DO PUBLIC POLICIES OF A NET-REVENUE-MAXIMIZING GOVERNMENT ALSO PROMOTE INFORMALITY?

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This paper examines the effects of fiscal and regulatory policies on the size of a country's informal economy and its government's net revenue. Introducing two types of formal goods with only one having a substitute in the informal economy, this paper finds that changes in public policies influence not only the size of the informal economy, they influence the composition of production within the formal sectors as well. Public policies that impact informality often have differential impact on the two types of formal production. This redistribution of production within the formal sector influences the impact of policies on the government's net revenue. The paper also allows some formal producers to evade taxes and informal producers to pay bribes. Tax evasion and the necessity of informal producers to pay bribes to hide their informal status further influence how public policies impact informality and distribute production within the formal sectors. Prior research on informality largely ignores multiple formal goods and fails to account for the differential impact of policies on the different formal sectors. These effects are further amplified when tax evasion and bribes are taken into consideration.

1 Introduction

In recent years the issue of production in informal sectors has drawn considerable attention. De Soto (1989) provides valuable information regarding factors which promote the development of informal markets. Although it has been recognized for long that the presence of these markets may adversely affect an economy, it is only recently that serious theoretical and empirical studies of the issue are being conducted.[1]

A large portion of the current literature has studied the effects of regulations and taxation on the size of the informal economy.[2] See Schneider and Enste (2000) for a review of many such studies. While this literature focuses on how government tax and regulatory policies promote the growth of informal economies, there is insufficient attention given to the reasons behind such policies. Marcouiller and Young (1995), Azuma and Grossman (2008) and Mukherji (2004) are some theoretical papers that study the possible rationale behind such government policies. These papers view the governments of proprietory or predatory states as agents that maximize tax revenue net of public services (termed net revenue by Azuma and Grossman and graft by Marcoullier-Young and Mukherji). Azuma and Grossman (2008) find that the distribution of productive endowments and access to private substitutes of public services impact public policies that induce some producers to operate in the informal sector. Hibbs and Pichulescu (2009) also incorporate public services and the quality of public institutions in a model of informality. They find that the incentive to operate in the informal sector is influenced by the quality of institutions

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[1] Papers such as Viramani (1989), Goswami *et al.* (1991), Besley and McLaren (1993), Shleifer and Vishny (1993), Jain (1998), Tanzi (1994, 1998), Bardhan (1997), Johnson, Kaufmann, Zoido-Lobaton (1998a, b) view informality to be a result of corruption of officials, such as tax collectors, and show that the government is better off if such corruptions can be eliminated. Loayza (1996), Sarte (2000), Loayza, Oviedo, Serven (2005) study the adverse impact of the informal economy on the economy's growth path.

[2] Feige (1989), Cebula (1997), Johnson, Kaufmann, Zoido-Lobaton (1998a and b), Friedman, Johnson, Kaufman and Zoido-Lobaton (1999), Ihrig and Moe (2001), Fugazza and Jacques (2004) and Chong and Gradstein (2007) are some recent papers in this literature.

and governance available to private sector producers. Marcoullier and Young (1995) show that in some cases a "black hole" of graft exists when public policies aimed at maximizing graft almost drive the formal sector out of existence. Mukherji (2004) extends Marcoullier and Young's model by endogenizing the labor supply decision of households and challenges the "black hole" result.

This paper extends the theoretical models in Marcoullier and Young (1995) and Mukherji (2004) to further examine how public policies affect informality and net revenue in a richer model. The paper's extensions involve i) introducing government regulations ii) increasing the number and types of goods produced by the economy, iii) allowing some formal producers to evade taxes, and iv) allowing informal producers to pay bribes to stay informal. Since the empirical literature finds a strong relationship between regulations and informality,[3] the extension related to regulation is natural. The paper extends the number of goods to simply recognize that most informal goods are produced in both formal and informal sectors and that some goods like automobiles are produced in formal sectors alone. Finally, it is well documented that many formal producers evade taxes and informal producers pay many bribes to remain informal. Hence these extensions are also natural.

Schneider and Enste (2000) cautions that the conventional result that higher taxes increase informality may not be robust and must be studied in a general equilibrium context that takes into the account the impact of taxes on individual labor-leisure decisions and demand and supply of formal and informal goods. The results of this paper demonstrate that indeed in a richer model, the conventional results may not hold. Dessy and Pallage (2001) also find ambiguous effects of tax policy on informality and caution against "simple-minded" policy recommendation based on taxation.

The extensions noted above are found to have significant impact on results. The inclusion of a formal sector that has no informal counterpart introduces some interesting sectoral redistributions of production in response to policy changes. These are further amplified when tax evasion is possible and informal producers must pay bribes to maintain their status. For example, when neither tax evasion nor bribes are allowed, informality increases as the tax rate increases. This is consistent with other papers in the literature. However, when tax evasion is allowed, a higher tax rate increases the price of the good that has no informal counterpart and causes sectoral redistribution of production within the two formal sectors of the economy. This effect is further affected when informal producers must pay bribes. The interaction of the tax evasion and bribes effects reduces the the positive impact of higher tax rates on informal production. It is possible for higher tax rates to actually reduce informality if the price effect noted above is strong enough. The rearrangement of production within the two formal sectors also impacts how higher taxes affect overall tax revenue. Existing theoretical literature on informality concentrates only on the movement of labor and production between the formal and informal sectors. This paper demonstrates that public policies impact the distribution of production also within formal sectors. If this effect is ignored, the results capture only a portion of the full impact of public policies on informality and net revenue.

Robinson and Slemrod (2011) suggest that when multiple types of taxes and methods of enforcement exist, the impact of taxation on informality is influenced by the complexity of the system. Consistent with Dessy and Pallage (2001) these studies show that the effect of taxation and other public policies on informality is more complex than what some prior research suggests.

Since some production such as large scale manufacturing always remains formal, some taxes are evaded, and informal producers routinely pay bribes, it is important to incorporate them in the study of informality. To our knowledge, there is no other paper in the literature that examines this

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[3] Johnson, Kaufmann and Shleifer (1997) and Friedman, Johnson, Kaufman and Zoido-Lobaton (1999) show that higher regulations of all types increase the size of the informal economy.

interaction in the context of informality. The results related to net revenue demonstrate that public policies influence the two formal sectors in opposite directions in most cases. Hence even if a change in policy increases informality, it may decrease production and revenue of one formal industry but increase the same for another. The net impact on net revenue depends on the strengths of these two opposing effects on tax revenue. Existing literature that mainly considers the presence of one formal sector fails to account for this inter-sectoral redistribution of production in the formal economy as a result of changes in public policy.

These results then also raise concerns about the choice of net revenue as the maximand for a government otherwise interested in policies that promote informal production. While theoretically it appears sensible to assume that a proprietory state would be interested in maximizing tax revenue net of some minimal productive services it must provide, the paper finds that the factors that contribute to informality do not necessarily increase net revenue. This suggests that if one needs to understand the motivations behind policies that promote informality, an alternative objective function is perhaps called for. Some metric measuring government extraction from publicly funded projects might be a better alternative.

Major implications of the relationship between public policies and both informality and net revenue are investigated empirically using data from about 50 countries. To our knowledge this paper provides the first attempt in the literature to empirically measure net revenue to study the impact of public policies on it in the context of informality. The empirical results related to informality and regulations are mostly consistent with existing literature. If indicators of democracy/bureaucracy and corruption are included in the estimation, regulations fail to have a significant impact on informality. This result is consistent with the results found in Chong and Gradstein (2007). The results on taxation and public services differ from other studies. The paper finds that higher taxes reduce informality and not increase it. This supports the theoretical result of the paper but is generally at odds with many other empirical studies cited above. Additionally, the existing literature argues that higher public services entice producers to operate in the formal sector and reduce informality. It also increases tax revenue (see Johnson and Kauffman, 1998b). While this paper finds that higher public services increase net revenue in most cases, it also increases informality. Unlike regulation, if indicators of democracy/bureaucracy and corruption are included in the estimation, public services and taxes continue to have a statistically significant impact on informality.

The empirical results related to net revenue show that higher taxes, lower regulations, and higher public services increase net revenue. Furthermore, countries with higher income, good democratic/bureaucratic and corruption indicators have higher net revenue. These are the factors that also reduce informality. These empirical results then raise concerns about the choice of net revenue as the maximand for a government otherwise interested in policies that promote informal production. While theoretically it appears sensible to assume that a proprietory state would be interested in maximizing tax revenue net of some minimal productive services it must provide, empirically the paper finds generally a negative correlation between factors that contribute to informality and the factors that increase net revenue.

Due to the lack of reliable data for countries run by dictatorships it is difficult to compare their graft or net revenue with the net revenue of other countries. However, the strength and robustness of the relationships found here for a very diverse group of countries question the ability of a government to extract increasing amounts of net revenue for itself by pursuing economically detrimental public policies. Thus policies that promote informality do not increase net revenue empirically, with the exception of public services. If public services are used to improve a country's institutions, law and order, bureaucracy, infrastructure and such, in the long run these improvements will reduce informality.

The rest of the paper is organized as follows. Section 2 describes the theoretical model, Section 3 addresses the key theoretical results, Section 4 includes an empirical investigation, and Section 5 provides concluding remarks.

2 Description of the economy

The model-economy analyzed here is similar to the one used in Mukherji (2004) and Marcouiller and Young (1995). Individuals in this economy produce two distinct goods, H and J. Unlike Mukherji's and Marcouiller-Young's papers, one of these two goods, denoted by H, can be produced in either the formal sector or an informal sector since its production can be concealed. If it is produced in the formal sector it is called F. Otherwise it is called I. Production of the other good, J, however cannot be concealed and hence must occur in the formal sector alone. All production requires some public services, g. If production of a good occurs in the informal economy, producers have only partial access to these public services. Hence, informal producers must bear the cost of acquiring private substitutes of necessary excludable public services to remain productive.

All formal production is taxed at the rate τ. Since good H is concealable, producers of F can evade taxes. Tax evasion of good J is not possible since output is costlessly verifiable by the government.

2.1 Description of production functions

2.1.1 Good F (Good H produced in the formal sector)

Recall that output of good H can be concealed. To reduce the incidence of tax evasion that concealment makes possible, the government requires all formal producers of good H, that is producers of F, to comply with some regulations. These regulations, represented by R, determine the government's success in catching such evasions. That remains the sole purpose of regulations in this economy. In the simplest case, R is also the probability that a firm will be caught in its efforts to evade taxes. If caught, a firm pays a penalty at a rate ν. The effective tax rate in that case becomes $\tau(1+\nu) \equiv T$.

A formal producer has the choice to truthfully report all production or to conceal it. Truthful reporting necessitates paying taxes at the rate τ while efforts to conceal leads to an expected tax rate of $R\tau(1+\nu) = R*T$. If $\tau < R*T$, all formal producers will truthfully report their production. If $\tau \geq R*T$, however, producers will misreport their earnings. After-tax return to the producers of F then depends on the above tax-regulatory situation.

Case 1: $\tau < R*T$

After-tax output when all firms truthfully report their production is given by:

$$Y_F = (1-\tau)\psi * ((1-R)l_F)^{1-\phi} g^{\phi} \tag{1}$$

This production function demonstrates that output depends on the amount of labor, l, and access to productive public services, g. Production in this economy is organized in units where the owner is the sole provider of labor. Hence l_F in equation (1) denotes the amount of labor supplied by a producer of good F. The term $(1-R)$ multiplying labor supply captures the

reduction in productive labor services caused by regulations. ψ is a technology parameter and ϕ is a positive fraction capturing the elasticity of output to public services.

Case 2: $\tau \geq R*T$

In this scenario all firms choose to conceal their production. Hence after-tax production is given by:

$$Y_F = (1-R+R(1-T))\psi*((1-R)l_F)^{1-\phi} g^{\phi}) \quad (2)$$

Recall that a firm successfully evades taxes with probability $1–R$ and is caught with probability R. In case it evades, it keeps the entire output. Otherwise it retains only the fraction $1–T$. Hence the term $1–R+R(1–T)$ in the above equation. The remaining variables and parameters are as described above.

2.1.2 Good I (Good H produced in the informal sector)

The informal sector producing good H works much like the formal sector, except that output here is not taxed and producers do not have to comply with any regulations. Producers here, however, do not have access to all public services. While some infrastructure related public services such as roads are available to all producers, certain other services are only partially available at best. Informal producers may expend some resources in the form of bribes to gain increased access to these services and in some cases provide private substitutes of these services. Thus, they have to divert some of their labor services for gaining more complete access to partially available public services and/or for the production of substitutes of the public services enjoyed by producers in the formal sector.

An informal producer is assumed to have full access to only a fraction γ of the public services g available to producers in the formal sector. By expending some effort they can increase that fraction to $\gamma+s$, where $0<s<1$ also represents the fraction of labor diverted for this purpose. The production function of the informal good I is then given by:

$$Y_I = \psi[(1-s)l_I]^{1-\phi}[(\gamma+s)g]^{\phi}) \quad (3)$$

A positive solution for the fraction s requires the assumption $\phi > \gamma 1+\gamma$.

Informal producers get caught by the authorities with probability π. This probability is assumed to be proportional to the ratio of informal to total population. That is:

$$\pi = \theta\, n_I(N) \quad (4)$$

where n_I equals the number of people who produce in the informal sector, N equals total population, and θ is a positive parameter reflecting the government's success in capturing informal producers. The positive relationship between the probability π and the ratio of informal to total population is based on the observation that it is much easier to escape the authorities if a very small fraction of producers produce informally than if a much larger fraction did. The government's incentive to go after these producers will also tend to increase as the proportion rises. Once caught, however, these producers have to give up their entire output. Hence expected output of an informal producer is $(1-\pi)Y_I$.

2.1.3 Good J

This good is produced in the formal sector alone and cannot be concealed from the government. Hence production here is not subject to regulations. The production function is similar to that of good H and is given by:

$$Y_J = \delta \psi l_J^{1-\phi} g^{\phi} \tag{5}$$

where δ is a positive constant indicating that the technology used by this sector is different from the technology used in the production of good H. The elasticities of output to labor and government services are assumed to be the same as those for good H to keep the problem tractable.

2.2 Preferences and optimal consumption-labor supply decisions

The producers of goods H (F, I) and J are individuals who choose the amount of labor they supply by balancing the disutility of labor and the consumption it makes possible. The utility function of a representative producer-consumer is as follows:

$$U(H_i, J_i, l_i) = [H_i^{\sigma-1\sigma} + J_i^{\sigma-1\sigma}]^{\sigma\sigma-1} - \alpha l_i \tag{6}$$

$i = F, I, J$. This utility function shows that individuals derive utility from the consumption of goods H and J and leisure. σ is the elasticity of substitution between the two goods and α is a parameter denoting the weight of leisure in the utility function. Assuming that the output of good H produced formally and informally are indistinguishable, utility is a function of H.

2.2.1 Consumption and labor supply decisions of producers of good F

Case 1: $\tau < R*T$

When the tax and regulatory structure is such that producers report their production truthfully to the government, the budget constraint producers of F face is as follows:

$$H_F + pJ_F = (1-\tau)\psi * ((1-R)l_F)^{1-\phi} g^{\phi} \tag{7}$$

The formal good H is treated as the numeraire in this economy and p is the price of good J in terms of good H. Producers of F choose their consumption and labor supplies by maximizing the utility given by equation (6) subject to the above budget constraint. Routine calculations yield:

$$H_F = p^{\sigma} J_F \tag{8}$$

$$l_F = \left((1-\phi)\psi\alpha\right)^{1\phi} (1-\tau)^{1\phi} (1-R)^{(1-\phi)\phi} (1+p^{1-\sigma})^{1\phi(\sigma-1)} g \tag{9}$$

Substituting from equations (8) and (9) in the budget constraint, consumption of the formal good is given by:

$$H_F = (1-\tau)^{1\phi} \psi^{1\phi} (1-R)^{(1-\phi)\phi} \left(1-\phi\alpha\right)^{1-\phi\phi} (1+p^{1-\sigma})^{1-\phi\sigma\phi(\sigma-1)} g \tag{10}$$

Indirect utility of producers of the formal good, V_F, then equals:

$$V_F = \phi\left(1-\phi\alpha\right)^{1-\phi\phi} \psi^{1\phi} (1-\tau)^{1\phi} (1-R)^{(1-\phi)\phi} (1+p^{1-\sigma})^{1\phi(\sigma-1)} g \tag{11}$$

Case 2: $\tau \geq R*T$

Case 2 parallels Case 1. The only difference here is the after-tax term in the solutions. The budget constraint in this case changes to:

$$H_F + pJ_F = (1-R*T)\psi*((1-R)l_F)^{1-\phi} g^{\phi} \tag{12}$$

The solutions are changed as follows:

$$l_F = \left((1-\phi)\psi\alpha\right)^{1\phi}(1-R*T)^{1\phi}(1-R)^{(1-\phi)\phi}(1+p^{1-\sigma})^{1\phi(\sigma-1)} g \tag{13}$$

$$H_F = (1-R*T)^{1\phi}\psi^{1\phi}(1-R)^{(1-\phi)\phi}\left(1-\phi\alpha\right)^{1-\phi\phi}(1+p^{1-\sigma})^{1-\phi\sigma\phi(\sigma-1)} g) \tag{14}$$

$$V_F = \phi\left(1-\phi\alpha\right)^{1-\phi\phi}\psi^{1\phi}(1-R*T)^{1\phi}(1-R)^{(1-\phi)\phi}(1+p^{1-\sigma})^{1\phi(\sigma-1)} g \tag{15}$$

2.2.2 Consumption and labor supply decisions of producers of good I

The budget constraint facing these producers is given by:

$$H_I + pJ_I + B = (1-\pi)\psi[(1-s)l_I]^{1-\phi}[(\gamma+s)g]^{\phi} \tag{16}$$

In this equation B represents the amount of bribes or additional expenses expended by these producers to remain informal.[4] s, as described above, is the fraction of labor services diverted by these producers to increase their access to public and/or private substitutes of public services.

Maximizing equation (6) subject to equation (16) results in the following optimal solutions:

$$s = \phi - \gamma(1-\phi) \tag{17}$$

$$H_I = p^{\sigma} J_I \tag{18}$$

$$l_I = \left((1-\phi)\psi\alpha\right)^{1\phi}(1-\pi)^{1\phi}(1+p^{1-\sigma})^{1\phi(\sigma-1)}(1-s)^{1-\phi\phi}(\gamma+s)^{1\phi} g \tag{19}$$

$$H_I = (1-\pi)^{1\phi}\psi^{1\phi}\left((1-\phi)\alpha\right)^{1-\phi\phi}(1+p^{1-\sigma})^{1-\phi\sigma\phi(\sigma-1)}(1-s)^{1-\phi\phi}(\gamma+s)^{1\phi} g - B(1+p^{1-\sigma})^{-1} \tag{20}$$

$$V_I = \phi\left((1-\phi)\alpha\right)^{1-\phi\phi}\psi^{1\phi}(1-\pi)^{1\phi}(1+p^{1-\sigma})^{1\phi(\sigma-1)}(1-s)^{1-\phi\phi}(\gamma+s)^{1\phi} g - B(1+p^{1-\sigma})^{1\sigma-1} \tag{21}$$

where V_I is the indirect utility of the informal producers.

2.2.3 Consumption and labor supply decisions of producers of good J

The problem faced by these producers parallels the one faced by the producers of good F. The optimal choices of consumption and leisure are also similar and are as follows:

$$l_J = \left((1-\phi)\delta\psi\alpha\right)^{1\phi}(1-\tau)^{1\phi} p^{1\phi}(1+p^{1-\sigma})^{1\phi(\sigma-1)} g \tag{22}$$

$$H_J = (1-\tau)^{1\phi}(\delta\psi)^{1\phi} p^{(1-\phi)\phi}\left(1-\phi\alpha\right)^{1-\phi\phi}(1+p^{1-\sigma})^{1-\phi\sigma\phi(\sigma-1)} g \tag{23}$$

Indirect utility of the producers equals:

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[4] If producers in the formal sector have to pay bribes instead of informal producers as discussed in this paper, a negative value is assigned to B.

$$V_J = \phi(1-\phi\alpha)^{1-\phi\phi}(\delta\psi)^{1\phi}(1-\tau)^{1\phi}\, p^{1\phi}(1+p^{1-\sigma})^{1\phi(\sigma-1)}\, g \tag{24}$$

2.3 Equilibrium allocation of labor

In this economy, producers can freely move from one production to another. With such free mobility, for these three sectors to co-exist, utilities in all three sectors must be identical, that is $V_F = V_I = V_J$. The price that sets $V_F = V_J$, is given by:

$$p = (1-R)^{1-\phi}\,\delta \tag{25}$$

if $\tau < R*T$ and:

$$p = (1-R*T)(1-R)^{1-\phi}\,\delta(1-\tau) \tag{26}$$

if $\tau \geq R*T$.

Result 1

The price of good J is higher when taxes are evaded. This price decreases as regulations increase. The relationship between the price and the tax rate depends on the tax and regulatory condition of the economy. If they are such that producers of F truthfully report their earnings, changes in taxes do not affect the price. If the tax-regulatory structure causes producers of F to evade taxes ($1 > R(1+\nu)$), the price increases as the tax rate increases.

This result follows directly from equations (25) and (26). As regulations increase, the indirect utility of producers of good F decreases. This increases the utility of producers of good *J*. To restore equality of utilities the price of good J must decrease. A reduction in the price increases the utility of the producers of good F (the buyers of the good whose price is falling) and decreases the utility of the suppliers of good *J*. Hence a rise in regulations reduces the price of the good exempt from regulations.

When the tax rate increases it affects the producers of goods F and J equivalently if producers of good F do not evade taxes. In that event the price p does not change. If the producers of good F evade their taxes, however, taxes impact the price p. Differentiation of the price p in equation (26) with respect to the tax rate τ shows that the derivative is positive if $1-R(1+\nu) > 0$. (Recall ν is the penalty for tax evasion). Since $\tau \geq R*T = R*\tau(1+\nu)$ is the same as $1 \geq R*(1+\nu)$, the price of good J increases as the tax rate increases. This shows that as long as the probability of getting caught, R, and the penalty for getting caught, ν, are reasonably small compared to the tax rate, an increase in the tax rate increases the price of good *J*. This is because the marginal impact of a one unit increase in the tax rate on the producers of good F, $R(1+\nu)$ is less than its impact on producers of J which results in a more adverse effect on the utility of the producers of good *J*. This is compensated by an increase in the price of *J*. The condition $1 \geq R*(1+\nu)$ also indicates that the price is higher when taxes are evaded. Hence the result.

For the informal production of good H to occur in equilibrium in this economy, the utility of these producers must equal the utility of producers in other sectors. Setting $V_I = V_F$ yields:

$$\pi = 1-1(1-s)^{1-\phi\phi}(\gamma+s)^{1\phi}\left[B(1+p^{1-\sigma})^{1-\phi\phi(1-\sigma)}\phi\psi^{1\phi}(1-\phi\alpha)^{1-\phi\phi}\, g + (1-\tau)^{1\phi}(1-R)^{1-\phi\phi}\right]^{\phi} \tag{27}$$

if $\tau < R*T$, but:

$$\pi = 1 - 1(1-s)^{1-\phi\phi}(\gamma+s)^{1\phi}\left[B(1+p^{1-\sigma})^{1-\phi\phi(1-\sigma)}\phi\psi^{1\phi}(1-\phi\alpha)^{1-\phi\phi}g + (1-R*T)^{1\phi}(1-R)^{1-\phi\phi}\right]^{\phi} \quad (28)$$

if $\tau \geq R*T$. Recall that the probability of getting caught in the informal sector is proportional to the fraction of the population working there. Thus, having determined π in equations (27) and (28), the number of producers in the informal sector directly follows from equation (4).[5] Thus:

$$n_I = N\theta\left[1 - 1(1-s)^{1-\phi\phi}(\gamma+s)^{1\phi}\left\{B(1+p^{1-\sigma})^{1-\phi\phi(1-\sigma)}\phi\psi^{1\phi}(1-\phi\alpha)^{1-\phi\phi}g + (1-\tau)^{1\phi}(1-R)^{1-\phi\phi}\right\}^{\phi}\right] \quad (29)$$

if $\tau < R*T$, but:

$$n_I = N\theta\left[1 - 1(1-s)^{1-\phi\phi}(\gamma+s)^{1\phi}\left\{B(1+p^{1-\sigma})^{1-\phi\phi(1-\sigma)}\phi\psi^{1\phi}(1-\phi\alpha)^{1-\phi\phi}g + (1-R*T)^{1\phi}(1-R)^{1-\phi\phi}\right\}^{\phi}\right] \quad (30)$$

if $\tau \geq R*T$.

Given the solution for n_I, the number of producers who produce either good F or produce good J equals $N - n_I \equiv n$. Market clearing conditions in the goods market determine the distribution of producers in the two formal product markets.

Demand for good H comes mainly from the producers of good J since the formal and informal producers of good H use portions of their own production for consumption. The supply of good H equals the portion that remains after personal consumption of the formal and informal producers of H. Demand for good J equals the demand by the formal and informal producers of good H. The supply of good J equals the demand for good H by the producers of good J divided by the price of good J. This market clearing condition is given by the following equation:[6]

$$n_J H_J = n_F H_F p^{\sigma-1} + n_I H_I p^{\sigma-1} \quad (31)$$

It follows from the condition $n_F + n_J = n \equiv N - n_I$ and equation (31) that:

$$n_F = nH_J - 1p^{\sigma-1}n_I H_I H_F p^{\sigma-1} + H_J \quad (32)$$

$$n_J = nH_F p^{\sigma-1} + 1p^{\sigma-1}n_I H_I H_F p^{\sigma-1} + H_J \quad (33)$$

It follows from the equality of indirect utilities of producers producing F and J that:

$$H_F = pH_J \quad (34)$$

Equating indirect utilities of producers of F and I yields:

$$H_I = H_F + (1-\phi)\phi B(1+p^{1-\sigma})^{-1} \quad (35)$$

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[5] Note that if the relationship between π and n_I, as given in equation (4), was assumed to be non-linear, there would be no qualitative impact on the solution for n_I and hence results.

[6] Note from equation (8) that $J_F = H_F P^{\sigma}$. With n_F producers of good F, total demand for good J by them equals $n_F H_F P^{\sigma}$. The value of that in terms of good H is obtained by multiplying this amount by the price p. Similar calculations explain the second term on the right hand side of equation (31).

Result 2

When informal producers must pay bribes, the loss in utility caused by the bribe is compensated in the form of higher output and consumption made possible by the lack of taxes, regulations, and free access to some public services.

This result follows from equation (35). Informal producers have a direct cost in the form of bribes that formal producers do not bear. For indirect utilities to be equalized across sectors, as is evident from a comparison of V_F and V_I, the indirect utility informal producers derive from consumption and leisure to offset bribery costs must exceed the indirect utility formal producers derive from the same factors. This is made possible by the higher output informal producers succeed in appropriating for themselves because of their ability to evade taxes, avoid regulations, and gain partial access to free public services. Comparison of V_I and V_F shows that the reduction in utility caused by the bribe, $B(1+p^{1-\sigma})^{1\sigma-1}$ is compensated in the form of higher consumption of goods H and J due to the increased output made possible by evading taxes and regulations. This extra amount equals:

$$\phi\left((1-\phi)\alpha\right)^{1-\phi\phi}\psi^{1\phi}(1+p^{1-\sigma})^{1\phi(\sigma-1)}g\left[(1-\pi)^{1\phi}(1-s)^{1-\phi\phi}(\gamma+s)^{1\phi}-(1-R*T)^{1\phi}(1-R)^{(1-\phi)\phi}\right]$$

This expression shows that this advantage increases with higher regulations and public services and thereby increases π and n_I. It also increases with higher taxes if the direct effect on it dominates the impact of taxes on the price p.

Using equations (34) and (35), the number of producers of goods F and J simplify to:

$$n_F = Np^{2-\sigma}+1-n_I-(1-\phi)\phi Bn_I H_F(1+p^{\sigma-2})(1+p^{1-\sigma}) \tag{32'}$$

$$n_J = N1+p^{\sigma-2}+(1-\phi)\phi Bn_I H_F(1+p^{\sigma-2})(1+p^{1-\sigma}) \tag{33'}$$

These equations complete the determination of all endogenous variables.

The above solutions for n_F, n_J, and n_I show that if informal producers do not pay any bribes, that is $B=0$:

$$n_F = N1+p^{2-\sigma}-n_I \tag{36}$$

since $H_I = H_F$. Also:

$$n_J = Np^{2-\sigma}1+p^{2-\sigma} \tag{37}$$

$$n_I = N\theta\left[1-1(1-s)^{1-\phi\phi}(\gamma+s)^{1\phi}\left\{(1-\tau)^{1\phi}(1-R)^{1-\phi\phi}\right\}^{\phi}\right] \tag{38}$$

if $\tau < R*T$. This expression is appropriately adjusted if $\tau > T*R$. The following result follows from a comparison of the solutions for number of producers when $B>0$ and when $B=0$.

Result 3

When informal producers pay bribes, the size of the informal economy is lower than when $B=0$. *The increase in the size of the formal economy caused by the reduction in informality is entirely absorbed by sector* F. *The bribe, however, causes an additional direct effect on the formal sector by moving some producers away from sector* F *to sector* J. *The number of producers of good* J *increases but the number of producers of good* F *may or may not increase when* $B>0$.

This result follows directly from equations (32) and (33). The ambiguity in the change for good F occurs because it experiences an increase due to the decrease in informal producers but experiences a loss of producers to industry J. The net change depends on which of these changes is stronger.

The following section examines the impact of government services, regulations and taxes on the distribution of producers and net revenue.

3 Impact of public services, regulations, and taxation on informality and net revenue

The last section showed that the government's tax and regulatory policies can shift production to the informal sector and also motivate some formal producers to evade taxes. A question that remains is what motivates governments to adopt policies that motivate such behaviors.

Marcouiller-Young (1995), Mukherji (2004) and Azuma-Grossman (2008) consider the government's objective to be the maximization of graft or tax revenue net of productive public services particularly in the context of predatory states. The objective of this section is to determine the relationship between this net revenue or graft and public policy instruments such as public services, tax rates, and regulations. The objective is not to determine the tax rate, regulation, and public services that maximize net revenue. Rather, the objective here is to examine how net revenue responds to each of these policy instruments for given values of the other two. This helps to answer questions such as: given the current level of public services and regulatory environment, can a government increase net revenue by taxing more?

As defined in Marcouiller and Young (1995) and Mukherji (2004), net revenue (or graft) equals tax revenue net of public services. In this paper tax revenue is obtained from the formal production of goods H and J. Thus net revenue, denoted by G, equals:

$$G = n_F R^* T\psi^* ((1-R)l_F)^{1-\phi} g^{\phi} + n_J \tau\delta\psi l_J^{1-\phi} g^{\phi} - g \tag{39}$$

Public policies impact this net revenue by changing production and by changing the sectoral distribution of producers. Analysis of this revenue is based on the assumption that the degree of substitutability between the two goods in consumption is not large ($\sigma < 1$). It follows from the solutions of labor supplies that higher taxes and regulations reduce labor supplies while higher public services increase them and these changes will have the expected changes on net revenue. That is, the decrease in labor supply as a result of higher taxes will interact with the direct impact of the higher tax rate and produce a Laffer curve type relationship. In this economy, these changes interact with the movement of labor within different sectors of the formal economy and from the formal to the informal economy. Interestingly, a sector may be impacted by regulation not because production there is subject to regulation but because regulations drive producers of other goods there. These movements are influenced by the possibility to evade taxes and the necessity to pay bribes in the informal economy, among other factors.

Result 4

When $B > 0$ tax revenue generated by industry J increases. Tax revenue generated by industry F may increase or decrease.

This result is a direct consequence of Result 3 which shows that the size of the informal sector is reduced. This increases the number of producers of F. However, an additional movement of producers from F to J occurs as a result of the bribe. If the decrease in F due to this effect

exceeds the rise in F due to the reduction in informality, tax revenue from F will decline; otherwise it will increase. The unambiguous increase in the number of producers of J will increase tax revenue generated by that industry.

An examination of how public policies impact the distribution of producers and tax revenues follows.

3.1 Change in the tax rate

Changes in policy variables impact sectoral distribution of labor and net revenue in three ways: 1) through their direct impact, 2) by changing the price/the price channel and 3) by changing the impact of bribes on utilities of producers. The net effect is the combined effects of these three changes. The analyses below separate these effects to gain a better understanding of the changes.

Case 1: No tax evasion and no bribes

To gain an understanding of how public policies impact informality and G, it is instructive to start from the simplest case: there is no tax evasion and informal producers do not pay any bribes, that is $\tau < R^{*}T$ and $B = 0$.

Equations (25) and (34)-(36) show that in such a situation, higher taxes do not impact the price p and the number of producers who produce good J. Higher taxes, however, increase the size of the informal economy and reduce the number of producers of F.

The solutions for l_F and l_J show that both decrease as the tax rate rises. Hence as the tax rate increases there is a decrease in the number of producers of good F and the amount of labor supplied by these producers, The negative effects of these on tax revenue is mitigated by the increase in revenue generated by the higher rate. This is also true for good J with the exception that there is no decline in number of producers here. The combined effects of the higher rate directly on revenue and indirectly through its impact on labor supply and number of producers of good F generate a Laffer curve type relationship between the tax rate and revenue.

Case 2: Tax evasion and no bribes

If the possibility of tax evasion is allowed, the main difference with Case 1 is that now the price p becomes a function of the tax rate. This creates an additional channel through which taxes impact both the sectoral distribution of producers and net revenue. Result 1 based on equation (26) shows that the price increases as the tax rate increases. Equations (36)-(38) show that as p increases, n_F decreases but n_J increases. This effect reinforces the decrease in n_F due to the direct effect of the tax change discussed in Case 1. The price change does not impact the size of the informal sector but increases the number of producers of J. Thus tax collection from production of good J increases but tax collection from production of F is reduced as the higher price drives producers away from good F to good J. The impact of this redistribution on net revenue will depend on the tax generating capacity of the two formal sectors.

Case 3: Tax evasion and bribes

If $B > 0$, equation (30) shows that n_I becomes smaller due to the additional term

$B(1+p^{1-\sigma})^{1-\phi\phi(1-\sigma)}\phi\psi^{1\phi}$. This term rises as the tax rate rises (see Result 1). Hence this will reduce the positive effect of higher taxes on informality due to the direct and price effects noted above. Informality then will not increase as much, or in the more extreme situation, decrease when $B>0$.

The relative reduction in informality will directly cause an increase in n_F (see Result 3). The change in the tax rate also impacts the term multiplying Bn_I in equations (32') and (33'). Substituting for H_F it follows that the term increases as the tax rate increases. If n_I is increased by the higher tax rate, this additional factor causes a decline in the number of producers of F. All of these producers move to sector J.

Result 5

When taxes are not evaded and informal producers do not pay bribes, higher taxes increase the number of informal producers. All of these producers are diverted from the formal sector F; there is no impact on number of producers of J. When taxes are evaded, the price of J increases and some producers move to industry J from F as taxes are increased. There is no additional impact on informality. However, if informal producers have to pay bribes, an increase in the tax rate may or may not increase informality. If informality increases, the producers will be drawn from good F. There will be a further loss of producers from good F to good J. The overall impact on net revenue depends on this redistribution and the revenue generating capacities of the two industries F and J.

3.2 Change in regulation

An increase in regulation decreases the price when both taxes are evaded and when they are not. The reduction in price becomes larger when taxes are evaded as equation (26) shows. So the impact of a change in regulation on sectoral distribution of producers and their labor supply will be in the same direction for these two cases. Hence these two cases are not treated separately for changes in R.

Case 1: Tax evasion and no bribes

When $B=0$, an increase in R increases n_I. This follows from equation (30). Also equation (36) can be rearranged as:

$$n_F+n_I=N1+p^{2-\sigma}$$

Since p decreases as R increases, the right side of the above equation increases implying that n_J decreases. While n_I increases and n_J decreases, the impact on n_F is less clear. Higher regulation drives more producers to become informal but the lowering of the price of good J stimulates some producers to good F. The price effect should be dominated by the direct impact of regulations on formal production. Hence higher regulations are expected to decrease n_F.

The reduction in n_J decreases the tax revenue from this sector as R increases. The higher R is also expected to reduce n_F and labor supply. This is offset by the increase in revenue brought about by the increased ability to catch tax evaders due to the increase in regulations. Hence

the net impact of higher regulation on net revenue depends on the relative strengths of the positive and negative effects on tax collection, number of producers, and labor supplies.

Case 2: Tax evasion and bribes

When $B > 0$, equation (30) shows that the number of informal producers is smaller. However, the increase in n_I as R increases is larger. This outflow of producers to the informal sector occurs from the sector producing F. There is also a redistribution of some producers between goods F and J from equations (32), (33), and (14)). This redistribution is proportional to n_I and follows $(1+p^{1-\sigma})^{(1-\phi)\phi(1-\sigma)}1+1p^{2-\sigma}$. While n_I increases, the other term decreases with a rise in regulations. If the net change is an increase, the number of producers of F is further reduced. Otherwise the decline in F is less sharp. Net revenue depends on this redistribution.

Result 6

When $B = 0$, an increase in R increases n_I but n_J and n_F decrease. Higher regulations reduce tax revenue from industry J. Higher regulations increase tax revenue from industry F only if the direct effect of higher tax collection as a result of the increased regulation is strong enough to offset the reduction in n_F and l_F. Otherwise, net revenue will decrease with higher regulation. If $B > 0$, higher regulations will divert some producers away from F to I, further reducing revenue from F. Higher regulations additionally will cause some redistribution of producers between goods F and J. If there is an increase in the number of producers of J as a result of this redistribution, it offsets the negative impact on production of J due to the price effect. The overall impact on net revenue will depend on the net flow of producers between the sectors and the revenue generating capacities of the two formal sectors.

3.3 Change in public services

The price p does not depend on government services g. Like the regulation case there is no benefit in separating out the possibility of no tax evasion since there is no additional impact through the price channel brought about by tax evasion. The presence of bribes, however, matters.

Case 1: Tax evasion and no bribes

When $B = 0$, g has no impact on n_F, n_J, or n_I. However, g increases labor supplies l_F and l_J. Substitution of these labor supplies in the net revenue equation shows that the revenues are linear functions of g. Hence an increase in g increases net revenue if net revenue is positive and decreases it if net revenue is negative. If net revenue is negative, a decrease in g to 0 will eliminate the deficit by eliminating production. This is similar to Marcoullier-Young's "black hole" result with the exception that informal production will also stop.

Case 2: Tax evasion and bribes

When $B > 0$, equation (30) shows that n_I is smaller but increases as g increases. This increase occurs because the higher public service increases the value of the additional consumption

informal producers enjoy as compensation for the bribes they pay. This motivates more producers to become informal.

Overall tax revenue will be higher than when $B = 0$ but declining as g increases and induces an increase in informality. If $n_1 g$ increases as g increases there is an additional movement of producers out of good F to good J.

Result 7

When informal producers do not pay any bribes, there is no sectoral redistribution of producers as a result of change in government services. Net revenue increases if it is positive and decreases if it is negative. When informal producers pay bribes, the number of producers of good F is reduced and higher public services may further reduce this number. Some of these producers move to the informal sector while some may move to good J. Hence the overall number of producers in the formal sector declines and mitigates the positive effects of higher public services on production and labor supplies.

The results highlight the importance of the sectoral redistribution of production in determining the impact of public policies on net revenue. The results also show that public policies can have different impacts on different types of formal production. That is, the impacts they have on goods that have close substitutes in the informal sector (good F) are often the exact opposite of the effects they have on goods that are produced formally only (good J). This is summarized in the following result.

Result 8

When goods with substitutes in the informal sector coexist with goods which can only be produced in the formal sector and informal producers pay bribes, government tax and regulatory policies that increase informality may also increase production of the good which has no informal substitute. The loss to the economy due to higher informality may be offset by the increased production of this formal good.

These results highlight the significant sectoral redistribution of production caused by tax and regulatory policies. Policies that promote and increase informality may positively benefit an industry that has no direct connection to informal production. Thus policymakers need to be aware of redistribution of production within the formal sector since it has significant impacts on production and net revenue.

4 Empirical investigation

The previous sections developed a model that examined the combined roles of multiple goods, tax evasion, and bribery on the relationship between public policies and informality and public policies and net revenue. This section investigates empirically these relationships when such differences in economic environments for conducting business are taken into account. Lack and unreliability of cross-country data on tax evasion, bribery and relative price of goods which have informal substitutes and goods which do not, limit the scope of conducting a full-scale empirical test of the theoretical model. Nonetheless, data on governance and corruption indicators allow for the possibility of capturing the general business environment that foster activities such as tax evasion and the burden of conducting business in the formal economy. There is no formal test of the price effect of public policies and the sectoral redistribution of production within the formal

sector as a result of changes in public policies. So the scope of the empirical investigation of this section is limited to the main objective of the paper - do public policies that promote informality also increase net revenue? While several papers have studied the public policy such as taxation and regulation and informality relationship empirically as the introductory section shows, there is no study that empirically considers how these policies also impact net revenue.

4.1 Data and descriptive statistics

The informal economy data come from Schneider (2004). Schneider estimates the size of the informal economy using a dynamic multiple-indicators multiple-causes framework. The informal economy is specified as a latent (unobservable) variable and various causes and indicators of the informal economy are used as observable variables. This method captures more than one "indicator" of the shadow economy as well as considers more than "one cause" in estimating the size of the informal sector. Three major types of causes identified in the literature include the burden of taxation, the burden of regulation, and citizens' attitude toward the state ("tax morality"). Three major types of indicators for the size of the shadow economy are monetary indicators (monetary transactions), developments in the labor market (movement of labor), and the developments in the production market (movement of inputs). Schneider compiles the size of the shadow economy for 145 countries for 1999-2000, 2000-01 and 2002-03. In this paper, the 1999-2000 data are used to conduct a cross-sectional analysis.

The tax rate used is the top marginal individual income tax rate obtained from the World Tax Database published by the University of Michigan. The series provide comprehensive data coverage across time and countries. The regulation variable is taken from the Heritage Foundation's component of the Index of Economic Freedom (with higher values indicating more regulation). As discussed below, to control for the quality of institutions, a democracy/bureaucracy measure that is the sum of democratic accountability and bureaucratic quality provided by the PRS Group's International Country Risk Guide (ICRG) is used. Additionally, a measure of corruption provided by ICRG (with higher values indicating better institutions) is also used. These two measures capture the general economic environment that foster activities such as tax evasion and bribery. It is worth noting that the bribery considered in the theoretical part of the paper deals with bribery in the informal sector only. Log real per capita GDP is used as another control variable and is taken from the World Bank's World Development Indicators.

Data on tax revenues and productive expenditures, necessary to compute net revenue, are obtained from the Government Finance Statistics yearbook's consolidated accounts (budgetary, extra budgetary, and social security) of the central government, published annually by the International Monetary Fund (IMF). The data expressed as percentages of GDP are available at the NYU's Development Research Institute (DRI) website. The series, however, exclude state and local government expenditures. While the tax revenue data are available, measuring government productive services is not straightforward. From a theoretical standpoint, these services include productive services that are part of formal sector firms' production functions. These services also impact firms in the informal sector although to a lesser extent. Thus to measure productive government services, government expenditures are defined as the sum of the expenditures on public order and safety, fuel and energy, and transportation and communications. Of course, this is not a perfect measure but given data limitations, it should provide a useful benchmark.[7] In addition,

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[7] The issue of measurement error in the expenditure variable needs to be taken seriously since the variable is also a regressor thus potentially resulting in the errors-in-variables problem. In our estimations we use an instrumental variable approach that should mitigate this problem.

since education and health could probably be considered as productive government services affecting firms' output, an alternative analysis including these expenditures is also conducted.

To mitigate measurement problems and business cycle effects in the data, 5-year averages taken over 1995-1999 are used, except for the GDP variable that uses only 1995 data. The use of the beginning-of-the-period data reduces possible endogeneity problems and thus GDP is not instrumented in estimations below. In total, data are available for 75 countries for net revenue and productive government expenditures. However, in estimations that follow, only about 50 observations are used since there are missing data for other variables.[8]

Table 1 presents descriptive statistics of the variables used. It also gives a list of the countries that are included in the study. The choice of countries is exclusively driven by data availability considerations. The average size of the informal economy in the data is about 30 per cent of the official GDP with a range from 8.6 to 67.1 per cent. Interestingly, the informal economy has a negative correlation –0.25) with individual income tax rate, but perhaps not surprisingly, a positive correlation with regulation and institutional measures (higher values indicate stronger institutions, so the correlation coefficients are negative). The relationship with productive government expenditures excluding education/health is positive but relatively small (0.09). The average net revenue relative to GDP is about 18 per cent and with education/health expenditures, it is about 12.5 per cent. The correlation of the net revenue measure with productive government expenditures is mainly negative. Yet interestingly, expenditures with education/health and the other measure of net revenue (revenue less expenditures excluding education/health) is positive at about 0.23, which is perhaps due to education/health expenditures being incorporated in the net revenue. Lastly, higher values of net revenue are associated with higher taxes but with less regulation and better institutions.

The countries sorted by net revenue excluding education/health are shown in Table 2. Since net revenue as defined in this paper does not mean government corruption, the pattern in the data is not as straightforward. Generally, more developed countries have higher net revenues suggesting that these countries generate larger tax revenues in excess of productive government expenditures. In addition, given the definition of net revenue, it may seem that instead of measuring government's "profit", a proxy is calculated for budget surplus or deficit. However, the relationship between these measures is very weak with a correlation of less than 0.1.[9]

4.2 Estimation and results

To analyze the effects of productive government expenditures, taxes, and regulation on the informal economy and net revenue, the following equations are specified:

$$Informal_j = \alpha_0 + \alpha_1 Expend_j + \alpha_2 Tax_j + \alpha_3 Regul_j + X\delta + \varepsilon_j \qquad (40)$$

for $j = 1,2,\ldots J$.

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[8] Future work can probably incorporate more data into the analysis and also use panel data to check for robustness of the results.

[9] The net revenue estimations discussed in the next section have also been estimated using surplus/deficit as a dependent variable. The OLS and GMM results produce mostly insignificant coefficients except for the coefficient on regulation in some instances. The coefficient on expenditures, in contrast to the net revenue estimations, is negative but insignificant in all but a few estimations at the 10 per cent level (using GMM). The GMM-CUE approach (discussed in the next section) also produces insignificant coefficients in most estimations. However, with the expenditures variable excluding education/health, in estimations using log GDP per capita and democracy/bureaucracy variables, a negative coefficient on expenditures with significance at 5 per cent (but not 1 per cent) and 10 per cent, respectively are obtained. In summary, given that other variables are insignificant and the expenditures variable is insignificant or marginally significant in a few estimations (yet with a different sign), there does not seem to be a statistical relationship between the regressors and the surplus/deficit variable.

Table 1

Descriptive Statistics and Correlation Matrix

	Informal Economy	Net Revenue	Net Revenue (educ/health)	Deficit	Expenditures	Expenditures (educ/health)	Indiidual Income Tax Rate	Regulation	Log Real GDP per Capita	Democracy/ Bureaucracy	Corruption
Mean	29.98	18.34	12.52	–2.33	2.98	8.8	35.03	2.95	8.19	6.99	3.76
Standard Deviation	13.04	9.66	8.84	2.9	1.88	4.56	14.95	0.85	1.49	2.26	1.21
Minimum	8.6	–6.69	–15.98	–8.7	0.01	0.02	0	1	5.09	1.52	1.37
Maximum	67.1	39.67	30.88	9.97	12.33	21.66	61.1	5	10.69	10	6
Observations	64	75	75	75	75	75	59	71	74	61	61
Correlation Matrix											
Informal Economy	1										
Net Revenue	–0.255	1									
Net Revenue (educ/health)	–0.254	0.938	1								
Deficit	–0.241	0.085	0.096	1							
Expenditures	0.089	–0.166	–0.363	–0.117	1						
Expenditures (educ/health)	–0.006	0.231	–0.101	–0.055	0.763	1					
Indiv. Income Tax Rate	–0.249	0.411	0.43	0.006	–0.273	–0.062	1				
Regulation	0.414	–0.267	–0.19	–0.273	–0.183	–0.284	0.171	1			
Log Real GDP per Capita	–0.538	0.485	0.461	0.264	–0.119	0.076	0.012	–0.598	1		
Democracy+Bureaucracy	–0.514	0.523	0.513	0.124	–0.194	0.071	0.236	–0.343	0.71	1	
Corruption	–0.552	0.555	0.54	0.112	0.078	0.188	0.155	–0.353	0.636	0.762	1

$$NetRevenue_j = \beta_0 + \beta_1 Expend_j + \beta_2 Tax_j + \beta_3 Regul_j + X\gamma + \varepsilon_j \quad (41)$$

for $j = 1,2,\ldots J$.

Expend, *Tax*, and *Regul* variables are productive government expenditures with and without education/health, individual income tax rates, and regulation, respectively. The variable X includes log real GDP per capita and institutional measures (democracy/bureaucracy or corruption) that capture the general economic environment.

Several estimators are used for the above equations. The first estimator used is OLS. However, since the regressors could be endogenous in the above specifications resulting in inconsistent estimates, the generalized method of moments, GMM (Hansen, 1982), and the continuously updated GMM (CUE) of Hansen, Heaton, and Yaron (1996), estimators are used. The CUE has been shown to have better properties in small samples (Hansen, Heaton, and Yaron, 1996) and in the presence of weak instruments (Stock and Wright, 2000 and Stock, Wright, and Yogo, 2002). Four different instrument sets are also used: (i) constant, log real GDP per capita in 1995, latitude, and lagged values of expenditure, individual income tax rate, regulation, and corruption (averaged over 1990-94); (ii) the first set plus two interaction terms of lagged expenditure and lagged tax rate with a developing country dummy; (iii) the first set plus dummies for South Asia and British legal origin (other region and legal origin dummies are insignificant in the first stage regressions); and (iv) the first set and all regional and legal origin dummies (10 dummies).

In the above instrument sets, when the democracy/bureaucracy variable is used as a regressor, its lag rather than lagged corruption variable is used. In using lagged values of the regressors as instruments, it is assumed that the regressors are predetermined; namely, the innovation/error term is uncorrelated with the past values of regressors (a similar assumption is made in panel data models).[10] This allows for the use of GMM or CUE to obtain consistent estimates. The validity of the instruments are tested by using Hansen's (1982) *J*-test of overidentifying restrictions. Additionally, to obtain right inferences, relevant instruments are necessary. The Cragg-Donald (CD) (1993) statistic for weak instruments is used to assess the strength of the instruments in the first stage regressions. Using lagged variables rather than just regional and legal origin dummies helps alleviate the weak instrument problem as indicated by the CD statistic. Lastly, with cross-sectional regressions, country-specific effect can correlate with the regressors or instruments. Since panel data are not used, country effect cannot be differenced out. The check on this issue is the *J*-test of overidentifying restrictions, and if the test does not reject the validity of the instrument set, the equations are less likely to be misspecified.

4.2.1 The informal economy

Table 3 shows the estimation results for the informal economy as a dependent variable.[11] Estimations using government productive expenditures with and without education/health as well as using OLS and CUE are presented.[12] The instrument set used is (i) discussed above and is based on the high Cragg-Donald statistic indicating the relevance of the instruments (Stock and Yogo,

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[10] Thus log real GDP per capita in 1995 is a valid instrument.

[11] The outlier observation for expenditures, Kuwait, is omitted in informal economy estimations, and Bahrain and Kuwait are omitted in net revenue estimations. The data for these countries have large expenditures (Bahrain: 6.8 per cent and Kuwait: 8.4 per cent with a mean of 3 per cent and standard deviation of 1.9 per cent for 75 observations of the data) and small tax revenues relative to total revenues (Bahrain: 0.31 and Kuwait: 0.04). Adding these observations to the estimations produces imprecise coefficients on expenditures and in the case of the informal economy, on tax rates as well.

[12] The GMM estimates are close to those using CUE but have a higher precision. Thus the GMM estimates result in stronger inference. Yet for the sake of brevity and since CUE is a better estimator, the CUE results are reported.

Table 2

Net Revenue, Expenditures, and Deficit
(average, 1995-99, sorted)

Country Code	Country Name	Net Revenue	Expenditures	Net Revenue	Expenditures	Deficit
NLD	Netherlands	39.667	3.084	27.449	15.302	–2.967
LUX	Luxembourg	35.998	4.98	30.882	10.096	2.276
SVN	Slovenia	34.042	3.858	24.134	13.766	–0.557
ISR	Israel	32.565	2.551	20.124	14.992	–2.402
SWE	Sweden	32.559	2.679	29.646	5.593	–3.333
GBR	United Kingdom	32.057	1.83	24.892	8.995	–2.096
DNK	Denmark	31.729	1.925	27.27	6.384	0.139
LSO	Lesotho	31.362	5.013	14.711	21.665	–0.957
SVK	Slovak Republic	31.361	4.056	18.804	16.612	–3.399
POL	Poland	30.781	2.706	24.097	9.39	–1.549
NOR	Norway	30.762	2.739	26.547	6.954	0.344
HUN	Hungary	30.124	3.346	24.104	9.366	–3.031
SYC	Seychelles	30.011	4.458	19.501	14.968	–6.265
IRL	Ireland	29.033	1.769	18.918	11.884	–0.522
CZE	Czech Republic	28.417	3.893	18.318	13.991	–0.777
BLR	Belarus	26.421	2.85	23.723	5.548	–1.829
ESP	Spain	26.203	2.052	22.819	5.435	–4.85
DEU	Germany	25.686	1.33	19.219	7.796	–1.912
EST	Estonia	25.164	4.915	16.247	13.831	0.183
FIN	Finland	25.14	2.421	20.166	7.394	–4.614
URY	Uruguay	24.992	1.189	21.079	5.102	–1.667
MLT	Malta	24.506	3.796	15.763	12.539	–6.737
LVA	Latvia	23.495	3.858	17.739	9.614	–1.626
BGR	Bulgaria	22.325	3.84	18.997	7.168	–2.858
TUN	Tunisia	22.129	3.248	14.09	11.287	–2.527
AUS	Australia	21.88	0.872	16.262	6.49	–0.042
ROM	Romania	21.723	3.243	16.372	8.594	–3.634
ISL	Iceland	21.698	3.975	10.904	14.769	–0.687
CYP	Cyprus	21.532	3.792	15.192	10.132	–3.83
ZWE	Zimbabwe	21.223	4.182	10.768	14.637	–8.464
TTO	Trinidad and Tobago	21.024	2.985	14.611	9.398	0.203
CHE	Switzerland	20.098	1.918	13.928	8.088	–1.037
MAR	Morocco	19.717	4.145	13.147	10.715	–4.397
BRA	Brazil	18.719	1.072	15.799	3.993	–7.311
USA	United States	18.062	0.836	13.546	5.352	–0.344
CHL	Chile	17.998	1.033	11.757	7.274	1.162

Country Code	Country Name	Net Revenue	Expenditures	Net Revenue	Expenditures	Deficit
GRC	Greece	17.589	2.62	12.223	7.986	–7.128
RUS	Russian Federation	17.55	1.277	16.523	2.304	–4.775
MYS	Malaysia	17.42	3.259	11.16	9.519	2.335
CAN	Canada	17.392	1.168	16.407	2.153	–1.666
BHS	Bahamas, The	16.652	2.727	9.706	9.673	–0.42
PAN	Panama	15.749	1.64	5.582	11.807	0.418
CRI	Costa Rica	15.501	2.696	6.462	11.735	–1.996
KOR	Korea, Rep.	15.501	2.79	11.645	6.647	–0.32
MUS	Mauritius	15.428	2.906	9.357	8.977	–2.045
EGY	Egypt, Arab Rep.	15.413	2.968	9.901	8.479	–1.02
VUT	Vanuatu	15.113	3.676	7.874	10.915	–2.606
TUR	Turkey	14.929	2.238	10.788	6.379	–7.359
TJK	Tajikistan	14.076	2.535	12.938	3.673	–4.656
BDI	Burundi	13.726	1.34	9.18	5.887	–5.021
SGP	Singapore	13.715	2.107	9.268	6.555	9.97
LKA	Sri Lanka	13.522	2.505	9.397	6.63	–7.089
IDN	Indonesia	13.447	1.399	11.84	3.006	–0.02
SYR	Syrian Arab Republic	13.362	3.455	10.197	6.62	–0.736
MNG	Mongolia	13.357	2.804	11.441	4.721	–8.698
MDV	Maldives	13.072	7.538	–0.569	21.178	–4.908
THA	Thailand	12.287	3.741	6.785	9.244	–3.046
DOM	Dominican Rep.	11.846	3.078	7.854	7.07	0.365
MEX	Mexico	11.596	1.277	7.333	5.541	–0.609
ARG	Argentina	11.278	1.235	10.018	2.494	–1.58
KAZ	Kazakhstan	10.791	2.057	8.309	4.539	–4.041
BOL	Bolivia	10.019	3.898	4.798	9.119	–2.327
CMR	Cameroon	9.417	0.81	7.212	3.015	0.841
IND	India	8.889	0.233	8.317	0.805	–4.918
SLV	El Salvador	8.681	3.705	4.972	7.414	–1.807
YEM	Yemen, Rep.	8.38	3.328	1.707	10.001	–3.15
COL	Colombia	8.299	2.032	3.284	7.047	–4.364
MDG	Madagascar	7.598	0.749	4.748	3.599	–1.452
IRN	Iran, Islamic Rep.	7.538	4.362	1.591	10.31	–1.022
NPL	Nepal	4.482	4.23	1.215	7.497	–4.088
MMR	Myanmar	2.503	1.406	1.244	2.666	–2.16
BHR	Bahrain	0.981	6.799	-4.599	12.379	–4.755
HRV	Croatia	0.037	0.006	0.027	0.016	–0.001
BTN	Bhutan	–5.177	12.33	–12.523	19.675	–0.004
KWT	Kuwait	–6.689	8.386	–15.976	17.674	–7.059

Table 3

Estimation of the Informal Economy

	Excluding Education/Health										Including Education/Health									
	OLS					CUE					OLS					CUE				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Expenditures	3.24	1.62	2.15	3.73	2.97	3.79	2.46	2.75	4.47	4.72	0.90	0.59	0.58	0.93	0.71	1.58	0.50	0.80	1.59	1.43
Standard error	1.32	1.58	1.28	1.30	1.66	1.63	1.53	1.06	1.11	1.29	0.51	0.51	0.56	0.55	0.57	0.60	0.60	0.44	0.46	0.53
p -value	0.02	0.31	0.10	0.01	0.08	0.02	0.11	0.01	0.00	0.00	0.08	0.25	0.31	0.10	0.22	0.01	0.41	0.07	0.00	0.01
Indiv. Income Tax Rate	–0.36	–0.35	–0.32	–0.31	–0.32	–0.73	–0.19	–0.28	–0.26	–0.28	–0.40	–0.38	–0.35	–0.35	–0.36	–0.84	–0.30	–0.35	–0.34	–0.35
Standard error	0.17	0.13	0.15	0.14	0.13	0.18	0.18	0.14	0.15	0.15	0.18	0.14	0.15	0.15	0.13	0.22	0.17	0.15	0.16	0.15
p-value	0.04	0.01	0.03	0.03	0.01	0.00	0.27	0.05	0.08	0.05	0.03	0.01	0.03	0.02	0.01	0.00	0.07	0.02	0.03	0.02
Regulation	7.48	1.65	2.93	3.27	1.86	6.79	–0.47	–0.26	1.22	2.04	8.65	2.19	3.60	4.76	2.10	9.13	0.51	1.51	4.93	3.03
Standard error	1.58	1.85	2.73	2.01	2.00	2.30	2.16	2.25	1.99	3.02	1.81	1.95	2.64	2.09	2.23	2.13	2.17	2.31	2.04	3.21
p-value	0.00	0.38	0.29	0.11	0.36	0.00	0.83	0.91	0.54	0.50	0.00	0.27	0.18	0.03	0.35	0.00	0.81	0.51	0.02	0.35
Log of GDP/Capita		–5.95			–2.27		–6.17			1.03		–6.18			–3.72		–6.54			–1.69
Standard error		1.66			2.20		1.28			3.06		1.49			2.11		1.34			2.64
p-value		0.00			0.31		0.00			0.74		0.00			0.09		0.00			0.52
Democracy+Bureaucracy			–2.84					–4.49					–2.95					–4.93		
St. error			1.44					1.07					1.48					1.04		
p-value			0.06					0.00					0.05					0.00		
Corruption				–5.72	–4.33				–6.89	–7.84				–5.41	–3.24				–7.46	–5.97
Standard error				1.41	2.11				1.52	3.36				1.42	1.97				1.58	2.78
p-value				0.00	0.05				0.00	0.02				0.00	0.11				0.00	0.03
Constant	12.99	84.18	48.92	44.39	64.80	29.81	83.56	67.64	52.02	44.75	11.77	84.86	49.18	41.96	75.22	24.18	90.15	69.20	44.96	60.65
Standard error	9.71	20.61	17.63	10.73	19.34	11.83	16.66	14.01	10.83	23.96	8.84	17.17	14.82	8.54	18.77	11.91	16.39	11.66	8.49	24.21
p-value	0.19	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.06	0.19	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.01
R^2	0.36	0.53	0.46	0.55	0.56						0.34	0.53	0.44	0.51	0.55					
Adjusted R^2	0.32	0.48	0.40	0.51	0.51						0.30	0.49	0.39	0.46	0.49					
J-test						5.09	3.23	1.31	0.81	0.69						5.42	1.78	1.52	0.47	0.07
p-value						0.17	0.20	0.52	0.67	0.40						0.14	0.41	0.47	0.79	0.80
CD stat						9.19	10.22	9.39	9.02	4.27						18.39	14.56	10.66	10.85	4.10
Number of observations	49	49	47	47	47	46	46	44	44	44	49	49	47	47	47	46	46	44	44	44

Notes: Heteroskedasticity-consistent standard errors.
Instrument set: Log GDP/capita in 1995, latitude, and lagged expenditure, individual tax rate, regulation, and corruption (1990-94).
When Democracy+Bureaucracy variable is used in estimations, lagged democracy/bureaucracy rather than lagged corruption is used in the instrument set. *J*-test: Test of overidentifying restrictions.
CD stat: Cragg-Donald statistic for weak instruments.

2004).[13] In addition, in all estimations, the *J*-test of overidentifying restrictions does not reject the null hypothesis of the validity of the instruments.

The impact of government expenditures without education/health using the OLS estimator is positive and large with a coefficient between 1.5 and 4. It is, however, imprecise in two of four specifications. Since there could be endogeneity problems with the OLS estimator, the CUE is examined. The coefficients are more precise and larger, about 2.5 to 4.5. These numbers imply that everything else constant, a one percentage point increase in productive government expenditures relative to GDP, increases the informal sector by 2.5-4.5 percentage points of official GDP. This is a large impact and the theory above confirms this finding.

Including education/health into the expenditures measure produces low and imprecise coefficients using OLS. However, the CUE results in more precise estimates. The parameters are smaller than in the estimation without education/health – at approximately 1.5. Perhaps the effect is smaller and is not as precise as before since the inclusion of education/health expenditures does not impact firms' incentives immediately. It may take years before a more educated and healthy workforce may impact the firms' decision in terms of the benefits and costs of operating in the informal economy.

The results also show that size of the informal economy increases with more regulation, worse institutions or lower level of development, and lower individual income tax rates. The coefficients are statistically significant (at 5 or 10 per cent) but including regulation and institutions or log GDP variables together results mostly in an imprecise coefficient on regulation perhaps suggesting some collinearity issues. The inclusion of both corruption and GDP variables confirms the significance of corruption and results in similar parameter estimates. It is not surprising that higher regulation and worse institutions imply a higher informal sector. This also suggests that the cost of these factors on the formal economy is stronger than on the informal and drives production to the informal sector. A higher cost of the formal sector suggests that the value of B in the theoretical section of the model should perhaps be negative. Another interesting result is that higher income tax rates imply a lower informal sector of the economy. However, this is consistent with the theoretical findings (see Section 3.1 for details). Finally, another important result is that higher public services that increase informality as well as net revenue (see the next section), may not promote informality in the longer run. Although one percentage increase in public services increases informality by about 4.5 per cent, improving corruption environment from that of Bulgaria to that of Australia results in a decrease of the informal sector by about 7 per cent. With higher public services on law and order, infrastructure, communications, country's institutions would improve and thus reduce informality, which is confirmed by the empirical results. Thus, if the goal of states is to use such a policy to maximize net revenue, it may not be an informality-increasing policy in the longer run.

4.2.2 Net revenue

Table 4 presents estimations for net revenue. Excluding education/health and using the OLS estimator, the impact of productive government expenditures is positive and statistically significant at 5 or 10 per cent level. It seems that the expenditure variable creates a problem of simultaneity since expenditures are subtracted from tax revenues to arrive at net revenue while the same expenditures variable is also used as a regressor. However, it is precisely because expenditures are

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[13] Using more instruments that include regional and legal origin dummies [instrument set (iv)], reduces the CD statistic to about 4, which is indicative of weak instruments. These estimations result in a higher precision of our estimates; however, given a weak instrument set, we cannot rely much on the inference. The results using instrument sets (ii) and (iii) are in general similar to those using (i). However, the CD statistic is smaller in size compared to that of instrument set (i).

Table 4

Estimation of Net Revenue

	Excluding Education/health										Including Education/health									
			OLS					CUE					OLS					CUE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Expenditures	1.87	2.61	2.19	1.40	2.28	3.10	2.61	3.18	1.65	2.15	0.19	0.34	0.29	0.10	0.20	0.32	0.19	0.32	–0.09	–0.08
Standard error	0.77	0.76	0.81	0.82	0.85	1.00	0.63	0.80	0.79	0.86	0.21	0.20	0.24	0.22	0.19	0.24	0.22	0.30	0.31	0.31
p-value	0.02	0.00	0.01	0.09	0.01	0.00	0.00	0.00	0.04	0.01	0.37	0.09	0.24	0.64	0.30	0.19	0.39	0.28	0.77	0.80
Indiv. Income Tax Rate	0.19	0.15	0.11	0.12	0.13	0.59	0.07	0.09	0.06	0.07	0.14	0.10	0.06	0.07	0.07	0.27	0.05	–0.03	–0.01	–0.01
Standard error	0.10	0.08	0.09	0.09	0.08	0.19	0.08	0.10	0.10	0.09	0.09	0.07	0.08	0.08	0.07	0.11	0.08	0.09	0.09	0.09
p-value	0.06	0.07	0.22	0.18	0.11	0.00	0.36	0.40	0.54	0.42	0.11	0.16	0.47	0.38	0.33	0.01	0.48	0.76	0.90	0.90
Regulation	–4.31	–0.18	–2.23	–2.86	–1.01	–3.56	2.79	0.30	–0.76	0.44	–3.02	0.94	–0.45	–1.22	0.10	–2.49	4.82	2.65	0.98	1.13
Standard error	1.05	1.24	1.46	1.08	1.18	1.39	1.61	1.32	1.19	1.78	1.03	1.19	1.16	1.00	1.09	0.98	1.61	1.45	1.21	1.99
p-value	0.00	0.89	0.13	0.01	0.39	0.01	0.08	0.82	0.52	0.81	0.00	0.43	0.70	0.23	0.93	0.01	0.00	0.07	0.42	0.57
Log of GDP/Capita		4.01			2.94		5.29			1.68		3.71			1.84		5.65			0.19
Standard error		0.66			1.17		0.88			2.01		0.78			1.02		1.01			1.96
p-value		0.00			0.02		0.00			0.40		0.00			0.08		0.00			0.92
Democracy+Bureaucracy			1.73					3.41					1.78					3.42		
Standard error			0.77					0.59					0.61					0.68		
p-value			0.03					0.00					0.01					0.00		
Corruption				2.94	1.12				5.35	3.69				3.11	2.01				5.23	5.06
Standard error				0.79	1.17				0.95	2.10				0.73	1.01				0.96	2.01
p-value				0.00	0.35				0.00	0.08				0.00	0.05				0.00	0.01
Constant	20.70	–25.87	3.99	9.09	–16.82	–1.89	–43.14	–18.02	–4.94	–18.22	16.21	–26.59	–1.96	2.52	–13.49	7.49	–51.96	–20.92	–7.64	–9.17
Standard error	6.04	9.11	10.02	7.14	10.81	9.31	10.63	7.86	5.55	16.21	5.39	8.92	7.13	6.28	8.56	5.92	11.70	8.19	6.08	16.89
p-value	0.00	0.01	0.69	0.21	0.13	0.84	0.00	0.02	0.37	0.26	0.00	0.00	0.78	0.69	0.12	0.21	0.00	0.01	0.21	0.59
R^2	0.35	0.52	0.48	0.50	0.52						0.21	0.42	0.40	0.44	0.45					
Adjusted R^2	0.31	0.48	0.44	0.46	0.46						0.17	0.38	0.35	0.40	0.38					
J-test						9.72	3.22	0.49	0.72	0.19						10.70	3.82	0.81	0.26	0.25
p-value						0.02	0.20	0.78	0.70	0.66						0.01	0.15	0.67	0.88	0.62
CD stat						12.56	13.27	10.69	10.06	2.86						22.65	15.07	12.80	11.58	2.86
Number of observations	56	55	52	52	51	52	52	48	48	48	56	55	52	52	51	52	52	48	48	48

Notes: Heteroskedasticity-consistent standard errors.
Instrument set: Log GDP/capita in 1995, latitude, and lagged expenditure, individual tax rate, regulation, and corruption (1990-1994).
When Democracy+Bureaucracy variable is used in estimations, lagged democracy/bureaucracy rather than lagged corruption is used in the instrument set. *J*-test: Test of overidentifying restrictions.
CD stat: Cragg-Donald statistic for weak instruments.

subtracted from tax revenues, they are no longer part of the net revenue measure, which should avoid the simultaneity problem. Nonetheless, the expenditure variable could be endogenous along with other regressors; that is, they could be correlated with the innovation/error term, so the CUE was used. The coefficient becomes larger in magnitude and more precise. The estimations imply that if productive government expenditures increase by one percentage point relative to GDP, net revenue rises by about 2-3 percentage points relative to GDP. However, introducing education/health into the expenditures variable results in a very small and insignificant coefficient. This suggests that health/education expenditures may not have an immediate impact on net revenue, and it may take time before the benefits of better health and education are reaped through higher productivity and higher tax revenues.

Similar to the informal sector estimations, the impact of the level of development and institutions variables is highly statistically significant and large indicating that worse institutions and lower level of development decrease net revenue. Tax rates positively affect net revenue while regulation has a negative impact. However, the impact of taxes is small (0.1) and statistically insignificant. *J*-test of overidentifying restrictions rejects the null at 5 per cent level in specifications using only a regulation variable. Introducing GDP or institutions variables, the regulation variable becomes statistically insignificant. Interestingly, the coefficient becomes positive, which implies higher regulation increases net revenue,[14] and significant at 10 per cent in a couple of estimations using the CUE and mostly in estimations including education/health. However, the evidence of positive impact is not conclusive, and the coefficient is statistically significant in only a couple of estimations.

5 Conclusion

The paper finds that the inclusions of tax evasion by formal producers, bribes paid by informal producers, and multiple types of goods significantly affect how public policies affect informality and net revenue.

Changes in public policies cause changes in the price of the good that has no informal sector. This price change causes changes in the number of producers of this formal good. Often these producers are drawn from the formal good that has an informal sector. Hence public policies shift producers within the two formal sectors. The literature on informality largely fails to account for this production redistribution.

Furthermore, when informal producers pay bribes to maintain their status, informality is reduced. The producers that remain informal, however, derive more utility from direct consumption than their formal counterparts to compensate for the loss of income and utility caused by the bribe. This additional utility is made possible by avoiding regulations and taxes and equivalently captures the value of the bribe to an informal producer in terms of lost utility. These utility effects depend on the values taken by public policy variables. This factor further impacts the distribution of producers between the various sectors.

As public policies redistribute production, it often impacts the two formal sectors in opposite directions. Whether tax revenue rises in response to a policy change depends on the relative responsiveness of the two sectors to policy instruments. Hence the paper demonstrates the importance of taking into consideration multiple formal sectors and bribes in studies of informality.

Empirically, the paper finds:

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[14] The positive coefficient on regulation is also consistent with the theory presented.

- Productive public expenditures increase net revenue. Once education and health expenditures are added, the result becomes statistically insignificant. As mentioned above, expenditures related to health and education have more longer term than immediate effect on current production. Hence, the results without education and health may be more appropriate for the current study.
- Taxes have a positive but small impact on net revenue. Once institutional variables are considered, taxes fail to have any statistically significant effect on net revenue.
- The impact of regulation on net revenue is mixed. Estimations which yield a significant impact of regulations show that if GDP is included in the estimation, higher values of regulations increase net revenue. However, if GDP is not included, in most other instances where regulation has a significant effect, higher regulations are associated with lower net revenue.
- GDP and institutional variables have a large and statistically strong impact on net revenue. They also show that countries with better institutions and higher level of development have higher net revenue.

These results show that it is possible to increase net revenue by having higher taxes, more regulations, and higher public services. With the exception of taxes (which has a small, if any, effect on net revenue) these factors also increase informality. The results also show that to achieve higher net revenue, institutional reforms in the form of better bureaucratic quality and democratic accountability and less corruption are desirable. Once these institutional factors are introduced, while public services continue to remain significant, the effects of regulations and taxes on net revenue weaken. Furthermore, good institutions are usually not present in countries with predatory governments. Hence to understand why countries engage in policies that increase informality, researchers may want to consider an alternative objective.

REFERENCES

Azuma, Y. and H. Grossman (2008), "A Theory of the Informal Sector", *Economics and Politics*, Vol. 20, No. 1, pp. 62-79.

Bardhan, P. (1997), "Corruption and Development: A Review of Issues", *Journal of Economic Literature,* Vol. 35, No. 3, pp. 1320-46.

Besley, T.J. and J. Mclaren (1993), "Taxes and Bribery: The Role of Wage Incentives", *The Economic Journal*, pp. 119-41.

Cebula, R.J. (1997), "An Empirical Analysis of the Impact of Government Tax and Auditing Policies on the Size of the Underground Economy: The Case of the United States 1993-94", *American Journal of Economic Society*, Vol. 56, No. 2, pp. 173-85.

Chong, A. and M. Gradstein (2007), "Inequality and Informality", *Journal of Public Economics*, Vol. 91, pp. 159-79.

de Soto, Hernando (1989), *The Other Path: The Invisible Revolution in the Third World*, June Abbot, translation, New York (NY), Harper and Row.

Feige, E.L. (ed.) (1989), *The Underground Economies. Tax Evasion and Information Distortion*, Cambridge (MA), Cambridge University Press.

Friedman, E., S. Johnson, D. Kaufmann and P. Zoido-Lobaton (1999), "Dodging the Grabbing Hand: The Determinants of Unofficial Activity in 69 Countries", World Bank, Discussion Paper.

Goswami, O., I.N. Garg and A. Sanyal (1991), "Bureaucratic Corruption, Income Tax Enforcement and Collection", mimeo.

Jain, A. (ed.) (1998), *Economics of Corruption*, Boston (MA), Kluwer Academic Publishers.

Johnson, S., D. Kaufmann and A. Schleifer (1997), "The Unofficial Economy in Transition", Brookings Papers on Economic Activity, Vol. 1997, No. 2, pp. 159-239.

Johnson, S., D. Kaufmann and P. Zoido-Lobaton (1998a), "Regulatory Discretion and the Unofficial Economy", *American Economic Review,* Vol. 88, No. 2, pp. 387-92.

——————(1998b), "Corruption, Public Finances and the Unofficial Economy", The World Bank Discussion Paper.

Loayza, N.V. (1996), "The Economics of the Informal Sector: A Simple Model and Empirical Evidence from Latin America", Carnegie-Rochester Conference Series on Public Policy, No. 45, pp. 129-62.

Loayza, N.V., A.M. Oviedo and L. Serven (2005), "The Impact of Regulation on Growth and Informality – Cross-country Evidence", The World Bank, Policy Research, Working Paper.

Marcouiller, D. and L. Young (1995), "The Black Hole of Graft: The Predatory State and the Informal Economy", *American Economic Review*, Vol. 85, No. 3, pp. 630-46.

Mukherji, N. (2004), "Government Policies and Graft in an Economy with Endogenous Labor Supply", *Journal of Development Economics*, Vol. 73, pp. 423-34.

Sarte, P.D. (2000), "Informality and Rent-seeking Bureaucracies in a Model of Long-run Growth", *Journal of Monetary Economics*, No. 46, pp. 173-97.

Schneider, F. and D. Enste (2000), "Shadow Economies: Size, Causes and Consequences", *Journal of Economic Literature*, Vol. 38, No. 1, pp. 77-114, March.

Schneider, F. (2002), "Size and Measurement of the Informal Economy in 110 Countries Around the World", The World Bank, Working Paper, July.

Shleifer, A. and R.W. Vishny (1993), "Corruption", *Quarterly Journal of Economics,* Vol. 108, No. 4, pp. 559-617.

Tanzi, V. (1994), "Corruption, Governmental Activities, and Markets", IMF, Working Paper, No. 99, pp. 1-20.

————— (1998), "Corruption Around the World: Causes, Consequences, Scope, and Cures", IMF, Working Paper, No. 63, pp. 1-39.

Virmani, A. (1989), "Indirect Tax Evasion and Productive Efficiency", *Journal of Public Economics*, No. 39, pp. 223-37.