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Governance and Productivity: Microeconomic Evidence from Ethiopia

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Abstract

We used household survey data from the rural Ethiopia to investigate the importance of governance for agricultural productivity. We argued that the impact of governance is household specific and identified some governance indicators accordingly. Trust in government and government officials, strength of property rights and personal contact with local authorities are identified as governance indicators. A stochastic frontier production function is specified and estimated to capture the effects of governance on productivity or technical efficiency of households. Our results show that improvement in governance could reduce technical inefficiencies significantly and hence could considerably boost productivity.

1 Introduction

The role of governance in explaining cross country economic performances has received considerable attention. In their empirical study, Kaufmann, Kraay and Zoido-Lobaton (1999) showed that there is a casual relationship from better governance to better development outcomes. Khan's (2006) review of the empirical literature also supports the positive role of good governance for economic performance.

One of the common features in the empirical literature is the overlap between the studies on governance and institutions. Most of the governance indicators are also used as an indicator of institutional qualities, though the two concepts are not necessarily the same. Accordingly, the risk of expropriation by the government, government effectiveness, constraints on the government, political stability and freedom from graft are some of the variables used to construct institutional index. Using some variant of these indicators, many studies including Hall and Jones (1999), Rodrik et al (2004), Acemoglu et al (2001, 2002),

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Dollar and Kray (2003), Easterly and Levin (2003) examined the empirical link between institutions and growth.

In the empirical literature, the endogeneity of institutions- whether better institutions cause growth or vice versa- is well recognized and different instruments are proposed. Hall and Jones (1999) instrumented institutions by the extent of Western European influence measured by distance from the equator and the extent to which the primary languages of Western Europe are spoken as first languages today. Acemoglu et al (2001) used mortality rate of colonial settlers to instrument for institutions on the premise that mortality rate determines early institutions which in turn explains current institutions. Rodrik et al (2004) and Easterly and Levin (2003) also followed the same method to instrument for institutions.

The empirical evidences from the above exercise showed that institutions are important determinant of growth. Rodrik et al (2004) reported that integration, geography and trade have either no direct effect or at best weak effects on incomes once institutions are controlled for implying that the measures of property rights and rule of law trumps everything else. Acemoglu et al (2001) also found that distance from the equator and the African dummy to be insignificant after controlling for institutions. Easterly and Levin (2003) reached to a similar conclusion that institutions affect growth significantly. More or less similar results have been reported in Dollar and Kray (2003), Acemoglu and Johnson (2005) and Hall and Jones (1999).

Nevertheless, the empirical results are not without serious scrutiny. Glaeser et al (2004) discussed the validity of the empirical results in detail. First, they noted that the usual measures of the risk of expropriation and government effectiveness rise with the level of economic development. That is, the causality may run from growth to these measures as opposed to the other way round. Second, the measure of constraints on the executives is volatile especially in developing countries implying that it cannot be considered to show durable institutions. Moreover the perception based indicators may be influenced by recent measures of growth, political events, and herd effects and hysteresis (Haque et al 1996, Brewer and Rivoli, 1990, and Soverville and Taffler, 1995 respectively; all cited in Aron, 2000). Third, Glaeser et al (2004) argued that the instrumental variable estimation results, specifically the work of Acemoglu et al (2001) and its derivatives, are flawed. They showed that the results of Acemoglu et al do not establish a role for institutions as the European settlers "may have brought with them not so much their institutions, but themselves, that is, their human capital" Glaeser et al (2004: 274).

Kaufmann, Kraay and Zoido-Lobaton (2006) also noted that the aggregate governance indicators could be blunt tool for policy analysis at a country level as specific aspects of governance may appear to be important in different countries. After reviewing the empirical literature, Pande and Udry (2006: 2) concluded

that "this literature is essentially complete" as the number of available instruments are limited on top of their coarseness that prevents the analysis of how institutions affect growth. They call for micro-data analysis to push the literature further. We, accordingly, follow their suggestion to look into the link between governance and agricultural productivity.

There are some studies that looked at how governance affects productivity at cross-country level (see Meon and Weill, 2005, Jayasuriya and Wodon, 2005, and Lio and Liu, 2004 for instance). However, we are not aware of any study dealing with how governance affects productivity using a micro data at household level. This paper is, thus, an attempt to fill this gap. We argued that even though households are under the same governance structure, the effects of governance can be household specific depending on the transaction cost each households face. Some households may face high transaction costs due to bad governance while others don't. For instance, good contact with the local bureaucrats may cut transaction costs significantly even when the overall governance is bad suggesting that the effect of governance can be household specific. We posit that households' productivity may vary depending on the quality of governance structure they are faced with.

Following Kaufmann, Kraay and Zoido-Lobaton (1999) classification of governance indicators, we develop the rule of law and effectiveness of government indicators at household level. Trust on government, security of property rights, and personal contact with local authorities are used as rule of law indicators while households' perception on the competence of civil servants is used as an indicator for government effectiveness.

The next section discusses the link between governance and productivity. It shows that good governance contributes to higher agricultural productivity through its effect on securing property rights, facilitating labor and credit markets, and promoting government effectiveness. A simple model of how good governance enhances productivity through its effect on the return to effort is also presented. To empirically address this issue, we used a stochastic frontier production function in which we can jointly estimate the frontier production function and determinants of inefficiency. This is contained in section three followed by the description of our data, governance indicators and empirical results in section four. Summary of the results and conclusions are provided in the final section.

The major finding of our paper is 'governance matters for productivity'. Improving in governance can cut inefficiency of farmers' significantly. In general our results suggest that improvement in governance would cut the average level of farmers' inefficiency within the range of 10% to 15%. With good governance, output can be increased significantly without requiring additional input. This underscores the importance of good governance in the process of growth and development.

2 Governance and Productivity

Following Kaufmann, Kraay and Zoido-Lobaton (1999: 1) we define governance as "the traditions and institutions by which authority in a country is exercised. This includes (1) the process by which governments are selected, monitored and replaced, (2) the capacity of the government to effectively formulate and implement sound policies, and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them". For our purpose we considered only the rule of law and government effectiveness measures of governance due to data limitation.

Rule of law refers to "the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence" (Kaufmann, Kraay and Mastruzzi, 2006:4). Maintenance of rule of law protects citizens against theft, government expropriation and repudiation of contracts and secures property rights which in effect cut transaction costs. This would make markets more efficient and promote productivity.

Maintenance of rule of law affects agricultural productivity in many ways. By productivity we are referring to technical (in)efficiency of farmers. Technical inefficiency refers to the failure to achieve a maximum level of output for a given technology and specific amount of inputs. For instance maintaining secure property rights and minimizing the risk of expropriation alone could affect agricultural productivity at least in three ways. First, security of land rights determines the expected return of investment in land. When land rights are insecure, the expected return on the investment in land attenuates. With the slack in investment in land, the productivity of the inputs may decline which in effect leads to a level of output that is below the maximum achievable level. Thus, tenure insecure farmers would tend to produce below what their production frontier allow them exhibiting technical inefficiency. The level of technical inefficiency would increase with the degree of tenure insecurity as the fall in investment would be higher with higher degree of insecurity.

Second, with secure property rights, households' properties can be used as collateral to get access to credit. Access to credit facilitates the optimal use of inputs by relaxing the constraints on investment and hence cut technical inefficiency. Finally, when land rights are insecure and contingent on the physical presence of a farmer in the village, labor mobility would be restricted. As a result farmers may be denied of off-farm income and savings that could have been invested in farm activities. To the extent that investment affects productivity, restriction on labor mobility would shrink the overall productivity of households.

The other aspect of governance is government effectiveness. It refers to "the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and

implementation, and the credibility of the government's commitment t such policies" (Kaufmann, Kraay and Mastruzzi, 2006:4). Better government effectiveness would cut transaction costs by improving the provision of public services. Government effectiveness directly affects transaction costs of agricultural households as they depend on government for the provisions of public goods, agricultural inputs and extension packages. Improvement in government effectiveness will cut transaction costs of acquiring inputs and hence promotes agricultural productivity.

Overall, good governance cuts transaction costs, makes market more efficient and hence promotes agricultural productivity. Below, we layout a simple framework to characterize the link between productivity and governance.

A Simple Model

Households produce output (y) with a given amount of labor (l), capital (k) and technology (A). For a given level of labor and capital, output among households varies depending on household specific characteristics (π_i) such as human capital, and effort (e_i). That is,

$$y_i|_{l,k,A} = \begin{Bmatrix} y_i^p \ with\ probability\ \pi_i + \theta e_i \\ y_i^L \ with\ probability\ 1 - (\pi_i + \theta e_i) \end{Bmatrix} \tag{1}$$

where $y_i^p$and $y_i^L$are frontier and below frontier levels of output of household i, respectively. θ is the reward for household's level of effort.

The expected level of output of household i is given as

$$E(y_i) = (\pi_i + \theta e_i)(y_i^p - y_i^L) + y_i^L \tag{2}$$

We define technical inefficiency of a household as the deviation between the potential and actual levels of output of the household-i.e. $(y_i^p - y_i^L)$.

$$(y_i^p - y_i^L) = \frac{E(y_i) - y_i^L}{(\pi_i + \theta e_i)} \tag{3}$$

For $E(y_i) - y_i^L > 0$, technical inefficiency is a declining function of $\pi_i, \theta,\ and\ e_i$.

The returns to households' levels of effort (θ) and effort itself (e) depend on the governance structure. Good governance that secures property rights, maintains rule of laws and promotes government's effectiveness signals a higher reward to effort. Thus, with good governance, we expect that both effort and the return to effort would increase which in effect cut inefficiency.

For our empirical analysis, we used stochastic output distance function to measure farmers' productive inefficiency -i.e. how far farmers are from their frontier. And we examined to what extent governance explain the observed technical inefficiencies.

3 Empirical Framework: Distance function approach

We used output distance function to model multi-output production technology. The distance function is proposed by Shephard (1953, 1970) and used, among others, by O'Donnell and Coelli (2005) and Brummer, Glauben and Lu (2006) to characterize multi-output production technology. The output distance function represents the maximum vector of outputs,$Y = (Y_1...Y_j)$, that can be produced for given vector of inputs,$X = (X_1...X_j)$, and technology. For the output set,$P(X)$, the output distance function is defined as

$$D_0(X,Y) = \min\{\alpha : \alpha > 0, (X, Y/\alpha) \in P(X)\} \tag{1}$$

where α is the scalar distance by which the output vector can be deflated. The output distance function is non-decreasing, positively linearly homogenous and convex in Y, and decreasing in X. If Y is an element of the feasible production set, $P(X)$, $D_0(X,Y) \leq 1$; and $D_0(X,Y) = 1$ if Y is located on the production frontier (O'Donnell and Coelli, 2005).

A Cobb-Douglas output distance function defined over M inputs and J outputs can be written as

$$\ln D = \beta_0 + \sum_m \beta_m \ln X_m + \sum_j \gamma_j \ln Y_j \tag{2}$$

For the case of two output ($j = 2$) , M inputs, and imposing the linear homogeneity in outputs ($\sum_j \gamma_j = 1$), equation [2] can be rearranged as

$$-\ln Y_2 = \beta_0 + \sum_m \beta_m \ln X_m + \gamma_1 \ln(\frac{Y_{1i}}{Y_{2i}}) - \ln D \tag{3}$$

This can be generalized for j number of outputs by dividing the distance measure and the $j-1$ outputs by the $j-th$ output variable. That is,

$$\ln(D/Y_j) = \beta_0 + \sum_m \beta_m \ln X_m + \sum_{j=1}^{j-1} \gamma_j \ln(Y_{j-1}/Y_j) \tag{4}$$

Equation [4] can be written as

$$-\ln Y_j = \beta_0 + \sum_m \beta_m \ln X_m + \sum_{j=1}^{j-1} \gamma_j \ln(Y_{j-1}/Y_j) + u \tag{5}$$

where $u = -\ln D$ is a non-negative term that captures the inefficiency effect. As the distance from the frontier can be either due to inefficiency or noise, we followed the stochastic frontier approach proposed by Aigner, Lovell and Schmidt (1977) and introduced a symmetric error term, v, to capture the noise. Accordingly, the stochastic frontier and the inefficiency equations are given as

$$-\ln Y_j = \beta_0 + \sum_m \beta_m \ln X_m + \sum_{j=1}^{j-1} \gamma_j \ln(Y_{j-1}/Y_j) + u + v \tag{6}$$

and following Battesse and Coelli (1995) we assumed truncated normal distribution for $u_i = |U_i|$ *where* $U_i \tilde{} N\left[\mu, \sigma_u^2\right]$and the inefficiency equation is given as

$$\mu_i = \sum_g \delta_g Z_g \tag{7}$$

where $\mu_i = E(\exp(u_i/\varepsilon_i))$ *and* $\varepsilon_i = v_i + u_i$, Z_g are the determinants of technical inefficiency that include indicators of governance and household characteristics, δ_g and are the marginal effect of determinant Z_g.

Technical efficiency in production of household i is given by $TE_i = E\left[\exp\left(-u_i\right)/\varepsilon_i\right]$.

Estimating [6] and [7] individually leads to biased results. As a result the maximum likelihood method is used to estimate the stochastic production frontier and the inefficiency effects simultaneously.

In practice, one problem with the estimation of the output distance function is in relation to how to handle multiple outputs. For instance, consider the case of four crop output production. And farmers produce different crops with different combination but all farmers may not produce all the four crops. Assume that 50%, 35%, 30% and 45% of farmers produce crop 1, 2, 3 and 4, respectively. Also 35%, 15% and 10% of the farmers produce crop 1 and 2, crop 2 and 3, and crop 3 and 4, respectively. If we normalize the distance function with output of crop 1, the distance function can be written as

$$-\ln Y_j = \beta_0 + \sum_m \beta_m \ln X_m + \gamma_1 \ln(Y_2/Y_1) + \gamma_2 \ln(Y_3/Y_1) + \gamma_3 \ln(Y_4/Y_1) + u + v \tag{8}$$

We cannot estimate the distance function in [8] with our assumed production structure as there is no observation that enable us to estimate [8] given that the farmers produce either one or two output with different combination. However, we can estimate [8] for the case of two outputs, say crop 1 and 2. In this case we will lose 65% of our observation since only 35% of farmers produce crop 1 and 2. Due to this problem, we resort to the estimation of the frontier production function with aggregated output. Accordingly our estimable frontier production function is given as [9]

$$\ln Y_i = \beta_0 + \sum_m \beta_m \ln X_m + u_i + v_i \tag{9}$$

where Y_i is household $i's$ total value of output divided by a Laspeyres price index[1]. The inefficiency equation remain unchanged as given in [7] above.

4 Data, Governance Indicators and Empirical Results

4.1 Data

The data come from the sixth round of the Ethiopian Rural Household Survey conducted in 2004. The total sample contains 1372 households in 17 peasant associations in 15 districts (Woreda). Following Croppenstedt and Muller (2000) we only considered cereal producing farmers with ox-plow technology to focus on a specific technology. This leaves us with 937 households to be considered in our analysis. The descriptive statistics are provided in Tables 1 and 2.

The overall picture shows the scarcity of land (1.86 hectare per household), the low level of household's head education (2.5 years), the rain-fed nature of the agricultural activities (with only 27% of households have irrigated land) and scarcity of farm animal with an average holding of 1.1 oxen per household.

The governance indicators (described below) show that the mean levels of trust on government, government officials and Kebele officials range from 4.31 to 4.68 with the scale of 1 to 7. Disaggregating the trust measurements into the different categories, Table 2 shows that about a quarter of the households are skeptical about the fact that the government maximizes social welfare in the form of 'doing what is right for the people'. The combined proportions of households who do not trust and who neither trust nor distrust government and Kebele (Local authority) officials are 42.3% and 47.3%, respectively. This implies that about half of the households either do not trust or have quite low levels of trust in the government and Kebele officials.

4.2 Governance indicators[2]

Rule of law
Trust on government, security of property rights, and personal contact with local authorities are used as rule of law indicators.

Trust on government: Bates (2005:xix) argues that "for institutions to strengthen incentives, private agents must recognize and believe that it is in the interest

[1] The price index is obtained by taking a weighted average of the price faced by each household; the weights are the respective proportions of the crops in total value of output (see Croppenstedt and Muller, 2000).

[2] Our classification of the governance indicators into rule of laws and government effectiveness may not be sharp.

of those with power to employ that power in ways that safeguard, rather than despoil, the creation of wealth." Following Bates we used trust on government as an indicator for the overall maintenance of rule of law. Trust on government may also show predictability of government's future action. Positive outlook of the government's future action may promote effort and hence productivity.

Our survey asks households whether they believe that the government does what is right for the people or not. We posit that individual's trust on government depends on how best the governance structure serves them. Accordingly levels of trust on government can be used as indices for the quality of governance-i.e. the higher the levels of trust the better the quality of governance and vice versa.

Protection of Property rights: we used the perceived risk of expropriation as an indicator for the strength of property rights. Our survey asks households about their expected land holding status in five years time. Some households perceive that they will be facing a risk of expropriation in five years time while the others are uncertain or expect either there will be an increase or no change in their land holding.

Contact with local officials: Gwartney and Lawson (2006:1) argued that "Without rule of law, the benefits from trade will be limited to those derived from personalized exchange, trade among family members and persons in the local neighborhood or village who know each other or at least know about each other. Here, trade is based on personal knowledge, and contract enforcement is achieved through family ties and social pressures." In cases where the rule of law is maintained, we expect personal contact with local officials or authorities to have no or little impact. Otherwise, personal contacts will be important for contact enforcement and access to public services.

In the case of Ethiopia, some anecdotal evidences suggest the importance of personal contact with the local authorities (Kebele). For instance according to Human Rights Watch (2005: 28-29) report "... people who had good relations with Kebele officials were allowed to carry massive amounts of fertilizer debt from year to year while for others repayment obligations were strictly enforced." The households are labeled to have a 'good' contact with the local bureaucracy if: i. the household head's parents are Kebele officials; ii. the household head is a Kebele official; iii. the household head has close associate in his Keble.

In terms of access to credit supplied by the public institutions such as cooperatives, local organizations and government sources, good relationship with Kebele officials may lead to better access. The descriptive statistics in Table 3 reveal that around 23.4% of Kebele officials secured loan from government sources including Kebele while 15.4% of the rest of households access government credit. On average, it appears that Kebele officials have better access to credit from government. Similarly, the proportion of households with either of the parents working as Kebele official and obtained government loan is also higher by around

5.5 percentages points as compared to the rest of the households. The overall picture shows that access to credit is an increasing function of political power and personal connection with government officials. The patter of fertilizer use is also similar with this. Chemical fertilizer use is uniformly high among farmers who have political power or personal connection with local officials.

Government Effectiveness

Following Kaufmann, Kraay and Mastruzzi (2006) measure of government effectiveness by the quality of the civil service, among other indicators, we used households' perception on the competence of civil servants as an indicator for government effectiveness. In rural Ethiopia, the government is the major supplier of fertilizer, extension packages and credit. These goods and services are distributed to the rural farmers through government's local bureaucracy. The local bureaucracy is also in charge of land allocation, dispute settlement and organization of voluntary labor contribution. Thus, the effectiveness of civil servants and local officials is an important element for the efficient distribution of government provided goods and services, land allocation and settlement of disputes.

4.3 Empirical Results

Table 4 presents the results from the maximum likelihood estimation of the stochastic production frontier [9] and [7]. Table 5 presents tests on whether the stochastic production frontier model with inefficiency component is a valid specification or not. The tests reject the null hypothesis that the deviation from the frontier are only due to random noise in support of the existence of inefficiency effects.

The result shows that land, labor and land fertility are the important variables in explaining output. Both the site and regional dummies are also significant suggesting different levels of frontier for each locality considered. The returns to scale, considering only land and labor, range from 0.43 to 0.45 suggesting for the decreasing returns to scale. This result is comparable with the ones reported by Weir and Knight (2000) and Croppenstedt and Muller (2000) ranging from 0.56 to 0.67. The average level of efficiency ranges from 55% to 57% depending on the specification.

The stochastic production function is estimated by introducing the different governance indicators discussed above in the inefficiency equation. The governance indicators are introduced in the inefficiency equation separately and in combination with each other. The second column of Table 4, Model 1, shows that trust on government matters in explaining inefficiency. The coefficient on the trust on government is negative and significant suggesting that households

who trust the government are less inefficient by around 10%. That is, by improving the governance structure, mean efficiency could increase from 56% to around 62%.

Strength in property rights has also a similar impact on inefficiency. The third column of Table 4, Model 2, shows that households who perceive that their land would be expropriated in five years time exhibit a higher level of inefficiency, though its coefficient is statistically insignificant. Being a member of local authority and trust on the competence of government officials have similar effects with a magnitude of 15% and 13% reduction in efficiency, respectively. The result on the impact of being a member of local authority is consistent with the findings of Goldstein and Udry (2005) in the case of Ghana. They found that farmers who lack local political power under-invest and hence produce lower level of output due to the uncertainty of their land tenure status.

The result on the effect of being a member of local authority (Kebele) may cast some doubt if it is the case that highly productive households are elected into the local authority. In this case the observed correlation cannot be attributed to the quality of governance. To check for this effect another variable-"relationship with Kebele officials"- is introduced in Model 8. The result is similar to the previous one though the coefficient is lower.

We introduced the governance indicators in combination of each other from column 6 to 9 of Table 4. The coefficients of trust in government and membership of local authority remain significant and negative. When trust in government and trust in the competence of government officials are combined together as in column 9, trust in government becomes insignificant and its effect on inefficiency drops to around 2% as opposed to 10% when it is introduced alone. The coefficient on trust in the competence of government officials remains negative and significant. This may be due to the high correlation between trust in government and trust in government officials.

Capital market failures in the form of constraining the farmers to get the required farm capital, oxen, on time could increase the mean inefficiency by around 29%. We found education to be a significant variable in cutting inefficiency. The result shows that a one more year of schooling could cut inefficiency by about 3%. Lack of access to credit is, however, found to be insignificant.

Our empirical result can be extended to illuminate on the dynamic effects of governance. Governance at time $t-1$ determines the economic outcomes at time $t-1$ and ahead. Consider individual who is negatively affected by the governance structure at time $t-1$ and hence impoverished. At time t, the individual may not have enough resources to invest in her land which will make her less efficient. That is, bad governance in the past may affect outcomes at present and future periods. We included poverty status indicators in our inefficiency model to capture this effect though we recognize that bad governance in the past is not

the only cause of poverty. In all of the specifications, our results show that poor households are less efficient than the non-poor, their difference in inefficiency being around 27%.

An interesting aspect of this result is that improvement in governance that promotes productive efficiency would benefit the poor significantly. We simulated a 20% increase in technical efficiency to investigate its impact on poverty. Assuming marginal propensity to consume out of income $MPC = 0.8$, a 20% increase in technical efficiency implies a 20% increase in output which is translated into a 16% increase in consumption. This exercise shows that the head count food poverty rate falls by 6 percentage points from 25% to 19%. This may show the pro-poor nature of governance improvement.

5 Summary and Conclusion

We approached the issues of how governance affects economic performance from a microeconomic perspective. There is an extensive part of the literature that deals with governance and economic performance using cross country evidences. Though the conclusion that governance matters is not quite controversial, the accuracy of the governance indices are scrutinized. Even after so many adjustment and fine tuning of the indices, the discontent continued.

To address these issues partially, we used household survey data to examine how governance affect households' productivity measured by their technical efficiency. Our main argument to handle this issue is that 'the effect of governance is household specific'. That is, even though the households are under the same governance structure, the effects of governance can be household specific depending on the transaction cost each households face. Some households may face high transaction costs due to bad governance while others don't for various reasons. For instance, good contact with the local bureaucrats (social network) may cut transaction costs significantly even when the overall governance is bad.

Following the cross country classification of governance indicators, we develop the rule of law and effectiveness of government indicators at household level. Trust on government, strength of property rights, and personal contact with local authorities are used as rule of law indicators while households' perception on the competence of civil servants is used as an indicator for government effectiveness.

The main advantage of our approach is the identification of governance indicators that affect farmers' productivity directly. To the extent that our indicators are correct, our approach would identify the governance indicators that are really important for households' efficiency in production.

Our empirical results show that governance matter for the productive efficiency of households. We found trust in government to be an important variable in explaining households' inefficiency. Those households with higher levels of trust in government exhibited higher levels of technical efficiency. We interpreted this result in light of the use of 'trust in government' variable. We argued that individuals trust the government when they are faced with a governance structure that reduces their transaction costs by maintaining rule of law. In this context good governance that maintain rule of law and minimize transaction costs would boost technical efficiency of households. In addition, when households believe that it is in the interest of the government to employ its power in ways that maximize the welfare of the society, they will have an incentive to exert more effort on their economic activities which imply higher levels of productive efficiency.

Security of property rights is also found to increase productive efficiency though its impact is insignificant. Secure property rights stimulate investment in land by increasing the expected return on investment. To the extent that investment in land contribute for productivity, secure property rights will cut inefficiency by promoting investment. However, tenure insecure farmers may involve in investments in land that have quick returns such as chemical fertilizer. In such a case and given our cross sectional data, differences in levels of efficiency due to insecurity may not be observed. The low level of significance of our tenure insecurity variable may be viewed in this way.

Without rule of law, economic exchange would be based on personal knowledge, and contract enforcement is achieved through family ties and social networks. When rule of law is maintained, the laws rather than personal relationships would determine the economic outcomes. Accordingly, when the rule of law is violated, contact with local authorities would be an important factor in facilitating production and exchange. Our results support this claim. Households with good relationship with the local authorities are found to be more efficient than the rest of the households. This result can be interpreted in the sense that violation of rule of law increases transaction costs but they can be reduced through good contact with the local authorities. However, transaction costs can be reduced through good contact with the local authorities. Hence, households with good contact would face lower transaction costs which would make them more efficient than the rest of the society.

Effectiveness of government, measured by households' perception on the quality of the civil service, is also an important determinant of households' productivity. In rural Ethiopia, the government is the major supplier of fertilizer, extension packages and credit. These goods and services are distributed to the rural farmers through government's local bureaucracy. The local bureaucracy is also in charge of land allocation, dispute settlement and organization of voluntary labor contribution. Our results show that effectiveness of civil servants is an important factor in enhancing households' productive efficiency.

In general our results suggest that improvement in governance would cut the average level of farmers' inefficiency within the range of 10% to 15%. With good governance, output can be increased significantly without requiring additional input. This underscores the importance of good governance in the process of growth and development.

In a nutshell, good governance that maintain rule of laws, secure property rights and high effectiveness of government have paramount importance in reducing inefficiency and poverty. Governance that enables individuals to operate fully under the constraints of effective laws that secure property rights and reduce transaction costs is necessary to achieve higher levels of output.

The main policy implication of our result is that promoting good governance should be taken as a major agenda to achieve higher levels of output and also reduce poverty. Maintaining rule of laws that diminishes the importance of contact with local authorities and also cuts transaction costs, and improving the competence of civil servants should be put at the forefront of reforming the governance structure. The synergic impacts of improving the competence of civil servants for the maintenance of rule of laws should also be examined.

Notwithstanding the importance of good governance, its realization is not apparent. The political economy of reforming governance structure follows a complicated path as it involves numerous interest groups with conflicting objectives. There are some generic studies that looked into this issue (see Acemoglu and Robinson, 2001 for instance). However, understanding the political economy of reform in governance with reference to a specific country could be one future area of research to enrich our knowledge on how good governance could be achieved.

Reference:

Acemoglu, Daron and Robinson, James A. "A Theory of Political Transition." *American Economic Review*, 2001, *91*(4), pp. 938-63.

Acemoglu, Daron; Johnson, Simon and Robinson, James A. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review*, 2001, *91*(December), pp. 1369- 401.

Acemoglu, Daron; Johnson, Simon; Robinson, James A. and Thaicharoen, Yunyong. "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution." *Quarterly Journal of Economics*, 2002, *117*(November), pp. 1231-94.

Aigner, D. J.; Lovell, C.A.K. and P., Schmidt. "Forumulation and Estimation of Stochastic Frontier Production Function Models." *Journal of Econometrics*, 1977, *6*(1), pp. 21-37.

Aron, Janine. "Growth and Institutions: A Review of the Evidence." *The World Bank Research Observer*, 2000, *15*(1), pp. 99-135.

Battese, G.E. and Coelli, Timothy J. "A Model for Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel Data." *Empirical Economics*, 1995, *20*, pp. 325-32.

Brummer, B.; Glauben, T. and Lu, W. "Policy Reform and Productivity Change in Chinese Agriculture: A Distance Function Approach." *Journal of Development Economics*, 2006, *81*(61-79).

Croppenstedt, Andre and Muller, Christophe. "The Impact of Farmers' Health and Nutritional Status on Their Productivity and Efficiency: Evidence from Ethiopia." *Economic Development and Cultural Change*, 2000, *48*(3), pp. 475-502.

Dollar, David and Kraay, Aart. "Institutions, Trade, and Growth." *Journal of Monetary Economics*, 2003, *50*, pp. 133-62.

Easterly, William and Levine, Ross. "Tropics, Germs, and Crops: How Endowments Influence Economic Development." *Journal of Monetary Economics*, 2003, *50*, pp. 3-39.

European Union Election Observation Mission. "Ethiopia Legislative Elections 2005: Final Report," European Union, 2006.

FreedomHouse. "Freedom in the World 2006: Selected Data from Freedom House's Annual Global Survey of Political Rights and Civil Liberties," Freedom House, 2006.

Glaeser, Edward L.; La Porta, Rafael; Lopez-de-Silanes and Shleifer, Andrei. "Do Institutions Cause Growth?" *Journal of Economic Growth*, 2004, *9*, pp. 271-303.

Goldstein, Markus and Udry, Christopher. "The Profits of Power: Land Rights and Agricultural Investment in Ghana." *http://www.econ.yale.edu/~cru2/pdf/goldsteinudry.pdf.*, 2005.

Gwartney, James and Lawson, Roberty. "The Path to Development: When Does the Legal Environment Become Critical?" *Cato Institute Economic Development Bulletin*, 2006, *7 (April)*.

Hall, Robert E. and Jones, Charles I. "Why Do Some Countries Produce So Much More Output Per Worker Than Others?" *Quarterly Journal of Economics*, 1999, (February), pp. 83-116.

Human Rights Watch. "Suppressing Dissent: Human Rights Abuses and Political Repression in Ethiopia's Oromia Region," 2005.

Jayasuriya, Ruwan and Wodon, Quentin. "Measuring and Explaining the Impact of Productive Efficiency on Economic Development." *The World Bank Economic Review*, 2005, *19*(1), pp. 121-40.

Kaufmann, Daniel; Kraay, Aart and Mastruzzi, Massimo. "Governance Matters V: Aggregate and Individual Governance Indicators for 1996 - 2005," W. Bank, Washington, D.C.: World Bank, 2006.

Kaufmann, Daniel; Kraay, Aart and Zoido-Lobaton, Pablo. "Governance Matters." *World Bank Policy Research Working Paper*, 1999, *2196*.

Khan, Mushtaq H. "Governance, Economic Growth and Development since the 1960s," Background paper for World Economic and Social Survey 2006, 2006.

Lio, Monchi and Liu, Meng-chun. "Governance and Agricultural Productivity: A Cross-National Analysis," www.econ.ntu.edu.tw/sem-paper/2004/hist040401.pdf, 2004.

Meon, Pierre-Guillaume and Weill, Laurent. "Does Better Governance Foster Efficiency? An Aggregate Frontier Analysis." *Economics of Governance*, 2005, *6*, pp. 75-90.

O'Donnell, Christopher J. and Coelli, Timothy J. "A Bayesian Approach to Imposing Curvature on Distance Functions." *Journal of Econometrics*, 2005, *126*, pp. 493-523.

Pande, Rohini and Udry, Christopher. "Institutions and Development: A View from Below." *Yale University Economic Growth Center Discussion Paper*, 2005, *928*.

Pausewang, Siegfried. "Local Democracy and Human Security in Ethiopia: Structural Reasons for the Failure of Democratisation," The South African Institute of International Affairs, 2005.

Rodrik, Dani. "Institutions for High Quality Growth: What They Are and How to Acquire Them," *Paper prepared for IMF Conference on Second Generation Reforms*. 1999.

Rodrik, Dani; Subramanian, Arvind and Trebbi, Francesco. "Institutions Rule: The Primacy of Instittutions over Geography and Integration in Economic Development." *Journal of Economic Growth*, 2004, *9*, pp. 131-65.

Shephards, R.W. *Cost and Production Functions*. Princeton, NJ: Princeton University Press, 1953.

____. *Theory of Cost and Production Functions*. Princeton, NJ: Princeton University Press, 1970.

Weir, Sharada and Knight, John. "Education Externalities in Rural Ethiopia: Evidence from Average and Stochastic Frontier Production Functions." *The Center for the Study of African Economies Working Paper Series*, 2000, *114*.

Appendix
Table 1: Descriptive Statistics

Variables	Mean	Standard Deviation	Range
Value of output	1006.5	988.8	104.4 - 10239
Land size (in hectare)	1.86	1.50	0.125- 21
Household size	4.83	2.30	1- 15
Working age household members	2.86	1.47	1 -11
Number of oxen owned	1.10	1.08	0 - 9
Access to credit (dummy 1=yes; 0=no)	0.76	0.43	0 -1
Household head education	1.33	2.49	0 - 14
Age	50.3	15.05	18 – 99
Sex of the household head (dummy 1= male; 0=female)	0.74	0.44	0 -1
Irrigated land (dummy 1= yes; 0=no)	0.27	0.44	0 -1
Land Fertility	1.65	0.75	1 - 3
GOVERNANCE INDICATORS			
Trust on Government	4.68	1.58	1 - 7
Trust on Government Officials	4.49	1.63	1 - 7
Trust on Kebele Officials	4.31	1.67	1 - 7
Kebele membership of the household head (dummy 1= yes; 0=no)	0.23	0.42	0 -1
Trust on government at village level	4.7	0.43	3.7 - 5.3
Trust on government officials at village level	4.5	0.44	3.5 - 5.2
Trust in kebele officials at village level	4.3	0.41	3.3 - 5.0
Perceived transfer rights (dummy 1= yes; 0=no)	0.76	0.43	0 -1

Table 2: Trust

Percentage of Households:	Trust on Government	Trust on Government officials	Trust on Kebele Officials
Strongly disagree	2.9	4.7	5.5
Disagree	14.4	15.6	18.2
Slightly disagree	7.5	9.7	12.0
Neither agree nor disagree	10.2	12.2	11.5
Slightly agree	25.4	23.4	23.4
Agree	34.7	30.4	26.0
Strongly agree	5.0	3.9	3.4

Table 3: Source of Credit and Fertilizer Use

	Kebele Member		Kebele Relationship		Parents are Kebele officials	
Source of Loan (in%)	Yes	No	Yes	No	Yes	No
Cooperatives	12.3	6.0	10.6	5.0	8.3	7.1
Local organizations	7.8	3.4	4.3	4.3	5.0	4.2
Bank	1.9	0.7	0.7	1.1	0.8	1.0
Government	23.4	15.4	18.2	16.2	21.7	16.2
Microcredit	13.6	11.6	11.6	12.4	14.2	11.5
Fertilizer Use per Hectare of Land (in KG)	14.4	10	12.4	9.9	12.9	10.4

Table 4: Maximum Likelihood Estimation of Stochastic Frontier Production Function

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Production Frontier Model								
Log(Labor)	0.073	0.073	0.083	0.078	0.072	0.066	0.068	0.073
	(0.06)*	(0.06)*	(0.03)**	(0.05)**	(0.06)*	(0.09)*	(0.08)*	(0.06)*
Log (Land Area)	0.376	0.377	0.37	0.366	0.364	0.364	0.372	0.363
	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***
Land Fertilitu	0.029	0.029	0.03	0.029	0.028	0.027	0.027	0.027
	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.01)***	(0.01)***	(0.01)***
Sex	0.089	0.09	0.091	0.072	0.072	0.072	0.088	0.072
	-0.146	-0.147	-0.14	-0.247	-0.243	-0.241	-0.154	-0.246
Age	-0.003	-0.002	-0.003	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.090)*	-0.151	(0.056)*	-0.239	-0.178	-0.215	-0.126	-0.181
Constant	7.401	7.395	7.383	7.419	7.421	7.415	7.41	7.403
	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***
Inefficiency Model								
Trust on Government	-0.096				-0.102	-0.108	-0.099	-0.02
	(0.044)**				(0.031)**	(0.023)**	(0.037)**	-0.751
Tenure Insecurity		0.064				0.066	0.062	0.066
		-0.16				-0.143	-0.17	-0.146
Trust on Government Officials			-0.129					-0.129
			(0.005)***					(0.037)**
Kebele Membership of Household Head				-0.146	-0.152	-0.157		-0.16
				(0.011)**	(0.008)***	(0.006)***		(0.006)***
Household s head relation with Kebele							-0.083	
							(0.075)*	
Access to Credit	-0.017	-0.017	-0.022	-0.019	-0.018	-0.016	-0.02	-0.019
	-0.741	-0.747	-0.677	-0.715	-0.731	-0.76	-0.704	-0.711
Capital market failure	0.293	0.297	0.293	0.292	0.286	0.282	0.29	0.284
	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***
Poor household	0.266	0.27	0.265	0.27	0.267	0.269	0.264	0.264
	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***
Education of Household head	-0.029	-0.028	-0.027	-0.022	-0.024	-0.026	-0.028	-0.025
	(0.01)***	(0.01)***	(0.01)***	(0.03)**	(0.02)**	(0.01)**	(0.01)***	(0.02)**
Constant	1.32	1.214	1.318	1.307	1.372	1.327	1.321	1.34
	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***
Log (σ^2)	-0.859	-0.848	-0.859	-0.855	-0.872	-0.879	-0.872	-0.882
	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.00)***
γ	0.884***	0.876***	0.879***	0.887***	0.881***	0.867***	0.872***	0.862***
Mean Efficiency	0.56	0.55	0.57	0.55	0.58	0.57	0.57	0.58
Observations	943	947	945	953	943	937	937	935

p values in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: Regional dummies are included in all the estimation. The inefficiency term is assumed to be distributed as truncated normal.

Table 5: Testing for Inefficiency Effect

Null Hypothesis $H_0 : \sigma_u = 0$

	Log (Likelihood)	$\chi^2(1)$ value	$\Pr ob > \chi^2$
Model 1	**-942.80**	**11.49**	**0.000*** **
Model 2	**-948.88**	**12.29**	**0.000*** **
Model 3	**-944.62**	**11.35**	**0.000*** **
Model 4	**-957.99**	**11.56**	**0.000*** **
Model 5	**-944.78**	**11.00**	**0.000*** **
Model 6	**-937.53**	**11.21**	**0.000*** **
Model 7	**-936.06**	**11.62**	**0.000*** **
Model 8	**-935.76**	**11.00**	**0.000*** **