good that the government will be providing. It will now be given by  $g = \frac{t(N_1 Y_1 + N_2 Y_2)}{N_1} = \frac{t[(1-\delta) + \delta\beta]Y_1}{(1-\delta)}$ .

Both the government and club play a simultaneous Nash game to choose the taxes. Club takes  $t$  as given and chooses  $t_c$  to maximise

$$V_2 = ((1 - t - t_c)Y_2)^\alpha (t_c Y_2)^{1-\alpha} \quad (4)$$

The best response for the club is given by

$$\hat{t}_c = (1 - \alpha)(1 - t) \quad (5)$$

Government on the other hand takes  $t_c$  as given and chooses  $t$  to maximise

$$V = N_1 [((1 - t)Y_1)^\alpha \left(\frac{tY}{N_1}\right)^{1-\alpha}] + N_2 [((1 - t - t_c)Y_2)^\alpha (t_c Y_2)^{1-\alpha}] \quad (6)$$

The first order condition for the government's optimization problem is

$$(N_1 Y_1)^\alpha Y^{1-\alpha} [(1 - \alpha)(1 - t)^\alpha t^{-\alpha} - \alpha(1 - t)^{\alpha-1} t^{1-\alpha}] - N_2 Y_2 \alpha (1 - t - t_c)^{\alpha-1} (t_c)^{1-\alpha} = 0$$

Plugging in  $\hat{t}_c = (1 - \alpha)(1 - t)$ , we obtain

$$(1 - \alpha)(1 - t)^\alpha t^{-\alpha} - \alpha(1 - t)^{\alpha-1} t^{1-\alpha} = \alpha^\alpha (1 - \alpha)^{1-\alpha} \frac{\frac{N_2 Y_2}{Y}}{\left(\frac{N_1 Y_1}{Y}\right)^\alpha}$$

or,

$$(1 - \alpha)(1 - t)^\alpha t^{-\alpha} - \alpha(1 - t)^{\alpha-1} t^{1-\alpha} = \alpha^\alpha (1 - \alpha)^{1-\alpha} \frac{\frac{\delta\beta}{1-\delta+\delta\beta}}{\left(\frac{1-\delta}{1-\delta+\delta\beta}\right)^\alpha} \quad (7)$$

Note RHS is independent of  $t$  and LHS is a decreasing function of  $t$ . Solving the above we get  $\hat{t}$ .

### 3.3 Incentive for Club Formation

A club will be formed only when the indirect utility of the rich with the club is in place is greater than the indirect utility of the rich when there is no club.

**Definition 1** ( $\bar{t}$ ).  $\bar{t}$  is defined as the tax rate chosen by the government at which the condition for club to exist holds with equality.

**Lemma 1.**  $\bar{t}(\delta, \beta) = 1 - \left(\frac{1-\delta+\delta\beta}{\beta}\right)^{1-\alpha}$

*Proof.* Mathematically, the condition for club to exist, can be expressed as

$$((1 - \hat{t} - \hat{t}_c)Y_2)^\alpha (\hat{t}_c Y_2)^{1-\alpha} > ((1 - t^*)Y_2)^\alpha \left(\frac{t^* Y}{N}\right)^{1-\alpha} \quad (8)$$

or,

$$\alpha^\alpha (1 - \alpha)^{1-\alpha} Y_2^{1-\alpha} (1 - \hat{t}) > \alpha^\alpha (1 - \alpha)^{1-\alpha} \left(\frac{Y}{N}\right)^{1-\alpha}$$

or,

$$1 - \hat{t} > \left(\frac{Y}{NY_2}\right)^{1-\alpha}$$

or,

$$\hat{t} < 1 - \left(\frac{Y}{NY_2}\right)^{1-\alpha}$$

By definition of  $\bar{t}$ , it can be written as

$$\begin{aligned} \bar{t} &= 1 - \left(\frac{Y}{NY_2}\right)^{1-\alpha} \\ &= 1 - \left(\frac{1 - \delta + \delta\beta}{\beta}\right)^{1-\alpha} \\ &= \bar{t}(\delta, \beta) \end{aligned}$$

□

$\bar{t}$  is the highest level of the tax rate which ensures that a club will be formed. In other words if the tax rate chosen by the government is less than or equal to  $\bar{t}$  then the rich people will agree to charge a tax  $t_c$  on top of it and form a club.

Now we will go back to the government's optimization problem. The first order condition is,

$$(1 - \alpha)(1 - t)^\alpha t^{-\alpha} - \alpha(1 - t)^{\alpha-1} t^{1-\alpha} = \alpha^\alpha (1 - \alpha)^{1-\alpha} \frac{\frac{\delta\beta}{1-\delta+\delta\beta}}{\left(\frac{1-\delta}{1-\delta+\delta\beta}\right)^\alpha}$$

The left hand side of the above equation is denoted as  $L(t)$ . The right hand side can be denoted as  $R(\delta, \beta)$ .

**Lemma 2.**  $\frac{\delta L(\bar{t}(\delta, \beta))}{\delta \beta} < 0$  and  $\frac{\delta R((\delta, \beta))}{\delta \beta} > 0$  for all  $\beta > 1$ .

*Proof.* Notice that  $\frac{\delta L(\bar{t}(\delta, \beta))}{\delta \beta} = \frac{\delta L}{\delta t} \cdot \frac{\delta \bar{t}}{\delta \beta}$ . Since  $\bar{t}(\delta, \beta) = 1 - \left(\frac{1-\delta}{\beta} + \delta\right)^{1-\alpha}$ , it is easy to see that  $\frac{\delta \bar{t}(\delta, \beta)}{\delta \beta} > 0$ . Now,

$$\begin{aligned} \frac{\delta L}{\delta t} &= \frac{\delta}{\delta t} \left[ (1-\alpha)(1-t)^\alpha t^{-\alpha} - \alpha(1-t)^{\alpha-1} t^{1-\alpha} \right] \\ &= -\alpha(1-\alpha)(1-t)^{\alpha-1} t^{-\alpha} - \alpha(1-\alpha)(1-t)^\alpha t^{-\alpha-1} \\ &\quad - \alpha(1-\alpha)(1-t)^{\alpha-2} t^{1-\alpha} - \alpha(1-\alpha)(1-t)^{\alpha-1} t^{-\alpha} \\ &< 0 \end{aligned}$$

for any  $t \in (0, 1)$ . Hence,  $\frac{\delta L(\bar{t}(\delta, \beta))}{\delta \beta} < 0$ .

$R(\delta, \beta)$  can be written as

$$R(\delta, \beta) = \alpha^\alpha (1-\alpha)^{1-\alpha} \phi(\delta, \beta)$$

where

$$\phi(\delta, \beta) = \frac{\frac{\delta \beta}{1-\delta+\delta \beta}}{\left(\frac{1-\delta}{1-\delta+\delta \beta}\right)^\alpha} = \frac{\frac{1}{\frac{1-\delta}{\delta \beta}+1}}{\left(\frac{1-\delta}{1-\delta+\delta \beta}\right)^\alpha}$$

As  $\beta$  increases,  $\frac{1}{\frac{1-\delta}{\delta \beta}+1}$  rises and  $\left(\frac{1-\delta}{1-\delta+\delta \beta}\right)^\alpha$  falls. Hence,  $\frac{\delta \phi(\delta, \beta)}{\delta \beta} > 0$  and thus  $\frac{\delta R((\delta, \beta))}{\delta \beta} > 0$ . □

**Proposition 1.** *Given any  $\delta \in (0, 1)$ , there exists a critical threshold  $\beta_c(\delta)$  such that for any  $\beta \geq \beta_c(\delta)$ , the rich have the incentive to form a club for provision of the public good.*

*Proof.* From Lemma ??, it is known that  $L(\bar{t}(\delta, \beta)) - R(\delta, \beta)$  is a monotonically decreasing function. The function is also continuous in  $\beta$ .

$$\bar{t}(\delta, \beta) = 1 - \left(\frac{1-\delta+\delta \beta}{\beta}\right)^{1-\alpha}$$

Therefore,  $\lim_{\beta \rightarrow 1} \bar{t}(\delta, \beta) = 0$  and hence as  $\beta \rightarrow 1$ ,  $L(\bar{t}(\delta, \beta)) \rightarrow \infty$  while  $R(\delta, \beta) \rightarrow \alpha^\alpha (1 - \alpha)^{1-\alpha} \frac{\delta}{1-\delta^\alpha}$ . Also, as  $\beta \rightarrow \infty$ ,  $\bar{t}(\delta, \beta) \rightarrow 1 - \delta^{1-\alpha} < 1$ . Hence, as  $\beta \rightarrow \infty$ ,  $L(\bar{t}(\delta, \beta))$  converges to a finite value while  $R(\delta, \beta) \rightarrow \infty$ . Therefore it is clear that,

$$\lim_{\beta \rightarrow 1} (L(\bar{t}(\delta, \beta)) - R(\delta, \beta)) = \infty \quad (9)$$

$$\lim_{\beta \rightarrow \infty} (L(\bar{t}(\delta, \beta)) - R(\delta, \beta)) = -\infty \quad (10)$$

Given that the function  $L(\bar{t}(\delta, \beta)) - R(\delta, \beta)$  is continuous in  $\beta$  and is a monotonically decreasing function and given Eq. (??) and Eq. (??), one can conclude that there exists a unique  $\beta_c \in (1, \infty)$  such that  $L(\bar{t}(\delta, \beta_c)) - R(\delta, \beta_c) = 0$ . Given any  $\delta \in (0, 1)$ ,  $\beta_c(\delta)$  indicates the critical value above which the rich have the incentive to form a club for provision of the public good.  $\square$

The result seems very intuitive. As discussed in the introduction, the emergence of a club catering to one section of the society to provide a public good of their desirable quality often occurs when the average income of this group is significantly above the average income of the rest.

### 3.4 The quality of the public good for the poor

When the rich form their own club for public good provision, the quality of the public good meant for the poor falls. The government maximizes the aggregate utility and the tax collected by the government does not benefit the rich once they provide for their public good through their own club. As a result, the government reduces the tax rate once the club is formed. This has a negative impact on the quality of the public good provided by the government for the poor. On the other hand, since the tax proceeds for the government are spent to provide public good only for the poor and not the rich, there is a positive effect on the quality as well. As it turns out, whenever

the rich have incentive to form the club, the first effect dominates the second effect and the poor receive a lower quality. This is spelled out in the next proposition.

**Proposition 2.** *Given any  $\delta \in (0, 1)$ ,  $\beta \geq \beta_c(\delta)$  implies lower quality of public good for the poor under the mixed system relative to that under pure public provision.*

*Proof.* With the club in place, the quality of the public good received by the poor is  $\hat{g}$ . Now,

$$\hat{g} \leq g^* \Leftrightarrow \frac{\hat{t}Y}{N_1} \leq \frac{t^*Y}{N} \Leftrightarrow \hat{t} \leq (1 - \alpha)(1 - \delta)$$

We show that  $\hat{t} \leq \bar{t} \Rightarrow \hat{t} < (1 - \alpha)(1 - \delta)$ , i.e. if there is enough incentive for club formation for the rich, then the quality of the public good received by the poor falls.

First suppose that  $\alpha\beta \leq 1$ . In this case,  $\frac{1-\delta+\delta\beta}{\beta} = \frac{1-\delta}{\beta} + \delta \geq \alpha(1 - \delta) + \delta$  since  $\alpha \leq \frac{1}{\beta}$ . Hence,

$$\begin{aligned} \frac{1 - \delta + \delta\beta}{\beta} &\geq 1 - (1 - \alpha)(1 - \delta) \\ \Rightarrow \left(\frac{1 - \delta + \delta\beta}{\beta}\right)^{1-\alpha} &\geq (1 - (1 - \alpha)(1 - \delta))^{1-\alpha} \\ &> 1 - (1 - \alpha)(1 - \delta) \end{aligned}$$

since  $1 - (1 - \alpha)(1 - \delta) < 1$ . Since  $\bar{t} = 1 - \left(\frac{1-\delta+\delta\beta}{\beta}\right)^{1-\alpha}$ , we can write

$$1 - \bar{t} > 1 - (1 - \alpha)(1 - \delta) \Rightarrow \bar{t} < (1 - \alpha)(1 - \delta)$$

Thus,  $\hat{t} \leq \bar{t} \Rightarrow \hat{t} < (1 - \alpha)(1 - \delta)$ .

Now consider the case  $\alpha\beta > 1$ . Suppose  $\hat{t} \leq \bar{t}$ , but  $\hat{t} \geq (1 - \alpha)(1 - \delta)$ . Then,

$$\begin{aligned} L(\hat{t}) &\leq L(t) \text{ at } t = (1 - \alpha)(1 - \delta) \\ &= (1 - \alpha)^{1-\alpha} \frac{\delta}{(1 - \delta)^\alpha} \cdot \frac{1}{(1 - (1 - \alpha)(1 - \delta))^{1-\alpha}} \end{aligned}$$

since  $L(t)$  is decreasing in  $t$ . But  $\hat{t}$  solves ?? and hence

$$\begin{aligned} L(\hat{t}) &= \alpha^\alpha (1-\alpha)^{1-\alpha} \frac{\delta\beta}{(1-\delta)^\alpha} \cdot \frac{1}{(1-\delta+\delta\beta)^{1-\alpha}} \\ &= (1-\alpha)^{1-\alpha} \frac{\delta}{(1-\delta)^\alpha} \cdot \frac{(\alpha\beta)^\alpha}{\left(\frac{1-\delta+\delta\beta}{\beta}\right)^{1-\alpha}} \\ &= (1-\alpha)^{1-\alpha} \frac{\delta}{(1-\delta)^\alpha} \cdot \frac{(\alpha\beta)^\alpha}{(1-\hat{t})} \end{aligned}$$

Plugging this in the last equation and canceling terms, we find that

$$\frac{(\alpha\beta)^\alpha}{(1-\hat{t})} \leq \frac{1}{(1-(1-\alpha)(1-\delta))^{1-\alpha}}$$

or,

$$\frac{1-\bar{t}}{1-(1-\alpha)(1-\delta)} \geq \left[ \frac{\alpha\beta}{1-(1-\alpha)(1-\delta)} \right]^\alpha > 1$$

where the last inequality follows from  $\alpha\beta > 1$  and  $1-(1-\alpha)(1-\delta) < 1$ .

Hence,  $\bar{t} < (1-\alpha)(1-\delta)$ . This is a contradictory to  $\bar{t} \geq \hat{t} > (1-\alpha)(1-\delta)$ .

Therefore,  $\hat{t} \leq \bar{t} \Rightarrow \hat{t} < (1-\alpha)(1-\delta)$ .  $\square$

### 3.5 Effect of the club on the utility of the poor

The poor's utility under pure government provision

$$\begin{aligned} V_1^g &= ((1-t^*)Y_1)^\alpha g^{*1-\alpha} \\ &= \alpha^\alpha (1-\alpha)^\alpha Y_1^\alpha \left(\frac{Y}{N}\right)^{1-\alpha} \end{aligned}$$

The poor's utility with the club in place is

$$\begin{aligned} V_1^c &= ((1-\hat{t})Y_1)^\alpha \hat{g}^{1-\alpha} \\ &= (1-\hat{t})^\alpha \hat{t}^{1-\alpha} Y_1^\alpha \left(\frac{Y}{N_1}\right)^{1-\alpha} \end{aligned}$$

Now, poor will be worse off in presence of the club, if,

$$V_1^g \geq V_1^c \Leftrightarrow \alpha^\alpha (1-\alpha)^\alpha \left(\frac{N_1}{N}\right)^{1-\alpha} = \alpha^\alpha (1-\alpha)^\alpha (1-\delta)^{1-\alpha} > (1-\hat{t})^\alpha \hat{t}^{1-\alpha} \quad (11)$$



**Proposition 3.** *There exists a critical  $\beta_g \in (1, \infty)$  such that for any  $\beta > \beta_g$ , the poor's utility is lower under the mixed system than under the pure public provision.*

*Proof.*  $\hat{t}$  is obtained from solving the first order condition of the government's optimization problem in presence of a club. The first order condition has already been stated in ??.

$$(1 - \alpha)(1 - t)^\alpha t^{-\alpha} - \alpha(1 - t)^{\alpha-1} t^{1-\alpha} = \alpha^\alpha (1 - \alpha)^{1-\alpha} \frac{\frac{\delta\beta}{1-\delta+\delta\beta}}{\left(\frac{1-\delta}{1-\delta+\delta\beta}\right)^\alpha} \quad (12)$$

It is clear from the above equation that as  $\beta$  rises  $\hat{t}$  falls. Furthermore,  $(1 - \hat{t})^\alpha \hat{t}^{1-\alpha}$  is maximized at  $\hat{t} = 1 - \alpha$ . Hence it follows from the above equation, that  $\hat{t} \in (0, 1 - \alpha)$  for any finite  $\beta > 1$ . Putting these together, one can write that, as  $\beta \rightarrow \infty$ , the RHS of ??  $\rightarrow 0$  while the LHS is a positive constant. Thus, there exists a critical  $\beta_g \in (1, \infty)$  such that the poor's utility falls as the club is formed when  $\beta$  crosses this critical value. □

This again is intuitive. In presence of a club, the government knows that the public good it is providing is not serving one section of the population. Hence a lesser benefit of public good provision is now internalized. As a result, government would have the incentive to produce a lower quality of public service which leads to a deterioration of the utility of the poor.

## 4 Fixed cost of public good provision

We now introduce a fixed cost of supplying the public good. Otherwise, the model is exactly similar to the one we discussed in the previous section previous section. It can be easily verified that if there is a fixed cost,  $F$ , of

supplying the public good, the optimal tax under pure public provision is

$$t^* = 1 - \alpha + \frac{\alpha F}{Y} = 1 - \alpha + \frac{\alpha}{1 - \delta + \delta\beta} \cdot \frac{F}{NY_1} \quad (13)$$

Under the mixed system, the best response function for the club changes to

$$\hat{t}_c = (1 - \alpha)(1 - t) + \frac{\alpha}{\delta\beta} \cdot \frac{F}{NY_1} \quad (14)$$

assuming that the club is formed. The government's choice of optimal tax rate under the mixed system is now

$$\frac{1 - \alpha - t + \frac{\alpha F}{Y}}{\left(t - \frac{F}{Y}\right)^\alpha (1 - t)^{1-\alpha}} = \alpha^\alpha (1 - \alpha)^{1-\alpha} \frac{\frac{\delta\beta}{1-\delta+\delta\beta}}{\left(\frac{1-\delta}{1-\delta+\delta\beta}\right)^\alpha}$$

which comes down to

$$\frac{1 - \alpha - t + \frac{\alpha}{1-\delta+\delta\beta} \cdot \frac{F}{NY_1}}{\left(t - \frac{1}{1-\delta+\delta\beta} \cdot \frac{F}{NY_1}\right)^\alpha (1 - t)^{1-\alpha}} = \alpha^\alpha (1 - \alpha)^{1-\alpha} \frac{\frac{\delta\beta}{1-\delta+\delta\beta}}{\left(\frac{1-\delta}{1-\delta+\delta\beta}\right)^\alpha} \quad (15)$$

The LHS of ??,  $L(t, \delta, \beta)$  is falling in both  $t$  and  $\beta$ , while the RHS which is exactly same as in the model without the fixed cost is rising in  $\beta$ . Thus, the optimal tax rate  $\hat{t}$  is again falling in  $\beta$ . One can also show that exactly like the earlier model the rich have incentive for club formation if  $\hat{t} \leq \bar{t}(\delta, \beta, F)$  where  $\bar{t}$  is rising in  $\beta$ . Therefore, as  $\beta$  rises above a critical level, the rich will form their own club. Proposition 1 of the earlier section holds in this extended model as well.

As argued earlier, the incentive for club formation holds good if

$$L(\bar{t}(\delta, \beta, F), \delta, \beta) \leq R(\delta, \beta)$$

Using simulation, we try to trace out the critical  $\delta - \beta$  frontier above which the club will be formed. For this purpose, we have taken  $F = \gamma \cdot (NY_1)$  where  $\gamma$  is a fraction between 0 and 1. This simplification enables us to do the analysis in terms of four numbers  $\alpha, \delta, \gamma$  and  $\beta$ . Except  $\beta$ , the other

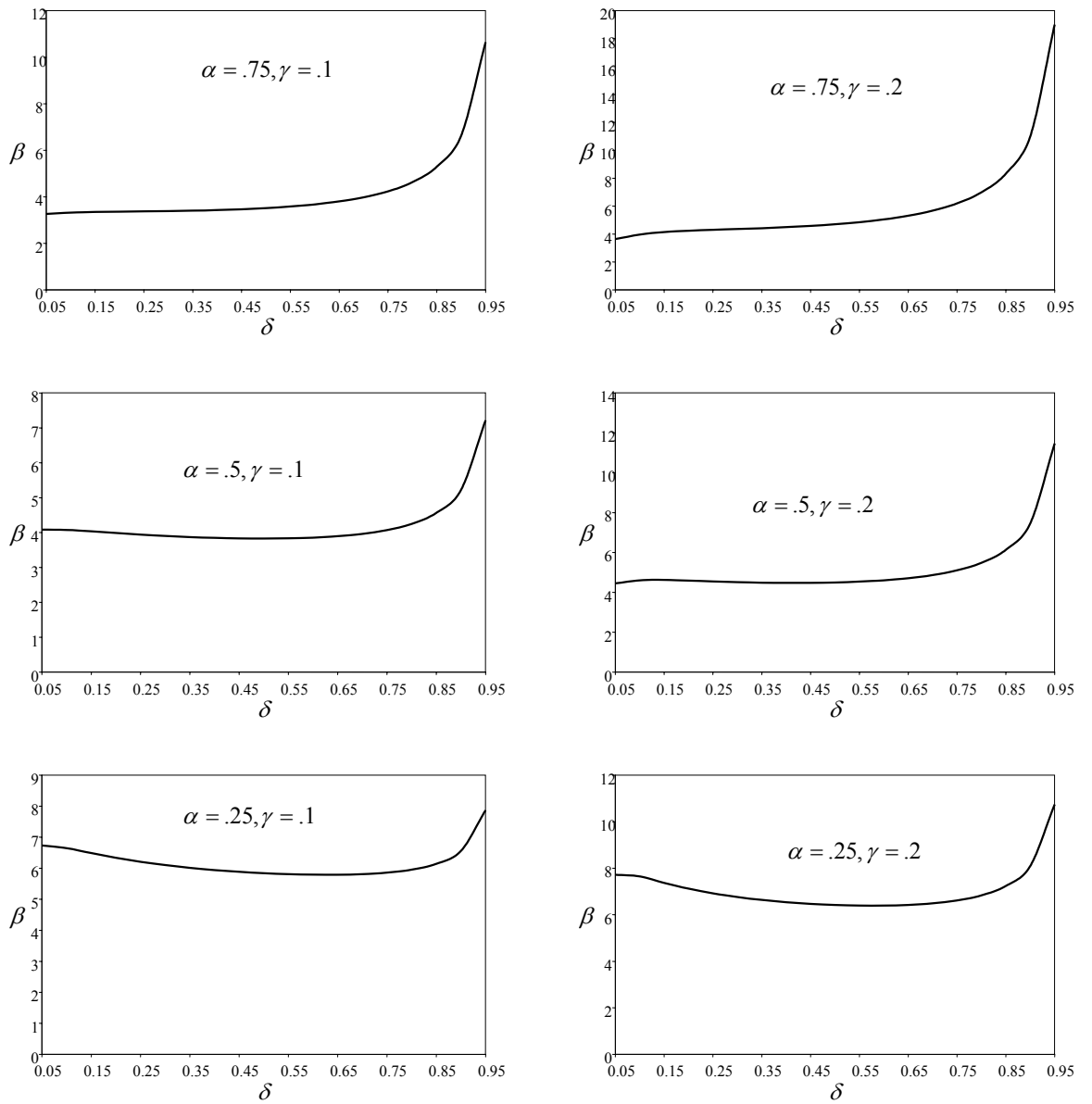


Figure 1: Simulation Pictures: Critical  $\beta$ - $\delta$  frontier for different parameter values.  
 Note: The rich have incentive for club formation for every  $\beta$ - $\delta$  configuration above the schedule.

parameters are fractions in  $(0, 1)$  interval, while  $\beta > 1$  is our measure of income inequality. The simulation results are reported in Figure 1. The results with the fixed cost are interesting in one aspect. Notice that for higher values of  $\delta$ , the frontiers are upward rising in all the cases. If we start at any  $\delta - \beta$  combination above the frontier, the rich will form their own club for public good provision. Now if  $\delta$  starts increasing, there may be an incentive for switching back to pure public provision beyond a certain level. This is not the case with  $\gamma = 0$ , i.e. in absence of fixed cost. Notice that the rich want to form their club for provisioning of the public good when they are dissatisfied with the quality of the public good that the government provides. The government supplies an *average* quality by collecting taxes from the rich and the poor. As the income of the rich rises, the demanded quality also rises. The shortfall of the average quality from the demanded quality increases further and beyond a certain level, the rich have enough incentive to provide for themselves even after paying the government-designated tax if they foresee that the government will adjust the tax rate downwardly once they walk out of the public system. But once the rich walk out, without the fixed cost they don't have incentive to switch back even if the fraction of poor comes down, because the net tax they face will go up once they switch back<sup>2</sup> while the quality they get goes down. With the fixed cost in place, as the number of poor decreases sufficiently, the average quality under pure public provision is still lower than the rich enjoy under the mixed system, but the shortfall gets lower and lower as the number of rich increases while

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<sup>2</sup>As long as the rich are in their own club, their net tax is

$$\begin{aligned}
 t_c + t &= (1 - \alpha)(1 - t) + t \\
 &= 1 - \alpha - \alpha t \\
 &< 1 - \alpha
 \end{aligned}$$

lower than the tax under pure public provision.

by switching back to pure public provision the rich can save the fixed cost<sup>3</sup> that they incur for their own provision. For sufficiently high values of  $\delta$ , the trade-off is resolved in favour of switching back. Once the rich switch back to pure public provision, the remaining poor are also better-off.

The last result helps us in relating the nature of income growth to its impact on the poor's utility. If only the income of the rich increases (characterized in terms of increasing  $\beta$  in our model), the poor's utility falls once the rich start providing for themselves and the effect is permanent in the sense that there is never any switching back and the poor's utility under the mixed system continues to fall as  $\beta$  rises. On the other hand, if the income growth is inclusive in nature, i.e. as a result of the income growth some people from the group of poor become rich (characterized in terms of increasing  $\delta$  in our model), the utility of the remaining poor may fall if the club is formed, but the impact is transitory. As income growth continues and  $\delta$  rises beyond a critical level (at a given  $\beta$ ), the rich would switch back to the pure public provision and the remaining poor will become better off.

## 5 Concluding Comments

This paper seeks to explain the growing discontent among a large section of the people in many developing countries about the quality of public services despite high growth in per capita income. We propose a model where the marginal utility of quality of public services rises with income. As a result, given the same proportionate tax rate on income, the rich's demand for better quality public services is higher. We show that if the government chooses the tax rate by maximizing a utilitarian social welfare function, the rich would have incentive to form their own club for self-provision of public

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<sup>3</sup>We implicitly assume that the fixed cost is not a sunk cost and required only in case of provision.

services despite being compelled to pay the government taxes if their income rises significantly above the poor. The result is driven by the fact that once the rich withdraw from the public system, the utilitarian government and the club of the rich play a Nash game to choose the tax rate and club fee respectively and the Nash equilibrium tax rate is significantly lower than that under pure public provision. We also show that once the rich form the club, the quality of public services for the poor is lower than that under the pure public provision and we identify this as one of the reason behind the popular discontent among the people in many developing countries.

In a modified model in which provision of public services involves a fixed cost, we use simulation results to portray differential impacts of different types of income growth. We argue that if income growth continues to grow the divide between the incomes of the rich and the poor, then the poor's utility falls at some stage after the rich arranges for their own provision of public services. Moreover, this effect is permanent and the poor's utility will go on falling as the income growth of this nature continues. On the other hand, if the income growth is inclusive in the sense of making some of the poor rich, the poor's utility may fall once the club is formed by the rich, but this decline is transitory. Once the size of the group of the rich is sufficiently large, the rich would switch back to pure public provision and from then on the remaining poor's utility would start increasing with income growth.

Although we attempt to address some crucial issues that are becoming very relevant in present development discourse, there are several issues for treatment of which we need a richer model. We assume a discrete income distribution with only two groups of people and as a result only one club is formed in our model. In a more complete model with continuous income distribution, the possibility of multiple club formation needs to be explored. If multiple clubs for people in different income bands are indeed formed, then such a model would predict multiple qualities of public services which

probably we observe in reality. Moreover, if we relax our assumption of utilitarian government which assigns equal weights to the benefits of the rich and the poor and incorporate a structure where the weights are determined endogenously by a political economy process, then there is another channel through which the sizes of the income groups and the income differential (through its impact on lobbying) would influence the ultimate decision of the government. In that case, the model can be extended to address the issues relevant for the developed economies as well.

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