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Dibyendu Maiti

Email: dibyendu@econdse.org

**Department of Economics
Delhi School of Economics**

**Chandril Bhattacharyya
Centre for Development Studies,
Kerala**

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CENTRE FOR DEVELOPMENT ECONOMICS
DELHI SCHOOL OF ECONOMICS
DELHI 110007

Informality, Governance and Growth

Dibyendu Maiti¹

Delhi School of Economics

Chandril Bhattacharyya²

Centre for Development Studies, Kerala

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Abstract

This paper develops a growth framework of a typical developing and democratic setting with formal and informal sectors, which faces trade-off of redistribution through either direct subsidy or strategic regulatory concession to operate informal activities. Inverted U-shaped growth and welfare functions against governance are found, which suggests a deliberated weak governance can raise growth and welfare of the economy with large informal sector keeping taxation at lower level. The governance that maximises growth varies inversely with subsidy given to informal sector and formal labour bargaining power. Unlike the level maximising welfare, the governance that maximises growth becomes independent of the bargaining power in case of no subsidy. Using standard parameters, the calibrated growth and welfare functions support these relations. Econometric results derived from instrumental and system regression models using pooled data for 46 countries during 1995-2009 justify such conjectures. This explains why the growing countries show higher level of informality.

Key words: informal sector, growth, strategic governance, taxation

JEL Code: J46, O43

¹ Address for Correspondence: Delhi School of Economics, University of Delhi, North Campus, New Delhi 110007. Usual disclaimers apply.

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1. Introduction

During the last couple of decades since the wave of globalisation came into force worldwide, the countries which are growing faster than others belong to the developing world (especially in Asia and Latin America), and incidentally a large share of their economic activities take place in the informal sector that undermines rules and regulations, violates environmental checks, ignores the conditions of decent works, forgo benefits and social securities of workers and unemployed persons (Schneider, 2005; ILO, 2009). The prevalence of informal sector could be due to structural constraints (Castellas and Porters, 1989), exploitation and discrimination (Sanyal, 2007; Harris-Barbara, 2002), low productivity (Lewis, 1956; Hart, 1973), poor institutions (Rodrik, 1998), weak financial markets (Banerjee, 1997), labour regulations and rigid industrial policies (Besley and Burgess, 2004; Albrecht et al., 2009) etc. But, this could be also strategic reason for a government who does not want to put much burden on the tax payers. In a pioneering work, De Soto (1989) believes that the informal sector thrives to avoid the cost of formality in terms of stringent rules and regulations, taxes, time and effort for complying with formal sector. Since then, researchers tend to account for various other aspects of informal sector (for example, Rauch, 1991; Choi and Thum, 2005; Johnson et al., 1997). A number of scholars among them rather show how political motives of government could be the reason for the informal sector existence (for example, Marjit et al., 2006; Dasgupta and Marjit, 2006; Sarkar, 2006; and Marcoullier and Young, 1995). Sarkar (2006) and Marcoullier and Young (1995) argued that a government derives own benefits from the existence of informal sector and has kept it alive deliberately. On the other hand, Marjit et al. (2006) and Dasgupta and Marjit (2006) provided political rationale of government to conserve the informal sector. In a different context, Banerjee (1997) argued that government bureaucracies are often associated with red tape, corruption, and lack of incentives due to the presence of asymmetric information in the credit market that led to a rise of mis-governance. Maiti and Mukherjee (2013) also provided a strategic reason for poor governance to attract FDI in the presence of foreign competition. So, the deliberate governance in the presence of informal sector becomes an area of investigation in the contemporary research. Its implication in the growth is almost not visible in the literature.

Conventionally, informal sector was viewed as a temporary feature of developing countries which was expected to be vanished over time as the economy progresses (Lewis, 1954). Hymer and Resnick (1969) theoretically argues that as an agrarian economy opens up,

such informal sector (defined by residual sector) tends to slim down and to be substituted by imports. The contemporary literature (e.g., Baily et al. 1998) points out that the labour-intensive traditional forms of production, including those in the countryside, are not disappearing, but persisting or even expanding as market-led industrialisation is intensifying in the developing countries. The sector becomes competitive with formal counter-part (Agenor, 1996; Marjit and Kar, 2011) or could be the result of exploitations and discriminations existing within the market (Harriss-White 2002; Sanyal, 2007).

It is evident that the size of informal sector is rising with the decline of social security provisions over time (Schneider and Enste, 2000). Though it is very hard to measure informal sector precisely, a number of works tried it. The share of informal economy in the developing countries is much higher than that of developed countries. They are 54.2% as an average of 33 African countries, 46.5% as an average of 9 Asian countries and 49.6% as an average of 9 Latin and South American countries. Loayza (1996) estimates the size as a percent of GDP for Latin American countries and finds more than 50% in Guatemala, Peru, Panama and Bolivia. Not surprisingly, the employment share of informal sector is much higher than its share in GDP. Schneider and Enste (2000) also estimates the average size of shadow economy (percent of GDP) for various countries in early 1990's and shows that it varies hugely across countries (for example, 76% in Africa, 60% in Central and South America, 70% in Asia, 28% in Central Europe, 43% in former Soviet Union countries and 30% in OECD countries). The Jütting and Laiglesia (2009) study concludes that more than half of all jobs in the non-agricultural sectors of developing countries can be considered as informal.

In comparison, the estimates of Schneider (2012) show that the share of informal participants in the total labour force in highly developed countries during 1990s were relatively low. They were around 15% in Austria and Denmark, around 20% in Germany and Sweden, around 48% in Italy and around 32% in Spain. For example, Schneider (2012) calculates the size of the sector as a percent of official GDP for 21 OECD countries and finds that it varies from 7.2 percent in USA to 25.1 percent in Greece with an un-weighted average of 13.9 percent for 21 OECD countries.

This has hit strongly to the foundations of public policy. We do no longer discuss public investment only, rather more concern about its level of efficiency. An effective governance is considered to be the key driving force behind the economic growth in the presence of globalised world. A large volume of works suggests that poor governance limits the incentive of

investment, trade and FDI (Rodrik, 1997, Besley, 2017). A number of international organisations and NGOs has been raising the concerns for the prevalence of informality in the name of decent works, fair trade etc. for humanitarian and social reasons. But, still it survives and is thriving. Regulatory concession for informal activities seem, therefore, to be a strategic outcome to be in the top of growth ladder.

In a typical developing economy, the workers who do not find employment in the formal sector crowd into the informal sector and, needless to say, a larger share of them falls below the poverty line. The level of informality is, therefore, highly associated with unpleasant and disgraceful images of a country, revealing a degree of social insecurity, low productivity, and nonconformity of laws and regulations. It is evident that the formal sector workers receive much higher wage than that of informal sector due to not only for technological superiority but also for legislation supports to the formal workers (ILO, 2009). These distortions produce unemployment. Without social security for unemployed workers, they must find something in the informal sector for survival. If the informal sector size is substantially large, the state could not ignore compensating those losses that has potential threat to their incumbency. In such a case, a benevolent government must look for a redistributive strategy that could minimise such distortions. Strict rules and regulations could not let any economic activities to be operated in the informal sector. Then, the tax needs to be raised to compensate the informal income. It essentially raises rent-seeking activities, impoverishment and unemployment (De Soto, 1989; Banerjee, 1997). The state could become unpopular that they do not want. Moreover, the state often is unable to handle if the size of government rises. There are ample evidences of such stories (e.g., Kaufmann et al., 2000; Ngo, 2008).

Even if the state is capable, a simple analogy led to argue that a government who cares redistribution more must levy higher tax rate in the presence of a large informal sector with higher inequality and poverty. To our best knowledge, there is no empirical study which confirms this claim. Rather, it has been observed that more egalitarian society and less informality (like in Europe) has higher tax rate than more unequal society and higher informality, like in Brazil (Persson and Tabellini (2000) and Drazen (2000)). Marcouiller and Young (1995), Choi and Thum (2005) and Marjit (2003) gave an answer to this puzzle and argued that such a government with informality usually allows to flourish activities outside the formal sector as a conscious strategy to tackle the unemployment and poverty without putting much burden on tax payers. Following this logic, Marjit et al. (2006) argues with a simple

political support model that a society with lower income inequality and poverty is likely to choose a higher tax rate than a society with a greater income inequality and poverty, even if both of them are equally concerned about the social impact of poverty. A strategic governance is an alternative choice variable of redistribution. But, none of these works looked at its implication on the economic growth and welfare in a dynamic setting. While the higher taxation is not good for formal sector, the weak governance is not too. Hence, the government obviously faces a dilemma what to choose and how much. Often, the one which offers popularity is preferred in democratic setting.

We develop a standard growth model with two sectors (formal and informal), where either formal sector could be taxed more to subsidise informal income or informal sector could be allowed to thrive deliberately needed to reduce the burden of tax-payers. The formal sector labour forms union with legislative supports and, hence, earn a rent. This creates a distortion and generates unemployment. They would remain unemployed if government provides unemployment benefits to them. By allowing them to work informal sector, the state manage to restrain the unrest from them.

In such a framework, we find that there exists a unique level of governance maximising growth rate, which varies inversely to subsidy rate and bargaining power of formal workers. When the government does not finance any subsidy, this level becomes independent of the bargaining power. If the government raises subsidy rate and wants to keep the growth rate constant, it should drop the level of governance if the existing level is higher than the growth rate maximising level of governance at a given subsidy. The level of governance maximising welfare is different from the level maximising growth rate; and it is likely to be greater than the later one. This essentially suggests that deliberate weak governance does not limit economic growth and welfare of the economy with large informality. Using standard parameters, we calibrated growth and welfare functions, which shaped inverted-U against governance. Further, we find direct relationship between governance and taxation, and run instrumental and system regression models using pooled dataset for 46 countries (including both developed and developing) during 1995-2009 and the results strongly supports our theoretical conjectures.

The rest of the paper is organised as follows. The next section reviews the existing work on governance and informality. Section 3 describes the formal model. Section 4 attempts to simulate the main relationship using standard parameters available in the existing literature. Section 5 draws some empirical evidences. The last section ends with concluding observations.

2. The Model

We model a typical developing economy, where a single final good is produced at both formal and informal sectors simultaneously with different production technologies. There are three economic agents in the model - households, government and labour unions. Labours prefer to find a job in the formal sector as formal wage rate is higher than informal one. Similar assumption is also made in Carruth and Oswald (1981) and Marjit (2003) in the context of an economy with union and non-union workers. For simplicity, we assume homogeneous labour, which implies that getting a formal employment is a matter of luck. Unlucky labours join the informal sector. Details of each economic actor are described below.

3.1. Formal Sector

The formal sector consists of a fixed number of competitive firms, who produce final good using private capita (K) labour (L), and non-rival and non-excludable productive public goods, G (mainly infrastructure). The government can affect output of the formal sector, Y_F , by its choosing a level of governance, g . This g represents the quality of governance (like, quality of public infrastructure & pavement, effective implementation of industrial regulations, tax rules etc.). The existing literature talks about dimensions of governance and its effect on production (Rodrik, 1997; Choi and Thum, 2005). In this paper, the term ‘governance’ represents a set of regulations affecting activities of both formal and informal sectors differently. If the level is higher, the government limits the size of informality and vice versa. Marjit et al. (2006) also linked governance and informality in a similar way. Jonasson (2011) further used the term, governance, as the extent to which government supports the market transactions. According to this paper, good local governance—or a high degree of government effectiveness—comes with both sticks and carrots for businesses and workers to participate the formal rather than in the informal sector.

The production function of the formal sector is given by

$$Y_F = AK^\alpha L^\beta G^{1-\alpha} \mu(g) \quad \text{where } \alpha, \beta, \alpha + \beta \in (0,1); \mu'(g) > 0, \mu''(g) < 0 \quad . \quad (1)$$

Following Barro (1990) and many of its extensions, G is assumed to be a flow variable for simplicity. In reality, it is a stock variable. The level of governance, g , is treated as a flow variable. Following Marjit et al. (2006), the formal output is assumed to rise with g , but at a decreasing rate. The evidences from World Bank Enterprise Survey also supports the

assumption. Here, A denotes the level of technology and is independent of time ignoring technological progress. In the model, α and β represent the output elasticities with respect to capital and labour respectively. Following Chang et al. (2007), that the Cobb-Douglas production function is assumed to satisfy increasing returns to scale of all inputs but decreasing returns in terms of private inputs. This implies that supernormal profit exists after paying the factor payments according to their marginal productivities. This positive profit is treated as a rent to be bargained between labour union and firm in this sector. Higher the bargaining power of the firm, the greater is the profit. To keep the number of firm's constant, we further assume, following Chang et al. (2007), that there exists a fixed factor, e.g., land. For the sake of simplicity, the number of firms is normalised to unity.

The representative formal firm maximises its profit, π , defined as

$$\pi = Y_F - w_F L - rK \quad . \quad (2)$$

Here w_F and r stand for the wage rate of labour in the formal sector and the rental rate of private capital respectively. As there is a single final good, so its price is normalised to unity.

3.2. Informal Sector

The unlucky workers, who cannot find a job in the formal sector, join the informal sector. They could be engaged in extra-legal activities, but not criminal and illegal works. We assume that the informal sector production does not need private capital. This is an approximation of reality, in the sense that informal sector is much less capital intensive compare to the formal sector. In addition, the informal activities are usually not financed by bank and do not build capital assets. This is evident from a survey in 1983 of 10,000 households in Lima discussed by Thomas (1992). The survey reveals that almost 50% of informal workers operate with less than US\$ 500 of capital per head, whereas 90% of a comparable sample of formally employed workers operate with more than US\$ 6000 of capital per head. Soderbom and Teal (2000)'s discussion on the survey data from Cameroon, Ghana, Kenya and Zimbabwe also points toward this heterogeneity of capital intensity. It suggests that manufacturing firms, which employ more than 100 workers, operate on average with three to four times more physical capital per worker than firms with less than six workers. Amaral and Quintin (2006) provides a theoretical explanation of why formal firms operate at higher physical capital to labour ratio than the informal firms. According to NSSO report on unorganised sector of Indian economy, more

than 95% enterprises working in the informal sector do not receive formal finance during 2005-06.

We also assume that the output of this sector, Y_I , varies proportionally with the number of informal workers³ and public expenditure, G . Jonasson (2011) empirically shows the positive impact of public investment on the informal sector. By the choice of units, we assume that the total labour force is equal to unity and does not grow over time. So, $(1 - L)$ is the number of workers in the informal sector. The production function of this sector is given by

$$Y_I = B(1 - L)G\gamma(g) \quad ; \quad \gamma'(g) < 0 \quad , \quad \gamma''(g) < 0 \quad . \quad (3)$$

To keep similarity with the reality, we assume that the informal sector is technologically backward than the formal sector. Here also, technology parameter, B , is time independent. In the spirit of Marjit et al. (2006), we assume that governance inversely affects informal output; and the rate of falling rises with level of governance. If the government's monitoring and compliance is high (i.e., g is high), then informal firms bear opportunity cost and/or spend some of its resources to avoid the rules - such as bribing to the government officials, using irregular procurement and distribution channels etc. On the other hand, if the government keeps g low (e.g., allowing street vendors to congest the streets, ironing out public electricity uses, tolerating slums in public spaces, waiving strict labour and industrial regulations for small and marginal firms), it helps informal sector to flourish. In reality, there exists informal activities which are not affected by the level of governance. Our model considers only those activities whose output vary inversely to the governance. Like Marjit et al. (2006), the complementarity between formal and informal sectors is assumed to be dominated by their substitutability. Loayza (1996) also empirically shows that the strength and efficiency of the government have significant negative impact on the informal sector. Jonasson (2011) uses Brazilian data to show that better quality of governance or government effectiveness negatively affects the informal sector.

Since there is only one private input in the informal sector, the whole output is paid to the informal workers as their factor payments. So, the informal wage, w_I , is given by

$$w_I = BG\gamma(g) \quad . \quad (4)$$

³ Mazumder (2015) also assumes that output in the unorganised sector varies proportionally with labour input.

3.3 Private capital market

Private capital market is perfectly competitive where the rental rate of capital is determined by demand supply equality. Profit maximisation of the competitive firm leads to the following demand function for capital.

$$r = A\alpha K^{\alpha-1}L^\beta G^{1-\alpha}\mu(g) = \frac{\alpha Y_F}{K} . \quad (5)$$

3.4 Government

The government taxes wage, rental and profit income generating from the formal sector. This tax revenue is spent to procure public goods and services, and subsidize informal sector workers. The government balances the budget in each period and spends a fixed fraction of formal income, $\bar{\tau}_G$, to finance public goods and services, for simplicity. We assume further, it is exogenously given. It is shown in the equation given below

$$\bar{\tau}_G Y_F = G . \quad (6)$$

Following Marjit et al. (2006), we also assume that governance is costly and the cost rises at an increasing rate with the level. We denote the cost per unit of G by $Z(g)$, where $Z'(g) > 0$ and $Z''(g) > 0$. The subsidy given to informal workers may not be a direct monetary transfer, but rather indirect in nature. It could be similar to subsidising food, fuels, health care services and education etc. So, the government's budget constraint becomes

$$\tau Y_F = G[1 + z(g)] + S(1 - L) , \quad (7)$$

where S is subsidy per informal worker and τ is the proportional income tax rate. We assume that S is proportional to formal sector's output, i.e., $S = sY_F$. So, the government's budget constraint in per unit of formal output is given by

$$\tau = \bar{\tau}_G[1 + z(g)] + s(1 - L) . \quad (8)$$

3.5 Labour Union and Wage Bargaining

We assume that labour union exists only in the formal sector. This is a source of imperfection/distortion in the model along with technological difference and the participation of government is needed to minimise the cost of such distortion. However, the results derived in this model should essentially be valid for other kinds of labour market distortions (e.g., Efficiency Wage Hypothesis). Following Chang et al. (2007) and Bhattacharyya and Gupta

(2015, 2016), we consider a Stone–Geary form of utility function for labour union, which derives utility from both employment⁴ and net wage rent after tax, arising from difference between formal and informal sector earnings. The utility function of the labour union is given by

$$u_T = [(1 - \tau)w_F - w_I]^m L^n \quad \text{with } m, n > 0 . \quad (9)$$

Here, u_T denotes the utility of the labour union. Moreover, m and n are two non-negative preference parameters representing elasticities of union’s utility with respect to wage and the employment gains respectively. If $m > (<) (=) n$, then the labour union is said to be “wage oriented” (“employment oriented”) (“neutral”).⁵

Here, we consider only the ‘Right to Manage’ model of bargaining as it is more common in the real world⁶. In this model, the union and firm bargained over the formal wage, and employment is solely determined by the firm from its labour demand function. The result of bargaining process can be obtained by maximising the ‘generalised Nash product’ function which is given by

$$\psi = (u_T - \bar{u}_T)^\theta (\pi - \bar{\pi})^{(1-\theta)} \quad \text{with } 0 < \theta < 1 . \quad (10)$$

Here, \bar{u}_T and $\bar{\pi}$ represent the fall back utility of labour union and profit of the firm respectively. Following Chang et al. (2007) and Bhattacharyya and Gupta (2015, 2016), we assume for simplicity, that bargaining disagreement stops production; which implies no profit and no utility with zero employment. The parameter, θ , represents the relative bargaining power of the union and it is a positive fraction.

The formal labour demand function can be obtained by maximising the profit given by equation (2) with respect to L ;

$$w_F = \beta AK^\alpha L^{\beta-1} G^{1-\alpha} \mu(g) . \quad (11)$$

So, incorporating equations (1), (2), (9) and (11) into equation (10), we obtain

$$\psi = \{[(1 - \tau)\beta AK^\alpha L^{\beta-1} G^{1-\alpha} \mu(g) - w_I]^m L^n\}^\theta \{(1 - \beta)AK^\alpha L^\beta G^{1-\alpha} \mu(g) - rK\}^{(1-\theta)} . \quad (12)$$

⁴ Since we assume a closed shop labour union, number of employment in the formal sector is equal to the number of union membership.

⁵ See Chang et al. (2007) to know more about these parameters.

⁶ Oswald (1993) and Oswald and Turnbull (1985)’s survey reveal that labour unions of both USA and Britain normally do not negotiate over the total number of jobs.

Since equation (11) shows a monotonic inverse relationship between the formal wage and employment. It is, therefore, equivalent to maximise equation (12) with respect to L to find out the solution of the bargaining process. Now, using the first order condition for maximisation of the equation (12) along with equations (1), (4), (5), (6) and (8), we obtain the negotiated level of formal employment, L^* , given by

$$L^* = \frac{\{1 - \bar{\tau}_G[1 + z(g)] - s\}\Theta}{\{\bar{\tau}_G B\gamma(g) - s\Theta\}} \quad . \quad (13)$$

Here, Θ is given by

$$\Theta = \frac{\beta\{\theta n(1 - \alpha - \beta) + \beta(1 - \theta)(1 - \beta) - \theta m(1 - \beta)(1 - \alpha - \beta)\}}{\{\theta n(1 - \alpha - \beta) + \beta(1 - \theta)(1 - \beta)\}} \quad . \quad (14)$$

We assume that the numerator of Θ is positive, i.e.,

$$\text{Condition 1: } \theta n(1 - \alpha - \beta) + \beta(1 - \theta)(1 - \beta) > \theta m(1 - \beta)(1 - \alpha - \beta)$$

This is to be satisfied and trivial when $m \leq n$, i.e., union is “employment oriented” or “neutral”. However, even if the union is wage oriented, this condition still holds provided that the union is not excessively wage oriented. These simple assumptions confirm that Θ is a positive fraction. A rise in the relative bargaining power of labour union lowers Θ as shown below.

$$\frac{\partial \Theta}{\partial \theta} = - \frac{\beta^2(1 - \beta)^2 m(1 - \alpha - \beta)}{\{\theta n(1 - \alpha - \beta) + \beta(1 - \theta)(1 - \beta)\}^2} < 0 \quad . \quad (14.a)$$

Now, formal employment has to be a positive fraction. So, both numerator and denominator have to be positive, but the denominator has to be greater than the numerator. These are given below by conditions 2, 3 and 4.

$$\text{Condition 2: } 1 - \bar{\tau}_G[1 + z(g)] - s > 0 \quad ;$$

$$\text{Condition 3: } \bar{\tau}_G B\gamma(g) > s\Theta \quad ;$$

$$\text{Condition 4: } \Theta - \Theta \bar{\tau}_G[1 + z(g)] < \bar{\tau}_G B\gamma(g) \quad .$$

Conditions (2), (3) and (4) imposes an upper bound on the level of governance for given $\bar{\tau}_G$ and s . Throughout the paper, the range of g always is assumed to satisfy all such conditions. Given these conditions, equation (13) shows that the share of negotiated level of formal employment is time independent and so is the share of informal employment. From equation (13), we also obtain

$$\frac{\partial L^*}{\partial s} = - \frac{\{\bar{\tau}_G B\gamma(g) - \Theta + \Theta \bar{\tau}_G[1 + z(g)]\}\Theta}{\{\bar{\tau}_G B\gamma(g) - s\Theta\}^2} < 0 \quad . \quad (13.a)$$

$$\frac{\partial L^*}{\partial \bar{\tau}_G} = - \frac{[1 + z(g)]\Theta\{\bar{\tau}_G B\gamma(g) - s\Theta\} + B\gamma(g)\{1 - \bar{\tau}_G[1 + z(g)] - s\}\Theta}{\{\bar{\tau}_G B\gamma(g) - s\Theta\}^2} < 0 \quad . \quad (13.b)$$

$$\frac{\partial L^*}{\partial \theta} = \frac{\{1 - \bar{\tau}_G[1 + z(g)] - s\}\bar{\tau}_G B\gamma(g)}{\{\bar{\tau}_G B\gamma(g) - s\Theta\}^2} \frac{\partial \Theta}{\partial \theta} < 0 \quad . \quad (13.c)$$

Equations (13.a) and (13.b) show that formal employment inversely vary with subsidy rate and public expenditure share of GDP. Because, a rise in both of them raises income tax rate, which bargains for higher wage that reduces formal employment.

Equation (13.c) shows that a rise in the union's bargaining power reduces formal employment due to higher wage. So, the bargained wage rises and employment falls. Now, putting the value of negotiated employment given by equation (13) in (11), we can obtain the resultant negotiated wage rate. Again using equations (1), (4), (6), (8), (11) and (13), we can show that

$$(1 - \tau)w_F = w_I \left\{ \frac{\beta}{\Theta} \right\} \quad (15)$$

Equation (15) shows that after tax formal wage rate varies positively with informal wage rate and varies inversely with θ , i.e., varies positively with θ . If we assume that the labour union is powerless, i.e., $\theta = 0$, then $\theta = \beta$. Equation (14.a) implies that $(1 - \tau)w_F > w_I$ when $\theta > 0$. Important results obtained is summarised in the following proposition.

Proposition 1: *Formal employment varies inversely with subsidy rate, public expenditure share of GDP and formal labour union's bargaining power.*

Note that equation (15) can be written as

$$\frac{(1 - \tau)w_F}{w_I} = \left\{ \frac{\beta}{\Theta} \right\} \quad (15.a)$$

The relative after tax wage gap between formal sector and informal sector is independent of government's policy instruments (here, tax rate and governance level). It is solely determined by the union's relative bargaining power and preference parameters.

Lemma 1: The government cannot influence the relative after tax wage gap between formal and informal sectors by any policy instruments as it is solely determined by the formal labour union's bargaining power and preference parameters.

3.6 The Household

The representative household derives instantaneous utility from consumption, c , of the final good and the level of governance, g . We ignore leisure as a source of utility. Total labour supply remains constant. Following Barro (1990) and many of its extensions, productive public goods and services do not enter into the utility function. The household chooses the time path of consumption to maximise her discounted present value of instantaneous utility subject to her intertemporal budget constraint. The household's problem is given below.

$$\text{Max} \int_0^{\infty} [\log(c)\eta(g)]e^{-\rho t} dt \quad ; \quad \eta'(g) > 0 \text{ and } \eta''(g) < 0 \quad (16)$$

$$\text{subject to, } \dot{K} = (1 - \tau)[w_F L + rK + \pi] + w_I(1 - L) + S(1 - L) - c \quad ; \quad (17)$$

and $K(0) = K_0$.

Here c is the control variable and K is the state variable. $\eta(g)$ captures the impact of governance on household's utility; and the marginal impact is positive but diminishing. ρ is the constant discount factor. Capital is irreversible and does not depreciate over time. The share of formal and informal sector workers are remained same for all households⁷; and the representative household saves and invests the rest of net-income after tax left over consumption, which is used for further capital accumulation. Household's net income consists of after tax income from the formal sector, informal wage and subsidy. Since all factors of production belongs to the household, all incomes goes there.

Solving this dynamic optimisation problem, we obtain the balanced steady state growth rate of consumption, denoted by v , as given below:

$$v = \frac{\dot{c}}{c} = (1 - \tau)r - \rho \quad . \quad (18)$$

Equation (18) shows that the rate of consumption growth is equal to the excess of the after tax rate of return on private capital over the discount rate.

Lemma 2: Unlike the welfare level, the steady state balanced growth rate is independent of utility from governance as this effect does not influence the return from capital accumulation.

⁷ Even if we do not make such kind of big family assumption, still we get similar kind of intertemporal budget constraint in the presence of homogeneous labour and perfect credit market.

This gives a hint that the welfare maximising level of governance will be different from the growth rate maximising one.

4. The Steady State

The economy is always in the steady state balanced growth equilibrium without any transitional dynamics. In the steady state, L^* , $1 - L^*$, g , r , $\bar{\tau}_G$, τ , s , v , G/K all are time-independent; whereas Y_F , Y_I , w_I , w_F , c , G , K , π and S grow at the rate v .

4.1 Growth Rate Maximising Governance

In this subsection, we focus on growth rate maximising level of governance along the steady state balanced growth path. The government's objective is to maximise welfare. However, for analytical complexity, we could not derive it. Rather, we first derive the growth rate maximising level of governance and later try to analyse whether it deviates from the welfare maximising one or not. First, we focus on the effect of governance on the level of formal employment. For that, we use equation (13) and obtain

$$\frac{\partial L^*}{\partial g} = - \frac{\bar{\tau}_G \Theta [z'(g) \{\bar{\tau}_G B \gamma(g) - s \Theta\} + B \gamma'(g) \{1 - \bar{\tau}_G [1 + z(g)] - s\}]}{\{\bar{\tau}_G B \gamma(g) - s \Theta\}^2} . \quad (19)$$

The numerator of the above equation is ambiguous as $z'(g) > 0 > \gamma'(g)$. We assume the following condition to be satisfied.

$$\text{Condition 5: } z'(g) \{\bar{\tau}_G B \gamma(g) - s \Theta\} + B \gamma'(g) \{1 - \bar{\tau}_G [1 + z(g)] - s\} > 0 .$$

Actually, condition 5 depends on the functional forms of $z(g)$ and $\gamma(g)$. For some functional forms, it may not be satisfied for all values of g . However, we assume that this condition is satisfied for the range of g that of our interest. This implies that governance has a negative effect on formal employment. The intuition behind this result is as follows. The labour union gets utility from the gap between after tax formal and informal wages and higher productivity. A rise in g raises the tax rate as governance is costly. This lowers the gap. However, higher the level of governance lower the informal income and widens the gap. We assume that the tax effect dominates and the gap decreases with g . As a result, the union bargains for higher wage, leading to a drop of employment.

To obtain the effect of g on the proportional income tax rate, we use equation (8) and get

$$\frac{\partial \tau}{\partial g} = \bar{\tau}_G z'(g) - s \frac{\partial L^*}{\partial g} > 0 . \quad (20)$$

Equation (20) shows that the governance raises the income tax rate. As g rises, the cost of financing governance goes up. On the other hand, with a rise in g , informal employment rises, which implies a higher burden of subsidy encouraging a higher tax rate to finance it.

Now, we use equations (1), (5), (6), (8) and (18) to obtain the growth equation of the economy in terms of governance, g . It is given by

$$v = \{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\} \alpha (\bar{\tau}_G)^{\frac{1-\alpha}{\alpha}} A^{\frac{1}{\alpha}} (L^*)^{\frac{\beta}{\alpha}} \mu(g)^{\frac{1}{\alpha}} - \rho \quad . \quad (21)$$

From equation (21), we obtain

$$\frac{\frac{\partial v}{\partial g}}{v + \rho} = \frac{-\bar{\tau}_G z'(g) + s \frac{\partial L^*}{\partial g}}{\{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\}} + \frac{\beta}{\alpha} \frac{\frac{\partial L^*}{\partial g}}{L^*} + \frac{1}{\alpha} \frac{\mu'(g)}{\mu(g)} \quad . \quad (22)$$

The growth rate maximising g is very likely to exist. Because, the first two terms on the right hand side of equation (22) are negative but the third term on the right hand side of equation (22) is positive. We assume that the growth rate maximising g exists (denoted by g^*), when the right hand side of equation (22) is zero. For the second order condition of maximisation, we use equation (22) and obtain

$$\begin{aligned} \frac{\frac{\partial^2 v}{\partial g^2}}{v + \rho} = & \frac{\left[-\bar{\tau}_G z''(g) + s \frac{\partial^2 L^*}{\partial g^2} \right] \{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\} - \left[-\bar{\tau}_G z''(g) + s \frac{\partial^2 L^*}{\partial g^2} \right]^2}{\{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\}^2} \\ & + \frac{\beta}{\alpha} \frac{\frac{\partial^2 L^*}{\partial g^2} L^* - \left(\frac{\partial L^*}{\partial g} \right)^2}{(L^*)^2} + \frac{1}{\alpha} \frac{\mu''(g) \mu(g) - [\mu'(g)]^2}{[\mu(g)]^2} \quad . \quad (23) \end{aligned}$$

We further assume $\frac{\partial^2 L^*}{\partial g^2} < 0$, which is a sufficient, but not a necessary condition for the right hand side of equation (23) to be negative. Schneider (2005) shows that shadow economy negatively and significantly affects growth rate in developing countries but positively in developed OECD and transition countries. Since size of informality in developing (developed) countries is comparatively high (low) and informality inversely with governance, so finding of Schneider (2005) points toward the inverted-U relationship between governance and growth. So our assumption regarding the existence of growth rate maximising level of governance is justified.

Now, to analyse properties of g^* in more details, we write below the equation solving for g^* from equation (22).

$$\frac{1}{\alpha} \frac{\mu'(g)}{\mu(g)} = \frac{\bar{\tau}_G z'(g) - s \frac{\partial L^*}{\partial g}}{\{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\}} - \frac{\beta}{\alpha} \frac{\frac{\partial L^*}{\partial g}}{L^*} . \quad (24)$$

The left hand side of equation (24) captures the benefit from rising g on the growth rate due to positive externality on formal production sector. However, a rise in g also pushes tax rate and lowers formal employment. These two effects together lowers after tax marginal productivity of private capital and is captured by the right hand side of equation (24). For the lower values of g , the former must be greater than the later in order to find optimum g .

Now, to analyse the effect of a rise in the subsidy rate, s , on g^* , we totally differentiate equation (24), and obtain

$$\begin{aligned} & \left\{ \frac{1}{\alpha} \frac{\mu''(g)\mu(g) - [\mu'(g)]^2}{[\mu(g)]^2} + \frac{\beta}{\alpha} \frac{\frac{\partial^2 L^*}{\partial g^2} L^* - \left(\frac{\partial L^*}{\partial g}\right)^2}{(L^*)^2} \right. \\ & \left. + \frac{\left[-\bar{\tau}_G z''(g) + s \frac{\partial^2 L^*}{\partial g^2} \right] \{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\} - \left[-\bar{\tau}_G z''(g) + s \frac{\partial^2 L^*}{\partial g^2} \right]^2}{\{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\}^2} \right\} dg \\ & = \left\{ \frac{\{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\} \left\{ -\frac{\partial L^*}{\partial g} - s \frac{\partial^2 L^*}{\partial s \partial g} \right\} - \left\{ \bar{\tau}_G z'(g) - s \frac{\partial L^*}{\partial g} \right\} \left\{ -(1 - L^*) + s \frac{\partial L^*}{\partial s} \right\}}{\{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\}^2} \right. \\ & \left. - \frac{\beta}{\alpha} \frac{\frac{\partial^2 L^*}{\partial s \partial g} L^* - \frac{\partial L^*}{\partial g} \frac{\partial L^*}{\partial s}}{(L^*)^2} \right\} ds . \quad (25) \end{aligned}$$

The term inside the big curly bracket on the left hand side of equation (25) is negative as $\frac{\partial^2 v}{\partial g^2} < 0$.⁸ Now, to get a sign of the right hand side of equation (25), we use equation (19) and obtain⁹

$$\frac{\partial^2 L^*}{\partial s \partial g} = - \frac{\bar{\tau}_G \Theta \left[\Theta \{ z'(g) \{ \bar{\tau}_G B \gamma(g) - s \Theta \} + B \gamma'(g) \{ 1 - \bar{\tau}_G [1 + z(g)] - s \} \} \right]}{\{ \bar{\tau}_G B \gamma(g) - s \Theta \}^3} < 0 . \quad (26)$$

Now, equations (13.a), (19) and (26) imply $\frac{\partial^2 L^*}{\partial s \partial g} L^* - \frac{\partial L^*}{\partial g} \frac{\partial L^*}{\partial s} < 0$. On the other hand, this set of equations also imply the other part of the right hand side of equation (25) to be positive. So,

⁸ See equation (23).

⁹ See conditions 4 and 5.

$\frac{\partial g^*}{\partial s} < 0$. The intuition behind this result is as follows. The growth rate maximising level of governance balances the marginal cost and marginal benefit of changing governance. Now, a rise in the subsidy rate lowers formal employment and raises income tax rate; and thereby raises the marginal cost of governance at the preceding g^* . So, g^* needs to fall for balancing out its marginal cost and marginal benefit.

Similarly, we derive below the effect of a rise in union's bargaining power on g^* by totally differentiating equation (24).

$$\begin{aligned}
& \left\{ \frac{1}{\alpha} \frac{\mu''(g)\mu(g) - [\mu'(g)]^2}{[\mu(g)]^2} + \frac{\beta}{\alpha} \frac{\frac{\partial^2 L^*}{\partial g^2} L^* - \left(\frac{\partial L^*}{\partial g}\right)^2}{(L^*)^2} \right. \\
& \left. + \frac{\left[-\bar{\tau}_G z''(g) + s \frac{\partial^2 L^*}{\partial g^2} \right] \{1 - \bar{\tau}_G [1 + z(g)] - s(1 - L^*)\} - \left[-\bar{\tau}_G z''(g) + s \frac{\partial^2 L^*}{\partial g^2} \right]^2}{\{1 - \bar{\tau}_G [1 + z(g)] - s(1 - L^*)\}^2} \right\} dg \\
& = \left\{ \frac{\{1 - \bar{\tau}_G [1 + z(g)] - s(1 - L^*)\} \left\{ -s \frac{\partial^2 L^*}{\partial \theta \partial g} \right\} - \left\{ \bar{\tau}_G z'(g) - s \frac{\partial L^*}{\partial g} \right\} \left\{ s \frac{\partial L^*}{\partial \theta} \right\}}{\{1 - \bar{\tau}_G [1 + z(g)] - s(1 - L^*)\}^2} \right. \\
& \left. - \frac{\beta}{\alpha} \frac{\frac{\partial^2 L^*}{\partial \theta \partial g} L^* - \frac{\partial L^*}{\partial g} \frac{\partial L^*}{\partial \theta}}{(L^*)^2} \right\} d\theta \quad . \quad (27)
\end{aligned}$$

Now, the term inside the big curly bracket on the left hand side of equation (27) is negative as $\frac{\partial^2 v}{\partial g^2} < 0$.¹⁰ To sign the right hand side of equation (27), we use equation (19) and obtain

$$\frac{\partial^2 L^*}{\partial \theta \partial g} = - \frac{\bar{\tau}_G \frac{\partial \theta}{\partial \theta} \left[\frac{\bar{\tau}_G B\gamma(g) z'(g) \{ \bar{\tau}_G B\gamma(g) - s\theta \}}{+ B\gamma'(g) \{1 - \bar{\tau}_G [1 + z(g)] - s\} \{ \bar{\tau}_G B\gamma(g) + s\theta \}} \right]}{\{ \bar{\tau}_G B\gamma(g) - s\theta \}^3} \quad . \quad (28)$$

We assume the following condition to hold.

$$\text{Condition 6: } z'(g) \{ \bar{\tau}_G B\gamma(g) - s\theta \} + B\gamma'(g) \{1 - \bar{\tau}_G [1 + z(g)] - s\} \frac{\{ \bar{\tau}_G B\gamma(g) + s\theta \}}{\bar{\tau}_G B\gamma(g)} < 0 \quad .$$

This condition implies $\frac{\partial^2 L^*}{\partial \theta \partial g} < 0$. So, equations (13.c), (19) and (28) imply $\frac{\partial^2 L^*}{\partial \theta \partial g} L^* - \frac{\partial L^*}{\partial g} \frac{\partial L^*}{\partial \theta} < 0$. On the other hand, this set of equations also imply the other part of the right hand side of

¹⁰ See equation (23).

equation (27) to be positive. So $\frac{\partial g^*}{\partial \theta} < 0$. The intuition behind this result is same as the case of effecting s on g^* . A rise in θ lowers employment and raises income tax rate by raising informal subsidy. So, the marginal cost of governance at the preceding g^* rises than the benefit. So, g^* has to fall.

Note that when the government does not finance informal subsidy, i.e., $s = 0$, then incorporating equations (13) and (19) into equation (22) we obtain

$$\frac{\frac{\partial v}{\partial g}}{v + \rho} = \frac{-\bar{\tau}_G z'(g)}{\{1 - \bar{\tau}_G[1 + z(g)]\}} - \left(\frac{\beta}{\alpha}\right) \frac{[z'(g)\{\bar{\tau}_G B\gamma(g)\} + B\gamma'(g)\{1 - \bar{\tau}_G[1 + z(g)]\}]}{B\gamma(g)\{1 - \bar{\tau}_G[1 + z(g)]\}} + \frac{1}{\alpha} \frac{\mu'(g)}{\mu(g)} . \quad (22.a)$$

So, the governance level maximising growth rate becomes independent of the relative bargaining power of the union. Because, in the absence of subsidy, a fall in formal employment cannot raise tax rate. And, a relative change in formal employment due to change in governance, i.e., $\frac{\partial L^*}{\partial g}$ becomes independent of θ . In the absence of s , a relative bargaining power of the union enters multiplicatively into formal employment given by equation (13) and also into the growth rate given by equation (21). So, it has no effect on the g^* . Over time, when the informal income exceeds the poverty line income, the government may not continue to subsidize and the bargaining power cannot not make any implication to the growth rate. Below, we summarise important results obtained in this sub-section regarding growth rate maximising level of governance.

Proposition 2: *There exists a unique governance level maximising growth rate, which varies inversely with subsidy rate and formal labour union's bargaining power. When the government does not subsidize, this level becomes independent of union's bargaining power.*

4.2 Governance and Subsidy

Now, we investigate the trade-off between governance and subsidy at a given growth rate. In the earlier subsection, we investigate the relationship between the governance level maximising growth rate, g^* , and subsidy rate, s . However, the government may not be always able to select the governance level for various reasons; such as, political constraints.

Specifically, if the country has a huge share of employment in informal sector, then the government may keep the governance weaker than the level maximising growth rate corresponding to the existing subsidy rate. In such case, it is interesting to know the relationship between g and s when the growth rate is fixed. We totally differentiate equation (21) keeping growth rate, v , as constant and obtain

$$\left\{ \frac{-\bar{\tau}_G z'(g) + s \frac{\partial L^*}{\partial g}}{\{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\}} + \frac{\beta}{\alpha} \frac{\partial L^*}{L^*} + \frac{1}{\alpha} \frac{\mu'(g)}{\mu(g)} \right\} dg$$

$$= \left\{ \frac{(1 - L^*) - s \frac{\partial L^*}{\partial s}}{\{1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)\}} - \frac{\beta}{\alpha} \frac{\partial L^*}{L^*} \right\} ds . \quad (29)$$

Now, equation (13.a) implies that the terms inside the curly bracket on the right hand side of the above equation is positive. However, the terms inside the curly bracket on the left hand side is ambiguous and is basically $\left(\frac{\partial v}{\partial g}\right)/(v + \rho)$. Its sign depends on the value of g . If $g \geq g^*$, then it is ≤ 0 . So $\left.\frac{dg}{ds}\right|_{v=\text{constant}} \leq 0$ if $g \geq g^*$. This result is stated in the following proposition.

Proposition 3: *If the government raises subsidy at a fixed growth rate, then it should decrease (not change) (increase) the level of governance if the existing governance is higher than (equals to) (lower than) the level maximising growth rate corresponding to the existing subsidy rate.*

In reality, we see countries like India, Brazil, Bangladesh and many other third world countries spending a low level of subsidy with a low level of governance encouraging informal sector. On the other hand, we also see developed countries in Europe incurring a high level of subsidy along with higher level of governance, which is not conducive for informal sector expansion. So, these scenarios seem to be suggesting a positive association between governance and subsidy rate. Our result obtained in subsection 3.1 that governance level maximising growth rate varies inversely with subsidy rate. As known from the political science literature, the incumbent parties in a democratic society may not be keen to maximise growth rate (Choi and Thum (2005)). Rather, they prefer to have higher employment keeping tax rate at a lower level to ensure their incumbency. Here, the equations (19) and (20) ensure to satisfy these two objectives simultaneously together with the presence of informal employment. According to proposition 3, if the government does not maximise growth but tries to keep

growth rate at a moderate level, then the subsidy rate and the governance level move towards the same direction.

4.3 Welfare Maximising Governance

In this subsection, we compare the levels of governance maximising growth rate and welfare. We define welfare, ω , as the discounted present value of instantaneous utility of the representative household as follows:

$$\omega = \int_0^{\infty} [\log(c)\eta(g)]e^{-\rho t} dt \quad . \quad (30)$$

Now $c = c_0 e^{vt}$, where, c_0 denotes consumption at the beginning. After incorporating the expression of c into equation (30) and integrating that, we obtain

$$\omega = \frac{\log(c_0)\eta(g)}{\rho} + \eta(g)v \left[\frac{1}{\rho^2} + x_1 \right] + x_2 \quad , \quad (30.a)$$

where, x_1 and x_2 are constants of integration. To obtain c_0 , we use equations (1), (2), (3), (6), (7), (8), (17) and (21) and get

$$c_0 = K_0 \left\{ \frac{(v + \rho)[s(1 - L^*) + \bar{\tau}_G B\gamma(g)(1 - L^*)]}{\alpha[1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)]} + \frac{[v(1 - \alpha) + \rho]}{\alpha} \right\} \quad . \quad (31)$$

Equations (30.a) and (31) show that if we differentiate ω with respect to g at $g = g^*$, then it may not be zero. This is shown below.

$$\left. \frac{\partial \omega}{\partial g} \right|_{g=g^*} = \left. \frac{\eta(g)}{\rho c_0} \frac{\partial c_0}{\partial g} \right|_{g=g^*} + \left. \frac{\log(c_0)\eta'(g)}{\rho} \right|_{g=g^*} + \left. \eta'(g)v \left[\frac{1}{\rho^2} + x_1 \right] \right|_{g=g^*} \quad , \quad (32)$$

where,

$$\left. \frac{\partial c_0}{\partial g} \right|_{g=g^*} = \left\{ \frac{K_0(v + \rho)}{\alpha[1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)]^2} \right\} \left. \left\{ \begin{aligned} & \left\{ \bar{\tau}_G B\gamma'(g)(1 - L^*) - [\bar{\tau}_G B\gamma(g) + s] \frac{\partial L^*}{\partial g} \right\} [1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*) \right] \\ & + [s(1 - L^*) + \bar{\tau}_G B\gamma(g)(1 - L^*)] \left\{ \bar{\tau}_G z'(g) - s \frac{\partial L^*}{\partial g} \right\} \end{aligned} \right\} \right|_{g=g^*} \quad . \quad (33)$$

Even if we do not consider the impact of governance on household's utility, i.e., $\eta'(g) = 0$, then also $\left. \frac{\partial \omega}{\partial g} \right|_{g=g^*} \gtrless 0$ as $\left. \frac{\partial c_0}{\partial g} \right|_{g=g^*} \gtrless 0$. Because, the welfare depends on two things - the initial level of consumption and the growth rate. The initial level of consumption may not be maximised at the level of governance that maximises growth rate. Informal income affects

consumption but does not affect after tax marginal productivity of private capital and therefore growth rate. Hence, the initial level of consumption should not be maximised at the growth rate maximising level of g . Since only $\bar{\tau}_G B \gamma'(g)(1 - L^*)[1 - \bar{\tau}_G[1 + z(g)] - s(1 - L^*)]$ term is negative in the $\frac{\partial c_0}{\partial g}\bigg|_{g=g^*}$ expression, so probably this negative part will dominate over all other positive terms and $\frac{\partial \omega}{\partial g}\bigg|_{g=g^*}$ will become positive. This means that the governance level maximising welfare is greater than that maximising growth rate.

Note that when the government does not subsidize informal income, i.e., $s = 0$, then using equations (13) and (31), we obtain

$$c_0 = K_0 \left\{ \frac{(v + \rho)\bar{\tau}_G B \gamma(g)}{\alpha[1 - \bar{\tau}_G[1 + z(g)]]} - \frac{(v + \rho)\Theta}{\alpha} + \frac{[v(1 - \alpha) + \rho]}{\alpha} \right\} . \quad (31.a)$$

This implies that unlike the growth rate maximising governance, the welfare maximising governance is not independent of union's bargaining power. Important results regarding welfare maximising level of governance is stated below.

Proposition 4: *The governance level maximising welfare is different from the level maximising growth rate and is likely to be greater. Unlike the level maximising growth rate, the governance level maximising welfare is not independent of union's bargaining power of formal sector even when the informal sector is not subsidised.*

4.4. Simulation:

The subsection attempts to simulate some of the key relationship discussed in the previous subsection. This requires us to draw standard values of the parameters relevant for a typical economy in the literature. In the production function of formal sector, we assume that capital share (α)=0.30 and labour share (β) = 0.60 with the level of technology (A) = 1. Governance externality is specified as $\mu = 3g^{0.5}$. We assume the elasticity of governance effectiveness here 0.5.

It has been observed that the level of productivity in the formal sector is roughly three to five time higher than that of informal sector on an average (Marjit and Maiti, 2009). Hence, B is assumed to be 0.2. Since informal activities highly depend on the level of governance, we assume that $\gamma = 50 - g^2$. The intercept term is kept at higher level so that the marginal effect of governance remains negative but γ remains positive. This specification also suggests that

the marginal effect of informal production falls less than 0.4 (as shown in Jonassan, 2011). Hence, the cost of governance is defined as $z = 0.2g^2$. The cost of bureaucratic resources is found 0.42 in Jonassan (2011).

On average, 10% of formal sector output is taxed in a typical developing economy and hence $\bar{\tau}_G$ is assumed to be 0.10. For example, RBI, India roughly spends five per of GDP to the social welfare schemes and subsidies. Subsidy, therefore, for social welfare scheme is considered to 5% of GDP ($s=0.05$).

Usually, a union assigns a higher weight on wage than employment (See table 3 of Gahan (2002)). Hence, we assume that $m=0.6$ and $n=0.4$ respectively. Abraham et al (2009) estimated that union bargaining power is roughly 0.2 to 0.3 in Belgium firms. Using similar method, Maiti (2014) suggested that it varies from 0.1 to 0.5 across Indian formal sector firms. Following these studies, we take an average and specify $\theta = 0.3$. Initial level of capital stock (K_0) is assumed as 1. Because, its scale does not have much implication on our calibrated values. The rate of discount factor (ρ) is considered as 0.02 (Barro and Sala-i-Martin, 2004).

Given the specification mentioned above, we have calibrated the values of formal employment, taxation and growth rate. First, we find that the level of governance that satisfies our conditions varies from roughly 0 to 6.5. Any value higher than 6.5 does not satisfy those conditions. Within this range, the formal employment (L^*), derived from equation 13, registers an inverse relationship with the level of governance (Figure 1). In other word, the formal employment declines as governance improves and this satisfies our conjecture.

Table 1: Parameters specifications for simulation

$\alpha=0.3$
 $\beta=0.6$
 $A=1$
 $B=0.2$
 $\bar{\tau}_G=0.1$
 $z=0.2g^2$
 $s=0.05$
 $m=0.6$
 $n=0.4$
 $\mu=3g^{0.5}$
 $\gamma=50-g^2$
 $K_0=1$
 $\theta=0.3$
 $\rho=0.02$

On the other hand, we derive taxation (τ) from equation 8. The taxation rises when governance improves in order to compensate informal income (Figure 2). This also confirms our hypothesis. Further, the growth rate and welfare, estimated respectively using the equations 21 and 30, have been presented in figures 3 and 4 respectively. Both the demonstrated curves are inverted U-shaped against governance. Interestingly, the optimum level of governance that maximizes welfare is found at $g=4.4$. On the other hand, the governance that maximises growth is observed at $g=4.2$. So, governance maximising growth rate is lower than that maximizes welfare. More importantly, both of them fall in between the two extreme levels of governance. This confirm that the deliberately weak governance improves both growth and welfare of a typically developed economy.

Figure 1: Formal employment and taxation against governance in equilibrium

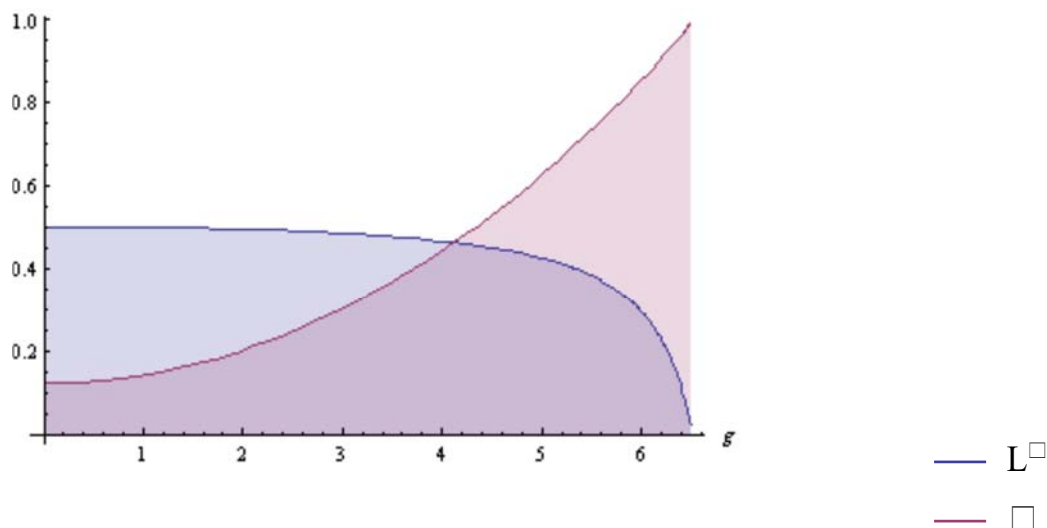
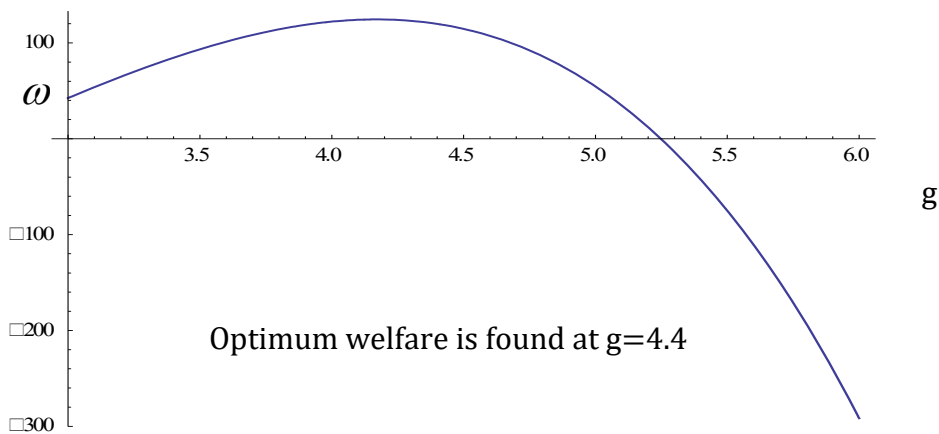
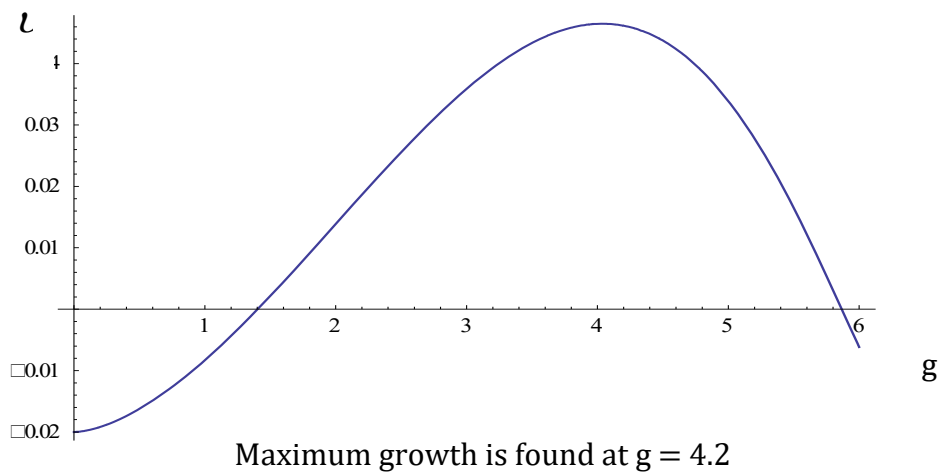


Figure 3: Optimum level of governance for growth and welfare



4.5 An Extension with Competitive Labour Market

In sections 3 and 4, we formulate the theoretical model with unionised labour market. However, unions are weaker in the developing countries than in the advanced countries.¹¹ Moreover, in both the developing and developed countries, the power of labour unions vary considerably.¹² So it becomes necessary to validate the results obtained from our model in a setting without unions.

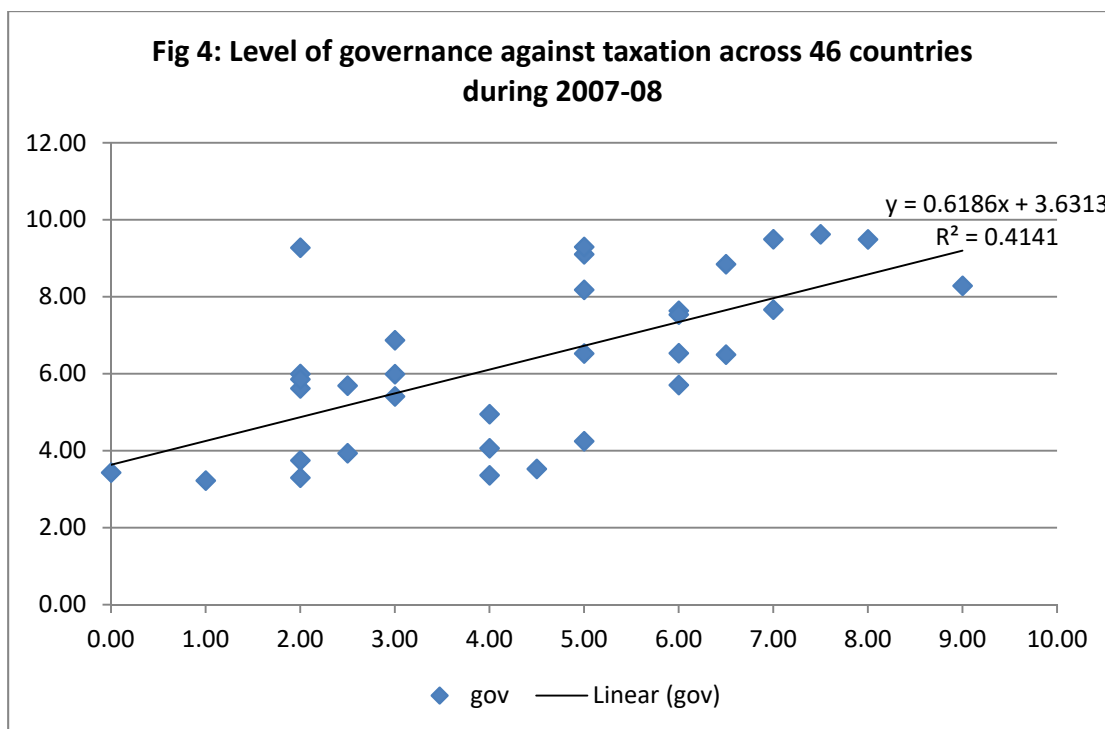
¹¹ See for example the survey paper Freeman (2009).

¹² The survey paper of Freeman (2009) can be seen.

In the absence of union, the market determines the allocation of labours in two sectors by equalising their marginal productivity. Since the marginal product of formal workers is higher than that of informal workers, the strategic redistribute policy is still very much relevant. Results of this analysis can be obtained by putting $\theta = 0$ in the previous analysis. Before going further, we put $\theta = 0$ in equation (14) and obtain $\theta = \beta$. Since union's effect in the whole analysis is captured by the term Θ , so putting β in the place of Θ in the previous theoretical analysis shall give us the results for non-unionised case. So, theoretical results derived in the unionised labour market case remain qualitatively same in case of non-unionised labour markets.

5. Relation between Taxation, Governance and Growth

It is really difficult to find proper longitudinal data on taxation, governance and other information across countries needed to empirically test the propositions developed in the previous sections. We want to see the implication of relationship of taxation and governance on economic growth in the presence of informal sector. Data on taxation, governance and other control variables have been primarily drawn from Economic Freedom of the World Database (The Fraser Institute) and World Development Indicators. The institute has compiled 46 countries over the period 1995-2009 and assigned relative scores on the institutional and country level variables using 10 point scale. The database is not balanced due to lack of information. The level of taxation (T) is defined as the percentage of income and payroll taxes. Similarly, the governance (G) represents an efficacy of legal system and enforcement level of property rights including law and order, legal enforcement of contracts, regulatory enforcement on the sale of real property in a 10-point scale. Lower the value weaker is the enforcement and lower would be the level of governance. The taxation and governance seem to be positively related (Fig 4). To find out their dynamics on economic growth in the presence of informal sector, one needs to run econometric analysis controlling other effects. Two types of model have been employed for regressions – instrumental variable regressions (2SLS, GMM, ML) and simultaneous regressions (3SLS). The instrumental variable regressions show the interaction effects of informality with taxation and governance on economic growth. On the other hand, simultaneous regression enables to demonstrate the transmission mechanism of informality on economic growth through taxation and governance.



Governance and taxation are regressed separately along with their interaction terms with informality (see Table 1). These apart, government consumption share (%of total consumption), index of sound monetary system (combining average inflation, money growth and fluctuations of inflation) and trade openness (combining average tariff rate, hidden trade barriers, costs of trading) are controlled in all the instrumental regressions. Note that the coefficient of governance and its interaction term with informality are significant but positive and negative respectively. This suggests the relatively lower level of governance in the presence of informality raises growth rate. Further, the coefficients of three interaction term between governance, taxation and informality are significant and positive, meaning that the governance starts rising with the increase of tax rate. Since a higher taxation can take of redistributive measures, the level of governance rises to limit informal activities who are compensated. This result is true in all three types of regressions. This justifies out theoretical results too.

Since, the principle variables (like per capita GDP, informality, taxation and governance) are interlinked, a system of four equations can be estimated simultaneously using 3SLS methods. These four variables are endogenous in the system model. First, three types of regulations (credit market, labour market and business rigidities) along with GDP (in logarithmic term) are regressed on the level of informality on the assumption that these rigidity encourages informality and a low level of development (captured in GDP) is associated with higher level

of informality. Second, the informality is regressed on the level of governance. Third, the level of informality (along with subsidy share of GDP) is also regressed on taxation. Finally, taxation and governance and their quadratic terms are regressed on logGDP. Here, sound monetary system, trade openness and government size (proxy for government expenditure) are controlled in the estimation. They are important factors for economic growth. These equations are regressed simultaneously using 3SLS.

$$Inform_{it} = f(\ln GDP_{it}, Credit_market_{it}, Labour_market_{it}, Business_regul_{it})$$

$$Govern_{it} = f(Inform_{it})$$

$$Tax_{it} = f(Inform_{it}, subsidy_{it})$$

$$\ln GDP_{it} = f(tax_{it}, (tax_{it})^2, govern_{it}, (govern_{it})^2, SM_{it}, Tariff_{it}, Govt_size_{it})$$

The results of the regression are presented in Table 2.

The level of informality is found to be directly influenced by credit market, labour market and business regulations to a large extent. The effect of these regulations has been statistically significant. A low level of development (captured by lnGDP) is statistically significant to explain informality as well. Next, the effects of informality on both governance and taxation are negative and statistically significant. The taxation is highly correlated to the subsidy rate as well. At last, the effect of taxation on growth has not been significant. Whereas, both the governance and its quadratic term are significant and respectively positive and negative. This suggests that the governance improves growth but at a declining rate. Again, the implication of government size, sound monetary system and trade openness show desirable results on economic growth. Hence, we can infer that there would be a range of high governance for which the growth could be negative. The optimum growth will be found at the level of governance lower than those at the extremes. Therefore, it appears from the regression results that labour market regulations along with credit market and business regulations increases the informality. Such informality tends to weaken governance to keep taxation at lower level, suggesting the direct relation between them. The relative lower level of governance is found to be better for economic growth. Therefore, it is clear that government can rely on either taxation or weak governance in the presence of higher degree of informality.

Table 1: Governance and Taxation on Growth (logGDP) in presence of informality

Variables	2SLS	LIML	GMM
Govern	0.24***	0.24***	0.23***
Govern*informal	-0.003***	-0.003***	-0.003***
Tax	0.018	0.018	0.02
Tax * informal	-0.001***	-0.0007***	-0.0007***
Govern. * Tax * Informal	1.95x10 ⁰⁶ ***	1.95x10 ⁰⁶ ***	1.7310 ⁰⁶ ***
Govt. Cons. Share (%)	0.01**	0.02**	0.02**
Sound Monetary system	0.16***	0.16***	0.15***
Trade openness	0.19***	0.19***	0.17***
Constant	7.4***	7.39***	7.27***
Instrumented variables	Government, tax	Government, tax	Government, tax
Instruments	Lag of Government, tax and regulations	Lag of Government, tax and regulations	Lag of Government, tax and regulations
Obs.	248	248	248
R ²	0.84	0.84	0.84
Wald chi	1809	1809	1907

Note: * p<0.10, **p<0.05, *** p <0.01

Table 2: Governance, Taxation and Growth in the presence of informality

Variables	Informality	Government	Tax (%GDP)	lnGDP
Cont.	1.65***	9.27***	31.05***	7.51***
Credit regulation	0.80*			
Labour regulation	0.68***			
Business regulation	2.51***			
lnGDP	-12.06***			
Informal		-0.09***	-0.10***	
Subsidy (%GDP)			0.84***	
Government				0.81***
Government ²				-0.06***
Tax				-0.07
Tax ²				0.001
Sound Monetary system				0.06**
Trade openness				0.12***
Govt. size				0.05*
Obs.	316	316	316	316
R ²	0.80	0.58	0.54	0.97
Chi	1382	612	418	11725

Note: This is estimated using 3SLS (country and years effects controlled) ; * p<0.10, **p<0.05, *** p <0.01

6. Conclusions

The paper attempts to provide an explanation why the developing countries that are growing are accompanied with higher level of informality. A democratic government prefers to weaken the level of governance a bit to keep the taxation at the lower. This improves both growth and welfare. We develop a framework to argue that a strategically weak governance in the presence of large informal sector could not only reduce the tax burden on the formal sector but also raise the level of growth. There exists a unique level of governance that maximises growth rate, which varies inversely with subsidy rate and labour union's bargaining power. When the government does not subsidize informal income, this growth rate maximising level of governance becomes independent of union's bargaining power. The governance level maximizing welfare is bit higher than that maximising growth rate. Considering standard parametric values, we simulated the model and found that taxation is positively related to governance for some region. The growth and welfare curves are inverted-U shaped against governance. The governance maximising growth is found at the level lower than the extreme values. Further, a pooled data of 46 countries for a span of more than 14 years (during 1995-2009) confirms these conjectures. The both instrumental and system regression models employed here have been sufficient enough to support our theoretical conjectures.

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